AN OBSERVATION OF THE RELATIONSHIP BETWEEN GOLD PRICES AND SELECTED FINANCIAL VARIABLES IN TURKEY

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ABSTRACT

The importance of gold as a precious metal has been increasing as a result of the recent crisis in financial markets. Consequently, the effects of gold trading and gold prices have considerably influenced the flow of funds in the financial system. In this context, the function of gold has been highlighted among alternative assets because of its value and credibility. This article observes the relationship between gold prices and selected financial indicators in Turkey from January 2002 to December 2011 with a regression model. The results demonstrate that there is a positive relationship between national gold prices, Istanbul Stock Exchange 100 Index and the exchange rate between Turkish Lira and the Dollar.

Keywords: Gold prices, exchange rates, stock prices, commodities, inflation

JEL Classification: G11, O16.

Türkiye'de Altın Fiyatları ve Seçilmiş Finansal Değişkenler Arasındaki İlişki Üzerine Bir İnceleme

ÖZET

Altın, son dönemde finansal piyasalarda oluşan krizle beraber önemini artıran bir kıymetli maden olarak ön plana çıkmıştır. Bu sebeple, altın piyasalarında oluşan fiyat hareketleri ve altın ticareti finansal sistemdeki fon akışı üzerindeki etkisini artırmıştır. Hanehalkının bir tasarruf aracı olarak kullandığı altın, güvenilirliği ve değerliliği nedenleriyle alternatif yatırım araçları arasındaki yerini sağlamlaştırmıştır. Bu çalışmada, Türkiye'de altın fiyatları ile seçilmiş finansal göstergeler arasındaki ilişki Ocak 2002-Aralık 2011 dönemi için incelenerek altın fiyatlarının bu değişkenlerden nasıl etkilendiği belirlenmeye çalışılmıştır. Elde edilen sonuçlar ulusal para cinsinden altın fiyatlarının Türk Lirası/Amerikan Doları döviz kurundan ve IMKB 100 endeksinden pozitif etkilendiğini göstermektedir.

Anahtar kelimeler: Altın fiyatları, döviz kuru, enflasyon, hisse senedi fiyatları, emtialar

JEL Sınıflaması: G11, O16.

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1. INTRODUCTION

The recent crisis in financial markets has considerably affected asset prices. In this context, investors of securities and derivative instruments have had big losses. As a result, they shifted from risky instruments to less risky instruments with the aim of minimizing their potential losses. Commodities are among these instruments which could protect investors from particular risks. Especially, precious metals such as gold and silver are preferred by savers because of their special features related to value and reliability. Therefore, these metals have become the main focus of research in the field of finance.

Since gold is superior to other metals and traded more frequently in the financial system, its price and relationship with various financial variables are often monitored by economic units. The current changes in gold prices and exchange rates in developed and developing countries, the use of gold instead of other securities in investments and the choice of gold in using savings in some countries support this trend. As a consequence, many countries develop their economic policies by considering the fluctuations in gold prices.

The aim of this article is to demonstrate the relationship between gold prices, exchange rates and stock market index in Turkey from January 2002 to December 2011. In the first section, recent developments in commodity markets and the features of gold markets are explained. The second part includes the literature review on gold markets and the relationship of gold prices with various financial variables. The following part illustrates the data analysis concerning the relationship between gold prices, exchange rates and stock market index. The factors, which affect gold prices are analysed by the regression model described in this section. Finally, the findings of the article will be summarized.

2. RECENT DEVELOPMENTS IN COMMODITY MARKETS

Before analysing gold markets, it is essential to observe commodity markets in which gold trades as a precious metal. In current years, there have been progressive changes and extra ordinary activities in prices in commodity markets. Furthermore, financial investments have been intensifying in commodity derivative markets (European Commission, 2011:2). After 2002, commodity prices and derivatives market transactions have shown a similar trend. In this context, commodity prices rose and there was a significant expansion in exchange traded commodity derivatives contracts. By the mid 2006, 1.7 percent of total over the counter derivatives transactions consisted of commodities (Domanski and Heath, 2007: 53).

The prices of main commodities, which demonstrated a steep rise from 2007 to 2008, were energy, metals and minerals, agriculture and food. However, there was a fall in their prices in the second half of 2008 (European Commission, 2011:2). The changes in commodity prices are also reflected by the commodity indices. Table 1 shows the commodity indices in the 2007-2010 periods with respect to US Dollar. According to the data, all commodity prices decreased in 2009. Nevertheless, they started to rise in 2010, which was regarded as an

indicator of a boost in demand (Langumier, 2009: 14,15).

Table 1: The Changes in Selected Commodity Prices in US Dollars (2007-2010)*

	2007	**2008**	**2009**	**2010**
All commodities	237	316	207	249
Total excl.energy	209	236	181	203
Food Total	174	233	201	202
Industrial Raw Materials	225	237	173	204
Energy Raw Materials	250	354	219	271

*Value of Index: 2000=100

Source: (Langumier, 2009: 15)

In general, emerging countries are heavily influenced by the increase in commodity prices because of the amount of food and commodity products, which are the main components of their economies (International Monetary Fund, 2011: 39). Among commodities, the significance of precious metals is increasing due to their characteristics mentioned in the introduction part. (Jorion, 2007:228) emphasizes that precious metals are included in the Goldman Sachs Commodity Index which represents their significance in the estimation of the performance of commodity prices. The following section describes the market for gold, which is the key precious metal trading in the financial system.

## 3. THE FEATURES OF GOLD MARKETS

Gold is a kind of precious reliable metal which could maintain its value and be used in transactions (Baur and Mc Dermott, 2010: 1887). In addition, (Jorion,2007:228,229) points out that it could be the subject of commodity contracts which serve the purpose of hedging in financial markets. (Whaley, 2006:758,760) notes that there is a great deal of derivatives contracts related to gold, which trade on organized exchanges and underlines the significance of gold in the over-the-counter market. (Baur and Mc Dermott, 2010: 1887) also argue that it is a kind of reserve asset which helps to maintain the value of currencies in the world. Nevertheless, (Buckley, 2005:22) has drawn attention to the fact that there are some disadvantages related to the reserve asset function of gold. These are the loss arising from its cost of production, the irrelevancy of its production with the development of the world economy and the mismatch between the supply of gold and the global requirement for additional liquidity.

Gold is substantially requested by developing nations. In this context, it is observed that twenty per cent of World demand belongs to India and Pakistan. While, the Middle East, Turkey, Greater China and further developing nations in South East Asia comprise fifteen to twenty per cent in the gold market (Starr and Tran, 2008: 416). Gold markets can be defined as the location where gold supply and demand meets (Mishkin,2010:20). Gold supply is created by mining facilities, recycling and the sale of gold by central banks and investors. In

contrast, dental fillings, industrial use, central banks, investors and customers who purchase gold are the main sources of gold demand (Aggarwal and Lucey, 2007:218). (Mishra et al, 2010:48) underline the main reasons for gold demand in India. They note that it is considered as a secure investment because of the demand by central banks. Moreover, it can be liquid in extreme conditions which include inflation and political unrest and helps investors in the establishment of portfolios with the aim of avoiding risk.

Recent developments regarding gold demand and supply are expressed by the World Gold Council. According to their research, gold demand was 4067,1 tonnes last year due to the effect of fourth quarter figures. Nevertheless, it almost exceeded the figures for 2010 as a result of the retrogression in jewellery and technology industries. With respect to value, there was a 21 per cent rise in the fourth quarter demand, which was equivalent to 55,2 billion US dollars. Consequently, the value of aggregate gold demand became 205,5 billion US Dollars annually. On the other hand, the figures for gold demand can be considered as different. In this context, there was a %8 fall in gold supply compared to previous years. The main reasons for this change were the changing participation of the Official gold buyers and lack of sufficient recycling. (World Gold Council, 2012:15) With regard to gold prices, "The year may have been characterised by periods of price turbulence, but the average price in 2011 of US$1571.52/oz was more than 28% higher than its 2010 equivalent." (World Gold Council, 2012: 4). Currently, the gold price per oz is 1643.6 US Dollars which equals to a %7.8 increase compared to the previous year.(economist.com/node/21554209, 2012)

Figure 1: The Change in Gold Prices from 2007 to 2012
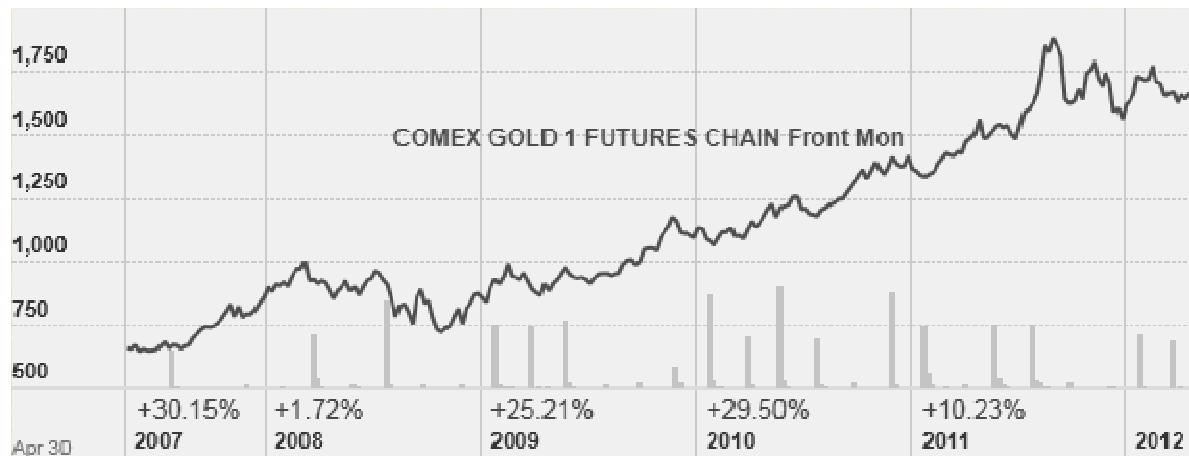
Source: Financial Times Market Data http://markets.ft.com/Research/Markets/Tearsheets/Summary?s=1045492, (May 06,2012)

Figure 1 shows the changes in gold prices for a five year period. It is clear that there is an increasing trend in gold prices in the World, which supports the above-mentioned developments.

In Turkey, the transfer of gold to the financial system, the creation of gold based financial instruments and the international acknowledgement of Turkish Gold Industry were

achieved after the foundation of Istanbul Gold Exchange (IGE). (IGE Book, 2009:1)

According to the data provided by the Exchange, there was an increase in gold prices, which was also observed at international level. In 2009, the maximum price for gold was 1220$. In addition to this, the figure for the gold transaction volume became 226629 kg. In 2010, there was a 17 percent rise in the maximum price of gold. Nevertheless, the transactions volume decreased by 46 percent. Gold prices maintained their increasing trend and a recovery was observed in transactions volumes after 2010. (IGE Book, 2009:36; iab.gov.tr/veriler.asp, 2012) There are two arguments for the importance of the function of the gold market in Turkey. In the first place, gold was regarded as the principal financial asset prior to the course of deregulation. In addition, its popularity prevailed despite the existence of different financial assets (Muradoğlu 1996 cited in Muradoğlu et al, 1998: 86). In the second place, households prefer gold for the purposes of individual decoration and savings. Furthermore, Turkish gold craftsmanship is considered as the finest in the world. As a consequence, gold is regarded as the principal import of Turkey. The foundation of Istanbul Gold Exchange was significant with regard to international regulations concerning gold. Prior to the exchange, grand bazaar was used for the settlement of gold prices. (Muradoğlu et al, 1998: 86)

The Turkish gold market has been more interested in international markets since the financial deregulation in 1989. Therefore, the changes in these markets have become an important indicator of gold trading in Turkey. (Gökdemir et al, 2007:468).

4. LITERATURE REVIEW

The literature on gold markets concentrates on the behaviour of gold prices, the relationship between the economy and gold markets.

(Gökdemir and Ergün, 2007: 464,474) argue that economic and political conditions frequently impact gold prices. As a result, the world economy, Turkish economy and gold trading are all influenced by the movements in gold prices. In this context, (Baur and McDermott, 2010:1886) focused on the observation of the function of gold in the global financial system and demonstrated the significance of gold as a hedging instrument and a reliable asset for the US and the key stock exchanges in Europe.

There are various financial indicators which determine gold prices. These are inflation rates, exchange rates, interest rates and the returns or prices of other securities. (Ghosh et al, 2004:1) note the short-term and long-term changes in gold prices and try to minimize these changes by an empirical model, which consists of cointegration regression methods. The results of the empirical model is considered to be in accordance with the main hypotheses of the theoretical model, which points out that gold prices and the rate of inflation move in the same direction. (Mishkin, 2010:21) demonstrates that there is a positive relationship between gold prices and the increase in unexpected inflation since the changing gold returns and capital appreciation will encourage gold demand which boosts gold prices.

On the other hand, it has been argued that gold does not fully protect investors from inflation. As (Hubbard and O'Brien, 2011:433) write "in the long run, gold has proven a poor hedge against inflation" considering the changes in nominal and real prices of gold from 1975 to 2010 in the USA. (Baur, 2011:265) has explicitly expressed that gold cannot be used for the purpose of hedging in the case of consumer price inflation. However, the inexistence of any kind of relationship is expressed by (Blose, 2010:35) who argued that market inflation expectations were not useful in the estimation of gold prices. (Blose, 2010:36) supports his argument with the carrying cost hypothesis. According to this hypothesis, "an increase in expected inflation will cause the expected future price of gold to be higher than otherwise, but it will also cause interest rates to be higher as well…Any speculative profit in holding gold will be offset by the higher interest costs." (Shafiee and Topal, 2010:188) have also expressed a similar view regarding the relationship between these variables.

(Kutan and Aksoy, 2004:13) also analysed the relationship between gold and inflation in their research for Istanbul Gold Exchange. According to their evidence, Istanbul Gold Exchange (IGE) is not affected by the announcement of Consumer Price Index (CPI) news, which implies the weakness of this market in protecting investors from inflation. (Poyraz and Didin 2008:104) observed that oil prices, exchange rates and foreign exchange reserves are the fundamental variables which are affected by gold prices in Turkey. (Muradoğlu et al, 1998:91) searched the efficiency of the gold market in Turkey and emphasized the significance of regulation in achieving informational efficiency. (Demireli and Torun, 2010:129) observe the behaviour of gold prices in Turkey and England from July 2003 to August 2009 and underline the effect of exchange rates and interest rates on gold prices in the over-the-counter market. Gold prices are also affected by the changes in exchange rates. According to (Sjaastad 2008:118) after the Bretton Woods System, gold prices has frequently changed due to volatile exchange rates. In this context, the value of the dollar determines the price of gold in different currencies. (Iktisadi Araştırmalar Müdürlüğü, 2005) cited in (Gokdemir and Ergun, 2007:467) argued that gold prices and the Dollar generally moved in opposite directions and (Pukthuantong and Roll, 2011:2070) noted the inverse relationship between gold and the selected currencies including the dollar and consider the law of one price as the key concept in describing this relationship. They observe that "if the gold price is fixed with respect to some world numeraire, then its price in a depreciating country will rise and its price in an appreciating currency will fall." Sjaastad (2008), Baur and McDermott (2010), Mishra et al (2010) and Capie et al (2005) also support this argument. Furthermore, (Capie et al, 2005: 343) notes the importance of inconsistent political developments in the determination of gold prices.

In financial markets, investing in gold is a different way of meeting investor preferences. Especially, some investors choose gold to protect their savings since its price changes differently compared to riskier assets. (Akar, 2011:114) demonstrated that following the 2001 crisis, Istanbul Stock Exchange (ISE) 100 Index and gold returns were inversely

related. (Starr and Tran, 2008:430-432) argued that income volatility affects gold demand. They also added that private credit markets have an adverse effect on gold demand. The study by (Baur and Lucey, 2010:217) questions whether gold is a hedging instrument or a reliable security in terms of its relationship with stocks and bonds. Constant and time varying relations between US, UK and German stock and bond returns are used to answer this question. The results of this study generally support the characteristics of gold both as a hedging instrument and a reliable security. However, (Albeni and Demir, 2005:16) highlight the unexpected positive relationship between gold prices and stock prices in financial sector in Turkey which contradicts with the role of gold as a substitute for stocks. (Mishra et al, 2010:47) searched the existence of causality relation between Indian gold prices and stock returns from January 1991 to December 2009 and found feedback causality, which implied the importance of each variable in forecasting the price of the other variable.

The influence of volatile crude oil prices, gold prices and exchange rates of the US Dollar in other currencies on selected stock price indices is examined by (Wang and Huang, 2010:80) who identify long-term constant relationships in the above-mentioned variables. Interrelationships between the prices of oil, gold and the euro are analysed by (Maliaris and Maliaris, 2011:1) who emphasize the efficiency of these markets and the lack of connection between them.

5. DATA ANALYSIS

The relationship between national gold prices and selected financial indicators is examined by a regression model from January 2002 to December 2011. The monthly financial indicators consist of ISE 100 Index, the rate of inflation, interest rates and TL/US Dollar exchange rate. Monthly gold prices are obtained from the Istanbul Gold Exchange. In contrast, the rate of inflation, which includes the monthly changes in the consumer price index (TUFE), the exchange rate of Turkish Lira against US Dollar and monthly interest rates can be found on the website of the Central Bank of the Republic of Turkey. The data concerning the ISE 100 Index are on the website of ISE.

The initial regression model is

$$Y_{\text{Gold price}} = \beta_1 X_{1(\text{Interest rates})} + \beta_2 X_{2(\text{TUFE})} + \beta_3 X_{3(\text{Exchange rate})} + \beta_4 X_{4(\text{ISE 100 Index})}$$

Table 2: Regression Statistics and ANOVA Test for the Initial Model**

Regression Statistics	
Multiple R	0,933122683
R Square	0,870717941
Adjusted R Square	0,866181728
Standart Error	8095,413766
Observation	119

ANOVA

	df	SS	MS	F	Significance F
Regression	4	50317862682	1,2579E+10	191,9482	1,15371E-49
Residual	114	7471072541	65535724		
Total	118	57788935223			

	Coefficients	Standart Error	t Stat	P-value
X_1	15153,50613	12459,08424	-1,2162616	0,226398
X_2	1023,220207	80260,90371	0,01274868	0,989851
X_3	79242,47309	5143,01136	15,4077966	1,23E-29
X_4	0,885006728	0,068097649	12,9961422	3,04E-24

**Calculations are made by the author with Excel.

When the P-values are considered, it could be observed that there is a significant relationship between gold prices, exchange rate TL/US Dollar (X3) and ISE 100 Price Index (X4). However, there is an insignificant relationship between the other variables since X1 and X2 (interest rates and TUFE) are insignificant at %5 confidence level. Consequently, the regression model is redesigned below and the following results are obtained.

Y= β3X3(Exchange rate)+β4X4(ISE 100 Index)

Table 3: Regression Statistics and ANOVA Test for the Revised Model***

Regression Statistics	
Multiple R	0,931913805
R Square	0,86846334
Adjusted R Square	0,866195466
Standart Error	8094,998207
Observation	119

ANOVA

	df	SS	MS	F	Significance F
Regression	2	5,02E+10	2,51E+10	382,9417111	8,02999E-52
Residual	116	7,6E+09	65528996		
Total	118	5,78E+10			

	Coefficients	Standart Error	t Stat	P-value
X3	78975,97683	5069,41	15,57893	3,27941E-30
X4	0,958426395	0,042015	22,81156	1,08434E-44

***Calculations are made by the author with Excel.

According to the regression statistics, ISE 100 Price Index and exchange rates account for %86 of the change in gold prices, which could be observed by R Square. Therefore, the independent variables are found as significant at %5 confidence level.

P value (X3)<0,05

P value (X4)<0,05

Moreover, the model can be considered as significant when the result of the F-test is analysed.

P value<0,05

The coefficients of the regression analysis also demonstrate that there is a positive relationship between gold prices, ISE 100 Price Index and exchange rates.

6. CONCLUSION

Commodities are important in the analysis of economic conditions since their prices are influenced by various factors including the changes in supply and demand, exchange rates and other financial variables. Furthermore, they account for a significant proportion of foreign trade in emerging countries. In this context, it could be pointed out that commodities have become one of the essential assets which investors prefer following the financial crisis.

The recent financial crisis has caused some facts to be discussed in the field of finance. These are the increasing use of commodity markets, which reflects the current preferences of savers and investors, the effect of derivative instruments on the risk of financial institutions and the rising importance of precious metals. Among these developments, the most important ones are the rising use of gold which is a well-known precious metal because of its unique features and the monitoring of gold prices in financial markets.

The related literature has focused on the relationship between gold prices, inflation, exchange rates and the returns of securities. It is almost clear that every indicator has some effect on gold prices. However, there is not any certain agreement on the nature of this effect. Considering the findings of this article, it could generally be highlighted that gold prices and particular currencies including the dollar have an inverse relationship which is also the case in Turkey. This relationship could be explained by the law of one price mentioned in the literature. Concerning the positive relationship between gold prices and ISE 100 Index, it is possible to say that this contradicts with the hypothesis that gold could be used as a substitute for other securities with the aim of hedging. This could either arise from the behaviour of investors or changing economic conditions in Turkey. Finally, it is observed that gold prices are not directly affected by inflation and interest rates. This is another finding of this article which supports the carrying cost hypothesis mentioned in the related literature.

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