“Demand for gold: goods and investment markets interdependence as a factor of gold market stabilization”

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Demand for gold: goods and investment markets interdependence as a factor of gold market stabilization

Abstract

This paper presents the model of interdependency between goods and investment markets on the basis of gold market which is divided into the market of physical gold and the market of speculative financial instruments backed by gold. The most important aspects of this interdependence are financial market boundaries.

We proved the hypothesis which states that, on the gold market, in the certain short periods of time, which are characterized by high volatility of price, interdependence between investors, speculators and consumers, i.e. goods and investment markets interdependence, acts as an automatic stabilizer of the market.

Keywords: gold, volatility, boundaries, goods markets, investment markets, market stabilization, markets interdependence.
JEL Classification: D84, G11, G17.

Introduction

It is known that gold is considered to be an asset which acts as one of the most important diversifiers of an investment portfolio. This is partially caused by the fact that its price reflects not only the state of demand and supply on the market of gold, but also shows the state of the world economy and, which is more important, expectations of economic individuals. In this sense, gold price has a considerably higher informative value in comparison with prices of many other financial assets. Another key feature of gold price is that it has a lower correlation to equities than other alternative assets while performing often better than alternatives[1].

Notably, gold acts as a commodity and an asset at the same time. It means that demand for gold is allocated among goods and financial markets. Therefore, gold market experiences effects of interdependence between the two markets[2].

We suppose that difference of incentives between goods and investment markets participants has visible impact on the market of gold. In this research, we try to analyze essence, influence and result of the interdependence between the two markets of gold and reveal the boundaries between them.

1. Economic theory: interdependence and boundaries between goods and investment markets

Interdependence between goods and investment markets is obvious. Moreover, investment markets should not be analyzed without taking into account goods markets. Investments depend on production and consumption which, in turn, depend on investments. In other words, any investment market model should include variables of goods market and consider them as extremely important while goods market should not be modeled apart from rapidly changing variables of investment market.

Economic theory of goods and investment markets is broad but as regards theories which accentuate the very interdependence between goods and investment markets, there are not many of them.

In macroeconomics, "IS-LM" model is well known. The model was created by Harrod (1937), Hicks (1937), Meade (1937), Lange (1938) and others on the basis of Keynes' theory named "General Theory of Employment, Interest and Money" (1936). The model describes macroeconomic equilibrium resulted from combination of models of equilibriums on goods and money markets. Connection between goods and investment markets is mainly determined by interest rate which acts as a variable in the investments (1) and demand for money functions (2). The functions are presented below.

$$I = e - d \times R, \quad (1)$$

where I is investments, R is interest rate, e and d are empirical coefficients which are relatively stable.

$$\frac{M}{P} = k \times Y - h \times R, \quad (2)$$

where M represents real demand for money, Y is output, k and h are empirical coefficients which are relatively stable.

The aggregate demand-aggregate supply model (AD-AS model) is the basic macroeconomic model which describes the Keynesian theory of business cycle. AD-AS model can be derived from the IS-LM model (DeJong, 1954; Barro, 1994).

Many models which regard aggregate demand and aggregate supply also worth mentioning: Wells (1960), Klevorick (1966), Gambs (1974), Palley (1997), Bradley (1984), Blanchard and Quah (1989), Chapple (1995) and others.

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[1] World Gold Council (2014).
[2] World Gold Council (2014).

It is important to note that in the basic macroeconomic equation consumption fully depends on investments if other variables are constant:

$$Y=C+I+G+X, \quad (3)$$

where Y is output, C is consumption, G is government spending and X is net exports.

As regards microeconomics, Walras in analyzing economic equilibrium takes into account goods and factors of production markets. The main conclusion is that if certain price system provides equilibria on any three markets, than there is also equilibrium on the fourth market. In case of absence of the equilibrium, sum of surpluses on one group of markets equals sum of deficits on other markets. (Walras, 1926; Solow, 1956; Ingrao, 1989; Daal, 1998).

Logics of the investigation leads us to give attention to boundaries between financial and goods markets and interdependence between them.

As regards financial market boundaries, there are no relevant theories in this field. We assume that this is because the boundaries of the financial market are always changing and shifting.

As regards goods market boundaries, there are well known theories. Some of them investigate substitute and complimentary goods. There are some examples: estimating the intertemporal elasticity of substitution Fauvel and Samson (1991), Ogaki (1998); studying for the joint hypotheses of rationality and gross substitutes (Chamber, Echenique and Shmaya, 2011) and others.

2. Demand structure on the gold market

Demand structure on the gold market can be classified on the basis of many factors but in this research we classify demand for gold on the basis of reaction of the market participants to the main market signals − price changes. So, demand for gold can be divided into two main categories.

The first category of demand represents market participants which have a standard, in terms of traditional economic theory, reaction to price dynamics, i.e. their behavior can be described by a demand curve which has a negative slope. It is clear that jewelry demand for gold, demand for bars and coins and technological demand have negatively sloping demand curves.

Nevertheless, we suggest that there is a second category of demand which reaction to price changes is more complex and varied since in particular periods of time it can be characterized by a positively sloping demand curve due to the expectations effect[1].

[1] Sazonov, Nikolayev (2013).

This category represents speculative investors such as Exchange Traded Funds (ETFs) and other similar investors.

3. Two-factor model of gold return

Return of investment in gold can be analyzed on the basis of the two-factor model in which the factors are supply and demand on the gold market. However, taking into account the fact that the majority of gold market participants are able to act on the both demand and supply sides, one variable can represent both demand and supply. In our model, we assume that positive value of variable represents demand for gold while negative one represents supply.

Corresponding with this structure, the two factors of the model can be presented as follows:

1) Demand for gold which is characterized by a negatively sloping demand curve in the certain period of time.
2) Demand for gold which is characterized by a positively sloping demand curve in the certain period of time.

Therefore, the model can be described by the following equation:

$$r = a + b_1 \times Q_1 + b_2 \times Q_2 + e, \quad (4)$$

where r is gold investment return for a certain period of time, Q_1 is quantity of gold demanded by the first group characterized by a negatively sloping demand curve, Q_2 is quantity of gold demanded by market participants which are characterized by a positively sloping demand curve, b_1 and b_2 are sensitivity coefficients, a is displacement coefficient and e is standard error coefficient. It is supposed that $b_1 \geq 0$, $b_2 \geq 0$.

During certain periods of time, different reactions to price dynamics can take place. For example, speculative investors such as ETF funds and jewelry demand can react to prices in opposite way. Such different reactions to price changes of gold market participants can be considered as an automatic stabilizer of the gold market.

We assume that this phenomenon is mostly based on the interdependence between goods and investment markets since gold belongs to both of them. For example, in certain periods of time, while goods market of gold, which mostly consist of jewelry market, reacts to higher prices negatively, investment market of gold, especially speculative one, reacts positively.

The stabilizing effect is based on negative correlation and covariation between the two factors and is responsible for lower value of return dispersion:

$$\sigma^2 = b_1^2\sigma_{Q_1}^2 + b_2^2\sigma_{Q_2}^2 - 2b_1b_2\, cov(Q_1;Q_2) + \sigma_e^2, \quad (5)$$

where σ^2 is return dispersion, $cov(Q_1;Q_2)$ is covariation between the factors and σ_e^2 is dispersion of standard error coefficient.

It is important to underline that this purely theoretical model is not created to be used for prediction purposes. It is primarily aimed at demonstration of the phenomenon of gold market stabilization based on the connection between goods and investment markets of gold.

Nonetheless, there are periods of time which are characterized by positive correlation of the factors as well as absence of correlation and can be characterized respectively by the following equations of dispersion:

$$\sigma^2 = b_1^2\sigma_{Q_1}^2 + b_2^2\sigma_{Q_2}^2 + 2b_1b_2\, cov(Q_1;Q_2) + \sigma_e^2, \quad (6)$$

$$\sigma^2 = b_1^2\sigma_{Q_1}^2 + b_2^2\sigma_{Q_2}^2 + \sigma_e^2. \quad (7)$$

4. Statistical aspects of negative correlation between different categories of demand for gold

It was previously said that the second group of demand for gold can be referred to as speculative. Though we suppose that ETF funds are speculative investors, we also assume that certain kinds of investment in gold can be also referred to as speculative.

Gold-backed ETF products, futures and other types of gold investment are used for speculation. However, these instruments are also used to buy physical gold. It means that boundaries between goods and investment markets of gold are changing. But we put forward the view that the boundaries can be defined in the certain periods of time on the basis of statistical methods.

In comparison with investing in physical gold, investing in futures and similar products is much more flexible and imposes lower operational costs. Thus, investing in physical gold is comparatively long-term while investing in speculative assets is short-term. But, it was mentioned that it is impossible to clearly and constantly display the boundaries between goods and investment markets of gold on the basis of means of investing in gold.

It was supposed that negative correlation between the factors takes place in the certain periods of time. In our view, in such periods gold price is highly volatile and the volatility is isolated from other markets and caused by events which have an impact on gold market only (or precious metals market).

Therefore, we chose the period of the first half of 2013 while giving big attention to April 2013. Huge drop in the gold price was initially prompted by the news about the decision of the Cyprus government to sell its gold holdings. We support that the dramatic decline of gold price was totally caused by outflow of speculative financial capital from the gold market. Nonetheless, lower prices lead to increase of physical demand, especially in China and India. We believe that the rise in physical demand, which was mostly driven by jewelry and long-term investment demand for gold, served as a stabilizing factor of the market. Thus, this period is a good example of phenomenon of the market stabilization which is caused by the connection between goods and investment markets.

To prove the hypothesis, it is necessary to investigate speculative demand for gold in comparison with demand of long-term investors and jewelry industry in the concerned period.

SPDR Gold Trust is the largest ETF specializing in gold. This fund is one of the best examples of a speculative institutional investor. Moreover, changes in the fund's gold holdings are used as an indicator of speculative demand on the market and have a big impact on the gold price.

As of 2013, China was the biggest market of physical gold. Shanghai Gold Exchange (SGE) is one of the most important centers of trade of physical gold in China[1].

In April 2013, Au(T + D) and Au9999 were the most popular gold contracts on SGE[2].

Au9999 contract is a physical spot contract which implies everyday physical delivery of gold bullions with a fineness no lower than 99.99%.

Au(T + D) is a deferred settlement contract. The contract is traded on margin. Notably, customers have the alternatives to settle on the trading day or at a later date. The deferred settlement service involves a deferred compensation mechanism to balance the supply and demand.

Au(T + D) product has features of a speculative mean of investing in gold. Investors can buy gold with a down payment of 10% of the trading volume. Investors are allowed to complete the transaction on the current or next day.

While analyzing demand for gold on SGE, we took into account volumes, gold price premium, deliveries and directions of Deferred Compensation Fees (DCFs) of Au(T + D) contract.

There are two kinds of directions of DCF: Long to Short and Short to Long. If there are more intentions to take delivery than to make delivery then all the shorts of Au (T + D) contract have to pay the longs Deferred Compensation Fee: Short

[1] World Gold Council (2014).
[2] Shanghai Gold Exchange (2013).

to Long. If there are more intentions to make delivery than to take delivery than all the longs of Au (T + D) have to pay all the shorts Deferred Compensation Fee: Long to Short. To put it differently, this indicator shows inequalities between demand and supply on SGE.

The table and the graph below provide information about directions of deferred compensation fees for the period of 8-26 April 2013. On the graph, L stands for Long to Short while S stands for Short to Long.

From the graph it can be seen that in the concerned period when gold price was decreasing, supply of gold was higher than demand in terms of DCF, but when the price was increasing demand exceeded supply. Taking this into account, it can be supposed that in this period Au(T + D) contract was mostly used as an instrument of speculation.

As of gold delivery on SGE, many analysts consider it as an indicator of demand for gold (Jansen Rong, 2013).

Table 1. Daily data of paying directions of differed compensation fees and average prices of Au(T + D) contract on SGE in the period of 8-26 April 2013[1]

Date	Weighted average price of Au(T + D) contract (CNY)	Paying direction of deferred compensation fees Au(T + D)
08.04.2013	315.91	Long to Short
09.04.2013	315.22	Short to Long
10.04.2013	316.84	Short to Long
11.04.2013	313.02	Long to Short
12.04.2013	311.96	Long to Short
15.04.2013	291.60	Long to Short
16.04.2013	272.55	Long to Short
17.04.2013	274.79	Short to Long
18.04.2013	272.63	Short to Long
19.04.2013	280.38	Short to Long
22.04.2013	285.06	Short to Long
23.04.2013	284.44	Short to Long
24.04.2013	283.60	Short to Long
25.04.2013	288.13	Short to Long
26.04.2013	295.19	Short to Long

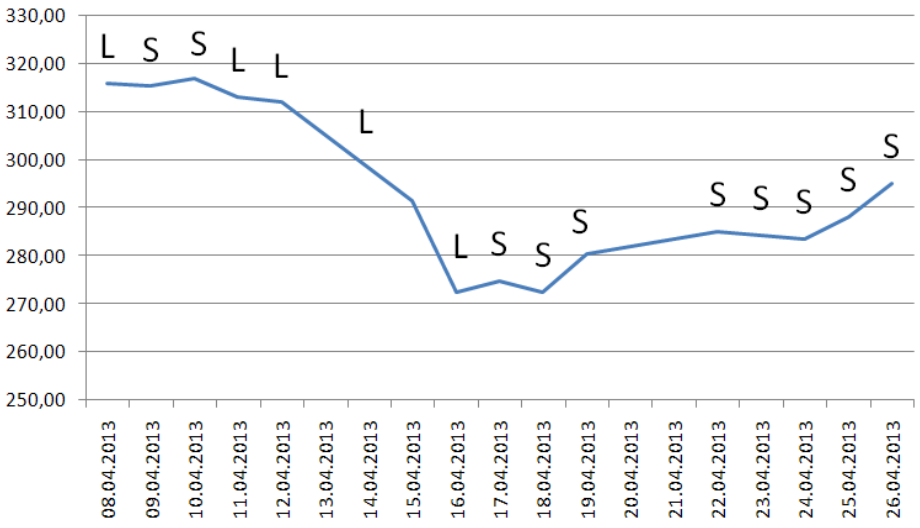

Fig. 1. Paying direction of deferred compensation fees Au(T + D) and gold price on SGE[2]

It is important to underline that this indicator reached a record of 236 tons in April 2013.

As of Au9999, the highest volumes of the contract on SGE were seen in the mid April when the prices were at the lowest level. Every day between April 16 and May 6 this indicator exceeded 20 tons which is more than four times the daily average in 2012.

As regards gold price premium on SGE, this indicator had positive value and reached 5% in some periods. The goldprices on SGE were higher than the London PM Fix prices. This represents high demand in this period[3].

It was mentioned that SPDR Gold Trust's holdings of physical gold act as an indicator of speculative demand for gold. On the other hand, it was shown

[1] Based on data from Shanghai Gold Exchange (2014).
[2] Idem.
[3] Based on Shanghai Gold Exchange (2013).

that volumes of trade of Au9999 spot contract on SGE in April 2013 can serve as an indicator of non-speculative demand for gold.

These two indicators are analyzed in the period of 8-26 April 2013 which is characterized by high volatility with periods of increase and decrease in price. The table below provides data for these indicators of demand for gold.

Table 2. Daily data of SPDR Gold Trust's holdings and Au9999 contract volumes in the period of 8-26 April 2013[1]

Date	ETF holdings, tonnes	SGE Daily volume, kg (Au9999)
08.04.2013	1205.31	9973.00
09.04.2013	1200.37	6505.80
10.04.2013	1183.53	3999.80
11.04.2013	1181.42	9721.80
12.04.2013	1158.56	11680.40
15.04.2013	1154.34	17824.00
16.04.2013	1145.92	21716.40
17.04.2013	1134.79	20170.20
18.04.2013	1132.99	20814.60
19.04.2013	1123.06	30440.00
22.04.2013	1104.71	43272.20
23.04.2013	1097.19	40614.20
24.04.2013	1092.98	29990.20
25.04.2013	1090.27	33055.40
26.04.2013	1083.05	34022.20

Linier coefficient of correlation between the indicators has negative value of -0.91. This shows high contrary relationship between the variables. Assuming that the level of statistical significance (α) equals 0.05 and using Student's t-test, we conclude that the correlation is significant. It means that in the concerned period when SPDR Gold Trust demand for gold was decreasing, demand for physical gold on SGE was increasing and vice versa. In other words, speculative and non-speculative demand for gold had opposite reactions to price changes. This fact proves the hypothesis which states that in the certain periods of time different types of demand for gold react to prices in opposite way. As was said, this phenomenon is an automatic stabilizer on the gold market.

Correlation analysis of May 2013 did not show significant relationship between the indicators. It means that the phenomenon can be seen only in the certain periods of time.

Demand for gold which is represented by demand for the products of SGE is not referred to as demand of goods market or demand of investment market since those products are used by the both markets. Corresponding with this, it is impossible to show boundaries between the markets on SGE on constant basis but it is possible to do on temporary basis by using daily statistics.

Correlation analysis of relationship between volumes of trade of Au(T + D) and SPDR Gold Trust's holdings didn't show significant results.

We put forward the view that the phenomenon of opposite reactions to price dynamics is mostly based on difference of reactions of jewelry and investment demand for gold. This phenomenon illustrates the interdependence between goods and investment markets of gold. In this case, the interdependence is considered as an automatic stabilizer on the market.

Conclusion

From the analysis it can be concluded that in the long run the interdependence between goods and investment markets of gold is similar with connection between equivalent assets, while in the short run the interdependence is similar with connection between substitute assets, other things being constant.

We are of the opinion that there are no pure boundaries between investment and goods markets on the gold market. However, the phenomenon of opposite reactions of demand for gold shows the connection between the markets and illustrates the stabilizing effect.

High negative correlation between SPDR Gold Trust speculative demand for gold and demand for Au9999 spot contract on SGE shows that in the periods of high volatility caused by events influencing only gold market (or precious metals market) speculative and non-speculative types of demand react to price changes in opposite way. This is caused by the fact that the first type of demand is characterized by a negatively sloping demand curve (goods market) while the second type, in the certain periods of time, is characterized by a positively sloping demand curve (speculative market). The positive slope of demand curve is based on the expectations effect and has speculative sense.

Therefore, return of investment in gold can be investigated on the basis of the two-factor model in which the factors represent types of demand for gold which react to price dynamics differently in the certain periods due to the connection between goods and investment markets of gold. In such periods, the interdependence plays the role of a stabilizer of gold price and gold market.

[1] Based on data from Shanghai Gold Exchange (2014) and SPDR Gold Shares (2014).

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