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IS IT POSSIBLE TO BACK A MAJOR WORLD CURRENCY BY GOLD?

Abstract: *The gold issue has been attracting increased attention. To the spotlight are coming its functions, especially a store of value and unit of account. Institutional, as well as small investors are advised to use gold as a stabilisation component of their portfolios. Similarly, we can record increased demand for gold from the side of central banks, which represent the largest players on the global gold market. In some cases we can observe also the desire to increase the share of gold on foreign exchange reserves. In this context, new views and opinions have emerged, which advocate the return of the gold to back the major world currencies. The aim of this paper is to analyse the possibilities of different alternatives of gold-backing of selected world currencies. We concentrate on three major currency regions: USA, Eurozone and China. Based on the available data processing and own calculations, we attempt to prove the absurdity of gold-backing of major world currencies.*

Keywords: *gold, currency backed by gold, gold reserves, money aggregates M2 and M3*

JEL : G 11, G 15, E 52

Introduction

Gold fetishism, with its unique functions, has played a positive role in the human history and in the international monetary system. After the fall of the Bretton-Woods monetary system, when the International Monetary Fund sold a significant part of its gold reserves, the exchange of the major world currency, namely the US dollar, for gold was cancelled. Thus, the function of gold as the unit of exchange in the world stepped back to the background. Afterwards, only a minor attention was paid to gold in the economic theory and practice.

Because of low gold prices, investors have focused on stock markets instead of gold during the 80's and 90's. The main attention was paid to communications and information technologies. The International Monetary Fund and central banks have soldbig portions of their gold reserves. Gold became only a partial theme of the economic theory. The research was mainly focused on the historical role of gold in monetary systems: Giovannini, Alberto and de Melo (1993) [3], Martha Kemmerer, Edwin Walter (1994 [6], MacEdo, Jorge Braga de; Eichengreen, Barry J; Reis, Jaime (1996) [7].

The last decade has brought severe economic instability in the form of asset bubbles and their bursts, recessions, and decrease of the world's economy real growth pace. The investors on the financial markets were searching for a "safe haven" and the attention turned to gold once again. This was reflected in a decade of rising gold prices. Gold's function of a store of value is currently favoured among the investors. Besides investors, the rising demand for gold has been assigned to jewellery and new industrial branches like information technologies or pharmacology, which use some specialcharacteristics of gold.

The area of theoretical research of gold and its functions has also been expanding lately. Attention in this area of research was attracted by increasing number of publications. One of them is the book named "*All About Investing in Gold"* by Jagerson John and Hensen S.Wade (2011) [5], which concentrates on gold as an investment asset. From the newest studies is very interesting *Gold Bubble: Profiting from Gold's Impending Collapse* from Ioni Jacobs (2012) [4] or *Gold Investing Secrets* from Louis Ruscitto (2012) [9]. In the above/mentioned publications, investing in physical gold and also other tradable forms as Exchange Traded Funds (ETF), mutual funds (etc.) are introduced.The authors are drawing attention to the rise of demand for this scarce metal, which is today linked also to the industrial use, and to a possible formation of an asset bubble on the gold market (Ioni Jacobs).

Current problems of the global economy like the growth of national debts of the developed countries, problems with the balance of payments, etc. are linked to a significant volatility of exchange rates and devaluation pressures on the major world currencies. Quantitative easing has a major role on these pressures, since immense quantities of new money have been issued in particular economies. These measures at the current level of stagnation and the possibility of a new recession develop inflationary pressures, and pressures on currency depreciation.There is an increasing number of voices that call for re-establishment of currencies backed by gold, i.e. gold standard, even among the experts, particularly in the area of monetary systems. Also Tobias Rotthalen (2012) [8] indirectly implied this contingency in his work "*What Everyone Should Know About Gold"* where he states that gold is money, and that the currencies are losing value, which is one of the reasons to own gold. John Butler's work "*The Golden Revolution: How to Prepare for the Coming Global Gold Standard"* (2012) [2] is devoted more precisely to the issue of gold and its possible use in currency matters. As he says: "Gold helps to protect private property rights, in particular by preventing governments from running deficits and other inflationary policies. If governments cannot confiscate property through deficit spending and inflation, they will be able to do so only through taxation with each generation having to pay for government as it goes along. Rather than passing that burden onto some number of future generations, it stands to reason that there will be greater scrutiny over government spending, which will more closely reflect societal preferences."

(p.196). From other authors André Astrow cannot be omitted, who devoted his book "*Gold and the International Monetary System"* (2012) [6] to the advantages and disadvantages of gold in the monetary system. The attention to this issue was expressed also from the International Monetary Fund (IMF) by its *Factsheet gold in the IMF* (2012) [10].

Is it currently really possible that there would be major world currencies backed by real gold? We will try to prove this assumption wrong with the following analysis and calculations.

The Assumption of Backing a Currency by Gold

If any of the economic powers wanted to back their currency by gold, they would have to have massive gold reserves in the value of several trillions of USD. In the next table we offer a ranking of the countries and international institutions with the largest gold reserves. In addition to the gold reserves, the table also shows the share of the gold reserves on the total foreign exchange reserves, whereby it is possible to observe notable differences, which prove that many countries, despite having large volumes of gold, have only a small share of gold on the total reserves (e.g. Japan, China). If we go by official figures, then the gold reserves of individual countries and their central banks are as follows:

Table 1

Official gold reserves by December 2012 (in metric tons)

	Country	tons	Share
1.	**USA**	**8 133,5**	**76,1%**
2.	**Germany**	**3 391,3**	**73,6%**
3.	**IMF**	**2 814**	
4.	**Italy**	**2 451,8**	**72,5%**
5.	**France**	**2 435,4**	**72%**
6.	**China**	**1 054,1**	**1,7%**
7.	**Switzerland**	**1 040,1**	**11%**
8.	**Japan**	**765,2**	**3,3%**
9.	**Russia**	**934,9**	**9,8%**
10.	**Netherlands**	**612,5**	**60,3%**
	Eurozone, incl. ECB	*10783,3*	*64,1%*
	World total	**31,491.1**	

Source: own processing according to the World Gold Council data

It results from the above/mentioned table that the largest volume of gold is accumulated in the Eurozone, which accounts approximately for one thirdof the reserve gold in the world. We can assert that inside the Eurozone the largest share of gold reserves, almost one third, belongs to Germany, which is also the most developed economy of the Eurozone. At the same time, it is important to note, that the Eurozone has a smaller share on the reserves than the USA.

Although the official gold reserves of the USA and Eurozone seem to be quite large, there are not enough of them to back a meaningful part of the main monetary aggregate. Our analysis is based on a simple system of equations.

It is important to evaluate the value of money that must be backed by gold. We assume that the country that will try to back its currency by gold would have to cover a meaningful part of its main monetary aggregate by gold. The value to be backed (Ω) equals to the value of the main monetary aggregate (M) times the coverage ratio (α). The coverage ratio tells how many percent of the monetary aggregate should be backed by gold.

$$\Omega = M * \alpha$$

The value to be backed by gold (Ω) logically equals to the value of gold used for backing (Φ). There is another equation that converts the value of gold to physical units of volume. The volume of gold needed for backing (G) equals to the value of gold used for backing (Φ) divided by the price of gold (P).

$$G = \frac{\Phi}{P} = \frac{M * \alpha}{P}$$

We assume that the current amount of gold reserves (R) is insufficient for any meaningful level of backing. Thence the value of the gold reserves needs to be increased by buying more gold or by increasing the gold price. By far the most probable scenario is a combination of both factors.

For measuring the price of gold needed to cover a selected part of the monetary aggregate by the current level of gold reserves, we use an equation where the price of gold (P) equals to the value to be backed (Ω) divided by the volume of current gold reserves (R). The value of (R) obviously equals to the value of (G). Different mark is used only to emphasize the fact that in this case the volume of gold represents the real volume of current official gold reserves.

$$P = \frac{\Omega}{R} = \frac{M * \alpha}{R} \rightarrow R = G$$

A simple verification shows that all the aforementioned equations fit:

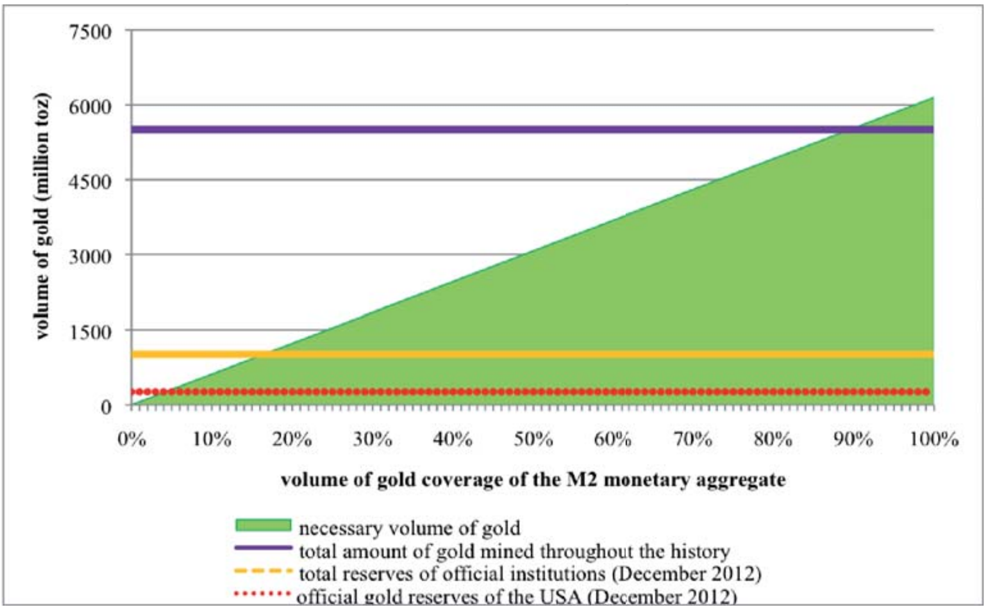
$$G = \frac{\Phi}{P} \cap \Phi = \Omega \cap P = \frac{\Omega}{R} \cap R = G \rightarrow \Omega = G * P \rightarrow P = \frac{\Omega}{G}$$

Backing the American Currency by Gold

In the ranking of individual countries it is obvious that most of the reserve gold is, despite serious economic problems, still owned by the USA, which still is the largest economy in the world. Also USD is, despite weakening positions, still the world's most important reserve currency. We would like to note that the current official gold reserves of the USA cover the M2 money aggregate only at the level of 4.253%. The USA stopped tracking the M3 money aggregate in 2006, so the indicative determinant of the American money supply became the M2 aggregate. Its level rose, according to the official data, to 10 391 300 000 000 USD in December 2012. Official gold reserves of the USA in the same month amounted to 8 134 metric tons, which is 261 498 097 troy ounces (toz). The average gold price in December 2012 was 1690 USD per troy ounce. The dollar value of American gold reserves was thus 441 931 784 295 USD, which is only 4.235% of the M2 money aggregate.

Graph 1

The volume of gold needed for n-% coverage of the USA M2 money aggregate by price of gold at 1690 USD/toz

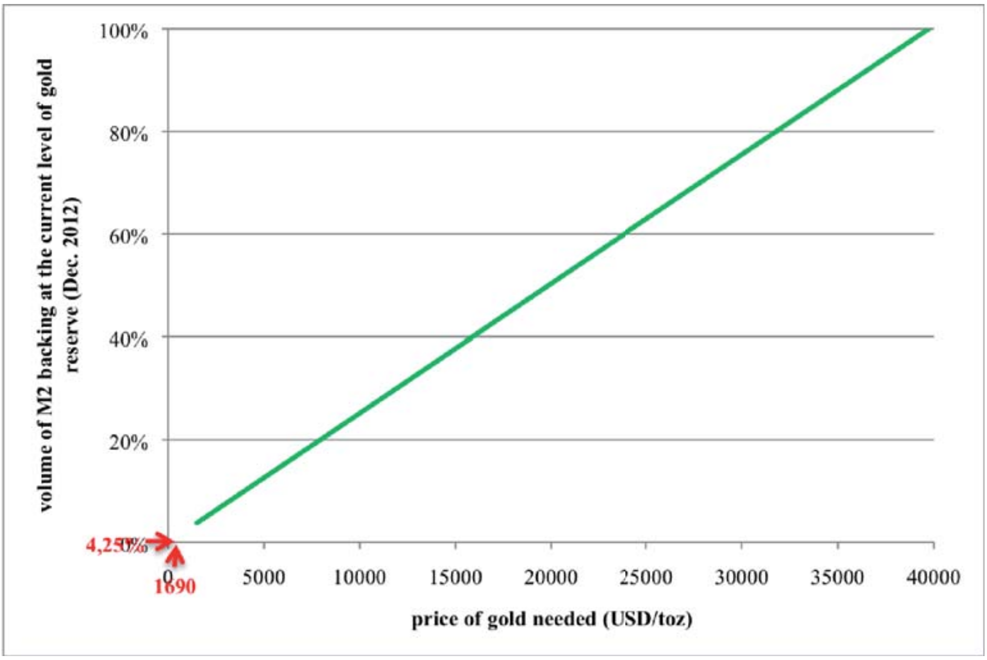


Source: Own processing, using data of The World Gold Council (8) (10) and Federal Reserve Economic Data (FRED) [9]

Graph No. 1 depicts the necessary volume of gold that would be needed at different levels of gold backing of the M2 money aggregate. The official American gold reserves from December 2012 are only able to back a small fraction of this aggregate. To make the backing more effective, a far larger share would need to be covered. For instance, in 1930's when USD was backed by gold, the level of backing was set to 40% by law. At the price of 1690 USD/toz, the reserves that would be needed would have to be at the level of 2,46 billion ounces. Just for comparison, on December 2012 gold reserves of 200 central banks, IMF, and the World Bank were at the level of 1,012 billion toz. In other words, the USA itself would need 250% of the official sector global world gold reserves just to back 40% of its M2 money aggregate. Furthermore, this volume is about 45% of historically extracted gold, which is estimated to be about 5,5bil. toz. As Graph 1 shows, at current gold price level, the whole historical amount of gold would be insufficient for 100% backing.

Graph 2

The price of gold needed to n-% backing of M2 money aggregate of the USA at current level of American gold reserves



Source: Own processing, using data of FRED (9)

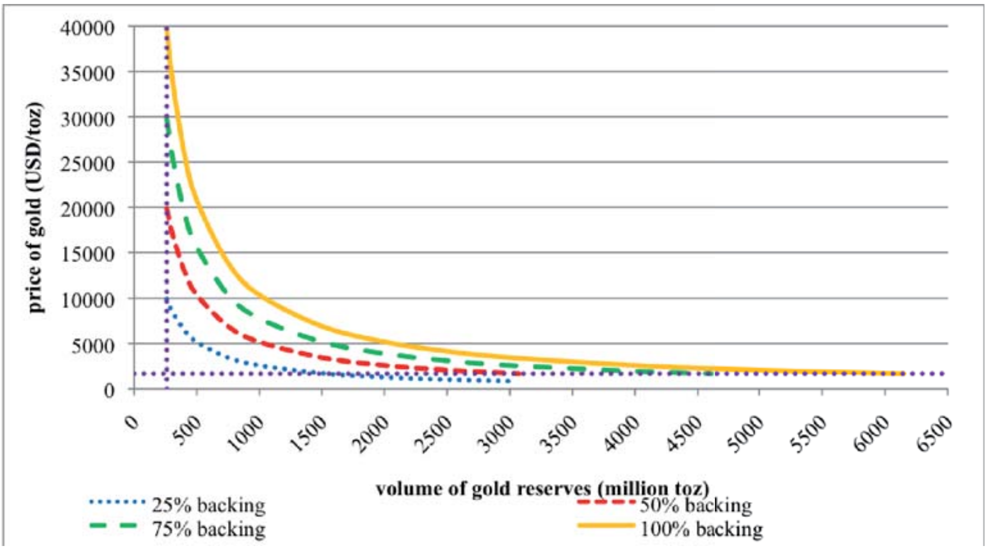
Except the increase of the gold reserve volume, there is a possibility to increase the share of backing by increasing the gold price of existing reserves. This situation is depicted on Graph No. 2. To reach the historical level of backing at the level of 40% (at the current level of gold reserves from December 2012 – 261,5 mil. toz) it would be necessary for the gold prices to reach a level just under 15 900 USD/toz. By a 100% backing and the same conditions the price of gold would have to attack the level of 40 000 USD/toz.

In the scenario, where Fed would decide to cover the M2 aggregate by gold, none of the above/mentioned extreme possibilities would be expected. The whole process would be most probably a combination of enlargement of the reserves and increase of the gold price.

Some basic scenarios are depicted in Graph No. 3. It illustrates the assumptions of 25%, 50%, 75%, and 100% gold backing of the M2 aggregate at various levels of gold prices and gold reserves.

Graph 3

Gold backing of the American M2 at different volumes of reserves and prices of gold



Source: Own processing, using data of FRED [9]

As the graph above shows, all scenarios provided assume a combination of multiple increases in gold reserve volume, as well as the gold prices. At the same time, it is obvious that more than 25% gold backing seems unrealistic, as the volume of reserves would have to increase significantly alongside considerable shifts in the gold price. It is very hard to answer the question where would the USA get the resources to purchase such amounts of gold. A possible option would be the confiscation of gold from American citizens, similar to the one in 1930's. Such a step would be disputable, and there would most probably not be a political will to do so. Ineffectiveness of such a step is also reflected in the fact that in the current globalised world it is not a problem for common investors to hold their physical gold in safe countries like Switzerland or in some of the tax havens.

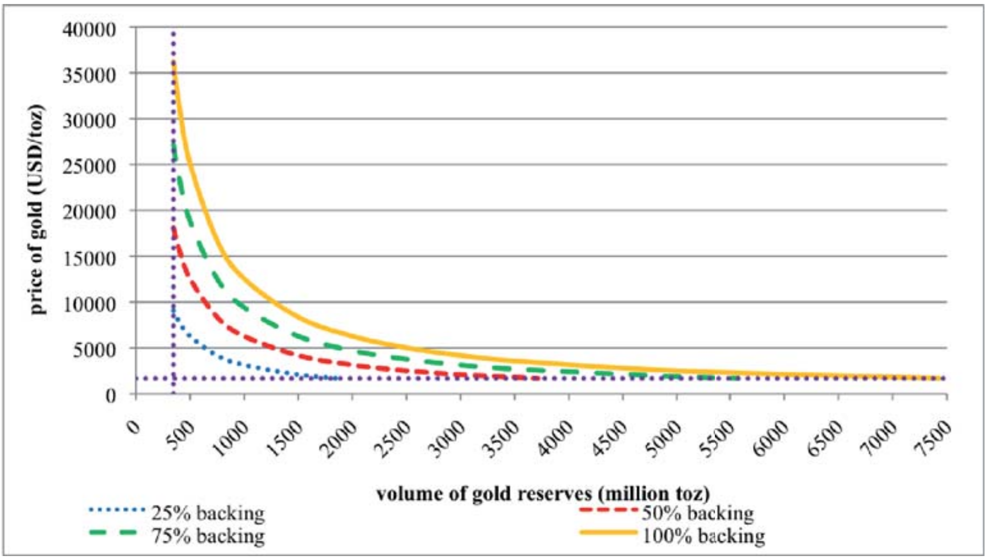
Monetary Gold Backing in the Eurozone and China

As it is apparent from Table No. 1, the Eurozone owns a significant share of the gold reserves. We could thus deduce that it is the next potential country for a currency backed by gold. The Euro is the world reserve currency number 2.

In November 2012 the main monetary aggregate of the Eurozone, M3, reached 12,557 trillion USD (converted from EUR). If ECB would decide to back the currency by gold, then Eurozone would need even larger gold reserves than in the case of the USA and the USD. Gold reserves of ECB and the central banks of the member states were on the level of 10 783 metric tons in December 2012, i.e. 346 691 145 toz. This volume of gold would back the M3 aggregate at the level of 4.666%.

Graph 4

Gold backing of the Eurozone's M3 at different volumes of reserves and prices of gold



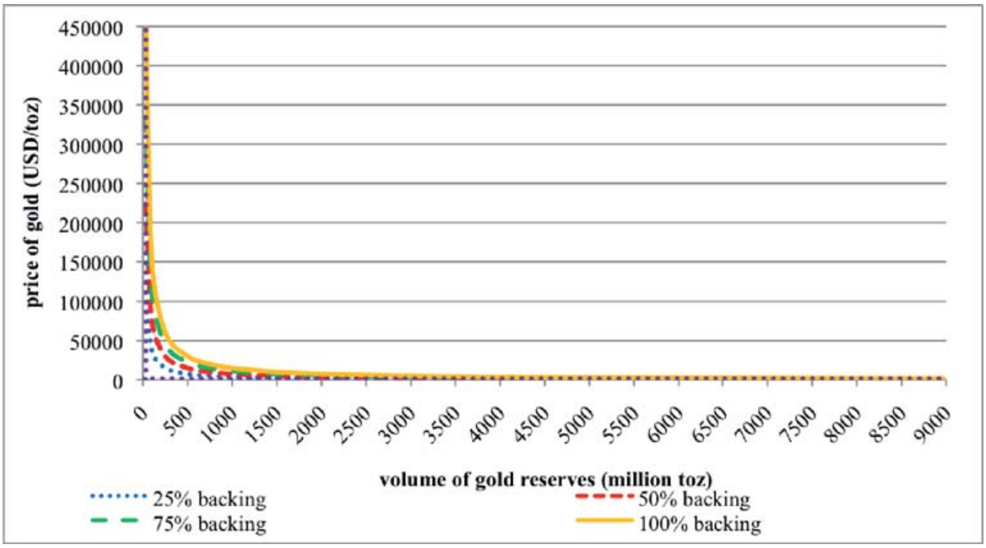
Source: Own processing, using data of ECB [14]

Similarly as by Graph No. 3 in the case of the USA, Graph No. 4 depicts several possibilities of the Eurozone's M3 backed by gold. The graph shows that, similarly as in the case of the USD, also when trying to back EUR by gold, it would be necessary to reach multiple growth of gold reserve volumes besides significant increase of the gold price. And, just like in the case of the USA, also the Eurozone would have to ask the question, where to get the source of such volumes of gold and resources for such volumes of gold.

China is not hiding its ambition to become the world economy number one and gradually decrease its dependency on the USD. Financing the purchase of gold should not be at the first glance a problem for China, which has massive foreign exchange reserves. Chinese foreign exchange reserves can be marked as the largest in the world. However, by a closer analysis we find a problem – to what extent is it possible to use these reserves for the purchase of gold ? It is also necessary to realise that the main Chinese monetary aggregate M2, is almost 50% larger than the M2 of the USA? Except that, there is the obvious issue – where to buy all that gold?

Graph 5

Gold backing of the Chinese M2 at different volumes of reserves and prices of gold



Source: Own processing, using data of Tradingeconomics (13)

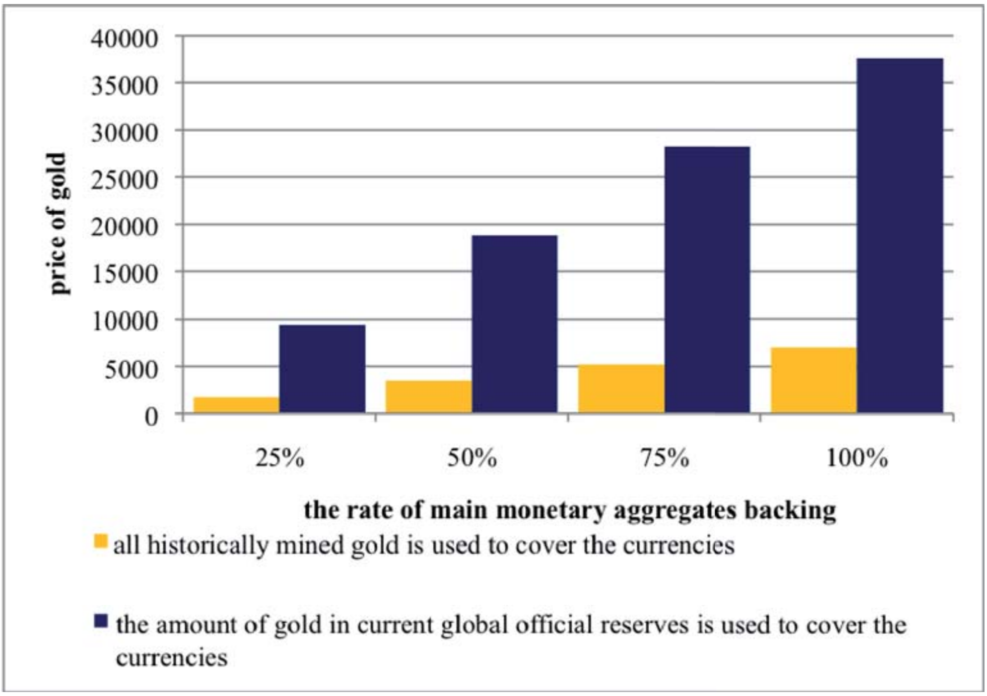
The main Chinese monetary aggregate M2 reached the level of 15,152 trillion USD in November 2012. Official Chinese gold reserves are on the level of 1054 metric tons or 33 890 102 toz. That means that even though China has a much larger money supply in comparison to the USA and Eurozone, their current levels of gold reserves are much smaller. Chinese gold reserves back only 0.378% of the M2 monetary aggregate. For backing 100% of Chinese M2 aggregate by gold, gold price of 450 000 USD would be needed, using current official Chinese gold reserves. On the other hand, by the December gold price of 1690 USD/toz, they would need 2,241 billion toz of gold, just to cover 25% of the M2 aggregate. To cover 50%, China would have to have 4,483 billion toz of gold. To cover the M2 entirely, China would need 8,966 billion toz of gold, i.e. 1,628 times the historically mined amount of gold.

All the previous scenarios assume that only one country (or integration) would try to cover its currency by gold. If such situation occurred and one of the economic powers would decide to adopt gold standard, it is very possible that the others would follow in order not to lose the importance of their currency in the international monetary system. In that case it would be necessary to hoard much larger volumes of gold than mentioned above and by even higher prices than we previously contemplated. The total US dollar value of the M2 monetary aggregates of the USA and China and M3 aggregate of the Eurozone amounted to 38,1 trillion USD by November 2012. Graph 5 depicts the situations where this amount would be covered by gold on the 25%, 50%, 75%, and 100% levels, by two volume alternatives of the used gold reserves:

- The first alternative assumes that all the historically mined gold would be used to cover the currency. This scenario is not real and it serves just for illustration.
- The second alternative assumes that amount of gold equals to the amount of all the gold in current central banks and international institutions holdings would be used to cover the currency.

Graph 6

Parallel backing of the American and Chinese M2 and M3 of the Eurozone



Source: Own processing, using data of The World Gold Council (8), FRED (9), Tradingeconomics (13) and ECB (14)

From Graph 6 it is obvious that all the three currencies could be covered by gold at once only in the case when all historically extracted gold were used, which is not realistic. Using the current global official gold reserves to back the currency would mean that already at the 25% level the price of gold would have to reach almost the 10 000 USD/toz level. This would bring several problems, including the collapse of some large financial institutions that are supposed to be holding large uncovered short positions on gold and silver markets. Such defaults would cause global economic turmoil, much worse than in the case of Lehman Brothers. This turmoil would be even worsened by the fact that much of the gold trading has become virtual, i.e. only 5% of the trade with gold is with physical delivery and the rest are mostly speculative trades linked to different types of derivates. This leads to paradoxical situations, when many times there are such volumes of gold traded, which have never been extracted.

If we also add the fact that large volume of gold is leased for trading and thus there are many fictitious transfers of gold from one country to another, then the volumes of gold in trading are multiplied.

Conclusion

Gold with its unique features has always played an important role in the monetary system. It has symbolized a “safe haven” in times of big economic turbulences and military conflicts. It was meant to be an ideal tool of anti-inflationary protection and a store of wealth.

The current situation in the world economy has led to “comeback” of the attention paid to gold. There is a growing amount of opinions about the need to return to currencies backed by gold. In this study we have quantified the amount of gold reserves and the price of gold needed in order to back some of the major world currencies by gold, on a meaningful level.

Our data and calculations show that re-introduction of the gold standard (a major currency backed by gold) would not be possible under current conditions. To make such a backing meaningful, the gold coverage would have to be on the level of tens of percent. Because of the vast key monetary aggregates it would mean hoarding large volumes of gold. Such a proposal would cause significant growth of demand for gold and thus increases in gold prices. Significant role in this issue is also attributed to other factors. There are relatively small reserves of gold, and it is not possible to find a partner that would have such volumes of gold that would be needed and besides that would be also willing to sell it. It is also very important to consider how the countries would find the resources to purchase such amounts of gold. And last but not least, the surge in gold prices would lead to the collapse of some major financial institutions and further shake the world economy on a much larger scale than in 2008.

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