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Gold and Exchange Rate Volatility: A Critical Review of Literature and Methodological Advances

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Abstract

The current study reviews the gold-exchange rate association with a wider prospect in case of Pakistan. Gold prices have shown a remarkable increase since past few years. Because gold is believed as exchange rate hedge, and instability of Pakistan rupee persists for long hence it is crucial to study gold-exchange rate relationship in Pakistan. The study discusses the great work of literature in context of causality, hedge and safe haven ability, predictive ability and volatility spillover effect of gold and exchange rate to stock indices of micro firms and industries. The study further proposes to examine hedge and safe haven ability of gold and identify impact of gold and exchange rate volatility on stock returns of micro sector using GARCH model. The findings of this study will benefit investors, policy makers and academicians.
Key words: Gold, Exchange rate, Pakistan.

1. Introduction

Investment in gold has inspired numerous research scholars, investors, financial analysts, and economists. Capie, Mills, and Wood (2005) states that gold plays imperative role in monetary system and gold standard became monetary system base in 19th century. However, its real value gradually began to decline due to disintegration of Bretton Woods System in 1971. They discuss that World War I lead the gold standard towards steady decline. It was held by Britain, United States during 1931 and 1933 and few countries maintained it until 1936 which disappeared by the end of World War II. The new international monetary system was known to be the Dollar Standard which was expressed as fixed price of gold (US$ 35.00 per oz).[3] Eventually, system came under strain in the period of 1960s. Bretton woods system completely crumbled in 1971, and gold's official role ceased.

In spite of its classical role, gold continues to be noteworthy among various stakeholders. Demand for gold investment is witnessed as a commodity and financial investment.[4] Gold market is not only centre of attention for investors but also remain insight of policy makers. An idiosyncratic characteristic that gold possesses is the reason of focal point for institutional investors. Conventionally gold is a successful hedge against economic collapses and political turmoil, falling interest rates, currency weaknesses, exchange rate fluctuations, high inflation rates and major financial market's downturns.[5] According to Baur and Lucey (2010), an asset is a hedge

[3]Study explains historical role of gold as monetary base e.g. (Capie et al., 2005)
[4]See for e.g. (Reboredo, 2013b)
[5] Studies have examined gold as a hedge against inflation e.g. (Ghosh, Levin, Macmillan, & Wright, 2004), hedge against dollar e.g. (Capie et al., 2005), safe haven against financial market crisis (Baur & Lucey, 2010) and safe haven against oil price movements for e.g.(Reboredo, 2013a).

when it is uncorrelated or negatively correlated on average with another portfolio or asset. Whereas an asset is a safe haven when it is uncorrelated or negatively correlated in times of extreme volatility and market turmoil with another portfolio or asset. Gold is believed as a hedge and it is due to the fact that in earlier times it remained in monetary system as a base.

Moreover, relationship of gold and dollar has captured attention of investors, speculators and researchers since long. Link between Gold-dollar is expressed according to law of one price which states that dollar depreciations corresponds with increasing gold prices. Puktuanthong and Roll (2014) finds that this theory does not imply for dollar only. Price of gold in a depreciating currency tends to rise and vice versa. Hence, price of gold in appreciating and depreciating currency tends to move in opposite directions giving rise to arbitrage opportunities. In addition, exchange rates are widely traded like gold. The relationship of gold-exchange rates is associated in period of high exchange rate volatility. This volatility has great impact on its economy because when a domestic currency fluctuates against foreign currencies as a result of depreciation, imports in the domestic country turn out to be expensive thus resulting imported inflation. Strong domestic currency on the other hand has vice versa effects on the economy.

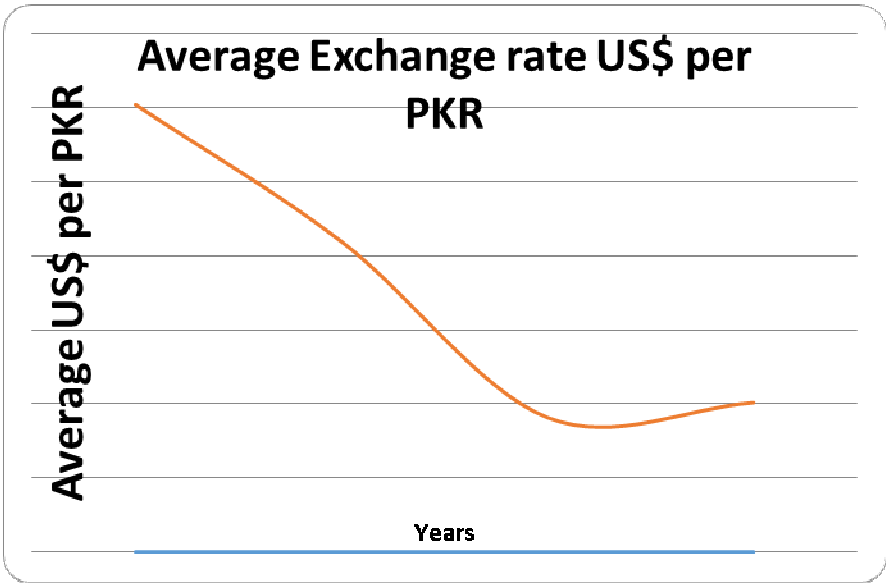

Figure 1: The graph shows depreciation of average US$ per Pakistan Rupee from 1947 to 1981. Source: sbp.org.pk

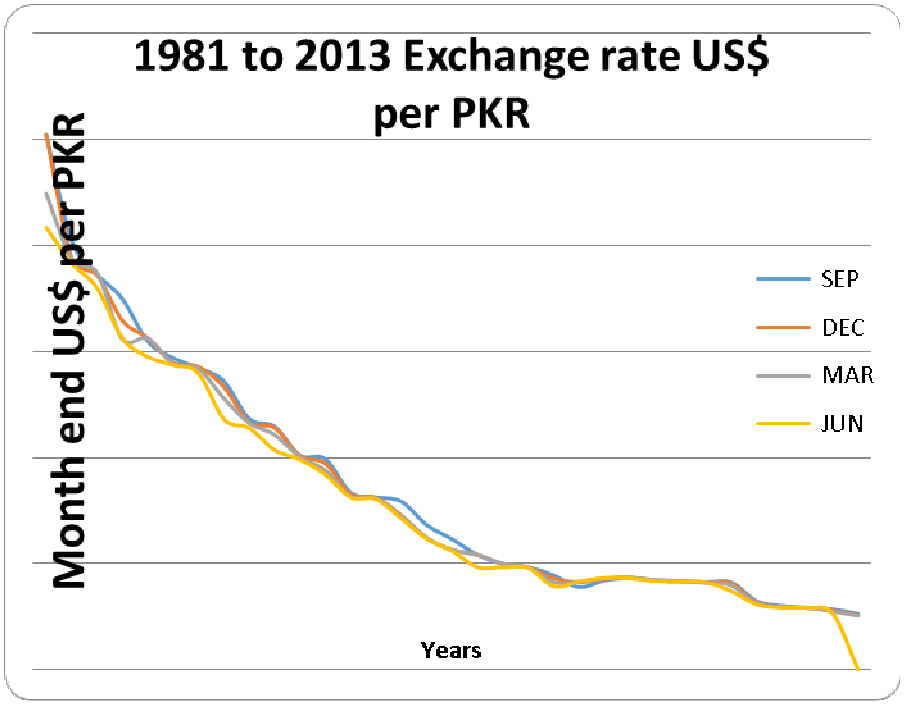

Figure 2: The graph shows depreciation of month end US$ per Pakistan Rupee from 1981 to 2013. Source: sbp.org.pk

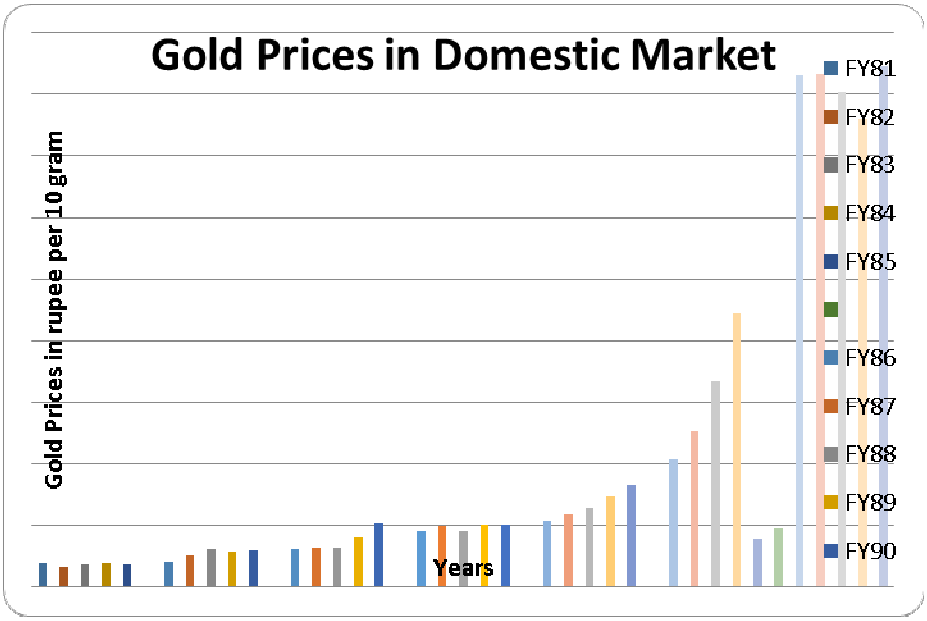

Figure 3: The graph shows Pakistan's gold prices in Karachi and Lahore (rupee per 10 gram) from 1981 to 2016. Source: sbp.org.pk

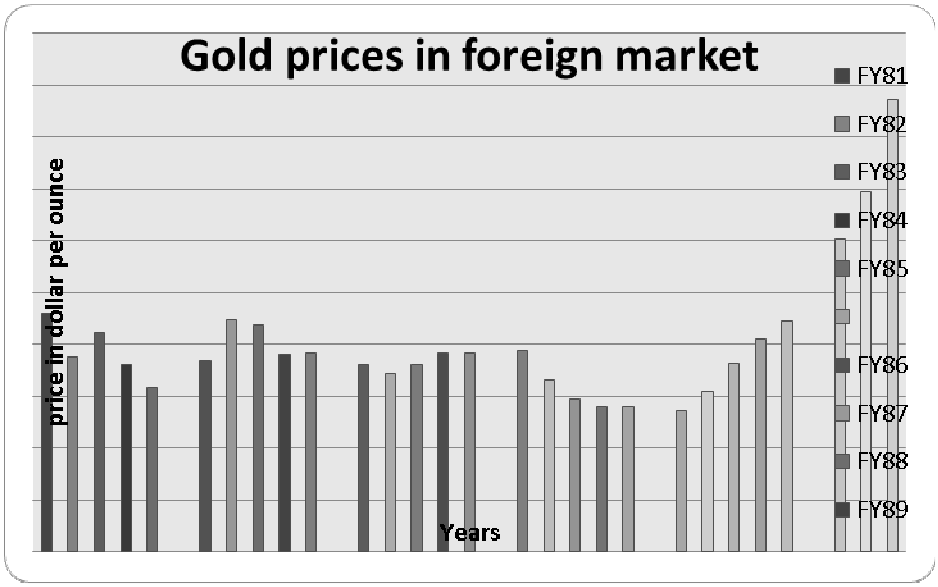

Figure 4: The graph shows gold prices in London (price in dollar per ounce) from 1981 to 2009. Source: sbp.org.pk

2. The Recent Evolution of Gold-Exchange Rate in Pakistan

Pakistan's currency has faced vulnerable position in economy. Pakistan rupee is constantly depreciating in international market. Devaluation of rupee is continuously experienced since 1983, which created worst situation of high inflationary pressures and trade account deficits and is still experienced today. This problem has adversely affected other macroeconomic variables too such as GDP, FDI and BOP. Pakistan's exchange rate is consistently fluctuating since long. Mahmood, Ehsanullah, and Ahmed (2011) describe that Pakistan had first experienced devaluation of rupee by 30% in June 1955, which created a worst situation of high inflationary pressures. This depreciation was a conscious attempt for bringing Pak rupee in line with the currencies of other trading partners of Pakistan. Further, Pak rupee was devalued by 58% in 1972. This depreciation is experienced during 1996 as well loosing 17% of its financial worth. Since last few years specifically 2008, different political issues have depressingly influenced economic factors in Pakistan. Subsequently, financial market was completely devastated due to the murder of Mohtarma Benazir Bhutto on 27 December 2007. Period of 2008 is considered as a worst year for Pakistan's economy. Up till October 2008 rupee has experienced a sharp decline in its worth.

Moreover, high exchange rate volatility in Pakistan has seriously affected stock market performance thus creating uncertainty about future investments. Efficient investment decision is inevitable by investors due to shrinking returns. It is confirmed that rising inflation, political, economic uncertainty and fall in rupee/USD in 2012 has resulted slumps on investment returns[6]. However, despite current severe crises, an unexpected switch of investment in gold is observed due to the fact that gold is generally believed to be safe haven investment. This unexpected increase in demand of gold results in increase in trend of gold prices. Gold prices increased remarkably from 2006 as shown in Figure.5.

According to world gold council, Pakistan has become top ten consumers of gold. As Pakistan has witnessed, sharp increases and frequent fluctuations in gold prices since last few years, it is imperative to study and understand the Gold-Exchange rate relationship in Pakistan. In addition, gold's significance in Pakistan cannot be ignored. Major portion of Pakistan's imports consists of gold and Pakistan has always kept sufficient gold reserves for future stability and security. Highest proportion of trading in Pakistan Mercantile Exchange (PMEX) consists of gold futures, yet Pakistan is devoid of extensive research on the subject cited above. On the other hand, gold and exchange rate volatility not only influences economy on the whole but also particular sectors and industries, financial institutions and financial markets. For example, Textile sector which is major source of revenue for Pakistan's economy has experienced high volatility in stock prices.

There is higher traditional usage of gold in Pakistan in form of jewelry. Gold investment in Pakistan is

[6] See The nation, 2012, Pak rupee weakens most in region in 2012

considered safe investment during unfavorable economic situations. Due to increase in gold prices since February 2012[7], investors prefer investing in gold as it offers higher returns comparative to stocks, bonds and certificate of deposits. Importance of gold is also realized by Pakistan's government since it keeps enough gold reserves for bad times. In addition, gold futures are seen to be greatly traded in Pakistan Mercantile Exchange (PMEX).[8] According to the best of knowledge, studies on commodity predictive ability for exchange rate are few and have been conducted mainly in commodity exporting countries[9]. Moreover, although studies have investigated gold-exchange rate nexus with stock prices at macro level while limited work is done at micro level.

3. Critical Appraisal of Literature

3.1. Empirical Studies on Causal Relationship between Gold and Exchange Rate

Numerous studies[10] have been conducted to investigate gold-exchange rate nexus. The findings of these studies state that there exists relationship between gold and exchange rate movements. However, these studies fail to identify true relationship (such as causal relation, safe haven) between gold and exchange rate. Firstly, Chen and Rogoff (2003) studies on causal relationship between gold and exchange rate are mixed.[11] Findings suggest that either there exist unidirectional causality or bidirectional causality. In context of spillover effect study by Badshah, et al. (2013) finds bidirectional spillover between gold and exchange rate.

Samanta and Zadeh (2012), investigates long run association between oil, gold, US dollar and US stock prices. The author uses daily data and finds that causality runs from gold and stock price to exchange rate and oil while gold is not influenced by other variables. In contrast to these findings, Pukthuanthong and Roll (2011) proves that gold price is related to currency depreciation not only for dollar but also for Euro, Pound and Yen. The study examines sample period from 1971 to 2009 and further infers that exchange rate causes gold returns but not vice versa. Moreover, Sujit and Kumar (2011) studies dynamic relationship between exchange rate, gold, oil price and stock returns. The study uses two models. Gold index in dollar is examined for the first model and gold index in euro for the second one. The study uses daily data from sample period 1998 to 2011 and confirms unidirectional causality from Gold euro to exchange rate but not vice versa. However for gold index in dollar, bidirectional causality is observed.
Recently, Jain and Ghosh (2013) studies dynamic relationship of global oil prices, Indian rupee dollar exchange rate and metals (gold, silver and platinum). On causal relationship between variables, findings reveal that exchange rate causes all other variables including gold while there is no evidence of gold causing exchange rate. Further, in context of spillover effect relation between gold, equity and exchange rate, Badshah, Frijns, and Tourani-Rad (2013) studies contemporaneous spillover effect. They confirm that there exists bidirectional causality between gold and exchange rate volatility indices. Thus, it can be concluded that above studies on gold-exchange rate causal relationship provide mixed results.

3.2. Empirical Studies on Gold as a Hedge and Safe Haven Against Exchange Rate Volatility

Gold has hedge and safe haven property against exchange rate volatility.[12] Studies have investigated the effect of exchange rate fluctuations on gold prices. However, these studies find contradictory results regarding safe haven property of gold.[13] Recent study by Beckmann, J., et al. (2015) provides different and interesting results on hedging properties of gold. Contrary to previous studies, they focus on volatility transmission relationship of exchange rate and gold prices. They conclude that exchange rate depreciations has negative effect on gold prices in different currencies e.g. British pound sterling, euro, Japanese yen and Indian rupee but this trend is reversed in next period. Thus, over all findings on hedge and safe haven property of gold with regard to exchange rate fluctuations is ambiguous.

Sjaastad and Scacciavillani (1996), Sjaastad (2008), Nadeem et al. (2014) and Jan, Wali, and Asif (2015) identify gold price association with currency rates. Former two studies confirm that dollar appreciation or depreciation

[7] Hikes in gold prices 2012 discussed in study of (Nadeem, Zakaria, & Kayani, 2014)
[8] See (Shahbaz, Tahir, Ali, & Rehman, 2014)
[9] (Apergis, 2014; Cashin, Céspedes, & Sahay, 2004; Chen, Rogoff, & Rossi, 2008)
[10] Studies such as [(Badshah et al., 2013; Beckmann et al., 2015; Jan et al., 2015; Joy, 2011; Pukthuanthong & Roll, 2011; Reboredo, 2013b; Reboredo & Rivera-Castro, 2014a; Sjaastad & Scacciavillani, 1996; Sujit & Kumar, 2011)]
[11] Results reveal Bidirectional causality, Unidirectional causality, Unidirectional causality, Unidirectional causality and both unidirectional and bidirectional causality in two different currencies respectively in five of these studies e.g. [(Badshah et al., 2013; Jain & Ghosh, 2013; Pukthuanthong & Roll, 2011; Samanta & Zadeh, 2012; Sujit & Kumar, 2011)]
[12] Studies on hedge and safe haven properties of gold include (Baur & Lucey, 2010; Beckmann et al., 2015; Capie et al., 2005; Reboredo & Rivera-Castro, 2014b)
[13] Converse findings see for e.g. (Joy, 2011; Reboredo, 2013b; Reboredo & Rivera-Castro, 2014a)

influences gold prices while the latter studies suggest negative gold price-exchange rate association. These findings ascertain law of one price. [14] Beckers and Soenen (1984) investigates hedging benefits of gold and finds asymmetric risk diversification of gold's holding positions for US and non US investors. In addition, study of Capie et al. (2005), reveals that gold provides protection against dollar devaluations in UK and Japan. Study confirms that gold is US dollar hedge. However, this relationship varies over time. The author employs EGARCH and uses weekly data sample from 1971 to 2004. But the study neither discriminates average and extreme shocks nor considers feedback effect in analyzing gold as exchange rate hedge. Besides, the study finds no evidence of cross correlation between exchange rate and gold returns in the long run.

In contrast to previous studies, Pukthuanthong and Roll (2011) concludes that gold price has positive association in both appreciating and depreciating currencies. Moreover, Joy (2011) studies gold's hedge and safe haven property against exchange rate. He extends work of Capie et al. (2005) and includes 16 US dollar exchange rate pairs. Throughout, the sample period from 1986 to 2008, the researcher finds that gold is consistently a hedge against US dollar fluctuations however the study finds no evidence of gold as a safe haven for exchange rate.

Zagaglia and Marzo (2013) find that recent financial crisis has not affected gold-USD association leaving hedging properties unchanged. On the contrary, Reboredo (2013b) concludes that gold acts as effective safe haven in periods of extreme USD market movements. He also states that gold is useful in portfolio risk management and confirms hedging property of gold. These results are consistent with Ciner et al. (2013) for both US and UK data. Reboredo and Rivera-Castro (2014b) examine gold's hedging properties in different time horizons. Results of the study suggest that both USD depreciation and gold are positively dependent against all currencies (Australian dollar, British pound, Norwegian krone, Swiss franc, Canadian dollar and euro) except Japanese yen. Reboredo and Rivera-Castro (2014a) distinguish average and extreme value time period on the basis of a likelihood ratio test. The finding of the study supports gold's role as a hedge but on the other hand gold as a weak safe haven.

On the contrary, Beckmann et al. (2015) provides new standpoint regarding gold-exchange rate relationship. They include five currencies in their study (US dollar, euro, pound, Japanese yen and Indian rupee). Results reveal that impact of exchange rate depreciation negatively affects gold price. However, this impact is regressed to positive after one day. While impact of gold price volatility on exchange rate is inconclusive since both positive and negative correlation results are observed. However, US dollar is an exception to these results and confirms strong hedging relation of gold. Over all findings of these studies are ambiguous.

3.3. Empirical Studies on Commodity Forecasting for Exchange Rates

Chen et al. (2008) finds that exchange rates are better predictors of commodity prices while commodity prices are probably less anticipating due to the fact that commodity prices are extremely responsive to supply and demand shocks. On the contrary to study of Chen and Rogoff (2003) who find evidence for in sample prediction of commodities for exchange rate, Apergis (2014) investigates gold's forecasting ability for Australian dollar. He concludes that out of sample forecasting of gold is robust in short and long run. Second, vast literature[15] exists on the impact of commodity prices on exchange rates in commodity exporting countries such as Australia, New Zealand and Canada. Gold is also found to have predictive ability for exchange rate. Recently, Apergis (2014) explores impact of gold prices on exchange rate for forecasting purpose in Australia which is largest gold exporter. To the best of our knowledge, limited studies address gold's predictive ability for exchange rate in gold importing country. Furthermore, Le,T.H., & Chang, Y. (2011), Irshad, H.,Bhatti, G.A., Qayyum, A., & Hussain, H. conduct study in gold importing country. The focus of these studies is relationship between gold and exchange rate but has not focused on forecasting ability of gold.

3.4. Empirical Studies on Gold, Exchange Rate and Stock Price Relationship at Micro Level

Scarce research is done on examining gold, exchange rate and stock prices relationship in particular sector. Chan and Faff (1998) studies returns of Australian industry equities and their sensitivities associated to gold prices. The study finds that resource and mining sectors shows positive response to change in gold prices but industrial sector responds negative.

Liao and Chen (2008) identify relationship between gold, oil and Taiwan industrial sub indices. Results indicate that oil price volatility spillovers to electronic and rubber industries while gold price volatility has spillover effect on cement, automobile, food and textile industries.

3.5. Gap in the Literature

First, the earlier studies which has not been examined and considered both macro and micro level. Second,

[14] Law of one price states that an asset should be sold at the same price in an efficient market otherwise an arbitrage opportunity will be created. It is based on purchasing power parity theory. This law is applied to gold because if gold is fixed to a measure of value then gold price in depreciating currency will increase and vice versa thus moving gold prices inversely in two different currencies.

[15] Studies such as (Antonakakis & Kizys, 2015; Cashin et al., 2004; Chen & Rogoff, 2003; Chen et al., 2008)

considering severe exchange rate fluctuations and adverse economic situation in Pakistan; none of research has been conducted so far in Pakistan according to our best estimate on the subject matter discussed above. This can be of interest for investors and portfolio managers. It will assist investors in preferring low risk investment avenue and guide portfolio managers in maintaining optimum portfolio that offers hedging and risk mitigation. It is due to the fact that gold has proved to be best diversifier in reducing risk.[16]

Third, the study has ignored gold's forecasting ability for exchange rate in Pakistan. Previous studies in this context have been conducted in commodity exporting countries[17] while Pakistan is gold importing country. Afzal, (2007), explains that imports of a country affects investment environment and possess long run relationship with exchange rate. Moreover, exchange rate stability is a macroeconomic indicator and is closely monitored by economic analysts and policy makers therefore findings will be useful for them in making wise economic decisions and devising policies accordingly by analyzing movements in gold prices.

Fourth, due to fluctuations observed in gold market, stock returns of corporate sector and Pakistan's exchange rate; limited studies have been conducted at micro level.[18] It has useful implications for speculators and investors as investor's decisions are influenced in case of poor of economic prospect. Moreover, although in a developing country like Pakistan gold-exchange rate relationship has been identified but hardly any studies has yet examined gold-exchange rate relationship comprehensively to the best of my knowledge. Besides, studies conducted in Pakistan have only considered US dollar as a foreign currency against PKR which is domestic currency.[19] As imports and exports exert great influence on a country's exchange rate,[20] i.e. when the domestic currency depreciates, imports decline and exports increase. Therefore, it is vital to study Pakistan rupee against currencies of trading partners of Pakistan.

Fifth, studies on gold-exchange rate relationship in literature is devoted on examining dynamic relationships between gold, exchange rate and stock prices at macro level. [21] These studies deal with stock prices at country level while limited studies are conducted at micro level. [22] Thus, keeping in view the stock price fluctuations in corporate sector of Pakistan, current study determines volatility transmission of gold and exchange rate on stock returns of industries in Pakistan. Finally, studies conducted in Pakistan in this regard considered gold relation with dollar only as a foreign currency. While other currencies can be investigated and taken into account. For example, the study may consider five foreign currencies i.e. (major trading partners of Pakistan) against rupee due to significant influence of import-export on exchange rates.

4. Conclusions and Possible Direction for Future Research

Currently, Pakistan faces instable economic situation which has increased fluctuations in gold prices and exchange rates. It is observed that gold has captured attention of institutional investors since gold prices rise is witnessed in Pakistan. This paper attempts to review the role of gold extensively for exchange rate and relevant findings are analyzed for both variables. The causality analysis review indicates that hardly gold cause exchange rate while evidence of exchange rate causing gold is confirmed. While limited studies find existence of bidirectional causality between gold and exchange rate. Gold has remained a hedge due to its significant role played in monetary system in the past. Moreover, gold is not influenced by government control. Gold possesses predictive ability for exchange rate but literature finds both in sample predictive ability in a study and out of sample prediction in the other. Finally, analysis on relationship of gold, exchange rates and stock prices in micro sector is almost nonexistent.

Future studies can use daily data of Rupee exchange rate returns against closer markets who share close trading association with Pakistan (for example, China, UAE, Saudi Arabia, USA and European Union) and gold prices in Pakistan. For instance, China is largest gold producers in the world and share intimate armed association with Pakistan. Both countries are connected in joint defense projects. Furthermore, China supports Pakistan on different issues including Kashmir issue and cooperates in providing extensive funds for improvement of infrastructure. Furthermore, UAE is 5th largest Gold importer and strong economic partnership is shared

[16] See for e.g. (ChuaJess & WoodwardRichard, 1990; Reboredo & Rivera-Castro, 2014b)
[17] Commodity exporting countries including Australia, New Zealand and Canada see e.g. (Apergis, 2014; Cashin et al., 2004; Chen & Rogoff, 2003; Clements & Fry, 2008)
[18] See (Liao & Chen, 2008)
[19] Studies conducted in Pakistan (Jan et al., 2015; Nadeem et al., 2014)
[20] (Afzal, 2007) explains importance of imports in exchange rate determination
[21] Various studies on gold-stock prices relationship such as (Badshah et al., 2013; Basher, Haug, & Sadorsky, 2012; Baur & Lucey, 2010; Baur & McDermott, 2010; Beckmann, Berger, & Czudaj, 2014; Bilal, Talib, Haq, Khan, & Naveed, 2013; Irshad, Bhatti, Qayyum, & Hussain; Le & Chang, 2011; Miyazaki, Toyoshima, & Hamori, 2012; Phylaktis & Ravazzolo, 2005; Samanta & Zadeh, 2012; Shahzadi & Chohan, 2012; Sujit & Kumar, 2011)
[22] See e.g. (Chan & Faff, 1998; Liao & Chen, 2008)

between Pakistan and UAE. Another close trading is with Saudi Arabia. Saudi Arabia and Pakistan have also developed extensive cultural, commercial, and political relations since formation of Pakistan in 1947. Finally, European Union friendly relations with Pakistan cannot be denied. European Union has always assisted Pakistan in times of crises. However, among European Union countries, Germany is largest trading partner of Pakistan. Looking Rupee exchange rate in perspective of these currency countries will be interesting. Estimation methods such as VAR, GARCH and EGARCH can be used and the study can be conducted over the period from February 1992 till July 2015. It is because of severe rupee depreciation which is witnessed in these periods particularly in the period of 1996. Secondly, this time span captures two main financial crises i.e., Asian financial crisis (1997) and Global financial crisis (2007-2008).

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