View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by University of Johannesburg Institutional Repository

PRECIOUS METALS AS SAFE HAVEN ASSETS IN THE SOUTH AFRICAN MARKET

David A Hunt, University of Johannesburg, South Africa
*Corlise L le Roux, University of Johannesburg, South Africa
Niël Oberholzer, University of Johannesburg, South Africa

Abstract The role of precious metals as hedges and safe havens has been extensively studied across various markets. However, no precious metals other than gold have been considered in a South African setting. This study extends previous literature by making use of the methodology established by Baur and Lucey (2010) to determine which of the four precious metals provides the most viable hedge and safe haven in relation to the domestic stock and bond markets for South African investors? The results suggest that all four precious metals have significant hedging properties in relation to domestic bond market but not the stock market. It was also determined that while all four metals contain safe haven properties, gold is the only precious metal to act as a significant safe haven against both South African stocks and bonds.

Introduction

The industrial revolution brought about the single greatest development of world economic history that ushered in an age of dramatic growth internationally across numerous sectors and industries (Clark, 2013). This growth is particularly notable in the financial sector, which saw an enormous increase in growth towards the second part of the twentieth century according to Greenwood and Scharfstein (2013). One of the many avenues of research that has stemmed from the increased size of the financial sector globally is the relationship between financial development, economic growth and how this interrelationship relates to a country's respective degree of participation in the world economy. The phenomenon alluded to, involving the interaction of all three elements, is referred to as the 'finance-growth-globalization nexus' (Rousseau & Sylla, 2003) and it has received a considerable amount of interest. The phenomenon can be associated to the long-held theory that in order to encourage welfare and growth in any economy, it is crucial for an effective financial system to be present.

While this sentiment is popular it is not one shared by all and the divisiveness of this theory has been pointed out by Alaabed and Masih (2016). Despite this divisiveness the 'finance-growth-globalization nexus' is generally considered to be positive by academics and regulators, according to Beck, Degryse and Kneer (2014). However, Wyplosz (1998) points out that the increasing frequency of financial crises over the last few decades raises questions as to whether the continued growth and integration of the financial industry globally can and should be regarded as a positive occurrence or not. The reasoning behind Wyplosz's (1998) view is that while there are undoubtedly a number of factors and elements that contribute to financial crises, globalization is considered by many as a contributing factor with the most consequences. This view is reaffirmed by Mendoza and Quadrini (2010) who highlight the important role played by globalization, specifically in the subprime real estate crisis of 2007/8. Globalisation as a contributing factor in this instance is significant. In addition to the significant influence of globalization, Luchian and Filip (2015) report that it has been claimed that the continued liberalization of world trade and markets contributes to and compounds the severity, as well as the frequency, of financial crises in general.

In light of the gradual continuation of financial globalization, attention is drawn by Schularick (2011) to the fact that between 1870 and the subprime crisis of 2007/8, there were no fewer than 71 systemic banking crises and that it can be expected that over the course of a similar time frame in the future this figure would increase. The expected increase in the severity and frequency of crises might have far reaching implications for investors and it is important, therefore, to consider relevant factors relating to financial crises. It has been suggested by many that the majority of financial crises are characterized by high levels of contagion and volatility (Caporale, Pittis & Spagnolo, 2006; Schmukler, Zoido & Halac, 2003). One of the most worrying implications is the claim that financial crises characterized by high levels of volatility can lead to increased equity market correlations which would result in markets behaving similarly (Baig & Goldfajn, 1999; Diamandis, 2009; Sandoval & Franca, 2012). An increase in the levels of volatility, contagion and market correlations should be of great concern to investors because of the significant extent to which these consequences are able to impact on some of their primary objectives, such as the pursuit of wealth creation, management and preservation.

In the pursuit of these objectives, investors have in the past, during periods of market turmoil and uncertainty, made use of various strategies. Some of these strategies were aimed at attaining higher returns, others were based on bearing lower levels of risk, and a few relied on both elements. Strategies that rely on both elements, such as a flight to safety and quality make use of diversification to insulate them from adverse market conditions. The 'flight to quality' phenomenon which is characterised by investors moving away from the stock market to either cash or the bond market as pointed out by Gulko (2002), does not offer the same benefit to investors that it once did. The effectiveness of a flight to quality and safety seems to have diminished over the years as a result of increasingly integrated and illiquid bond and stock markets (Goyenko, 2006; Kaminsky & Reinhart, 2002). The co-movement of conventional assets and continued market integration, a principle of diversification, was famously referred to by Nobel laureate, Harry Markowitz as the 'only free lunch' in finance. This 'free lunch' might not be as effective as it once was when employed in conjunction with conventional asset classes. In the face of more frequent and severe crises, as well as the continued integration of markets, investors are constantly searching for potential solutions to address the growing inefficiency of diversification using traditional asset classes.

In recent years investors have considered, amongst other things, alternative investments as a potential solution to the problems posed by these growing concerns. The appeal of alternative investments across investor types in this regard can, according to Baker and Filbeck (2013:25), be attributed to 'their generally low correlation with traditional financial investments'. To investors wary of these developments, Baur and Lucey (2010) point out that the 'increased interdependence among markets and more traditional asset classes create the potential need for an asset that is relatively simplistic and safe: a haven'. One such haven that has generated a great deal of interest over the last decade is that of gold. Over the course of the last few decades, gold has been alluded to by the financial press as a safe haven. However, humankind has been obsessed by it for millennia. It has historically been an unparalleled symbol of wealth and has been traded in markets for over 6000 years according to Green (2007). Man's fascination with this metal is reflected in written accounts over the course of the last six centuries. King (1865:94) emphasizes this point by referring to the writings of an ancient Roman philosopher, Gaius Plinius Secundus who in reflection describes the characteristics of gold, specifically the color that infatuates mankind: 'The golden nugget, glittering amongst the pebbles of the stream, caught the eye of primitive man, who saw in it the image of the sun, the oldest object of worship, and of whom gold has ever since continued the symbol'.

The ability of gold to intrigue people has not diminished over the course of the last six centuries. This precious metal's propensity to serve as both a hedge and safe haven has been intensively studied and, more recently, it has been established (Baur & Lucey, 2010) that gold is able to act as a safe haven in times of market turmoil. This finding has propagated various questions regarding the potential safe haven and hedging properties of other precious metals; specifically silver, platinum and palladium. While gold is clearly the most acclaimed of the precious metals Lucey and Li (2015) have pointed out that the three remaining precious metals might in certain circumstances act as better safe havens. The ability of any precious metals to serve as either a hedge or safe haven in a specific market should, therefore, be investigated on a case-by-case basis. The indications are that these properties seem not to be homogeneous across markets and vary depending on the market (Beckmann, Berger & Czudaj, 2015). The variation in precious metal properties across markets, coupled with the challenges resulting from the globalization and integration of financial markets necessitates the testing for potential safe haven and hedging properties in developing markets such as South Africa.

The volatility and uncertainty of markets in recent times has made it increasingly difficult to ignore the potential benefits offered by precious metals. There is already a foundation established in the literature, which supports the beneficial hedging and safe haven properties of precious metals. Despite the increase in interest relating to the investment properties of precious metals, research regarding this topic remains relatively sparse with regard to emerging markets and more specifically South Africa. Only a few studies investigate the properties of precious metals from the perspective of a South African investor and most of these consider only one precious metal, gold. The limited scope of these studies indicate the need to address the shortfall in research on potential hedging and safe haven benefits of precious metals from the perspective of the South African investor.

The concerns and shortfalls identified in the problem statement gives rise to an important question: Which of the precious metals, gold, silver, platinum or palladium, provides the most viable hedge and safe haven in relation to the domestic stock and bond markets for South African investors? A time period spanning almost 16 years is considered, which includes various periods of economic turmoil necessary in measuring hedging and safe haven properties. The

time period begins 3 January 2000 and ends on 2 September 2016. This question spanning a period of 16 years must be addressed through the research objectives.

Data and Methodology

The quantitative precious metal, equity and bond data are secondary data and were collected from Thompson Reuters Datastream. This study made use of raw data in the form of daily closing prices. In line with the methodology set out by Baur and Lucey (2010) the daily closing prices are obtained for the ALSI, ALBI and gold, silver, platinum and palladium spot prices. ALSI refers to the Johannesburg Stock Exchange All Share Index and ALBI refers to the Johannesburg Stock Exchange All Bond Index. The data are time series in the form of daily closing prices.

The sample covers a time period spanning almost 16 years starting on the 3rd of January 2000 and ending on the 2nd of September 2016. The data range includes a total of 4081 data points in the sample which may increase when lagged terms are included when testing for the most appropriate fitting model. The closing price data were initially denominated in USD, however, the data was converted to ZAR in order to make the results relevant for South African investors.

The framework for defining precious metals as either a hedge or safe haven was established by Baur and Lucey (2010). The term 'diversifier' is also defined although it is not relevant in the present case. Baur and Lucey (2010) define a hedge as an asset that on average is uncorrelated or negatively correlated with another asset or portfolio. The definition for a safe haven is similar to that for a hedge but differs from the latter in terms of the time frame. A safe haven is an asset that, similarly to a hedge, is uncorrelated or negatively correlated with another asset or portfolio. However, it differs in that these conditions are applicable during times of market stress or turmoil. Furthermore, the authors only clarify that the defining property of a safe haven is its non-positive correlation with an asset or portfolio in extreme market conditions. This property means that the correlation can generally be positive or negative, however, it must be either zero or negative during times of turbulence and market distress. The theoretical framework for defining each of the precious metals as either hedges or safe havens enables the development of a hypothesis that can then be tested.

The hypothesis relevant in the present case is similar to that put forward by Seetharam et al. (2015), which considers only the ability of gold to act as a hedge in relation to the domestic stock and bond market as well as gold's ability to act as a safe haven in relation to international stocks, along with domestic stocks and bonds. In the present case the hypothesis put forward by Seetharam et al. (2015) is expanded to include silver, platinum and palladium but it only considers the safe haven and hedging properties of these four precious metals in relation to the domestic stock and bond markets and not any international markets.

The hypotheses developed from the theoretical framework:

H1. Gold/Silver/Platinum/Palladium is a hedge for stocks and bonds in the South African market.
H2. Gold/Silver/Platinum/Palladium is a safe haven for stocks and bonds in the South African market.

Least-squares regression is a generalized linear modelling technique used to estimate the relationships between dependent and independent variables. In order to test the hypothesis that has been developed and, in doing so, determine whether the four precious metals act as hedges or safe havens in relation to the domestic stock and bond market it is necessary to model the relevant variables using regression analysis. This step is in line with the methodology set out by Baur and Lucey (2010), who use a dynamic regression model to investigate the precious metal gold which is denoted by the term 'pm' in the following equation:

$$r_{pm,t} = a + b_1 r_{stock,t} + b_2 r_{stock,t,(q)} + c_1 r_{bond,t} + c_2 r_{bond,t,(q)} + e_t \quad (1)$$

The regression model presented by this equation is the principal model used to determine the safe haven and hedging ability of all four precious metals. In this equation rpm, r_{stock} and r_{bond} represent the returns of the relevant precious metal prices, ALSI and ALBI. In order to highlight falling domestic stock and bond markets the terms $r_{stock,t,(q)}$ and $r_{bond,t,(q)}$ are included. They represent asymmetries of extreme positive and negative shocks. The role played by a precious metal during times of extreme market conditions is particularly relevant to the study and is determined through the inclusion of regressors that contain stock or bond returns that are in the q percent lower quantile, specifically the five percent, two and a half percent and one percent quantiles. If any of the returns are found to be

larger than the q percent quantile they do not represent extreme market conditions and the value of $r_{stock,t,(q)}$ or $r_{bond,t,(q)}$ is zero. The only time that the parameters b_2 and c_2 can be viewed as vectors is when any or all of the three thresholds are estimated simultaneously. The model also assumes that the price of a precious metal can be affected by both contemporaneous as well as lagged stock and bond returns.

In order to investigate and address this assumption it is necessary to consider the link between variables dynamically and determine the optimal lag length. Therefore, an asymmetric GARCH process is estimated for the error term in the regression equation. The GARCH model was popularized by Tim Bollerslev and similarly to its precursor the Autoregressive Conditional Heteroskedastic (ARCH) model it contains a weighted average of past squared residuals. How- ever, Engle (2001) points out that in contrast to ARCH models its weights decline but never fall to zero. Furthermore, this model type addresses the additional drawback of its precursor, the ARCH model, in that the specification appears closer to a moving average than that of an autoregression by including lagged conditional variance terms as autoregressive terms (Asteriou & Hall, 2010).

The GARCH model extension, while similar to that of ARCH models, is more flexible and therefore more capable of matching a wide variety of financial volatility patterns, according to Koop (2006). In line with Engle's (2001) argument, a GARCH process is ideally suited to model the present case because of the fact that the stock, bond and precious metal data's variance of error terms can reasonably be expected to vary across the range and that the GARCH process is able to treat this expected heteroskedasticity as a variance and model it. The determination of the lag length and relevant GARCH model is selected according to certain predetermined estimators. The greatest number of corresponding estimators that are in agreement is generally an indication of the optimal length; however, the methodology set out by Baur and Lucey (2010) suggests that both the Akaike information criterion as well as the Schwarz information criterion should be considered when determining the optimal lag length and GARCH model. The asymmetric GARCH model for the error term is specified in the following equation:

$$h_t = ae_{t-1}^2 + \gamma e_{t-1}^2 D(e_{t-1<0}) + \beta h_{t-1}. \quad (2)$$

The asymmetric GARCH model forms an integral part of the dynamic regression model and when both are estimated the relationship between the dynamic regression model representing each of the four precious metals and the hypotheses developed from the theoretical framework can be explained. When determining whether a precious metal is a hedge or safe haven by way of either accepting or rejecting the hypotheses, both *b* and *c* coefficients or parameters of the dynamic regression model in equation 1 are important indicators. Therefore, the first hypothesis will be accepted and either of the four precious metals can be considered a hedge for domestic stocks if the parameter b_1 is found to be zero or negative. If the parameter c_1 is determined to be zero or negative then the second hypothesis will be accepted and either of the four precious metals can be considered a hedge for domestic bonds. In both of these cases the first hypothesis will be accepted because these conditions, when present, conform to the definition of a hedge since the assets are uncorrelated or negatively correlated with the stock and/or bond market on average.

The second hypothesis relates to safe havens. It will be accepted if the sum of the b_1 and b_2 parameters in equation 1 are non-positive. In other words if the hypothesis is accepted, the respective precious metal can be considered a safe haven asset for falling stocks during periods of extreme market stress. If the sum of the c_1 and c_2 parameters is non-positive then the hypothesis will also be accepted and the respective precious metal can be considered a safe haven asset for falling bonds during periods of extreme market stress. In the case of both stocks and bonds the respective metal will be considered a safe haven owing to the fact that these conditions, when present, conform to the definition of a safe haven since the assets are uncorrelated or negatively correlated with the stock or bond market during times of market stress and turmoil. The overall effect for any of the three quantiles (five percent, two and a half percent and one percent) is determined by the sum of all the coefficient estimates up to the relevant quantile. When a negative correlation is present between precious metals and either stocks or bonds during times of market turmoil, Baur and Lucey (2010) state that investors will be compensated for losses incurred from stock and bond investments by rising precious metal prices.

Empirical Results

The results derived from the regressions of each of the precious metals determined through the dynamic and asymmetric GARCH model equations are presented below. The regression analyses concern the hedging and safe haven properties of gold, silver, platinum and palladium in relation to the South African ALSI and ALBI. The hedging and safe haven findings with regard to the regression analyses for each of the precious metals are discussed and are followed by the results pertaining to the conditional volatility for each of the respective precious metals, determined by means of GARCH models.

The hedging, safe haven and conditional volatility properties of the gold are as follows. The coefficient estimate for the marginal effect of contemporaneous South African stocks on gold is 0.073. The coefficient is positive and highly significant at a five percent confidence level. Although this result is significant it indicates that gold does not act as a hedge in relation to South African equities. The coefficient estimate for the marginal effect of contemporaneous South African bonds on gold is -0.7429. The coefficient is negative and highly significant at a five percent confidence level. This indicates that gold does indeed act as a hedge for South African bonds on average. Gold is a safe haven in relation to domestic stocks for shocks exceeding both the two and a half percent and one percent quantile. The results are significant only for the lowest one percent of returns with a safe haven coefficient of -0.2012. Gold also does act as a safe haven for South African bond investors. The GARCH results show that the α coefficient indicates that past shocks have a statistically significant impact on future volatility. The β coefficient implies that the previous value of volatility is effective in explaining current levels of volatility. The sum of the α and β coefficients is one and an indication that shocks will persist in the future. Finally γ has a negative coefficient which suggests that the magnitude future change of conditional variance for positive shocks is disproportionately higher in comparison to negative shocks of the same sign.

The hedging, safe haven and conditional volatility properties of the silver are as follows. The coefficient estimate for the average effect of stocks on silver is highly significant at a five percent level of confidence but not negative or zero and therefore not a hedge in relation to the domestic stock market. The coefficient estimate for the marginal effect of contemporaneous South African bonds on silver is -0.5203 and highly significant at a five percent confidence level, silver does act as a hedge for South African investors in relation to the domestic bond market. Silver is therefore not a safe haven for the South African stock market or bond market when the full sample period is considered. The GARCH results show that the α coefficient in this case indicates that past shocks have a meaningful impact on future volatility. The β coefficient implies that the previous value of volatility is effective in explaining current volatility. The total value of the α and β coefficients is one and this indicates that shocks will persist in the future. Last, γ has a negative coefficient, indicating that future shocks signify a disproportionately higher future conditional variance compared to negative shocks of an identical sign.

The hedging, safe haven and conditional volatility properties of the platinum are as follows. The coefficient in the case of platinum is highly significant at a five percent level of confidence but not negative or zero and therefore not a hedge for the domestic stock market. Platinum serves as a hedge for the domestic bond market, however it does not serve as a significant safe haven for either South African stocks or bonds. The GARCH results show that the α coefficient indicates that past shocks have a statistically significant impact on future volatility. The β coefficient implies that the previous value of volatility is effective in explaining current levels of volatility. The sum of the α as well as β coefficients is one and indicate that shocks will persist in the future. Finally, γ has a negative coefficient, which implies that the magnitude future change of conditional variance for positive shocks is disproportionately higher in comparison to that of negative shocks with a similar sign.

The hedging, safe haven and conditional volatility properties of the palladium are as follows. In the case of palladium the coefficient estimate for the average effect of stocks on palladium is highly significant at a five percent level of confidence but not negative or zero and, therefore, not a hedge in relation to the domestic stock market. The coefficient estimate for the marginal effect of contemporaneous South African bonds on palladium is -0.5326 and is highly significant at a five percent confidence level. This result indicates that palladium serves as a hedge for South African investors in relation to the domestic bond market. Palladium does not contain safe haven properties in relation to the domestic stock market. In contrast to the stock market palladium appears to contain safe haven properties in relation to the domestic bond market. Palladium is a better safe haven for investors against bond market turmoil than it is in relation to stock market turmoil. The GARCH results show that the α coefficient indicates that past shocks have a meaningful impact on future volatility. The β coefficient implies that the previous value of volatility is effective in

explaining current levels of volatility. The sum of the α and β coefficients is one and this implies that shocks may persist in the future. Last, γ has a positive coefficient, suggesting that future shocks will have a disproportionately higher future conditional variance compared to negative shocks of an identical sign. However, the γ coefficient is not statistically significant and, therefore, the future shocks relating to palladium will have no significant impact.

Conclusion and Implications

The results and findings of the study that pertain to the hedging and safe haven properties of gold, silver, platinum and palladium are relevant to South African investors looking to safe guard against turmoil in both the domestic stock and bond markets. The results indicate that precious metals are able to provide both hedging and safe haven properties to investors to a certain extent over the entire sample period. Of all the precious metals gold has received the most widespread attention in the financial news as a premier source and store of value (O'Connor, Lucey, Batten, & Baur, 2015). The findings of this study contend that there is merit to the widespread acclaim and attention that gold has received over the years.

The results indicate that although gold does not serve as a hedge for investors in relation to the domestic stock market, it does serve as a hedge against the domestic bond market with a significant negative coefficient estimate. With regard to gold as a safe haven it was determined that gold does contain safe haven properties in relation to both domestic stocks and bonds across all thresholds with the exception of the five percent quantile for the domestic stock market. The coefficient estimates that were found to be statically significant at a five percent confidence level are stock returns at the lowest one percent quantile and bonds at a five percent threshold.

The conditional volatility findings that relate to gold indicate positive coefficients for all of the estimates with the exception of γ. All of the coefficients are also statistically significant at a five percent level of confidence. Last, the negative coefficient of γ implies that the magnitude future change of conditional variance for positive shocks is disproportionately higher in comparison to those of negative shocks of the same sign.

The findings of silver relate more closely to those of gold than any of the other precious metals that are considered. In line with the findings related to gold it was found that silver is not a hedge against the South African stock market but can be considered a hedge for the domestic bond market, owing to the fact that the results indicate a significant negative coefficient for silver. The study, therefore, determined that silver did not contain any safe haven properties in relation to the domestic stock market over the sample period. In contrast to the stock market it is established that silver contains safe haven properties in relation to the bond market, as indicated by the negative coefficient estimates for the two and a half percent and one percent quantile. However, they are not significant at a five percent level of confidence.

The coefficient estimates that pertain to the conditional volatility of silver are all highly significant and positive, with the exception of γ. The γ coefficient is negative and contends that future shocks in the market are indicative of a disproportionately higher future conditional variance compared to negative shocks of the same sign.

The study revealed that platinum and palladium have similar hedging and safe haven results. While both precious metals indicate significant hedging properties in relation to the domestic bond market neither of these metals is able to serve as hedges in relation to the South African stock market.

Furthermore, the findings suggest that both platinum and palladium do not act as significant safe havens for South African investors in relation to the domestic stock market. Despite this, the results indicate that both metals do contain safe haven properties in relation to the South African bond market; however, they are not significant at a five percent confidence level. The study also determined that platinum has negative coefficient estimates across all three thresholds while results pertaining to palladium indicate that both the two and a half percent and one percent quantiles contain safe haven properties.

The conditional volatility of platinum relates closely to that of gold and silver. All of the coefficients are highly significant and positive, with the exception of γ that points to the fact that the magnitude of future change of conditional variance for positive shocks is disproportionately higher in comparison to negative shocks of the same sign.

The results relating to the conditional volatility of palladium differ from those of the previous precious metals. In contrast to other metals the coefficient estimates for palladium are all positive. The coefficients are also all highly significant at a five percent confidence level, with the exception of γ which is not statistically significant and indicates that future shocks will not have a significant impact in relation to palladium.

This study set out to address the research question which enquired as to the most viable hedging and safe haven precious metal for South African investors in relation to the domestic ALSI and ALBI. Through answering the research question, the objective of the study would also be achieved which was to investigate the safe haven and hedging relationships between the four relevant precious metals and the domestic stock and bond markets. In doing so the study extends previous literature by considering additional precious metals to gold in the South African market. By replicating the methodology first set out by Baur and Lucey (2010) the study was able to achieve the objective by determining the relationships between all four precious metals; gold, silver, platinum, palladium and the South African stock and bond market respectively.

It was also determined that all four precious metals have significant hedging properties in relation to the South African bond market but not the stock market and that all four precious metals contain safe haven properties in relation to South African markets. Furthermore the research question was answered when the findings and results revealed the most viable hedging and safe haven precious metal for South African investors to be gold. The findings regarding gold are in line with those determined by Seetharam et al. (2015) who also established that the metal is a hedge and safe haven against the South African stock and bond market. The implications of holding gold during distressed market periods is that a South African investor is compensated for negative stock and bond returns through positive gold returns.

References

Alaabed, A. & Masih, M. (2016). Finance-growth nexus: Insights from an application of threshold regression model to Malaysias dual financial system. *Borsa Istanbul Review*, 16(2), 63-71.

Asteriou, D. & Hall, S.G. (2011). *Applied Econometrics,* 2nd edition. New York, NY: Palgrave Macmillan.

Baig, T. & Goldfajn, I. (1999). Financial market contagion in the Asian crisis. *IMF Staff Papers*, 46(2), 167-195.

Baker, H.K. & Filbeck, G. (2013). *Alternative Investments: Instruments, Performance, Benchmarks and Strategies*, 1st edition. New York, NY: John Wiley & Sons.

Baur, D.G. & Lucey, B.M. (2010). Is gold a hedge or a safe haven? An analysis of stocks, bonds and gold. *Financial Review*, 45(2), 217-229.

Baur, D.G. & McDermott, T.K. (2010). Is gold a safe haven? International evidence. *Journal of Banking & Finance*, 34(8), 1886-1898.

Beck, T., Degryse, H. & Kneer, C. (2014). Is more finance better? Dis- entangling intermediation and size effects of financial systems. *Journal of Financial Stability*, 10(1), 50-64.

Beckmann, J., Berger, T. & Czudaj, R. (2015). Does gold act as a hedge or a safe haven for stocks? A smooth transition approach. *Economic Modelling*, 48(1), 16-24.

Caporale, G.M., Pittis, N. & Spagnolo, N. (2006). Volatility transmission and financial crises. *Journal of Economics and Finance*, 30(3), 376-390.

Clark, G. (2013). The industrial revolution. In S.N. Durlauf, & P. Aghion, (ed.) *Handbook of Economic Growth,* 2nd edition. Amsterdam, Holland: North Holland.

Diamandis, P.F. (2009). International stock market linkages: Evidence from Latin America. *Global Finance Journal*, 20(1), 13-30.

Engle, R. (2001). GARCH 101: The use of ARCH/GARCH models in applied econometrics. *The Journal of Economic Perspectives*, 15(4), 157- 168.

Goyenko, R. (2006). *Stock and bond pricing with liquidity risk*. Working Paper, Indiana University.

Green, T. (2007). *The Ages of gold. London: Gold Fields Mineral Services Ltd.*

Greenwood, R. & Scharfstein, D. (2013). The growth of finance. *The Journal of Economic Perspectives*, 27(2), 3-28.

Gulko, L. (2002). Decoupling. *The Journal of Portfolio Management*, 28(3), 59-66.

Kaminsky, G.L. & Reinhart, C.M. (2002). Financial markets in times of stress. *Journal of Development Economics*, 69(2), 451-470.

King, C.W. (1865). *The Natural History, Ancient and Modern, of Precious Stones and Gems and of the Precious Metals*. London, Greater London: Bell and Daldy.

Koop, G. (2006). *Analysis of Financial Data*. Chichester, West Sussex: John Wiley & Sons.

Lucey, B.M. & Li, S. (2015). What precious metals act as safe havens, and when? Some US evidence. *Applied Economics Letters*, 22(1), 35-45.
Luchian, I. & Filip, A. (2015). Globalization as financial crises premise. *Journal of Financial and Monetary Economics*, 2(1), 127-134.
Mendoza, E.G. & Quadrini, V. (2010). Financial globalization, financial crises and contagion. *Journal of Monetary Economics*, 57(1), 24-39.
O'Connor, F.A., Lucey, B.M., Batten, J.A. & Baur, D.G. (2015). The financial economics of gold A survey. *International Review of Financial Analysis*, 41(1), 186-205.
Rousseau, P.L. and Sylla, R. (2003). Financial Systems, Economic Growth, and Globalization. In M. Bordo, A. Taylor and J. William-son (ed.), *Globalization in a Historical Perspective*. Chicago University of Chicago Press.
Sandoval, L. & Franca, I.D.P., (2012). Correlation of financial markets in times of crisis. *Physica A: Statistical Mechanics and its Applications,* 391(1), 187-208.
Schmukler, S.L., Zoido, P. & Halac, M. (2003). Financial globalization, crises, and contagion. *Globalization World Bank Policy Research Report.*
Schularick, M. (2011). 140 years of financial crises: Old dog, new tricks. *Jahrbuch Fr Wirtschaftsgeschichte/Economic History Yearbook*, 52(1), 45-68.
Seetharam, Y. & Bodington, L. (2015). Gold in the South African market: A safe haven or hedge? *Applied Economics Quarterly*, 61(4), 331-352.
Wyplosz, C. (1998). Globalized Financial Markets and Financial Crises, In J. J. Teunissen, (ed.) *Regulatory and Supervisory Challenges in a New Era of Global Finance*, Amsterdam, North Holland: Fondad.