



MIDLANDS STATE UNIVERSITY

FACULTY OF COMMERCE

DEPARTMENT OF BANKING AND FINANCE

**EVALUATING EQUITY PORTFOLIO PERFORMANCE AND THE ROLE OF
GOLD AND USD IN PORTFOLIO MANAGEMENT IN ZIMBABWE**

BY

TATENDA MUTAMBANADZO

STUDENT REGISTRATION NUMBER: R181784E

SUPERVISOR: MR S SIZIBA

**DISSERTATION SUBMITTED IN PARTIAL FUFILMENT OF THE
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IN BANKING AND FINANCE.**



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APPROVAL FORM

I, the undersigned, hereby approve that supervision and approval has been granted to the dissertation entitled: Evaluating equity portfolio performance and the role of Gold and USD in equity portfolio in Zimbabwe. Submitted by Tatenda Mutambanadzo in partial fulfilment of Bachelor of Commerce in Banking and Finance Honours Degree of Midlands State University in 2021

Supervisor..... Date.....2021

(Signature)

Chairperson.....Date.....2021

(Signature)



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DEPARTMENT OF BANKING AND FINANCE

RELEASE FORM

NAME OF AUTHOR: TATENDA RODGERS MUTAMBANADZO

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SUPERVISOR: MR S SIZIBA

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DECLARATION

I Tatenda Mutambanadzo declare that this research is my own work and has not been copied from any source without acknowledging the source.

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Signature

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Date

DEDICATION

This dissertation is dedicated to my loving family for their commitment and unconditional support.

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I would like to thank the Almighty Lord for giving me strength throughout my research project. I would also like to pass my heartfelt gratitude to my supervisor, Mr S Siziba for patiently guiding me in the completion of this thesis. It was due to his scholarly guidance and constructive suggestions and comments that inspired me to complete this thesis. My deepest gratitude goes to my family for making it possible for me to pursue this degree and for their emotional and moral support during the course my research project .

ABSTRACT

Over the past few decades equity investors in Zimbabwe have experienced recurrent episodes of capital depreciation due to rising inflation and debilitating economic conditions. The equity market delivered risk adjusted returns of 15% from 2009 to 2015 during the multi-currency regime. The global boom, wider involvement of emerging markets in stock trading, high capitalisation levels of stock markets and economic crises that have been experienced during the last few years which has adversely affected investors returns have awakened the need to improve portfolio management strategies. Modern Portfolio Theory was developed to reduce portfolio risk of high volatile assets by diversifying portfolios with negatively related assets. To evaluate equity only portfolio and the role of Gold and USD in portfolio management data for 10 years was collected from 2009 to 2019. Gold international price, USD index and ZSE industrial index was used to investigate equity only portfolio, equity and Gold portfolio and equity and USD portfolios' average returns during distress times to measure average returns during these times. The findings of the study were that USD and Equity portfolio performs better during financial turmoil and USD asset is the best equity portfolio effective hedge in Zimbabwe. Also, we noted that Equity and Gold portfolio performs best on a risk adjusted basis compared to Equity and USD portfolio. From these findings we recommend that investors and portfolio managers should also invest in hard international recognised assets especially in commodities like Gold and hard currency like USD and practice portfolio diversification strategies by increasing assets investments portfolios to reduce portfolio management risk and increase portfolio returns.

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LIST OF ACRONYMS

ZSE	ZIMBABWE STOCK EXCHANGE
INDX	INDUSTRIAL INDEX
JSE	JOHANNESBURG STOCK EXCHANGE
RBZ	RESERVE BANK OF ZIMBABWE
USA	UNITED STATES OF AMERICA
SA	SOUTH AFRICA
SEC	SECURITIES AND EXCHANGE COMMISSION
MPT	MODERN PORTFOLIO THEORY
SHFE	SHANGAI FUTURES MARKETS
SGE	SHANGAI GOLD EXCHANGE
OTC	OVER THE COUNTER
LPMCL	LONDON PRECIOUS METALS CLEARING LIMITED
SE	STOCK EXCHANGE
USD	UNITED STATES DOLLAR

CHAPTER 1 INTRODUCTION

1.1 Introduction

Over the past few decades equity investors in Zimbabwe have experienced recurrent episodes of capital depreciation due to raising inflation and debilitating economic conditions. The equity market delivered risk adjusted returns of 17% from 2009 to 2015 during the multi-currency regime, (ZSE). The low returns were mainly caused by losses recorded in heavily capitalised counters. These counters were adversely affected by challenging economic environment characterised by significant slowdown in economic activity, liquidity crunch and company closures and limited access to affordable medium to long term loans to finance working capital and expansion projects (RBZ). The situation was worsened by hyperinflation which started in 2016 after the introduction of the bond notes. Equity investors depends on the performance of the stock counter in order to earn meaningful returns. As discussed economic challenges adversely affect counters and investors should employ portfolio diversification strategies by adding assets which are negatively correlated to market activities to reduce risk of loss. In times of economic stress assets such as Gold and hard currencies United States Dollars (USD) have proved to be safe haven and perfect hedge instruments to mitigate risk of loss of investors Baur and Lucey (2010).

1.2 Background to the study

As the worldwide equity markets have encountered their most explosive development over the previous decade, emerging equity markets have encountered a considerably more fast development, taking on an undeniably bigger portion of this worldwide boom. The global equity market capitalisation rose from US\$15.2 trillion to US\$35.8 trillion from 2009 to 2020 (Statista, 2021). Trading activities in emerging markets surged equally fast with market capitalisation of Johannesburg Stock Exchange (JSE) increasing from US\$614 billion in 2009 to US\$1 trillion in 2020 (JSE 2020). The global boom and the wider involvement of emerging markets in stock market has attracted the interest of academics in this area of study. Thus plenty of studies currently centre of how to properly diversify equity portfolios to increase returns and reduce risk.

The Zimbabwe Stock Exchange (ZSE) is the only official stock exchange in Zimbabwe. The market was established in 1894 and was officially opened to foreign investors in 1993. The

exchange has 63 listed companies with two primary indices, the ZSE All Share and ZSE Top 10. The ZSE market capitalisation and volume figures were US\$233.46 million and 155,202,868 respectively as at 22 February 2019 (ZSE). The Zimbabwe currency was depreciated to US\$1:ZW\$2,5 on 22 February 2019 resulting in the conversion of ZSE to ZW\$ negatively affecting investors capital which had initial being deposited in US\$.

Over the past few years, home bias equity Zimbabwean investors have experienced a turbulent environment due in part to volatile economic conditions raising questions whether equity are safe investment havens. The Zimbabwean economy has been experiencing economic challenges since “Black Friday”, this the day when the Zimbabwean dollar (ZW\$) depreciated by 72 per cent against the United States dollar (US\$). The ZW\$ crashed on this day, signalling the beginning of economic challenges for the Zimbabwean. The Black Friday was caused by fiscal imprudence when the government awarded massive packages to war veterans and massive cuts in aid by multilateral aids organisations (Mugano, 2014) .Twenty-three years later the economy has endured under stress from the events of this day.

The equity market is an essential part of the financial market as investors wishing to build portfolios usually do so using a combination of both money market and capital market securities. Equity exchange is one of the most volatile assets to economic conditions (Mutodi, 2010). Any change in equity prices can have adverse implications on an economy, which makes the relationship between macroeconomic variables and stock returns one of the most discussed topics in finance in the past (Ozbay, 2009). If the public are aware of the changes that might happen in the economy or the financial market, the risk of loss will be reduced and the public will be able to take risk mitigation measures (Abu-Libdeh & Harasheh, 2011).

Zimbabwean investors lost value on their, equity, pension fund and money market portfolios over the past years due to poor and inconsistency economic policies and political instability (Pension and Insurance Commission of Enquiry, 2018).The ZSE witnessed delisting of counters from 82 to 52 and market capitalisation declined from US\$ 6 billion to US\$3 billion from 2013 to 2016.Foreign participation was also subdued during this period despite the country using a stable US\$ currency opposed to domestic currency because investors had suffered huge losses during the 2008 hyper-inflation period (Mutodi,2019). The lack of inflation hedging knowledge and portfolio diversification techniques on the stock market and

lack of exchange rate linked financial instruments has also contributed to the poor performance of equity portfolios. Poor performance on stock portfolios can also be contributed by investor's preference to invest in local domestic stock which can be easily affected by macro-economic factors.

This shows that home biased equity portfolios are volatile to the adverse effects of interest rates, inflation, volatility, public debt, foreign policy, financial crisis, pandemics, current account balances and political instability.

Markowitz (1950) found that investors can enjoy diversification benefits if they increase the number of assets they hold in a portfolio. Conventionally, investors have diversified their portfolios with primary asset classes: stocks, bonds and cash (Idzorek, 2006). However, recent studies (Idzorek, 2005; Johnson & Soenen, 1997) found that there is positive correlation between these basic asset classes particularly in periods of economic instability, as experienced by many investors during 2008 economic crisis. As a result, investors experience less diversification benefits and a lack of investments protection in times of need. (Bernhart et al., 2011). Economic and political crises, force investors to look for assets that are less correlated with primary asset classes to diversify their investment portfolios.

Gold and USD has emerged as an alternative investment assets to hedge against the volatile local currency portfolio prices. The association between commodities like Gold and domestic assets market performance has been and still is the subject of interest to many researchers. Gold is often employed as a safe haven asset to mitigate the risk of losses and preserve wealth as a result of its low to negative correlation with the market and traditional assets (Clapper ton, 2015). Gold is scarce and cannot be manipulated by monetary authorities therefore it cannot be overprinted like currency, It has also, been valued for many years as a durable and reliable source of investment, (Clapper ton, 2015). As a physical commodity, Gold investment has value outside the banking and economic systems, making it a best investment for investors looking to preserve their wealth against black swan events. Gold prices often rises during times of economic strife as investors seek a safe haven for their wealth (Dempster, 2008).

Gold investments can be used to diversify equity portfolios though it might be harder to get positive returns quickly (Fernando, 2017). The objective would be for stability and hedging the

portfolio. Also Gold can be easily traded on the Gold exchange market. The USD is another candidate competing for hedging against stock market fluctuations in emerging markets. Giovannini and Jorion (1989) show that the co-movements and the dependence structure between equities and USD would have important implications for their cross market risk management for portfolio diversification.

As a way of preserving capital equity Investors' asset portfolios should at least be diversified by adding assets that has proved to perform better in financial crisis times like Gold and USD (Clapperton, 2010). Therefore the study seeks to evaluate equity portfolio and the role of Gold and USD in equity portfolios in Zimbabwe.

1.3 Problem Statement

During economic crises, the correlation between assets normally increases. This poses a challenge to portfolio managers that need to diversify and hedge their portfolios given that our portfolio managers have limited hedging options confined to equity and real estate as a hedge instrument with little access to other international recognised hedging liquid assets like Gold and USD. Gold or hard currencies (USD) assets are normally used to diversify portfolios for hedging and flight to quality in times of distress. It is however, not clear whether Gold or hard currencies are effective portfolio hedge, or safe havens over the crisis period such as the one Zimbabwe has experienced over the past few years.

1.4 Objectives of the study

- Whether Gold and USD are effective hedge assets in portfolio management.
- Whether Gold and USD are effective safe haven assets in Zimbabwe.
- To compare the performance of portfolios that contain Gold to those that contain USD on a risk adjusted basis.

1.5 Research Questions

- Are Gold and USD effective hedge assets in Zimbabwe?
- Are Gold and USD effective safe haven assets in Zimbabwe?
- How do portfolios that contain Gold compare to those that contain USD on a risk adjusted basis?

1.6 Significance of the study

The Reserve Bank of Zimbabwe has been trying to promote a savings culture and restore financial services confidence amounts citizens in order to curb speculative parallel exchange rate activities and to manage inflation. Assessing equity portfolios activities will assist RBZ and investors in coming up with efficient hedging tools to mitigate macro-economic challenges and help preserve capital for the investing public ultimately restoring the public confidence in financial services.

The understanding of Gold over and above hard currency investments can in turn be used as a tool against the plight of economy downturns as investing and diversifying portfolios with international assets like Gold and USD provides a means for long term wealth creation and financial investments value reservation for corporates and individuals.

1.7 Delimitations scope of the study

This research is narrowed at evaluating equity portfolios and the role of Gold and USD as effective portfolio hedge and safe haven assets. The research will focus on the multi-multicurrency regime period 2009 to 2019. The study was conducted on Industrial Zimbabwe Stock Exchange Index, USD Index and Gold International prices.

1.8 Assumptions

Value at Risk will be calculated on Industrial index to identify distress times for this study, also the risk free rate assumed for calculating risk adjusted returns was five per-cent being the rate that was applied on Foreign Currency Treasury bills during the period under study.

1.9 Limitations of the study

Given the quantitative nature of the study, the researcher had challenges in having access to all the necessary data. Some statistics over the years have not been published limiting the researcher's ability to test all the related variables. The research was limited to use of secondary data only.

1.10 Definition of Terms

Diversifier: assets which are positively but not perfectly correlated to other assets.

Hedge: an asset which is uncorrelated or negatively correlated with another asset.

Safe haven: an asset that is uncorrelated with the market conditions in times of economic crisis.

1.11 Organisation of the Study

Chapter one introduced the study under review as well as the background leading to such study. In this chapter the problem of the study was identified as well as the significance, and objectives of the study including the limitations of the study. Chapter two followed previous studies and earlier scholars view on the subject matter and related theories. In the same chapter we tried to explain the objectives using existing literature. Chapter three outlined the research methodology, research design, data collection and tools, data procedures and data analysis. Chapter four focused on data analysis, presentation of results as well as a discussion of the results. Finally chapter five summarized the whole research and the conclusion was presented in this chapter as well as recommendations.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

This chapter reviews theoretical and empirical literature conducted on equity portfolio and the role of Gold and USD in portfolio management. Theoretical issues like the benefits of portfolio diversification will be discussed. The chapter also focus on empirical studies done on the similar topic including methodologies used. This chapter will enhance the researcher's understanding of portfolio management.

2.2 Theoretical literature

2.2.1 Investment Issues

Stock investments does not operate in a vacuum, it operates in a world swirling with issues and events that affect stock and investment decisions. Debt, inflation, international challenges, recession and depression are some of the events and conditions in today's economic and social landscape that can affect equity market performance (Mladjenovic, 2016).

If one buys stock of an over indebted company or with customers that are over indebted the risk of the equity investor losing is very high in this investment. In addition international challenges like financial crises, government mismanagement and regional conflicts around the globe ultimately affects stock portfolio performance. Inflation also affects equity portfolio performance it is normally caused by central banks overproducing their currency in order to settle government debts resulting in too much money chasing few goods, inflation erodes capital of investors

2.2.2 Investment Approaches

Hua, 2018 in her article published on fairmontequities.com discussed six investment approaches which are value investing, income investing, growth investing, small cap investing, active investing and passive investing.

Value investors look for stocks which have a market price which is lower than the intrinsic value of the company. This strategy is suitable for long term investors because the value of the under-priced stocks may take long time before their prices rise. Income investing strategy is the buying of stocks that produces income to the investors and this involves buying stocks with a high dividend yield in established stable companies. Growth investing is suitable for risk

seeking investors because these stocks are more volatile than average and involves investing in stocks with rapidly growth potential in the future.

Small cap investing is also another strategy for risk seeking investors who does not need access to their capital for a while. This approach involves buying stocks of companies which are still in their growth phase of the business lifecycle, these companies usually have high propensity for capital growth. Active investing approach is the frequent buying and selling of stocks to take advantage of stock volatility and stock mispricing. The main reason for active investing is to beat the market and outperform the index. Passive investing portfolio management style implies that the portfolio is build up so it mimics a market index. Passive investors believe the market is priced efficiently and hold shares which track an index.

2.2.3 Modern Portfolio Theory

The main concept of Modern Portfolio Theory (MPT) is that combinations of investment assets can deliver investors with better returns per risk unit than individual assets. Nobel laureate Markowitz in 1952 presented a mathematical technique to combine assets to optimize an investment portfolio using a method called Mean-variance optimization. Markowitz noted that investors are facing contradictory objectives when making an investment decision pertaining to high returns at low risk conflict known as risk reward trade off. The market usually rewards high risk with high returns and low risk with low returns. Implying that high returns are associated with taking high risk, and low risk gives low returns. MPT provides a solution to investor's problems of conflicting objectives by encouraging investors to diversify their portfolios by investing in multiple securities instead of just one. The reason beings, that the covariance of assets is essential in returns and risk relationship than the characteristics of the individual assets (Sharpe et al., 1999,). Elton and Gruber, 1997 shared the same view that the goal of MPT is to find the tolerable level of risk, and then find a portfolio with the maximum expected return for the same level of risk. They also clarified that up till now Markowitz model is the centrepiece of MPT. According to O'Neil, (2000) MPT has essential practical applications such as that it reduces volatility in a portfolio of discrete stocks.

Black and Litterman, 1992 improved on the initial MPT Mean Variance (MV) model by linking mean-variance optimization of Markowitz and Capital Asset Pricing Model (CAPM).They perceived that investors would make more returns by combining their views about returns with the information in the equilibrium.

Markowitz (1952) also developed efficient frontier which shows different combinations of securities that produce the maximum expected return for a portfolio given level of risk. According to him, each point on the efficient frontier represent an optimal combination of securities that maximizes the return for any given level of risk. Furthermore, any point below the efficient frontier are inferior to the portfolios that lie on the line, they either offer the same returns but with less return for the same level of risk. The efficient frontier clearly demonstrates the power of diversification.

2.2.3.1 Measurement of Risk and Return

Markowitz (1952; 1959) proposed a numerical model strategy for an ideal portfolio development, and gave the formula of risk minimization by methods for using uncorrelated assets. One of his critical accomplishments was characterizing the ideas of expected return and risk. For assessment of the connection between expected return and risk in his model, he uses the appropriation of probabilities. As a pointer of expected return he involves factual assumption (weighted normal) and standard deviation as a measure of risk.

2.2.3.2 Diversification

Markowitz (1959) was the main author who stood out to the idea of diversification of portfolio. He demonstrated that financial investors may decrease risk of portfolio by choosing differentiated assets, and try not to choose those instruments which are highly correlated for the portfolio. According to Bodie and Merton, (2000) the principal of diversification states that investors can reduce their overall portfolio risk with no reduction to their expected return by diversifying across risky assets. However, Bodie and Merton, 2000 found that investors cannot infinitely reduce equity risk by buying many shares. They realized that the non-diversifiable risk is systematic risk caused by market factors and the diversifiable risk is unsystematic risk which is related to price change which can be eliminated by adding more stocks to the portfolio. The following figure depicts effects of adding stocks in a portfolio.

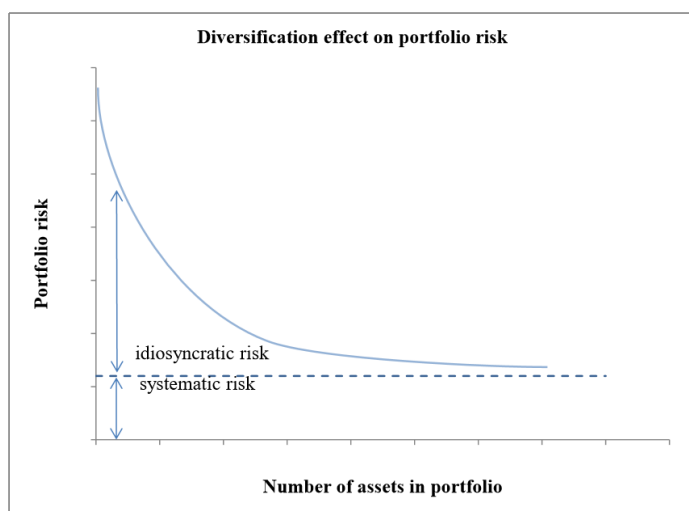


Figure 1: Diversification effect on portfolio risk
Source: Own construction based on Bodie et al. (2011)

2.2.4 Behavioural Finance Theory

Sewell (2012) defines behavioural finance as the study of psychology on the behaviour of financial practitioners and the subsequent effect on markets. Behavioural finance assist to elaborate why and how markets might be efficient. In states of vulnerability and risk, individuals' conduct is impacted by an assortment of feelings, misperception of data and other irrational factors (Jaiswal and Veronina, 2011). In light of such irrational factors and appraisal of their impacts on financial markets, the hypothesis of behavioural finance is imperative to direct concentration to comprehend the portfolio development behaviour and the cost and return change investments.

Barberis and Thaler (2003) recommended two aspects that affects investors' decision making in investing activities i.e. beliefs and preferences. They came up with summarised aspects from previous studies concerning beliefs as follows, anchoring, conservatism, belief perseverance, overconfidence, optimism and representativeness.

Barber and Odean (2007) identified that bullish investors trade more markedly because they believe that they possess greater knowledge and abilities than other investors. They tested their research on gender and found out that male are more overconfident than females. Barberies and Thaler (2003) proposed that conservatism is mainly consistent with under reaction. Investors who slope to conservatism may ignore the full information of declaration on the off chance that they have earlier assessment on an event, which repudiates with existing picture about the event. Optimism is related to positive thinking, high prospect and great desires of

investors. Anchoring is related to the situation when investor's decision on estimations depends on previous beliefs, which usually causes inadequate adjustments as a result.

Preferences is another aspect that affects investors' decision making process. Kahneman and Tversky (1979) developed Prospect Theory in order to understand risk acceptance or loss aversion. They defined the following behavioural aspects: loss aversion, certainty effect and isolation effect. According to the Prospect Theory investors are usually averse to risk however people overweight prospect outcome that are only feasible in comparison with outcomes that are obtained with certainty. This behaviour contributes to risk aversion in choices involving sure gain and risk seeking in choices involving sure losses (Kahneman & Tversky, 1979.). This tendency is known as certain effect. Under isolation effect tendency behaviour, people generally discard components that are shared by all prospects under consideration", "which leads to inconsistent preferences when the same choice is presented in different forms" (Kahneman & Tversky, 1979). They also found out that the pain from losing by investors is quite higher than happiness from gaining. Therefore investors select financial instruments where the chance to avoid losses is the greatest known as risk aversion.

2.2.5 Risk Parity and Maximum Diversification Theory

This model ranks risk of assets and allocates preferences to assets (Yavas, 2012). The process involves measuring assets risk first, compare different assets risks and then select assets with minimum risk in relation to investors risk appetite. This theory also uses volatility to measure risk. Each asset volatility is measured and an average is taken, each weight is multiplied by the number of assets in the portfolio. The ratio of diversification should exceed one, if it is more than one it means that the total portfolio risk has a margin of safety comparably to the individual assets risk, (Stulz, 1980).

2.3 Empirical Literature

Although Gold and USD are used to hedge risk in the equity market, there are few studies on how these assets can hedge stock market risk during extreme economic conditions. There is some indirect confirmation that these assets can theoretically serve as safe havens in economic crisis. During financial crisis, when the prices of risky financial assets decline significantly, investors may decide to sell risky assets and rush into buying safe assets to lessen losses. The prices of other alternative assets increase due to flight to quality hypothesis, Caballero and Krishnamurthy (2008).

Most studies the likes of Baur and Lucey, (2010), Beckmann, et al., (2014) and Fernando, (2017) investigated the importance of diversifying equity portfolios with Gold as a hedge against macro-economic factors like inflation and volatility. Most of these studies found that Gold can only act as a portfolio hedge in economic crisis times and not act as a safe haven. Hlupo (2017) on his study on the Zimbabwe Stock Exchange analysing the relationship between Gold prices and equity market performance found that there is an insignificant relationship between Gold prices and stock market performance proxy by the ZSE Industrial Index. The same tests showed that there is a short-run association between Gold prices and the performance of Gold mining firms listed on the ZSE. Hence, he recommend that Gold can be used for diversification purposes by investors in Zimbabwe during times of economic crisis. He also, suggested that Gold should be held as a commodity as opposed to holding shares in Gold mining firms since their performance does not track the performance of the Gold markets in the long run.

Hussin et al. (2013) indicated that Gold adjust quickly to inflation rate and thus has a value-preserving ability. (Pullen et al. 2016) said that Gold bullion and Gold exchange traded funds (EFT) can be used as a safe haven during stock market slumps, Gold bullion proved to be a safe haven during 1987 stock market crash and Lehman Brothers collapse in United States of America (USA) and Gold stock and Gold mutual funds were important during the USD September 11 attacks. However, study by (Van Hoang et al., 2016) revealed that Gold can be used as a hedge in the short run only but is not a hedge in the long run. Their study was applied in China, United Kingdom (UK), USA and India Bhunia and Mukhuti (2015) used Granger Causality tests on information collected on a daily basis for 10 years and found that Gold and stocks are not related in the long run. Baur and McDermott (2016) conducted a similar study covering a 30 year period using a GARCH model, in extreme daily and weekly market conditions and found out that Gold can be used as a safe haven in European and US equity markets but not in Canada, Australia, Japan and the BRICs.

Fernando,(2017) examined the correlation between equity and Gold on the Sweedish Stock Exchange (SE) using data for a period of 47 years and found out that there is weak positive correlation between these two assets. In addition Fernando also noted that Gold is a low risk asset than equities because the asset specific risk can be diversified and investors are only rewarded for systematic risk. Fernando, (2017) also found that Gold improve the risk return characteristics of an investment portfolio only devoted to domestic equity market. Iqbal (2017) studied equity portfolio performance in India and Pakistan and concluded that Gold acts as best

portfolio diversifier especially in times of economic crisis. Moreover, Pule, (2017) evaluated Gold as an investment asset from South African context and found that Gold is as useful asset to include in a portfolio of stocks from a risk management perspective because it reduces unsystematic risk. Fernando, (2017) studied the role of Gold in an investment portfolio in Sweden and concluded that Gold enhances the risk adjusted returns for Swedish investors equity portfolios. He also noted that portfolio optimal allocation vary depending on prevailing macro-economic environment and the performance of portfolio assets. He suggested that diversification benefits increase with the addition of precious metals including silver and platinum.

Klein T et al (2018) investigated the safe haven and hedging characteristics of bitcoin and Gold after employing the portfolio based comparison approach and concluded that Gold is a safe haven and hedge asset and bitcoin is correlated with the market therefore cannot be used as a hedging asset.

The USD is another asset competing for hedging against stock market variations in developing markets. Giovannini and Jorion (1989) show that the co-movements and the dependence structure between equities and USD would have important repercussions for their cross market risk management for portfolio diversification. Hau and Rey (2006) suggest that the relations between stock and USD can be either positive or negative due to the return-chasing, portfolio rebalancing and exposure effects. Kaul and Sapp (2006), Ranaldo and Soderlind (2010) analyse the safe haven status of various currencies. Beck and Rahbari (2008) find that dollar bonds act as safe haven currencies during unexpected economic crisis, and they are a better hedge for global black swan events and for regional sudden stops in Asia and Latin America. Ning (2010) found significant symmetric tail dependence in all stock return pairs for both pre and post Euro periods when he employed the copula models to examine the extreme co-movements of USD and stock markets in G4 countries. According to Wang et al. (2013) the general dependence and tail dependence are asymmetric for Gold and USD in many countries when the equity market and currency exchange are positively related. This was his findings after using a dependence-switching copula model to ascertain the dependence structure of these two assets.

To summarize the studies in the field, there is some evidence that Gold and USD can be used as hedging tools through hedging inflation or other macroeconomic variables, although the empirical results are somewhat mixed. Theoretically, few studies have examined why or

whether these assets can serve as safe havens except for the flight-to-quality hypothesis. There are some empirical studies that investigate the roles of Gold and USD as safe havens and hedge, but these studies often either examine two assets at a time without taking into account the possible effect of the existence of other alternative assets, or investigate the average dynamic correlation among multiple assets without considering their extreme movements. For example, Ning (2010) and Wang et al. (2013) examine the extreme dependence between stocks and USD, but use only one alternative investment, USD, as the safe haven. Zagaglia and Marzo (2013) investigate how the relation between Gold and the USD has been affected by the financial turmoil. Other studies, such as Baur and McDermott (2010) and Ciner et al. (2013), investigate the safe haven property between stocks and Gold or focus on pairwise correlation structures for multiple assets, but do not consider extreme market situations.

2.3.4 Gold Optimal Allocation

Fernando, (2017) SE studies found that an allocation of 26% Gold in an equity portfolio with holding periods more than 40 years maximized Sharpe ratio. He also suggested average allocation of 25% for a portfolio with holding period above 20 years and 28% for a portfolio with a holding period around 10 years. His allocations were consistent with the studies by Chua et al. (1990) and Conover et al. (2009), where almost the same Gold allocation of 25% in portfolio was suggested. These studies also noted that the optimal allocation of Gold depends on the time period examined. Periods of Gold bull markets, equity bear markets and economic downturns they suggested high optimal allocations of Gold up to 38%. Periods of bull equity markets, bear Gold markets and stable economic environments will result in Gold optimal allocations declines. However, the optimal allocation of Gold from the above studies does not apply when incorporating other precious metals like silver and platinum.

2.3.5 Gold and USD trades in other markets

The London OTC market has generally been the focal point of the old exchange and consist of roughly 70% of global notional trading volumes (Gold,org, 2021).The London market pulls participants around the world and sets twice every day worldwide reference yardstick for Gold, the LBMA Gold Price. Particularly the market in London exchanges 400 ounce bars ‘Good Delivery’ bars which are stored in the vaults of the London Precious Metals Clearing Limited (LPMCL) and the Bank of England.

The US futures market (COMEX) derivatives exchange market operated by CME Group has become an increasingly important venue in driving Gold price discovery (Gold.org, 2021). Trading on this market is mainly focused on the ‘active month’ contract which acts a proxy for the spot price. There are few contracts that physically settle into delivery of bars on this market which are kept in COMEX vaults.

The biggest pure actual Gold spot trade in the world is Shanghai Gold Exchange (SGE), set up in 2002 under close oversight of the People’s Bank of China. SGE has delighted in a quick ascent to conspicuousness that has reflected China’s developing in the Gold market. It ought to be noted that SGE’s spot and conceded contracts are supplemented by very active trading on the Shanghai Futures Market (SHFE) despite the two exchanges not directly connected.

In South Africa (SA) Gold investments can be done by purchasing Gold bullion in the form of Gold coins. There are a variety of merchants in South Africa who sells Gold coins to the general public and can also buy them back (Pule,2017).The price of the coins are linked directly to the international price of Gold. The most common coin is the Krugerrand. Krugerrand are the most common coins with more that 50 million minted coins (Pule, 2017).There are other rare Gold coins like Natura, Protea and Mandela which are not only linked to Gold price but also to the scarcity of the coin. Gold coins can also be purchased from InvestGold and The South African Gold Exchange.

USD can be traded international on the on foreign exchange trading platforms like Reuters or Bloomberg. The foreign exchange market is a highly liquid markets which connects traders from around the globe. The market trades high volumes and operates 24 hours a day. USD can be traded on the spot market, forward market and SWAP market, (fxstreet.com, 2021)

In Zimbabwe Gold is mainly traded through mining operations and Fidelity Printers and Refiners is the sole buyer of Gold. The recent launch of Exchange Traded Funds by ZSE will enable easier investments in Gold assets once the asset has been listed on the Stock market.

2.4 Hypothesis Testing

Hypothesis 1

H0: Gold is an effective hedge or safe haven asset in Zimbabwe

H1: Gold is not an effective hedge or safe haven asset in Zimbabwe

Hypothesis 2

H0: The USD is an effective hedge or safe haven asset in Zimbabwe

H1: The USD is not an effective hedge or safe haven asset in Zimbabwe.

2.5 Summary

This chapter focused empirically on the equity portfolio performance and the role of Gold and USD portfolio management. The aforementioned authors have collectively established equity portfolios are negatively affected by economic crisis and that Gold and USD can be considered a portfolio diversifiers. Diversification and hedging potential of Gold and USD stems mainly from the assets lack and low correlation with other assets. It is thus evident that Gold and USD has a role to play in modern portfolio management and adding Gold or USD to an investment portfolio has the potential of improving portfolio performance during economic crisis.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

Steered by the literature reviewed in previous chapter, this chapter outlines the techniques and procedures used to evaluate equity portfolio and role of Gold and USD in equity portfolios in Zimbabwe. This chapter contains the research paradigm, the research approach, research design, data type and sources and how the data was analysed.

3.2 Research Paradigm

This study adopted a deductive approach which means that the study will be based on Modern Portfolio Theory. According to Eriksson and Wiedersheim (2001) deductive approach is based upon existing theory by using, adopting or developing that theory and come up with a conclusion. When writing a research project, the approach chosen assists the writers in researching and writing a research project that satisfies their particular needs and expectations, as well as offering the best answers to their research questions. To provide an effective analysis, the theory determines the information and dataset that will be gathered for this research project as well as how it should be interpreted. The deductive approach is used to not only understand fact, but also to forecast the future. Empirical verification in the form of index prices is often used to complement the deductive approach.

3.3 Research Approach

The researcher engaged quantitative research approach on this study. The quantitative approach is the most appropriate in this study because we will almost exclusively use calculations and representation of numerical data in the form of index prices. According to Hole and Solvang, (2005) the quantitative method is based on the translation of data into numbers in order to arrive at a conclusion and make an inference.

3.4 Research Design

Research design is the plan which provides the processes and procedures in the collection of data Hargreaves and Forasacco (2015). Research design is the blueprint for fulfilling objectives and answering questions (Ghauri and Gronhaug (2015). There are four basic research design namely, casual, explanatory, descriptive and analytical (Moon et al., 2016). This researcher

employed a descriptive research design. The researcher used the research process shown on figure 1 below,

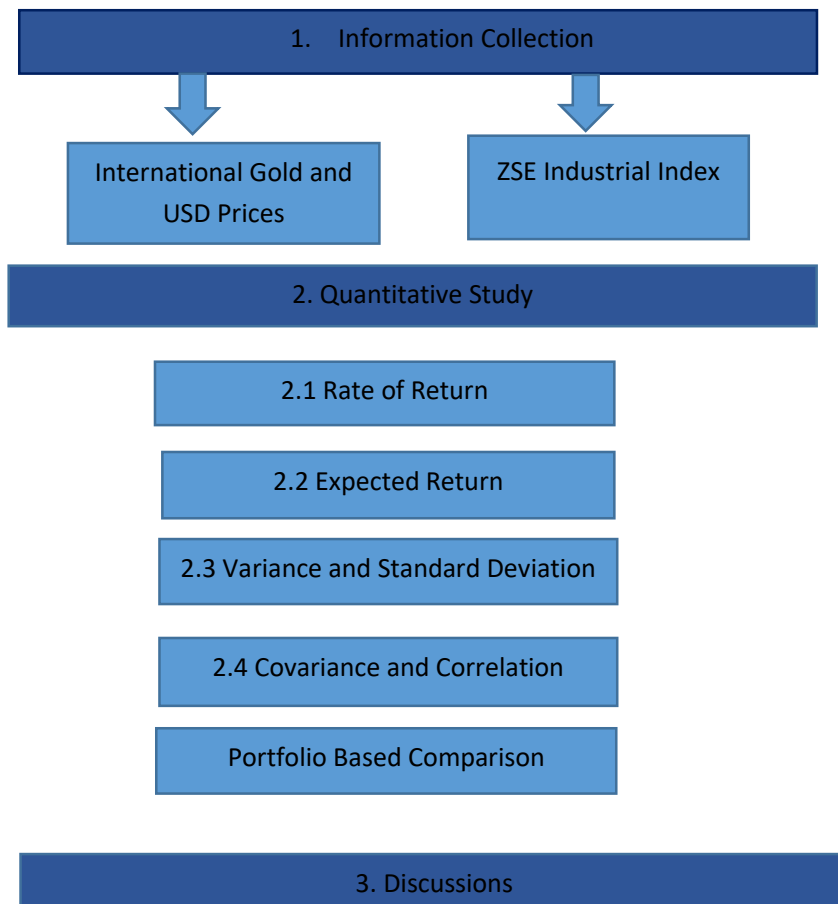


Figure 2: Research Process

Source: Author

The following formulas were used to calculate descriptive statistics used in this research study. Microsoft excel was used in performing the calculations and the data will be presented using tables showing risk and return for diversified and undiversified portfolio.

3.4.1 Rate of Return

Returns were calculated from the collected data of ZSE Industrial index and Gold prices using the formula below. Returns give the researchers a scale-free characterization of the asset performance as well as appropriate statistical properties for analysis. The other formulae used in the study are listed from 3.4.2 to 3.3.5.

$$r = \frac{p_1 - p_0}{p_0}$$

Where: $p_1 = \text{ending price}$
 $p_0 = \text{beginning price}$

3.4.2 Expected Return

$$E(r) = \frac{\sum r}{n}$$

$$E_p = w_A E(R_A) + w_B E(R_B)$$

Where:

$n = \text{number of observations}$

3.4.3 Variance and Standard Deviation

$$\text{Variance} = \sigma^2 = \frac{\sum (r - \bar{r})^2}{n-1}$$

$$\text{Standard Deviation} = sD = \sqrt{\frac{\sum (r - \bar{r})^2}{n-1}}$$

$$\text{Standard Deviation Portfolio} = \sqrt{w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \rho_{AB} \sigma_A \sigma_B}$$

Where:

$\bar{r} = \text{mean return}$

3.4.4 Covariance

$$\text{cov AB} = \frac{\sum_{t=1}^n \{[R_{tA} - \bar{R}_A][R_{tB} - \bar{R}_B]\}}{n-1}$$

3.4.5 Correlation

$$\rho_{AB} = \frac{C_0 V_{AB}}{\sigma_A \sigma_B}$$

3.4.5 Optimum Portfolio Weights

$$W_1 = \frac{(Er_1 - r_f)\sigma_2^2 - (Er_2 - r_f)Cov(r_1, r_2)}{(Er_1 - r_f)\sigma_2^2 + (Er_2 - r_f)\sigma_1^2 - (Er_1 - r_f + Er_2 - r_f)Cov(r_1, r_2)}$$

$$W_2 = 1 - W_1$$

3.5 Methodology

3.5.1 Portfolio Based Comparison

To investigate the hedging and safe haven capabilities of USD and Gold , we employed ex-post Portfolio- Based approach comparison by means of dynamic correlation analysis with three steps used by Klein T et tal, (2018) in their study “Bitcoin is not the new Gold a comparison of volatility, correlation and portfolio performance”

1. We calculated the portfolio weights W_t of a two component minimum-variance portfolio of an asset with a market index, eg Gold and Industrial Index. The optimum portfolio weights were calculated using the formulae below;

$$W_A = \frac{\sigma_B^2 - C_0 V_{AB}}{\sigma_B^2 + \sigma_A^2 - 2C_0 V_{AB}}$$

$$W_B = 1 - W_A$$

2. We calculated the historical Value Of Risk of the Industrial Index taking into account the whole sample period of 2437 observations, denoted by VaR_q we take the empirical quantile q at 1%, 5%, and 10% of the returns r_t of the industrial index. To obtain the VaR_{0.01} of an index, we sort all returns on the index in an ascending order. If the index has T returns, the Value at Risk is $[T \times 0.01]$ -Th return in that list. Henceforth we define all points in time

$$t^* := \{t | r_t < VaR_q\}$$

As times where the index is in distress.

3. Lastly, we evaluate the two-component portfolio, consisting of an index and Gold or USD, with returns r_t^{PF} calculated from the weights in step 1. With a special focus on distressed times t^* , we calculate the mean of the portfolio returns during these times as

$$\bar{r} = \frac{1}{t} \sum_{m=t} r_m^{PF}$$

Which can be seen as a kind of Expected Shortfall or Conditional Value at Risk

This methodology allows us to scrutinize whether the asset can serve as hedge i.e. hedge the equity index during times of turmoil and thus, lower the impact of distressed times on the index on average.

3.5.2 Sharpe Ratio

To investigate which portfolio performs best on a risk adjusted basis either one that contain Gold or the one than contain USD we used the model developed by Sharpe and applied the formula below;

$$\text{Sharpe} = (R_p - R_f) / \sigma_p$$

R_p is the portfolio return

R_f is the risk free rate (5%)

σ_p is the portfolio standard deviation

3.6 Data Types and Sources

This study used daily price data collected from 2009 to 2019. The times series data was collected everyday expect for weekends and holidays. The data on equity index was collected from the Zimbabwe Stock Exchange. On the other hand, the Gold and the USD indices were accessed from the Thompson Reuters network. The prices collected by the author were end of day prices for all the assets.

3.7 Summary

This chapter presented the research design followed by this study and the choice was influenced by the nature of the objectives of the study. To add on, the chapter also presented the research methodology process to be followed in investigating the hedging effect of USD and Gold on

equity returns and in this regard an ex-post Portfolio Based Comparison dynamic correlation analysis approach with three steps was chosen. The chapter also hinted on the data sources and data types and lastly the chapter narrated the procedure followed by the author from data collection, presentation and analysis.

CHAPTER 4: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents results that were obtained in this research study. The chapter focuses on the interpretation and analysis of data that was collected guided by the research objectives and questions. The data is displayed using graphs and tables for clarity. The results are then compared across the assets and discussions are generated relating the findings of this study to the empirical literature.

4.2. Market Trends

Before discussing the statistical tests results, we should see what our data tell about the trend of Gold market prices and ZSE industrial index. This will assist us to see how volatile these markets were during 2009 to 2019.

4.2.1. Gold Price Trend

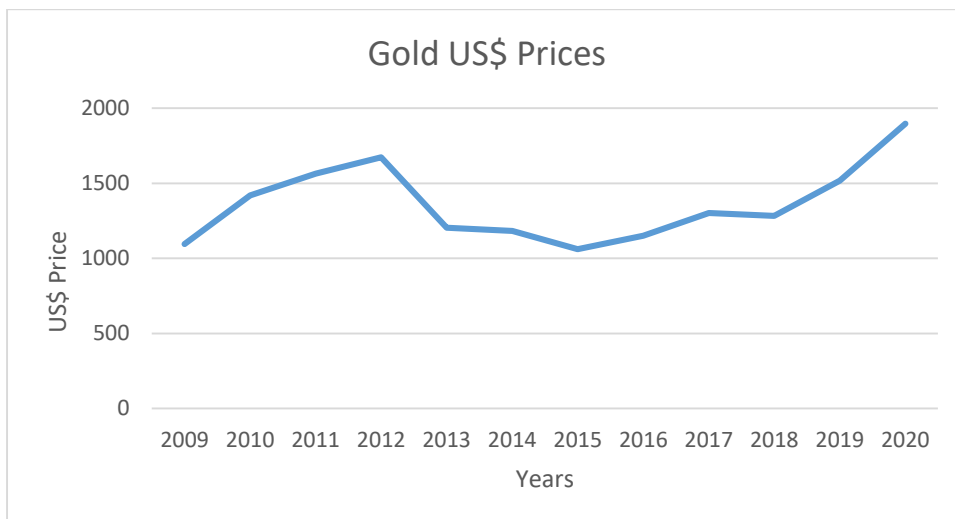


Figure 3: Gold Price development in US\$ (2009 to 2019)

Source: Author, 2021

We can see in figure 3 that the price of Gold increased by 38.45 per cent during the period under study. In the beginning of 2009 it was about US\$1,095.70 per ounce and reached US\$1,517.01 by end of 2019. The price of Gold was on an upward trajectory from 2009 to 2011 this is the period just after global economic crisis and United States September 11 terrorist attack. The price volatility started dropping from 2012 to 2015 and market started to increase thereafter up to end of 2019. Overall we can say that the Gold has been growing since 2009 with some short term fluctuation.

4.2.2. ZSE Industrial Index Trend

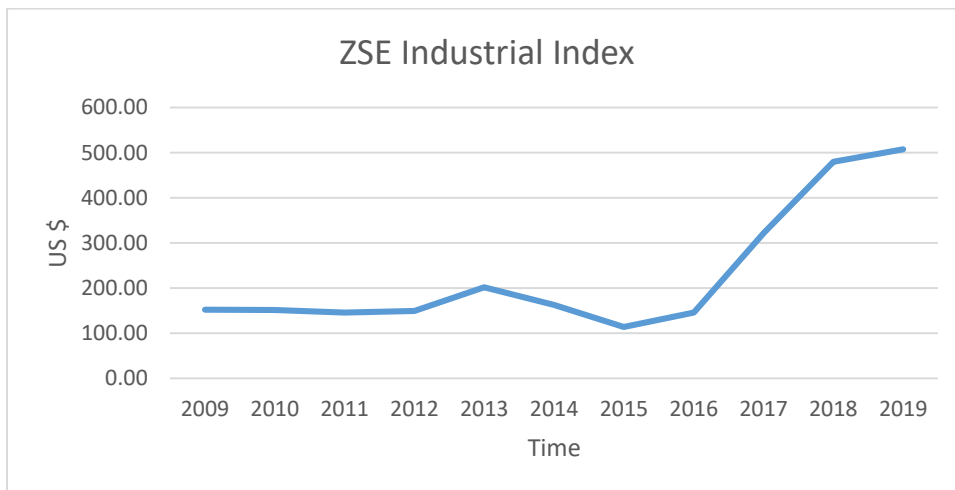


Figure 4: ZSE industrial index development in US\$ (2009 to 2019)
Source: Author, 2021

ZSE industrial index increased by 234 per cent during the period under study. From the figure we can see that there was very low volatility from 2009 to 2012. Volatility started to increase from 2012 to 2019 as shown on figure 4. The price increased from 2012 to 2019. The upward trend trajectory can be seen from 2016 to 2019 which is also the period bond notes were introduced in Zimbabwe at par to the US\$. The money in circulation was now made up of bond notes and US\$. The share prices during this period were increased by large influx of participation on the equity market, with significant gains witnessed in value stocks as some investors sought value preservation on the equity market (CFA 2019). Notwithstanding, the bond notes set off a further decrease in the net foreign investment inflow in light of the fact that foreign investors were unwilling to the arising risk.

4.2.3 USD Index Trend

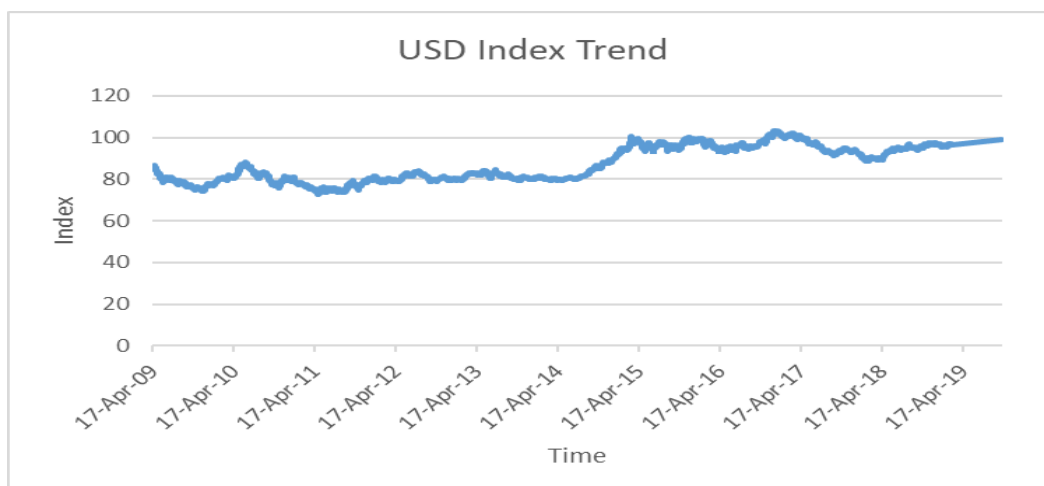


Figure 5: ZSE industrial index development in US\$ (2009 to 2019)

Source: Author, 2021

The USD index increased by 12.25 per cent during the period under study. From figure 5 we can see that there is a very low upward trend on the USD index. The USD has always been above US\$80.00 from 2012 to 2019. Between 2010 and 2011 the dollar declined due to growing US debt, sequestration and worldwide diversification. Between 2011 and 2016 the dollar was strengthening because investors were worried about debt crisis it weakened demand for Euro and increase demand for USD. Also, the 2015 US economic reforms slowed China's growth and pushed investors back to USD. The USD started to decline from 2016 to 2019 after President Trump took office due to investors' concerns about Trump administration's trade war (balance.com).

4.2.4. Gold, USD and Equity Returns Trend

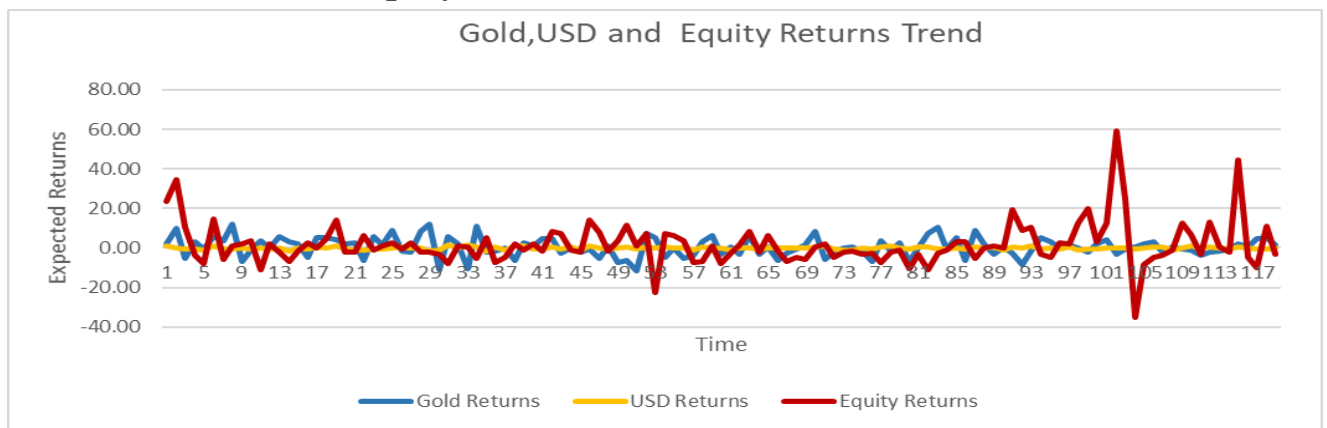


Figure 6: Equity, USD Gold Returns Volatility Graph

Source: Author, 2021

Gold and equity returns were more volatile when compared with USD for the period under study. Volatility on equity returns increased from period ninety seven to one hundred and seventeen, volatility for Gold was moderate and USD was low during the same period. Period one to ninety six is the period Zimbabwe was using the multi-currency system without bond notes in circulation. Period Ninety seven to one hundred and seventeen Zimbabwe was still under the multi-currency regime but added bond notes to the basket of currencies. Equity returns experienced the highest negative returns after the introduction of the bond notes by the government of Zimbabwe. From the trend analysis USD is the only currency with low volatility centred on zero.

4.3 Results presentation and analysis

<i>Panel A Descriptive Statistics</i>				
		Industrial Index with,		
		USD	Gold	
Weights		0.89	0.59	
Mean		0.0153	0.0502	
Std. Dev		0.484	0.926	
Min		-4.775	-8.57	
Max		5.156	10.142	
<i>Panel B Value at Risk Measures</i>				
Var0.01			-3.31733	
Var0.05			-1.44847	
Var0.10			-0.94504	
<i>Panel C Hedging Properties</i>				
		Ind Index only	Gold & Equity	USD & Equity
Return		0.0865	0.0502	0.0153
Variance		0.0207	0.8575	0.2343
Return	VaR0.01	-6.3537	-3.8903	-1.6518
Return	VaR0.05	-2.85007	-2.0409	-1.0446
Return	VaR0.10	-2.0148	-1.5179	-0.8348
<i>Panel D Sharpe Ratios</i>				
		Equity and Gold	Equity and USD	
		-534.54	-10.30	

Table1: Descriptive Statistics minimum variance portfolios
Source: Author

This section presents and analyse the portfolio based test of hedging property results of the study shown in Table 1. The portfolios under examination are ZSE Industrial Index, ZSE Industrial Index and USD and ZSE Industrial index and USD. The minimum variance portfolio weights for ZSE IND and USD came out as 0.11 and 0.89 respectively. The portfolio weights for ZSE IND and Gold came out as 0.41 and 0.59 in contrast to the findings of Fernando, (2017).The equity only portfolio has the highest return of 0.0865% with lowest variance of 0.0207% followed by ZSE IND and Gold portfolio with expected return of 0.0502% and standard deviation of 0.926% and lastly the ZSE IND and USD has lowest expected return of 0.0153% and low standard deviation of 0.484%. The returns for diversified portfolios had low returns showing that there is negative correlation between the equity and Gold and equity and USD. The portfolio that contain Gold performed better than one with USD in terms of returns.

The USD and Equity portfolio results are consistency with findings of Bodie and Merton, (2008) whom concluded that low risk assets have low returns.

The historical Value at Risk measures for ZSE industrial index are determined. The values came out as -3.32, -1.44 and -0.95 at 99%, 95% and 90% confidence intervals respectively. The higher the confidence level the higher the loss anticipated.

The calculated Value at Risk under panel B was used to determine times of distress for the ZSE industrial index and examined how a portfolio including USD or Gold responds in times of turmoil in Zimbabwe. This panel also shows the expected return, the variance, and the expected returns of the portfolios for the times the industrial index is below the Value at Risk (VaR). We report a 100% investment in the portfolio compared with the minimum variance portfolios. The Returns VaR at 0.01, 0.05 and 0.10 significance levels for equity only were US\$6.35, US\$2.85% and US\$2.01% respectively. Diversifying the equity portfolio with Gold and USD at same significance level resulted in the reduction of portfolio returns Value at Risk as depicted in Table 1 Panel C, showing that USD and Gold assets are negatively correlated to equity in distress times. The Sharpe ratios under panel D used for calculating risk adjusted returns showed that equity and USD portfolio is better than equity and Gold portfolio.

In times when the equity index is under stress where the return of the index is smaller than the Value at Risk calculated under panel B. Gold and USD both provide hedge for the equity portfolio. The minimum variance portfolios for Gold and Equity and USD and Equity all provide higher average returns than Equity only portfolios during time under distress showing that USD and Gold are safe haven assets during financial turmoil. The USD and Equity portfolio has the highest average returns implying that USD is a better hedge asset and safe haven asset than Gold in Zimbabwe. The results are consistent with the findings of Klein et al (2018), Pule, (2017) Beck and Ruhbari, (2008) whom concluded that international assets such as USD and Gold are effective hedge and safe haven assets in times of financial turmoil.

4.4 Summary

This chapter presented the results of the methodology employed to analyse the performance of equity only portfolio and equity and Gold and equity and USD portfolios conducted for the study, the data was analysed using trend analysis data. The results of the portfolio based comparison helped to fulfil the objectives and answer the questions of the study.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter will highlight the entire summary of the study from the background to the results. The section also gives the recommendation of the study in terms of portfolio management and provides suggestions on further studies.

5.2 Summary of the study

The study sought to evaluate equity portfolio performance and the role of Gold and USD in portfolio management in Zimbabwe. The study looked at global, regional and Zimbabwe equity market developments. The study also touched on the economic crisis in Zimbabwe starting with the “black Friday” the day that triggered the economic woes in Zimbabwe. Also discussed the results of the commissioner of enquiry report of 2018 on the impact of Zimbabwe economic challenges on peoples’ savings. This was in an effort to highlight the adverse impact economic challenges had on people’s investments including those who invest in stock markets in home currency and pinpoint the importance of diversifying investments with international asset that act as effective safe havens and hedge assets during economic crisis.

Related literature of the study was reviewed which comprised mainly major theories of portfolio investments, MPT, Behavioural Finance (BF) and Risk Parity and Maximum diversification (RPMD) theories. MPT explains the risk and return trade off in investments and the advantages of portfolio diversification in order to mitigate portfolio management risks. The BF theory explained investor’s conduct, beliefs and behavioural approach in investment activities. The RPMD states that assets risk should be measured first and then rank and compare assets based on risk. Assets with less risk are then selected. Related empirics were reviewed in line with the study, portfolio performance of Equity, USD and Gold mainly focusing on diversification, hedging and safe haven studies.

The research design used in this study was descriptive using time series data. The Zimbabwe stock exchange industrial index, Gold prices and USD prices was the focus of the study. Secondary data was gathered from 2009 to 2019 for ZSE industrial index, Gold prices and USD index. The study employed ex-post Portfolio Based Comparison methodology borrowed from Klein et al., (2018) to determine hedging, safe haven characteristics of Gold and USD in

Zimbabwe. The Sharpe methodology was used to risk adjusted returns for Gold and equity and USD and equity portfolios.

The study results showed that Gold and USD are effective hedge and safe haven assets in Zimbabwe. The results also showed that USD is the best asset for portfolio diversification in Zimbabwe. It was also noted that equity only portfolio offers investors higher returns and low risk in a healthy financial environment. Lastly the portfolio that contain gold perform better than the portfolio that contain USD on a risk adjusted basis.

5.3 Conclusion

The study makes the following conclusions

- The USD asset is the best asset which is an effective hedge and safe haven asset. A portfolio that is hedged with USD will have higher average returns than an unhedged portfolio during times of turmoil Beck and Rahbari, (2008)
- Gold asset can also be used as an effective hedge asset in Zimbabwe. Gold also proved to be an effective safe haven asset in times of distress. The returns of an equity portfolio that is hedged using Gold during times of distress are also higher than an unhedged portfolio.(Pule,2017)
- The portfolio that contain Gold performs better than a portfolio that contain USD on a risk adjusted basis we arrived at this conclusion after employing Sharpe performance measure model Ciner et al., (2013)
- From the results of the study we conclude by accepting the null hypothesis that Gold and USD are effective hedge and safe haven assets and rejecting the alternative that Gold and USD are not effective hedge and safe haven assets in Zimbabwe.

2.4 Recommendations

5.4.1 Portfolio Diversification Strategies

Investors and portfolio managers in Zimbabwe should practice diversification strategies by incorporating international assets like hard currencies and commodities to mitigate the effect of shocks like inflation and exchange rates that adversely affects home based portfolio

performance in Zimbabwe. This will result in returning value of investor's funds in times of economic turmoil as experienced in the past.

5.4.2 Invest in commodities

Portfolio managers should also invest commodities like Gold .Gold has proved to be an asset with constant returns during time of shocks and long term volatility. The asset is rare and cannot be manipulated like what happens to currency which can be over printed by monetary authorities. Also, Gold is a perfect portfolio diversifier to reduce portfolio risk and has proved to be an efficient safe have instrument (Fernando, 2017).

5.4.2 Invest in hard currencies

I advise portfolio managers and investors to incorporate hard currencies like USD in their portfolio in order to reduce the risk of loss from macro-economic shocks. USD is used internationally, it's a high liquid asset with store of value status (Wang et al, 2013). The results of this study also showed that USD and Equity portfolio returns were the highest during financial distress times.

5.5 Suggestions for Further study

The results and discussion are not exhaustive, I have left some questions for further investigation of relationship between Gold, USD and stock returns. First, the study was based exclusively on historical data adding a factor that includes the investor's preference would make the study exciting and highlight the pros and cons with human impact.

Second, considering that Gold and USD plays a role as an efficient portfolio diversifier, and we only carried out the model of portfolios with industrial index only, a future study investigating Gold and USD performance with other indices like mining and bonds would be very interesting.

Thirdly, taking into account that financial markets are dynamic in nature and changes happen quite fast, we recommend studying the same research questions by applying it to other financial markets and time periods.

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APPENDICES

Panel A Descriptive Statistics				
		Industrial Index with,		
		USD	Gold	
Weights		0.89	0.59	
Mean		0.0153	0.0502	
Std. Dev		0.484	0.926	
Min		-4.775	-8.57	
Max		5.156	10.142	
Panel B Value at Risk Measures				
Var0.01			-3.31733	
Var0.05			-1.44847	
Var0.10			-0.94504	
Panel C Hedging Properties				
		Ind Index only	Gold & Equity	USD & Equity
Return		0.0865	0.0502	0.0153
Variance		0.0207	0.8575	0.2343
Return	Var0.01	-6.3537	-3.8903	-1.6518
Return	Var0.05	-2.85007	-2.0409	-1.0446
Return	Var0.10	-2.0148	-1.5179	-0.8348
Panel D Sharpe Ratios				
		Equity and Gold	Equity and USD	
		-534.54	-10.30	

Table: 1 Descriptive Statistics minimum variance portfolio
Source: Author

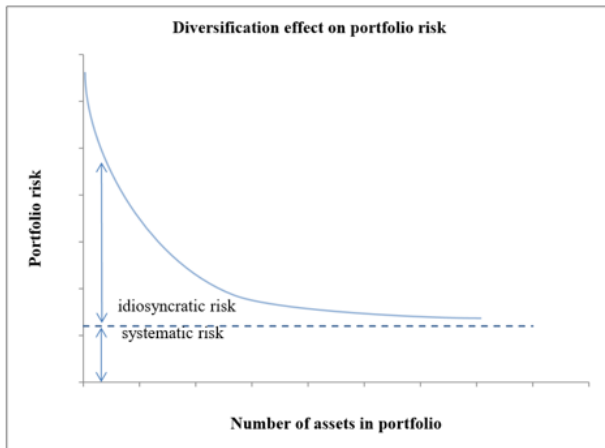


Figure 1: Diversification effect on portfolio risk
 Source: Own construction based on Bodie et al. (2011)

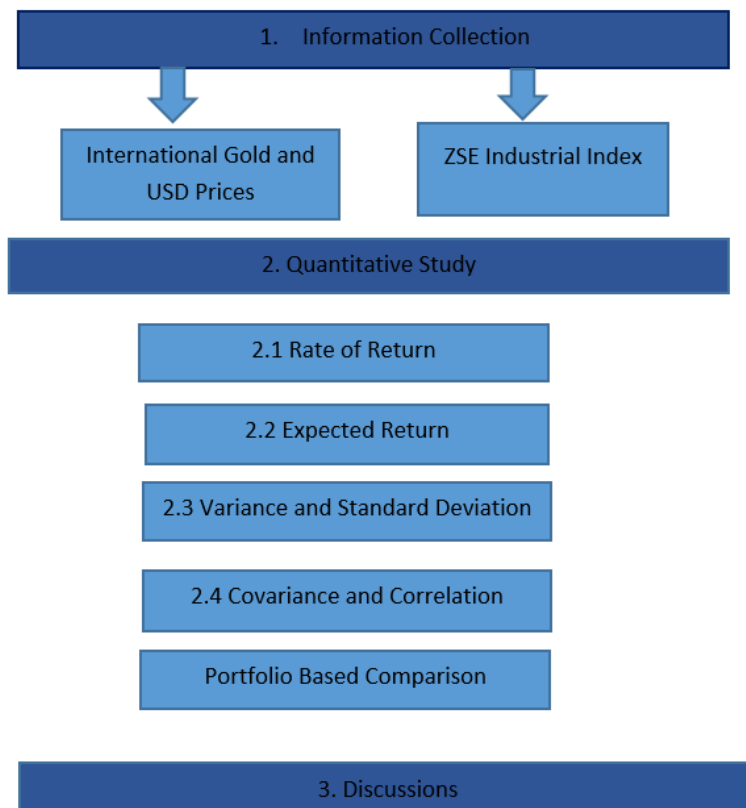


Figure 2 : Research Process

Source: Author

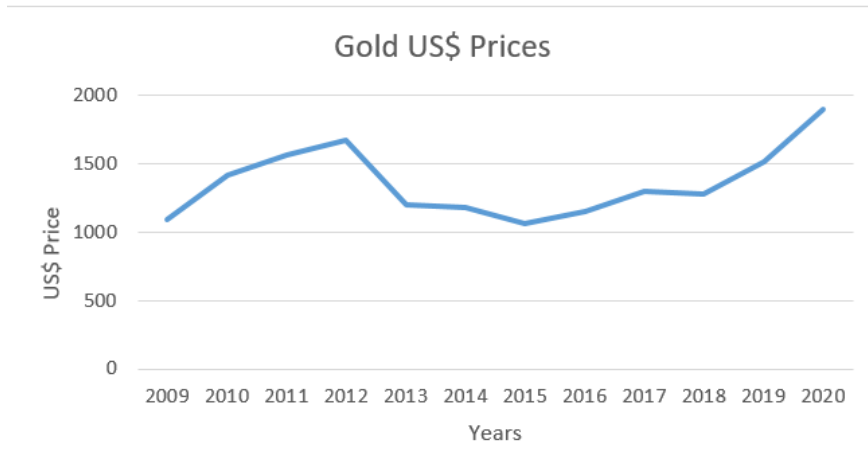


Figure 3: Gold Price development in US\$ (2009 to 2019)
 Source: Author, 2021

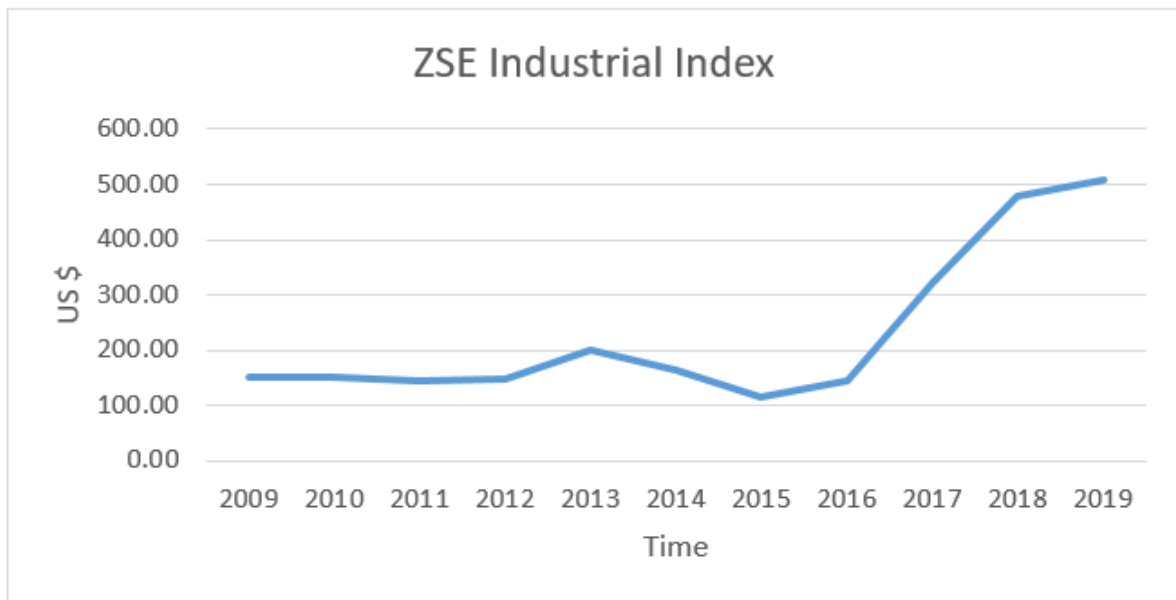


Figure 4: ZSE industrial index development in US\$ (2009 to 2019)
 Source : Author, 2021

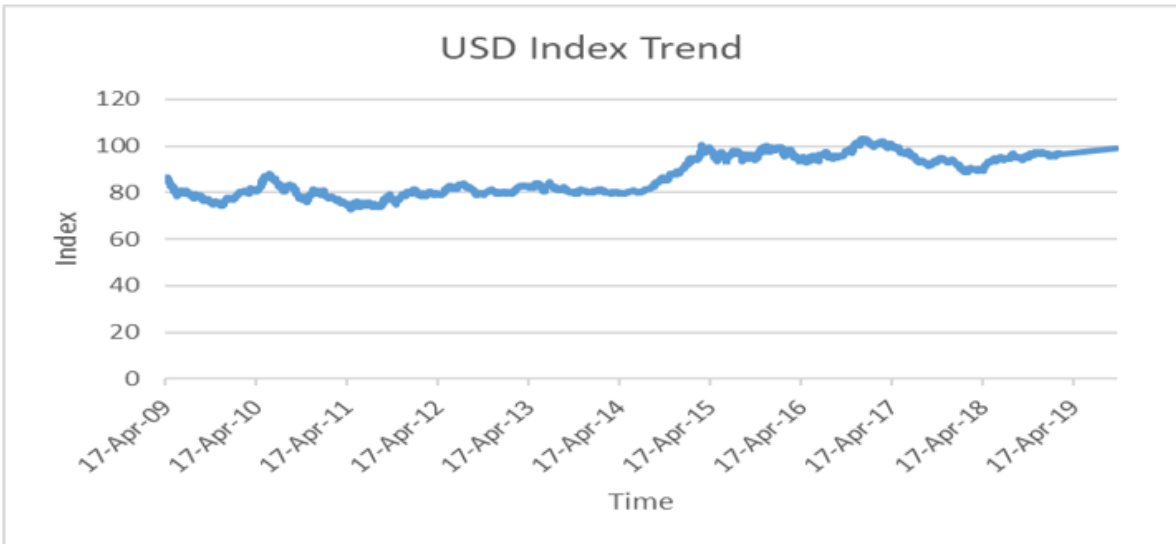


Figure 5: ZSE industrial index development in US\$ (2009 to 2019)
 Source : Author, 2021

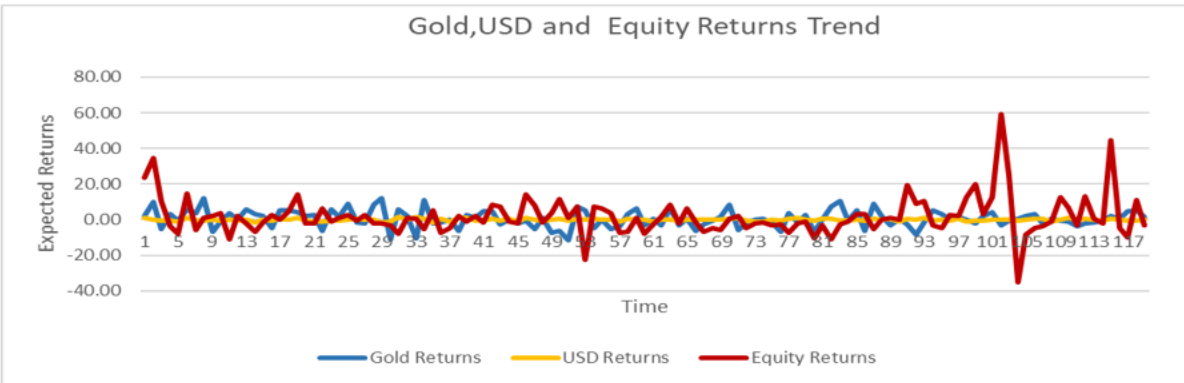


Figure 6: Equity, USD Gold Returns Volatility Graph
 Source: Author, 2021

XLSTAT 2021.1.1.1108 - Correlation tests - Start time: 05/04/2021 at 09:11:01 / End time: 05/04/2021 at 09:11:07
Observations / Quantitative variables: Workbook = Equity and inflation.xlsm / Sheet = Sheet1 / Range = 'Sheet1'!\$B\$1:\$D\$2438 / 2437 rows and 3 columns

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing data	Minimum	Maximum	Mean	Std. deviation
Gold	2437	0	2437	-13.962	16.229	0.025	1.200
Equity	2437	0	2437	-14.505	17.862	0.086	1.439
USD	2437	0	2437	-5.117	5.903	0.006	0.515

Correlation matrix (Pearson):

Variables	Gold	Equity	USD
Gold	1	0.009	-0.357
Equity	0.009	1	-0.003
USD	-0.357	-0.003	1

Values in bold are different from 0 with a significance level alpha=0.05

p-values (Pearson):

Variables	Gold	Equity	USD
Gold	0	0.662	<0.0001
Equity	0.662	0	0.887
USD	<0.0001	0.887	0

Coefficients of determination (Pearson):

Variables	Gold	Equity	USD
Gold	1	0.000	0.128
Equity	0.000	1	0.000
USD	0.128	0.000	1

Table: 2 OLS output Individual assets statistics

You are using the XLSTAT trial version. Number of days remaining until the trial expires: 10

Order

XLSTAT 2021.1.1.1108 - Correlation tests - Start time: 07/04/2021 at 23:23:56 / End time: 07/04/2021 at 23:24:03

Observations / Quantitative variables: Workbook = Garch Data.xlsx / Sheet = usdequity / Range = usdequity!\$A\$1:\$B\$2438 / 2437 rows and 2 columns

Type of correlation: Pearson



Summary statistics

Summary statistics:

Variable	Observations	Obs. with missing data	Obs. without missing	Minimum	Maximum	Mean	Std. deviation
USD	2437	0	2437	-4.775	5.156	0.015	0.484
GOLD	2437	0	2437	-8.570	10.142	0.050	0.926

Correlation matrix (Pearson):

Variables	USD	GOLD
USD	1	-0.041
GOLD	-0.041	1

Values in bold are different from 0 with a significance level alpha=0.05

p-values (Pearson):

Variables	USD	GOLD
USD	0	0.044
GOLD	0.044	0

Coefficients of determination (Pearson):

Variables	USD	GOLD
USD	1	0.002
GOLD	0.002	1

Table: 3 OLS Output Gold/Equity and USD/Equity statistics

