

THE RELATIONSHIP BETWEEN STOCK MARKET RETURNS AND PARALLEL MARKET EXCHANGE RATES IN ZIMBABWE: AN ECONOMETRIC INVESTIGATION (2000 TO 2007)

By

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Abstract

The study empirically tests the existence and nature of relationship between ZSE returns and three macroeconomic variables, the main one being the parallel market exchange rates. Engle-Granger's Cointegration analysis and the Error Correction Model (ECM) techniques were employed on monthly time series from 2000 through to 2007. Empirical results point to the existence of a long-term relationship between ZSE returns and parallel market exchange rates, international oil prices and money supply (M2) growth. Money supply growth is observed to exert the highest influence on stock market returns. The parallel market exchange rate, though reported to be insignificant in the short-term, regains its influence in the long run in explaining ZSE returns. However, the importance of international oil prices on ZSE returns is noted to be minimal. Despite some minor influences being observed in the short-term, they vanish away in the long term. These findings seem to point to the fact that ZSE investors or potential investors should pay more attention to the trends of the aforementioned variables for them to be able consistently beat the market. Nonetheless, other factors that are not incorporated in the study should also be considered in making investment decisions, since the aforementioned variables are reported to account for only 53.3 percent of the variations in ZSE returns, signifying the importance of the omitted factors.

Introduction

Over the past decade, Zimbabwe has experienced one of the longest and severe economic recessions since its Independence in 1980. Among other problems, the economic turmoil has given birth to a foreign currency crisis, which in turn has brought about a vibrant parallel market for foreign exchange that has robbed business from the formal market. The parallel market for

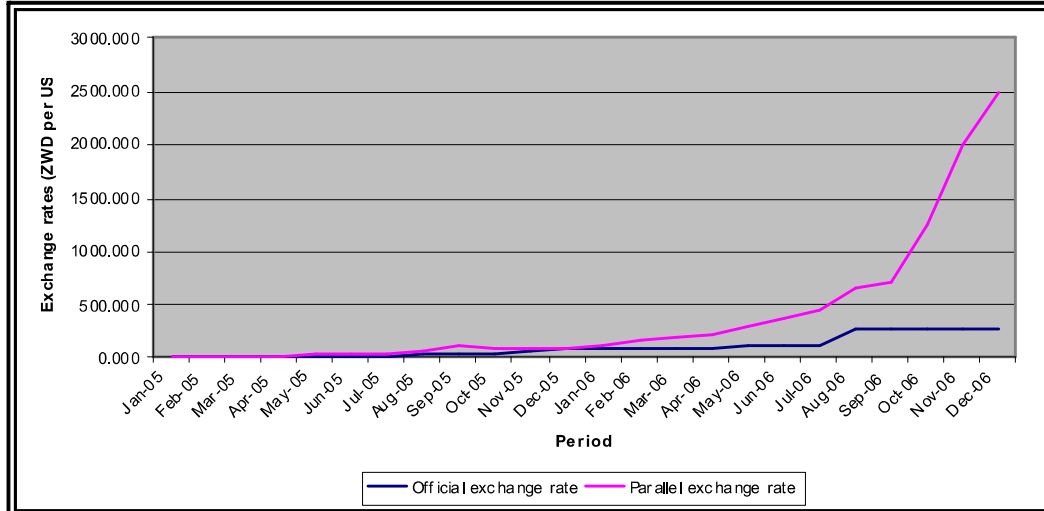
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foreign exchange, which dates back to 1998, has grown immensely over the years and is now the main source of foreign currency for many individuals and corporates. Although the precise volume of trade in the parallel market is not known, it undoubtedly exceeds that of the official market, as the parallel market is now the ‘only market of resort’ for most economic agents. The incessant growth in the parallel market can be attributed to foreign currency shortages and myriad of exchange controls in the official exchange market. The exchange rates in the two markets have thus varied enormously, with official rates remaining relatively fixed and the parallel rates varying in response to macroeconomic developments in the country. The government has been deprived of the much-needed foreign currency by the parallel market, which has even attracted the participation of authorized dealers such as banks and *bureaux de changes*¹. Nkomazana and Tambudzai (2008) assert that depressed export earnings, declining Foreign Direct Investments (FDI) and falling capital inflows such as loans and Balance of Payment (BOP) support are the major causes of the foreign currency crisis in the country.

In recent years, the importance of the parallel market on the overall economic activities has continued to grow. Virtually, all transaction prices in the goods, real and financial markets are implicitly indexed to the parallel market exchange rates. Monetary authorities acknowledge the rampant use of the parallel market exchange rates, especially in the Real Estate Sector, “where now most rentals are being indexed to parallel market exchange rates, leading to relentless monthly escalations” (Reserve Bank of Zimbabwe, 2007:16).

Other sectors of the economy have also followed suite with some financial institutions in “deliberate utilization of local liquidity in purchase of foreign currency from the illegal parallel and underground foreign exchange markets” (Reserve Bank of Zimbabwe, 2004:15) and “importers/exporters are doing deals in the parallel market” (Reserve Bank of Zimbabwe, 2007:79). The Reserve Bank Zimbabwe (RBZ) on the other hand, has continued to control the operations of the official market with the goal of stabilizing the value of the Zimbabwean dollar, but the parallel market premiums have continued to increase monotonically, especially since 2006. This can be attributed to the culture of speculation and rent-seeking behaviour among dealers and high inflation expectations among economic agents. See Figure 1 below.

¹*Bureaux de changes* in Zimbabwe were closed in November 2002 on allegations of being “conduits for parallel market dealings” in the country. See 2003 National Budget Statement.

Figure 1: Official and Parallel Market Exchange Rates in Zimbabwe (2005-2006)

Source: Techfin Research (2008)

On the other hand, the Zimbabwe Stock Exchange (ZSE) has also recorded significant growth over the same period. Despite some periodic slumps, the industrial index over the period, especially since 2005, has been increasing sharply, characterised by frequent and persistent bull runs. The two ZSE indices (industrial index and the mining index) made historical record highs and broke them on daily basis. The industrial index for instance, rose from a mere 16.77¹ points in January 2000 to close 2007 at 1 911 538 282 points (Zimbabwe Stock Exchange, 2007). Stock returns remained attractive over the period, as they were continually above the rate of inflation. As such, many investors rallied to the stock market to hedge their funds from the hyperinflation that characterised the financial landscape during the period of study. The negative real returns in the alternative money market and the illiquidity of the Real Estate Sector market led to increased participation on the ZSE by both individuals and corporates who previously shun the stock market.

In general, both stock prices and parallel market exchange rates over the period of study were moving in tandem. The rise (or fall) in exchange rates make the ZSE shares cheaper (or expensive) for foreign investors. Thus, fluctuations in exchange rates should have an impact on equity investment decisions. It is therefore, imperative to investigate whether there is a meaningful economic relationship between the two variables.

The purpose of this study is to establish the existence and nature of relationship that exists between ZSE returns and the parallel market exchange rates in Zimbabwe. The study seeks

¹ All figures quoted in this paper reflect the revalued new currency implemented on 31 July 2006 by the Reserve Bank of Zimbabwe

to make a contribution to financial literature. Published literature on macroeconomic risk factors and the ZSE is hard to find as it has not received a great deal of attention among academic researchers. The results from this study are important to investors eyeing the ZSE since the link between the parallel market exchange rates and stock market returns may be used to predict the path of stock market developments. The study helps investors to forecast ZSE returns using exchange rates and other macroeconomic risk factors included in the study. Also, the understanding of stock price-exchange rate relationships can be used by policy makers in predicting the country’s economic cycles.

The paper tests the hypothesis that there is either a positive or negative long run relationship between ZSE returns and the parallel market exchange rates against the alternative hypothesis that there is no long run relationship between the two variables.

Having outlined the introductory part of the study, the remainder of the paper is organized as follows: review of related literature, research methodology, empirical findings and finally the concluding remarks.

Literature review

There are many theories and models that predict an association between macroeconomic variables and stock market returns. Of special interest in this section are those that link exchange rates, international oil prices and money supply to stock market returns and are discussed under theoretical and empirical literature reviews.

Theoretical Literature Review

This section outlines the Dividend Discount Model (DDM) and the Arbitrage Pricing Theory (APT) and how they link the aforementioned variables to stock returns.

The Dividend Discount Model (DDM)

The Dividend Discount Model (DDM), set forth by Gordon (1962), predicts that the price of a share of common stock is the present value of all future cash flows (dividends) that it is expected to provide over an infinite time horizon. Mathematically, this relationship can be spelt as follows:

Where: P_j - is the price of Common stock j, D_t - is the dividend during period t, k - is the required rate of return¹ on stock j,

After simplification, equation 1 decomposes to:

$$P_j = \frac{D_1}{k - g} \dots\dots\dots 2$$

Where: D_1 - is the dividend in period 1 and g - is the constant growth rate of dividends.

Equation 2 posits that the share price depends on future dividends (D_1) and the required rate of return (k) on that share. It therefore, follows that any macroeconomic variables (such as exchange rates) that may have an influence on future dividends or the required rate of return (discount rate) should have an influence on the share price. In other words, economic variables, which impact future cash flows and the required returns, can therefore be expected to influence share prices.

2.1.2. Arbitrage Pricing Theory (APT) 2.1.5 Arbitrage Pricing Theory (APT)

The Arbitrage Pricing Theory (APT), which was developed by Ross (1976), contends that returns on an individual stock will depend upon a variety of variables in an economy. It is built on the premise that investors take advantage of arbitrage opportunities, though they are short-lived. This means that the return of any asset can be written as follows:

$$R_i = E_i + \mu \dots\dots\dots 3$$

Where: R_i - is the total return on asset i , E_i - is the expected return component and μ - is the unexpected return component.

The surprise in return (μ) comes from market-wide (m) and firm specific (ε) sources, such that equation 3 can be written as:

$$R_i = E_i + m + \varepsilon_i \dots\dots\dots 4$$

The market-wide risk (m) under the APT is measured by economic fundamentals and can therefore be decomposed to specific economic factors as follows:

$$R_i = E_i + (\beta_{i1}\sigma_1 + \beta_{i2}\sigma_2 + \dots + \beta_{ik}\sigma_k) + \varepsilon_i \dots\dots\dots 5$$

For $i = 1 - N$

Where: β_{ik} - Reaction in asset is return to movement in a common factor, σ_k - multiple factors expected to have an impact on the returns of all assets (economic fundamentals) and N - number of assets.

The APT allows investors to focus on a handful of significant factors that seem to determine the returns on most assets, the number and identity of the factors being determined by the

¹ The required rate of return is determined by the risk commensurate with the stock's cash flows.

data on historical returns. While the APT focuses on individual security returns, it may also be used in an aggregate stock market framework, where a change in macroeconomic variables could be seen as reflecting a change in an underlying risk factor regarding future returns.

Empirical Literature Review

Studies investigating the relationship between macroeconomic variables and stock returns have been carried out in a number of stock markets using varying types of datasets. However their results are not conclusive and are mixed. Some of such studies are outlined below.

Kwon *et al* (1997) investigated the relationship between stock returns and macroeconomic variables in Korea for the period 1980 to 1992, using regression models and monthly data. Their results indicated that the Korean stock market is more sensitive to foreign exchange rates, trade balance, money supply and the production index as opposed to inflation and interest rate-related variables. Evaluating the Korean share market, Kwon and Shin (1999) also established a long run relationship between stock prices and the following macroeconomic variables: industrial production index, exchange rates, trade balance and money supply. Ibrahim (1999) analysed the dynamic interaction of macroeconomic variables and stock prices in Malaysia using Cointegration analysis and Granger-causality tests. He used monthly dataset from January 1977 to June 1996 and documents that stock prices are Granger-caused by changes in the official reserves and exchange rates in the short-run.

Muradoglu *et al* (2001) also tested the long run relationship between stock returns and monetary variables in Turkey using daily observations from January 1988 to April 1995. Their results reveal that the influence of monetary expansion and interest rates disappeared and foreign currency prices regained their expected influences in the long run. In another Malaysian study, Ibrahim and Aziz (2003), using cointegration and Vector Autoregression (VAR) estimated the following long run relationship between stock prices and some selected macroeconomic variables:

$$KLCI = 0.2476IP + 4.5197CPI - 0.395M2 - 1.5787EXC - 9.0716 \dots\dots\dots 6$$

Where: *KLCI* - Kuala Lumpur Composite Index, *CPI* - Consumer Price Index, *IP* - Real Industrial Production Index, *M2* - Monetary aggregate and *EXC* - Exchange rates

The results in equation 6 reveal a positive long run relationship between stock prices and the industrial production and the consumer price index. A negative long run association is found between stock prices and money supply () and the exchange rates.

Similarly, Jiranyakul and Brahmasrene (2005), in a Thailand study examined the relationship between the stock market index and the following macroeconomic variables: consumer price index, money supply, interest rates, industrial production index and nominal exchange rates. Using Johansen cointegration tests, they estimated the following long run relationship between the stock market index and the four macroeconomic variables during the pre-financial crisis:

$$SET_t = -1.078IP_t + 0.975M2_t - 8.44EX_t - 1.496OP_t \dots\dots\dots 7$$

(0.655) (0.358) (2.212) (0.169)⁴

Where - SET_t denotes the logarithm of market index of overall market value of listed stocks in the Stock exchange of Thailand, IP_t is the logarithm of the total industrial production index, $M2_t$ is the logarithm of changes in broad money supply, EX_t is the logarithm of the nominal exchange rate measured in terms of Thai bath per US dollar and OP_t is the logarithm of oil prices measured in US dollars per barrel.

Equation 7 reports a positive relationship between money supply ($M2_t$) and the stock price index. All other variables, including exchange rates, are negatively related to the stock market index.

Wickremasinghe (2006) also examined the causal relationship among stock prices and macroeconomic variables in the Colombo Stock Exchange of Sri Lanka for the period January 1985 to December 2004. Making use of Johansen's cointegration test, Error Correction Models, variance decompositions and impulse response functions, Wickremasinghe (*ibid*) found that there are both short and long-run causal relationships among stock prices and macroeconomic variables in Sri Lanka. He noted three feedback or bi-directional causal relationships between the stock prices and three-month fixed rate, US share price and Gross Domestic Product. Uni-directional causality was found running from stock prices to CPI, money supply and to the US dollar exchange rate. In essence, these results indicated that stock prices in Sri Lanka could be predicted using macroeconomic variables, of which the exchange rate and money supply were among them.

In an Indian study, Chakravarty (2006) examined the relationship between stock prices and a set of macroeconomic variables, using monthly time series data from April 1991 to December 2005. His findings suggested that neither exchange rates Granger-cause stock prices nor stock prices Granger-cause exchange rates.

Other researchers who have documented at least a relationship between stock returns and variables under study include Islam (2003) for Malaysia, Moskalenko (2005) for Ukraine, Karamustafa and Kucukkale (2005) for Turkey and Gan *et al* (2006) for New Zealand.

⁴The numbers in parenthesis are the standard deviation.

Methods

Model Specification

The relationship between ZSE returns and parallel market exchange rates was modeled in the following functional form:

$$SMR_t = \alpha_0 + \alpha_1 EXC_t + \alpha_2 OP_t + \alpha_3 MS2_t + u_t \dots\dots\dots 8$$

Where - SMR_t is the stock market returns in period t , EXC_t is the parallel market exchange rate in period t , OP_t is the Crude oil price per barrel in US dollars in period t , $MS2_t$ is the money supply (M2) in period t and u_t is the disturbance or error term.

A linear functional form was considered appropriate for this study because the data does not have to be transformed first and “one can obtain explicit, or analytical, solutions of the coefficients of such models” (Gujarati, 2005:573). Other researchers in the same scope of study who have used the same functional form *inter alia* are Oyama (1997), Ibrahim and Aziz (2003) and Adrangi *et al* (2000).

Data types and sources

A sample of monthly time series data from January 2000 through to December 2007 was used in this study. The selection of the study period was guided by data availability and the need to capture the most recent developments in the stock and foreign currency markets. The end-of-the month values of the industrial index were used as a proxy for stock prices in Zimbabwe. It is from these values that the stock market returns⁵ were calculated, using the following formulae:

$$SMR_t = \frac{P_{t+1} - P_t}{P_t} * 100 \dots\dots\dots 9$$

Where - P_t is the end-of-the month value of the industrial index in period t , P_{t+1} is the end-of-the month values of the industrial index in the next period, $t+1$.

Explanatory variables chosen for the study are the parallel market exchange rates (EXC), crude oil prices (OP) and money supply (MS2). The description of each of these variables is given in Table 1.

⁵Although stock returns consist of both price changes and dividends, the study considered only the price variations component since dividends in absolute terms tend to be stable over time. It is the movement in prices, which constitutes the volatile component of stock returns. The omission of dividends, thus should not pose a problem.

Table 1: Description of Explanatory Variables

VARIABLE	DESCRIPTION
Parallel Market Exchange Rates (EXC)	This is the end-of-the month exchange rate of the US\$1 in the Parallel market.
Crude Oil Prices (OP)	This is the US dollar price of crude oil per barrel for OPEC ¹ countries.
Money supply (MS2) as growth	Broadly defined monetary aggregates as measured by M2 ² monthly growth rates.

The industrial index figures were obtained from the ZSE and the parallel market exchange rates were sourced from Techfin Research⁸. Crude oil prices were obtained from Energy Information Administration website and money supply figures from the RBZ.

Estimation Procedure

The estimation of empirical results proceeded as follows:

Step 1: Stationarity tests

As a prerequisite, each time series was examined for stationarity⁹. Mathematically, a time series

X_t is said to be stationary if:

It is generally accepted that most time series used in economic analysis are non-stationary in nature. Thus, regressing a non-stationary series on another non-stationary series may produce spurious results, such as misleading high R-squared and unreliability in the forecasting power for long-term case (Gujarati, 2005). The Augmented Dickey Fuller (ADF) unit root tests were employed for this purpose. The ADF test consists of the following regression:

⁶ OPEC stands for the Organisation of Oil Exporting Countries.

⁷ M2 is defined as notes and coins in circulation plus demand deposits with the banking system plus savings deposits plus less than 30 day deposits with the banking system.

⁸ Techfin Research provides economic and investment research and consultancy services to Zimbabwe market.

⁹ Mathematically, a time series X_t is said to be stationary if:

$$E(X_t) = \mu, \quad \text{Var}(X_t) = \sigma^2 \quad \text{and} \quad \text{Cov}(X_t, X_{t+j}) = \sigma_j$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_1 \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t \dots\dots\dots 10$$

Where - ε_t is the white noise error term, and $\Delta Y_{t-1} = Y_{t-1} - Y_{t-2}$

Despite the availability of other methods such as the Phillip-Perron (PP) and the Ng-Perron unit root test, most researchers have continued to use the ADF tests because it is available in many econometrics packages. Similar studies that employed the same unit root tests *inter alia* are Bhattacharya and Mukherjee (2001), Ibrahim and Aziz (2003), Islam (2003), Karamustafa and Kucukkale (2003) and Gan *et al* (2006).

Step 2: Cointegration tests

Engle and Granger (1987) have shown that it is quite possible for a linear combination of two (or more) non-stationary series to be stationary. Cointegration means that, despite being individually non-stationary a linear combination of two or more time series may be stationary. The existence of cointegration among a system of economic variables means that they have a long run equilibrium relationship between them (Gujarati, 2005). The Engle and Granger (1987)'s residual-based cointegration test was employed to test for cointegration among the variables under study. This is a two-step procedure involving: (i) Regressing stock prices on macroeconomic variables to obtain Ordinary Least Squares (OLS) regression residuals, (ii) Testing for the existence of unit roots in the OLS residuals. This test is conducted without the intercept and the trend. The null hypothesis of no cointegration is accepted if the unit root statistics fall below some critical values.

Step 3: Error Correction Model (ECM)

If variables are not stationary at level but cointegrated, the Error Correction Model (ECM)¹⁰ can be used to determine the short run deviations from the long run equilibrium. If variables are regressed in differenced form, valuable long-term relationships are lost between the dependent and the explanatory variables. The error term in the cointegration regression model links the short run behaviour of the variable to its long run value. The ECM was specified as follows:

$$\Delta SMR_t = \beta_0 + \beta_1 \Delta EXC_t + \beta_2 \Delta OP_t + \beta_3 \Delta MSG_t + \beta_4 ECT_{t-1} + \varepsilon_t \dots\dots\dots 11$$

Where: Δ denotes the first difference operator, ECT_{t-1} is one period lag of the error term obtained from the cointegrating equation. It is the error correction term¹¹, ΔEXC_t , ΔOP_t and ΔMSG_t captures the short run impact of all the respective explanatory variables and β_4 measures the speed of adjustment towards the equilibrium value.

¹⁰ ECM is a way of reconciling the *short run* behaviour of an economic variable with its long-term behaviour.

¹¹ It is calculated as follows:

Results and discussion

This section reports the empirical findings of the study. The findings are presented and discussed in the following order: stationarity and cointegration test results, cointegrating equation and the ECM results¹².

Stationarity and Cointegration test results.

The stationarity tests are presented in Table 2. All variables except parallel market exchange rates were found to be non-stationary at level. This means that these variables are random-walk at the level form, that is, they have a unit root. However, they were observed to be stationary after first differencing. In essence, EXC is integrated of order zero, I(0), while all the other variables are integrated of order one, I(1). These results seem to confirm the generally held wisdom that most economic time series are difference stationary and are in tandem with the findings of Ibrahim (1999), Jiranyakul and Brahmairene (2005) and Gan *et al* (2006) who all found that the economic variables that they used were nonstationary and non-mean reverting.

Table 2: Stationarity test results

VARIABLES	ADF Unit Root Tests (<i>with intercept</i>)		ORDER OF INTEGRATION
	LEVEL	FIRST DIFFERENCE	
<i>SMR</i>	-2.565	-9.813***	I(1)
<i>EXC</i>	9.503***	-	I(0)
<i>OP</i>	1.317	-5.743***	I(1)
<i>MSG</i>	-1.880	-6.552***	I(1)
<i>ER</i>	-7.200***	-	CI(0)

Note:

- The ADF critical values for *t*-statistics at 10 percent and 1 percent levels for a model with an intercept are 2.583 and 3.502 respectively.
- *** indicates statistical significance at 1 percent.
- ER denotes residuals estimated from the cointegrating equation. The ADF critical values for *t*-statistics at 1 percent level for a model without a constant and time trend is 2.588.

¹² A full set of original results can be provided upon request.

Employing the Engle-Granger's residual based cointegration test, the residuals from the cointegrating equation were found to be stationary at level, suggesting that the time series are cointegrated, $CI(0)$. This implies that the coefficients of the cointegrating equation can be interpreted as the long run coefficients, measuring the long run relationship between the variables. In effect, there exists a long run relationship between ZSE returns and the parallel market exchange rate, together with other macroeconomic variables included in the study. The stationarity tests for the residuals (ER) are also reported in Table 2 above.

Cointegrating Equation

The estimated long run ZSE returns equation is reported below:

$$SMR_t = 0.0000526 * EXC_t + 0.19853OP_t + 1.352125MSG_t - 7.262271 \dots\dots 12$$

(3.090)	(0.598)	(5.602)	(-0.653)
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$R^2 = 0.533$ $DW = 1.953$ $F - \text{Statistic} = 35.06$

Note: The figures in parentheses are the t -statistics.

Parallel market exchange rates and the money supply (M2) growth were significant, while the oil price movements were insignificant in explaining ZSE returns. This means that the stock market returns in Zimbabwe are better explained by exchange rates and money supply movements as opposed to international oil prices.

While the influence of exchange rates on stock returns was reported to be positive, other researchers such as Kwon and Shin (1999), Ibrahim and Aziz (2003) and Jiranyakul and Brahmasrene (2005) documented a negative relationship between the two variables for Korea, Malaysia and Thailand, respectively. However, Gunasekarage *et al* (2004) and Wickremasinghe (2006) in Sri Lanka and Gan *et al* (2006) in New Zealand, observed that exchange rate movements are not very important in determining stock returns. In theory, when the domestic currency depreciates against foreign currencies, it makes the local share market attractive to foreign investors. This should therefore, lead to increased participation in the share trading by foreigners and the stock market index will rise in response, and as such a positive relationship is the most expected, as reported from this study. These variations in the nature of the relationship between stock returns and exchange rates may be due to different levels of development of the capital markets in respective countries.

Monetary expansion is generally inflationary and as such, a positive money supply-stock-price relationship was expected. The positive influence of money supply growth on stock returns is consistent to findings by Gunasekarage *et al* (2004) for Sri Lanka and Nkomazana and Mtetwa (2007) for Zimbabwe, and supports the view that money supply growth has fuelled inflation in the country, thus forcing investors to hedge their portfolios through investing in the risky stock market. Bhattacharya and Mukherjee (2001), however, found no causal linkage between stock prices and money supply in India.

The cointegration equation above also reports the insignificance of international oil prices in explaining stock market returns in Zimbabwe. This may be explained by the speculative nature of the ZSE. In theory, increase in oil prices will be beneficial to oil-exporting countries and as such a positive relationship between stock and oil prices is expected in such countries. On the other hand, oil-importing countries (like Zimbabwe) are expected to envisage a negative relationship between stock and oil prices. In line with theory, and in contrast to the findings documented in this study, Kwon *et al* (1997) and Jiranyakul and Brahmairene (2005) noted the significance of oil prices in explaining stock returns in Korea and Thailand, respectively.

However, this variable should not be discarded since the overall model is significant as inferred from the F-Statistic. The F-statistic of 35.06 is well above 5, using the rule of thumb, showing that the explanatory variables taken together are highly significant in explaining ZSE returns. In addition, the model does not suffer from spurious regression, using the rule of thumb, since $R^2 < DW^{13}$.

A coefficient of determination (R^2) of 0.533 means that about 53.3 percent of the systematic variations in ZSE returns is attributable to the explanatory variables in the equation. Other factors not included in this study account for about 46.7 percent of the variation in ZSE returns. A DW statistic of 1.953 is in the neighborhood of 2, thus using the rule of thumb, shows that the estimated long run equation for ZSE returns does not suffer from the problem of autocorrelation.

Error Correction Model Results

Since the time series were found to be nonstationary, but cointegrated, the ECM was used to determine the short run deviations from the long run equilibrium. The results from the ECM are summarized below:

$$\Delta SMR_t = -0.0000112 * \Delta EXC_t + 2.824 * \Delta OP_t + 1.867 * \Delta MSG_t - 0.987 * ECT_{t-1} - 1.524$$

(0.240) (1.580) (6.246) (-8.068) (-0.35)

$$R^2 = 0.575$$

$$DW = 1.97 \dots\dots\dots 13$$

The obtained results show that the short run changes in parallel market exchange rates have negative effects on stock returns, though not significant. Oil prices are also shown to have a positive effect on stock returns, but it is still insignificant. However, money supply growth is reported to be the only significant variable in the short run. The coefficient of the error term is significant at 1 percent. This coefficient of -0.987 means that about 98.7 percent of the discrepancy between the actual and the equilibrium values of ZSE returns are corrected for in each month.

¹³ This stands for the Dubin-Watson statistic.

Conclusions

From the findings presented above, the following conclusions can be drawn:

- Macroeconomic variables such as the parallel market exchange rates, international oil prices and money supply growth have a long run equilibrium relationship together with ZSE returns.
- The parallel market exchange rates exert a significant influence on the long run ZSE returns. However, this is not so in the short run. Whilst its influence is negative and insignificant in the short-term, it becomes positive and statistically significant in the long-term. The null hypothesis that there is either a positive or negative long run relationship between ZSE returns and the parallel market exchange rates is therefore accepted at 1 percent significance level.
- Money supply growth is the most important risk factor of the three explanatory variables used in this study. Its significance in explaining ZSE returns is apparent both in the short and long-term.
- International oil prices are not among the important risk factors that should be considered by investors eyeing the ZSE, especially in the long-term. Their influence on stock returns is observed to disappear with time.
- Overall, the results indicate that ZSE returns can be predicted from some of the macroeconomic risk factors discussed above. The findings, thus violates the validity of the semi-strong version of the Efficient Market Hypothesis (EMH), that is, publicly available information can be used to consistently earn supernormal returns from the ZSE.
- Investors who are interested in investing in the ZSE should therefore, pay more attention to the parallel market exchange rates and money supply growth rather than international oil prices.
- Since the aforementioned variables account for 53.3 percent of the variations in ZSE returns, investors should also consider other risk factors not discussed in the study when making their investment decisions.

Thus, the present study concludes that the above mentioned variables are important in explaining stock market returns in Zimbabwe, which means that investors who want to earn above normal returns should also pay attention to the behaviour of these variables. Future studies in this area should, however, concentrate on applying other methods such as the General Moments Method (GMM) and should also incorporate other variables not used in this study such as trade balance and foreign exchange reserves as explanatory variables.

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