

# Does firm size affect stock returns? Evidence from the Zimbabwe Stock Exchange

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## Keywords

Zimbabwe Stock Exchange, firm size; portfolio, stock returns.

## Abstract

*The objective of the study is to investigate the relationship between firm size and stock returns for firms listed on the Zimbabwe Stock Exchange (ZSE) between June 2009 and July 2013. We adopt the regression model employed by Banz in 1981, with innovations. The regression is based on constructed portfolios, with market capitalization as the basis for portfolio construction. The portfolios comprise at most 5 stocks, and stocks are sorted in ascending order by market capitalization for selection into portfolios. The sample period spans from June 2009 to July 2013. We select the sample period beginning from 2009 because that is when the government of Zimbabwe demonetized the Zimbabwean dollar and adopted a basket of foreign currencies as legal tender. The data prior to 2009 is also distorted by hyperinflation and therefore is not reliable. The sample size covers 64 companies listed on the ZSE, of which 60 are industrial and 4 are mining companies. We find that the estimated coefficient for the firm size factor is not significant at the 5% level of significance. Therefore, firm size has a positive yet insignificant effect on stock returns for companies listed on the ZSE for the period June 2009 to July 2013. Contrary to the general empirical findings, larger firms on the ZSE tend to exhibit higher risk-adjusted returns than smaller firms.*

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## 1. Introduction

The traditional capital asset pricing model (CAPM) developed in the 1960s has failed to model asset returns in many Asian and European markets ([1]; [2]; [3]; [4]; [5]; [6]). The studies that have been carried out since the inception of CAPM provide evidence that CAPM on its own cannot fully explain asset returns. This has led to the development of competing asset pricing models, such as the arbitrage pricing theory (APT). The APT models include a variety of factors which endeavor to explain the dynamics of asset returns. The majority of the studies have been conducted on the evolution of stocks returns on stock markets.

This study is motivated by the results obtained in [6] on CAPM, showing that CAPM does not fully hold on the ZSE. We explore return dynamics on the ZSE further by studying the significance of the size effect in explaining differences in stock returns on the ZSE. The size factor is based on the relative market capitalization of a firm.

## 2. Literature review

Our study differs from previous studies in many ways. Firstly, we estimate stock beta using a comprehensive approach that not only adjusts for lagged reaction of small stock returns to the market but also accounts for the empirical tendency for betas to regress towards unity. Secondly, instead of using individual stocks to test for the size effect, we use portfolios in our test regression. The use of portfolios results in more stable betas and also reduces standard errors in the regression, which improves test results. Thirdly, we document the size effect at a time when the Zimbabwean economy is undergoing significant structural transformation, which provides scope for insightful findings on stock market dynamics in transition economies.

The question of how firm size influences stock returns dates back to the 1980s. In 1981, Banz pioneered the empirical work on the influence of size on common stock returns. We adopt the model of Banz but with some innovations. Firstly, we use portfolio estimates rather than

individual stocks to avoid bias in estimation [7]. Secondly, the methodology used in computing betas for individual stocks and portfolios is different. We use lagged betas and make an adjustment using the Bloomberg adjustment [7]. Lastly, we create portfolios based on their market values and standardize the portfolios based on the average market value of the portfolio series. The criteria for grouping stocks differ from [8]. In [8], firms were grouped based on their distress risk, the likelihood of a firm becoming bankrupt, and account for the size factor by the market value of equity. In contrast, [9] use the market value of equity for size and find a negative and insignificant relationship with past stock returns after taking into account the leverage of firms.

It was observed in [10] that firm size, as measured by market value of equity, has a negative and significant effect on stock returns. Their scope is focused on how earnings affect stock returns. In contrast, [11] introduce a new dimension by focusing on the effect of industry concentration on stock returns. Past studies provide mixed results depending on the methodology employed, sample period used and the market under study. Some results find no size effect ([12]; [13]) whilst others find strong size effect [14]. We find that in most of these studies, they didn't test for problems associated with ordinary least square (OLS) regression model. However, we have incorporated that in our study to test the limitations and problems associated with OLS.

### 3. Methodology

Our study uses data for 64 common stocks listed on the ZSE, of which 60 are industrial stocks and only 4 are mining stocks. We use the industrial index and the mining index as market proxies for industrial stocks and mining stocks respectively. The choice of sample period is guided by the monetary realities in the Zimbabwean economy. The government of Zimbabwe introduced a multi-currency system in 2009 in response to unfavorable macroeconomic fundamentals, characterized by galloping inflation and a virtual breakdown of the entire monetary system. The introduction of the multi-currency system meant that business transactions would now be conducted using foreign currencies. The ZSE adopted the United States dollar (USD) for both trading and reporting purposes when it opened for trading on the 19th of February 2009, marking a new era in the history of the ZSE.

The period between February and May 2009 recorded very little trading as investors pondered on the valuation of stocks under the new monetary regime. As such, we use data for the period starting June 2009 to July 2013. Delisted stocks are not included in this study. The data was extracted from the ZSE website.

#### 3.1 Research variables

We use contributing portfolio value size (CPS) measured as the ratio of the difference between portfolio value and the average portfolio series value to the average portfolio series value. The monthly returns (SR) are calculated by taking the natural logarithm of the ratio of current month stock price and previous month stock price. The same approach is employed in the calculation of monthly industrial (IND) and mining (MIN) indices. We regress SR on IND and the one month lagged IND for the industrial stocks and for mining we regress SR on MIN and the one month lagged MIN. We obtain two sets of betas, the current beta and the one month lagged beta. We sum the two betas and apply the Bloomberg adjustment for the summed betas. The Bloomberg adjusted beta is two thirds of the summed beta plus one third. The portfolio beta (PB) is the value-weighted average of the respective Bloomberg betas of the stocks forming that portfolio. The portfolio return (PR) is the value weighted average of monthly returns of the respective stocks forming that portfolio. We form a total of 13 portfolios based on the market

capitalization values as at 1 June of each of the years 2009 to 2013. We obtain a total of 65 portfolio observations for the period 2009 to 2013.

### 3.2. Data analysis

We adopt the regression employed by Banz in 1981, with some innovations. We use the multiple regression model based on OLS regression assumptions. The regression model is as follows:

$$PR_{it} = \alpha_0 + \beta_1 PB_{it} + \beta_2 CPS_{it} + \varepsilon_{it}$$

Where:

PR, PB and CPS are the portfolio returns, portfolio beta and contributing portfolio value size.

The parameters  $\beta_1$  and  $\beta_2$  are partial regression slope coefficients,  $\alpha_0$  and  $\varepsilon$  are intercept and error terms respectively. We perform several tests regarding the multiple regression model. We test for model misspecification and serial correlation using the Durbin-Watson tests. To test for heteroscedasticity of the residuals, we employ the Breusch-Pagan-Godfrey (BPG) and Koenker-Basset (KB) tests. We also check for multicollinearity of the variables PB and CPS using the condition index (CI) and the variance inflation factor (VIF). All tests are done at 5% level of significance. We use the SPSS 16.0 software for data analysis.

### 4. Results and discussion

We use two approaches to detect multicollinearity, namely the condition index (CI) and the variance inflation factor (VIF). The CI is generally between 1 and 7 as reported in Table 1 below and the VIF is less than 10 for the variables used. The CI and VIF suggest that multicollinearity is not a problem in our model. We test for serial correlation using the Durbin-Watson  $d$  statistic. A  $d$ -statistic of 1.658 reported in Table 1 is large enough to rule out positive and negative serial correlation. Therefore, our regression model is not misspecified. The heteroscedasticity tests are based on the BPG and KB tests. The reported  $p$ -values are insignificant for the BPG and KB tests (0.4622 and 0.5981 respectively), providing evidence that there is no heteroscedasticity. We find that our regression model is robust based on the above tests.

**Table 1: Model Diagnostics**

Condition Index		Variance inflation factor		Durbin-Watson statistic	BPG (p-value)	KB (p-value)
Dimension	Condition Index	Slope coefficients	VIF			
1	1.000	$\beta_1$	1.030	1.658	0.4622	0.5981
2	1.398	$\beta_2$	1.030			
3	6.642					

#### 4.1 Regression model results

Table 2 below shows the regression model results. The slope coefficients  $\beta_1$  and  $\beta_2$  are positive yet insignificant at the 5% level of significance. The evidence demonstrates that portfolio beta and the size factor have positive yet insignificant effects on stock returns on the ZSE. The findings of this study are consistent with [12] and [13]. However, our findings differ from those by [14], who find a positive and significant size effect on stock returns. However, [9] found a negative and insignificant size effect on stock returns. The findings from past studies on the effect of size on stock returns are mixed. The mixed results suggest that firm size impact on stock returns depends largely on the stock market under study, methodology used and the

period of study. The F-test result suggests that the model can be improved by including other factors. We however, recommend the possibility of model improvement in sections 5 of our further studies.

**Table 2: Summary of Multiple Regression Results**

	Coefficients	Standard Error	t Stat	P-value
$\alpha_0$	-0.043	0.052	-0.829	0.410
$\beta_1$	0.031	0.068	0.537	0.593
$\beta_2$	0.009	0.173	1.370	0.176
Overall F-test				0.295

## 5. Conclusions

We conclude, in line with [12] and [13], that firm size has a positive yet insignificant effect on stock returns on the ZSE. Larger firms exhibit higher risk-adjusted returns than smaller firms in Zimbabwe. This is not surprising given that larger firms on the ZSE are generally market leaders in their respective industry, and they have had easier access to bank credit to fund the refurbishment and expansion of production infrastructure to enhance efficiency, service delivery and price-competitiveness. The evidence in this paper confirms the recent trend towards consolidation on the ZSE, and indicates a priori that equity investors have taken a flight to quality since the adoption of the multi-currency regime. The lack of evidence for the significance of beta in explaining stock returns further confirms that the CAPM may not be an appropriate model for explaining differences in stock returns on the ZSE for the period under study. We however acknowledge the limitation imposed by the short nature of the sample period, especially regarding its impact on the standard errors of our beta estimates. The evidence we present here however suggests a need for further research into the drivers of stock returns on the ZSE. An interesting starting point could be studies of how behavioural factors may have influenced returns on the ZSE since the year 2009.

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