

Running head: THE SMALL FIRM EFFECT IN GHANA

Ashesi University College

The Small Firm Effect: The Case of Ghana Stock Exchange

By

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Declaration

I hereby declare that this undergraduate thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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I hereby declare that preparation and presentation of this undergraduate thesis were supervised in accordance with the guidelines on supervision of undergraduate thesis laid down by Ashesi University College.

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Abstract

The small firm effect is a stock market anomaly which shows that firms with smaller market capitalization earn higher returns than firms with larger market capitalization. The objective of this study was to test whether the small firm effect exists on the Ghana Stock Exchange (GSE).

The study adopted an explanatory research design. The study used 30 listed firms that had traded consistently from 2009 to 2016 as sample. The study created quartile portfolios in ascending order for the stocks based on market capitalization. The first and fourth portfolios were used as small and large firm portfolios. The study also calculated monthly returns for the stocks for the study period. The study then used secondary data from the GSE, Bank of Ghana, Ghana Statistical Services and Annual Reports Ghana to conduct a regression analysis. The OLS regression analysis was used to test for the relationship between size and returns on the GSE.

The regression results showed that there was a statistically insignificant and weak positive relationship between stock market returns on the GSE and small firm returns. On the contrary, large firms on the GSE showed a statistically significant and strong positive relationship between stock market returns on the GSE and small firm returns. Thus, the study concluded that small firm effect was not present on the GSE since large firms showed higher returns than small firms. The study then recommended that the Securities and Exchange Commission formulate policy to reduce the impact large firm size has on stock returns.

Keywords: Small firm effect, small firm returns, market anomalies

List of Abbreviations

CAPM – Capital Asset Pricing Model

EMH – Efficient Market Hypothesis

GSE – Ghana Stock Exchange

GSE-CI – Ghana Stock Exchange Composite Index

NYSE – New York Stock Exchange

OLS – Ordinary Least Squares

US – United States

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CHAPTER 1: INTRODUCTION

1.1 Background

Over the past decades, financial market anomalies have attracted the attention of many financial researchers (Alagidede & Panagiotidis, 2006). Kuhn (1970) described these anomalies as cross-sectional and time series patterns in security returns that are not predicted by a central paradigm or theory.

These anomalies include the calendar effects, earnings/ratio effect and the small firm effect (Mghendi, 2014). Some of the calendar effects are the January Effect and Day of the Week Effect. The January effect asserts that stock returns are higher in January than in other months of the year (Brown, Kleidon & Marsh, 1983). The day of the week effect posits that stock returns are lower between the close of Friday and the close of Monday than the other days of the week (Gibbons & Hess, 1981).

However, this paper focused on the small firm effect also known as the size effect or anomaly. The small firm effect is a consistent empirical evidence that small firms in terms of market capitalization earn higher returns than large firms (Mghendi, 2014). Banz (1981) was the first to document the small firm effect on the US stock market but could not explain the phenomenon behind it. The absence of an explanation for the small firm effect spurred a lot of research into explaining the causes of the anomaly.

After further research, the small firm effect was associated with measurement or methodological errors (Drew & Veeraraghavan, 2002; Fama & French, 1993; Gaunt,

2004). Other studies explained the small firm effect by identifying its relationship with other market anomalies. Research examining market anomalies (Brown, Kleidon & Marsh, 1983; Keim, 1983) established relationships between the small firm effect and the January effect. Despite these numerous attempts to explain the small firm effect, there is still no accepted explanation for this anomaly.

Most of the earlier research that identified the small firm effect were carried out on developed markets like the USA. However, there is a current growing trend in research conducted on small firm effect in emerging markets. In India, Sehgal and Tripathi (2005) tested for the presence of the small firm effect. In Kenya, Oluoch (2003) also investigated the prevalence of the small firm effect. Bundoo (2006) conducted research on the small firm effect on the Mauritius Bourse. Nonetheless, the results from these emerging markets differ.

Besides, emerging markets specifically the African markets are experiencing rapid development and growth such that investors and researchers are interested in the dynamics of stock return volatility on these markets (Winful, Jnr, & Kumi, 2012). It is important to explore the possible presence of abnormal positive stock returns on emerging markets for economic gains (Schwert, 2003). The African market currently boasts of about 20 bourses with impressive equity gains over the last two decades (Winful et al., 2012).

In addition, African markets have the potential to perform better than markets in Europe, Asia and America (Winful et al., 2012). For example, despite research testing the

efficiency of the GSE (Frimpong, 2008; Osei, 2002) stating that the Ghanaian market was inefficient, Winful et al. (2012) asserted that the GSE performed better than Standard and Poor's 500 on average. According to Osei (2005), the Ghana Stock Exchange (GSE) was named the best performing emerging market by the Birinyi Associates, a UK based research group in 1994. It was also named the best performer in Africa by Standard Chartered in 1998 (Osei, 2005).

However, the Ghanaian market today is inefficient and this is blamed on inflation (Graphic Online, 2016). Inflation currently stands at 18.3% (Graphic Online, 2016). Winful et al. (2012) affirmed that inflation is a common characteristic of inefficient markets in Africa and has a negative impact on stock returns on these markets like the GSE. In light of these negative developments on the GSE, it is necessary for investors to explore market anomalies like the small firm effect to increase the chances of adopting a profitable investment strategy. This is because the presence of such anomalies on a market serves as evidence of market inefficiency which allows for profit opportunities (Schwert, 2003).

1.2 Research Problem

In an efficient market, stock prices reflect all available market information about the stock such that investors cannot earn superior profits. However, the presence of market anomalies contradicts this theory because anomalies show predictable patterns in the volatility of stock returns (Mghendi, 2014). Some market anomalies have been described as one time effects brought to light by empirical studies. This is because once

the anomalies are discovered and made known to investors who seek out patterns to beat the market, they do not persist any longer (Schwert, 2003).

However, research has consistently proven that the small firm effect still exists (Drew & Veeraraghavan, 2002; Lukale, 2007; Mghendi, 2014; Sehgal & Tripathi, 2005). However, Griffin (2002) asserts that the test for the small firm effect is best performed on a country-specific basis. This is because countries may have different features in their markets which can affect results of the study (Griffin, 2002). For instance, Mghendi (2014) claimed that the small size of the Kenyan market which had 62 stocks as compared to countries in other studies was a potential cause of the difference in results. Research conducted on the small firm effect in Kenya (Lukale, 2007; Oluoch, 2003) showed different results due to the difference in size of the market in the different periods of the studies. The GSE has 42 stocks which makes it a smaller market as compared to Kenya (Ghana Stock Exchange, 2016). Thus, the results from other markets like Kenya might not apply to Ghana. Therefore, there was the need to conduct the study of small firm effect in Ghana.

Furthermore, in Ghana, there have been some research on the existence of market anomalies but they are only limited to calendar anomalies. Some of the anomalies documented cover January effect, day of the week effect and month of the year effect (Alagidede & Panagiotidis, 2006; Ayadi, Dufrene & Chatterjee, 1998). There is very little known research on the small firm effect on the GSE. Therefore, this study sought to fill this gap in literature by examining the existence of small firm effect on the GSE.

1.3 Research Objectives

The paper aimed to examine the relationship between small firm size and stock market returns on the GSE.

1.4 Research Hypothesis

The efficient market hypothesis (EMH) and random walk hypothesis theories posit that there is a random pattern in returns of companies from historical information such that no abnormal returns are made by investors. However, the small firm effect theory postulates that there are abnormal returns in stocks of smaller firms (Beechey, Gruen & Vickery, 2000). Banz (1981) confirmed in his research on the cross section of returns, that stock returns decrease with increase in firm size. In light of the contradiction between the predictions of small firm theory and the EMH theory, it was necessary to test a hypothesis on the relationship between firm size and market returns. Therefore, the study sought to test the null hypothesis:

H₀: There is no relationship between small firm size and stock market returns on GSE.

1.5 Significance of Study

There are few studies that have investigated market anomalies in Ghana (Alagidede & Panagiotidis, 2006; Ayadi et al., 1998). Thus, a study on small firm effect will add to existing literature on market anomalies. It will also add breadth to market

anomalies documented in Ghana because these studies in Ghana have been on only calendar effects.

Furthermore, according to Marriage (2016), 86% of active equity funds globally are underperforming. 80% of actively managed funds in Europe, 98.9% of actively managed equity funds in USA and 97% of managed funds in emerging markets have failed to beat the market over the past five years. These results place considerable amount of pressure on fund managers to deliver results that match the fees they are charging for actively managed funds.

Therefore, this study could be relevant to fund managers, arbitrageurs and investors in general. It would help them know whether they can make abnormal returns with regards to investment in small firms. The results of this study could also help to adopt a consistent and profitable trading strategy.

1.6 Methodology

The study adopted a quantitative approach to test the presence of an inverse relationship between firm size and its stock returns on GSE from 2009 to 2016. The sample for the study comprised of 30 firms listed on the GSE which have consistently traded from 2009 to 2016 (see Appendix I, for list of firms). The data set for the research consisted of monthly share prices, total shares outstanding of listed firms, exchange rates (cedi to dollar rate), interest rates (91 Day Treasury bill rates), monthly GSE Composite Index and inflation rates of Ghana. The sources of the data set were the Ghana Stock

Exchange data archives, Ghana Statistical Services, Bank of Ghana, Annual Reports Ghana and the websites of the companies under study. The monthly share prices were used to calculate stock returns. Total shares outstanding of listed firms were used to calculate market capitalization.

Furthermore, an explanatory research design using multiple linear regression was used in the study to explain the relationship between firm size and stock returns on the GSE. The Ordinary Least Square (OLS) regression analysis was used to test for the small firm effect on the GSE. The monthly GSE-CI was used as proxy to calculate market returns of the GSE. The study also conducted trend analysis on the returns of small firms, large firms and GSE returns. The study conducted an endogeneity test, heteroscedasticity test and multicollinearity test to test the OLS assumptions. This helped establish the reliability of the results from the OLS analysis.

1.7 Outlook of Thesis Report

Chapter 2 reviewed existing literature on the relationship between the size of a firm and its stock returns. Chapter 3 described the methodology and characteristics of data used for the study. Chapter 4 was a discussion of results. Chapter 5 presented the conclusions and recommendations of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviewed existing literature on testing the small firm effect. The first section of this chapter addressed the theoretical foundation of the study. This section explained the efficient market hypothesis, random walk theory and the small firm effect theory. It also showed the differences and similarities in the different theories concerning the nature of returns of small firms. The second part reviewed empirical evidence under different themes that necessitated the study in Ghana. This part first described how the evidence of the small firm effect has been documented over years. It then describes how contrary evidence to the small firm effect has been documented during times the theory was discovered. This was to prove that empirical evidence show varying conclusions as to the existence of small firm effect on a market. The second part of the chapter also reviewed literature associating the small firm effect with either market inefficiency or measurement errors. This was done to show that there is no generally accepted explanation for the small firm effect. Therefore, it is difficult to predict the small firm effect on a market. The chapter also concludes by summarizing evidence on the small firm effect in emerging markets and other market anomalies in Ghana. This was to show the gap in literature concerning the study of small firm effect in Ghana.

2.2 Review of the Theoretical Literature

This section reviews existing theories that explain the behavior of stock market returns in order to provide a foundation for the study on the small firm effect. The theories covered are the efficient market hypothesis, random walk hypothesis and small firm effect.

2.2.1 Efficient Market Hypothesis (EMH)

Fama, Fisher, Jensen and Roll (1969) were one of the earliest to document the efficient market hypothesis. Samuelson (1965) also found the EMH independently. The EMH states that stock prices on the market fully incorporate all available information and expectations on the market (Fama et al, 1969). Thus, in an efficient market, it is difficult to take advantage of any information about stocks to make superior returns. Fama (1970) proposed three main forms of EMH. They are the weak form, the semi-strong and strong form of market efficiency. The strong form suggests that stock prices reflect all available information; both private and public about stocks. The semi-strong form states that stock prices reflect all available public information about stocks. The weak form efficiency asserts that stock prices reflect all historical information about stocks.

The EMH has been critiqued heavily by the presence of seasonal anomalies and the argument of behavioral scientists (Malkiel, 2003). Behavioral scientists argue that investors are not rational. This contradicts EMH's assumption that there are rational investors on the market. Also, seasonal anomalies which includes small firm effect,

January effect and the day of the week effect are seen as evidence of irrational human behaviors like overreaction (DeBondt & Thaler, 1985), regret (Bell, 1982) and herding (Huberman & Regev, 2001). These specific behavioral biases have been explained as causes of certain stock price behavior on the market rather than the constant relative risk aversion approach embedded in the efficient market hypothesis (Mghendi, 2014).

Schwert (2001) argued that a lot of critics have found enough evidence to show that stock prices could not have been set by rational investors. In addition, seasonal anomalies are claimed in his study as evidence of inadequacies in asset pricing models.

The presence of seasonal anomalies shows a predictable price pattern and profit making opportunities (Schwert, 2001). This is contrary to the EMH which asserts that there are no price patterns that can be used as information to make superior returns.

2.2.2 Random Walk Hypothesis

The random walk theory proposes that there is no predictable pattern in stock price movements. As such, investors cannot use past movements in stock prices to predict future patterns (Fama, 1991). This theory confirms the EMH by asserting that no investor can beat the market by using widely known or available information. Thus, the random nature of price movements presents no investment strategy to investors. Fama (1991) proposed that random walk theory works on the basis that information flows freely. Therefore, prices tomorrow only reflect information tomorrow and is independent of information yesterday. Thus, stock prices quickly reflect information as soon as they happen such that no abnormal gains can be made from such information.

Cowles and Jones (1937) conducted one of the earliest tests to debunk the random walk theory. This was done by comparing the frequencies of the sequences and reversals of two pairs of consecutive historical returns where, one pair had same sign and the other pair had opposite signs. They found an evidence of structure in stock prices. Lo and Mackinlay (1999) also debunked the random walk theory through the evidence from their study because they found many successive moves in same direction of stock prices.

2.2.3 Small Firm Effect

The “small firm effect” predicts that firms with smaller market capitalization enjoy higher returns than firms with larger market capitalization (Reinganum, 1983). Banz (1981) was the first to establish that small firms have higher risk-adjusted returns than large firms. Thus, stockholders in small firms earn more returns than stockholders in large firms.

The small firm effect contradicts the weak form of EMH and random walk theory. According to the weak form of EMH and random walk theory, stock prices reflect all available historical information about the stock. Therefore, investors cannot make profits using price patterns. The size of a firm is a public historical information available to all investors as such, investors should not be able to make profits investing in stocks of small firms (Mghendi, 2014). However, the small firm effect suggests a price pattern based on size. Banz (1981) confirmed in his research on the cross section of returns that stock returns decrease with increase in firm size.

In summary, the EMH states that there is a random pattern in returns of companies from historical information but the small firm effect states that there is an increasing pattern in returns of small firms (Beechey, Gruen & Vickery, 2000). Thus, these theories suggest varying conclusions as to the behavior of stock returns by smaller firms. These varying conclusions make the empirical study of this behavior important.

2.3 Empirical Evidence

This section reviews empirical evidence showing the varying conclusions on the existence of small firm effect and the need for this study. The section also includes empirical evidence on the attempted explanations of the small firm effect and how these explanations influenced the different methodologies used in those studies. In addition, there is evidence from the different parts of the world to establish the differences in markets which necessitated a unique study in Ghana.

2.3.1 The Presence of Small Firm Effect on Stock Market

Banz (1981) is the earliest study that identified the small firm effect. Banz (1981) adopted a model similar to Fama and Macbeth (1973) in studying the relationship between the risk-adjusted returns of all common stocks quoted on New York Stock Exchange (NYSE) and the market value of those stocks for at least five years from 1926 to 1980. The study identified a negative relationship between risk adjusted returns of stocks and their market size, after using regression analysis to estimate returns on 5 equal

groups of stocks based on their market capitalization. He incorporated a generalized asset pricing model in the study to estimate returns in response to critiques of CAPM.

In addition, Reinganum (1981) conducted one of the early studies on the small firm effect which confirmed the findings of (Banz, 1981). Reinganum (1981) found a significant negative relationship between abnormal returns and firm size. He used quarterly return data on common stocks of both the NYSE and American Stock Exchange (AMEX) from 1975 to 1977. This was unlike Banz (1981) who used only the NYSE and monthly return data. Reinganum (1981) used a shorter period than Banz (1981) however, the small firm effect was still evident. Both studies concluded that size effect might be a proxy for factors like risk.

Furthermore, Keim (1983) also carried out a study on the relationship between abnormal returns and market values of common stocks on the NYSE and AMEX between 1963 and 1979. This work confirmed the negative relationship between firm size and abnormal returns. It concluded that the size effect is more evident in January than other months. The study found that about 15% of the size effect was due to abnormal returns in January which are higher than other months. Unlike Banz (1981) who used five portfolios in his study, Keim (1983) divided the sample into ten portfolios according to their market capitalization. The first portfolio contained large firms and the last portfolio contained small firms to eliminate grouping bias. Results of both studies still confirmed the existence of the small firm effect on the US markets.

After two decades of the discovery of the small firm effect, Sehgal and Tripathi (2005) also found the small firm effect on the Indian Stock market by using 482 listed companies on the bourse between 1990 and 2003. They adopted alternative measures to measure firm size like enterprise value, net fixed assets, net annual sales, total assets and net working capital. The earlier tests like that of Banz (1981) used market capitalization to determine size however, the alternative measures used by Sehgal and Tripathi (2005) still showed a strong size premium on the Indian equity market.

Mghendi (2014) also confirmed the presence of the small firm effect on the Nairobi Stock exchange by using a cross sectional multiple regression to test the relationship between 30 stocks and their market returns between 2008 and 2013. The study adopted a descriptive approach thus, it used monthly share prices to calculate the monthly returns rather than estimating returns with an asset pricing model. The study used quartile portfolios and arranged portfolios from largest to smallest. The middle two portfolios were dropped. Moore (2005) argues that this is the best way to reduce cross over biases.

2.3.2 The Absence of Small Firm Effect on Stock Market

The existence of the small firm effect has been questioned by early works done around the same time as Banz (1981) discovered it. Roll (1981) conducted a study on common stocks on the NYSE and Standard and Poor's 500 index from 1962 to 1977 to test for the small firm effect. The study compared the daily and semi-annual trends in the beta and mean returns of stocks and found that both increased irregularly. Roll (1981)

established that firm size does not matter when beta (market risk) and returns are equal. The study rejected the size effect and showed that the small firm effect was caused by incorrect methods or biases. The error in the study was reported to be caused by autocorrelation in returns of portfolio arising from the positive relationship between firm size and frequent trading in the study.

Handa, Kothari and Wasley (1989) also confirmed the results of Roll (1981) by rejecting the existence of small firm effect. The study used the monthly data of all common stocks on the US market from 1926 to 1982, a longer time frame than that of Banz (1981). Firm size was used to create 20 portfolios which represents more portfolios than most studies used. Equally weighted returns based on a buy and hold strategy were calculated instead of the market returns estimated with the asset pricing models in the studies of (Banz, 1981; Reinganum, 1981). These calculated returns were used to test the beta and size effect on return intervals and it was found that changes in beta could predict the expected return interval. Annual betas were found to predict returns more accurately than monthly betas. The study regressed annual and monthly firm size co-efficient and beta and found out that firm size was not statistically significant. They concluded that small firm effect cannot be predicted by beta. There are doubts on the findings of both (Handa et al., 1989; Roll, 1981) because once portfolios are formed based on size, beta can never explain cross-sectional returns accurately (Jegadeesh, 1992). Fama and French (1993) also argued that the small firm effect cannot be explained by market beta alone hence size should be incorporated as a factor in a three-asset pricing model to estimate returns.

Two decades after the studies by Handa et al. (1989) and Roll (1981), Patel (2012) also attempted to compare recent performance of small firms to large firms in both developed and emerging stock markets. The study used six Russell stock indexes and calculated the monthly returns of each index from 1996 to 2010 by using the standard formula. T-test and Wilcoxon Signed Rank test statistics were used to analyze the differences in stock returns between the indices. The study found out that small firms did not make any significant abnormal returns than large firms in recent times. They concluded that size premiums were insensitive to market conditions and did not show dominance in January like Keim (1983) found. Patel (2012) asserted that stock markets no longer show the small firm effect.

These varying conclusions on the existence of small firm effect made it very important to conduct the study because as seen; the difference in time frame, methodologies and a number of unexplainable factors cause a difference in the tests for small firm effect even in the same country. There are contradictions in attempts to determine if size predicts returns on various markets. Various risk measures are also unable to predict the abnormal returns of small firms correctly. Thus, it was important for this research to first observe the behavior of historical returns of firms on the GSE based on their size and compare. According to Korolenko and Baten (2005), most studies on the small firm effect focus on the future however, only few take a historical perspective or find out the relationship that currently exists between size and market returns of the stock at specific points over time.

2.3.3 The Possible Explanations of the Small Firm Effect

The seminal work of Banz (1981) has been attributed to the discovery of the small firm effect however, the study failed to provide a theoretical explanation for the anomaly identified. Therefore, results of Banz (1981) and the contradictory results in the empirical studies that followed, spurred a lot of research into the possible causes of the small firm effect. Two broad arguments based on market inefficiencies and errors in measurement and methodology have been tested as possible explanations for the small firm effect. However, both arguments have failed to predict the observed excess returns on small firm stocks by their theories, models and concepts (Sweeney, Scherer & Goulet, 1996).

It was thus necessary to find out if stocks of small firms in Ghana earned abnormal returns over a given period because no theory or explanation can conclusively predict whether it will exist on the GSE or not. Sweeney et al. (1996) also argues that the broad explanations of the small firm effect are influenced by time period selected and data set used in the studies. The data set and time period used in this study was different from other studies thus necessitating this study. Below is a summary of these broad arguments.

2.3.3.1 Market Inefficiency Arguments

Barry and Brown (1984) documents the informational inefficiency of the market as a possible cause of small firm effect by using Monthly NYSE security returns from 1931 to 1980. Their results showed that the lack of information about some stocks failed

to explain the small firm effect but rather the period of listing is related to the small firm effect.

Furthermore, Beedles (1992) attempted to establish a relationship between the size of a firm and liquidity on the Australian stock market from 1974 to 1987. The study concluded that the small firms were less liquid thus, required higher returns. On the other hand, James and Edmister (1983) attempted to establish a relationship between stocks, market value and the level of trading on 500 listed firms on the NYSE and AMEX from 1963 to 1980. The results of their study posit that differences in the level of trading activities does not explain the small firm effect and that there is a high correlation between firm size and trading activity.

In addition, seasonal trend in markets has been heavily documented as one of the market inefficiency argument for small firm effect. Brown, Kleidon and Marsh (1983) noted that the adjusted stock returns of Australian stocks from 1958 to 1977 in a portfolio of small firms was larger in January than the other months. Keim (1983) also confirmed this behavior of small stocks in January. This led to the formulation of the tax loss selling hypothesis. Investors were seen to sell securities towards the end of the year to make capital losses in the short term for tax purposes. Once the pressure to sell brings down stock prices towards the end of the year, the same stocks gain back their equilibrium values in early January creating large returns (Brown, Kleidon & Marsh, 1983). Roll (1983) and Reinganum (1983) realized that the tax loss selling hypothesis does not fully justify the January Effect of small stock returns. Other studies by Constantinides (1984)

and Jones, Pearce, and Wilson (1987) found no association with seasonality of returns and taxes.

Moreover, Leonard and Shull (1996) after examining the monthly movement of closed end funds and the returns of small firm using the CRSP files of NYSE and AMEX from 1963 to 1980, asserted that regardless of a significant tax effect, there is strong evidence of the size effect. This result confirmed the conclusions of (Keim, 1983; Rozeff & Kinney, 1976).

2.3.3.2 Measurement Error Argument

Basu (1983) attempted to study the relationship between earnings yield, firm size and returns of common stock on the NYSE from 1962 to 1973. The study found out that small firms earned higher returns than large firms but firms with higher earnings-price ratio earn higher returns than firms with lower earnings-price ratio. However, after controlling for the disparities in earnings-price ratios and risk, the small firm effect is no longer significant. This affirms Reinganum (1981) conclusion that the small firm effect incorporates the earning-price effect. Thus, once earnings-price effect is controlled for, size effect is also controlled.

Furthermore, Stoll and Whaley (1983) established that the small firm effect was significant in their study on the effects of transaction costs on the size effect on the NYSE and AMEX from 1955 to 1979. They found out that transaction costs affect both the size effect and Capital Asset Pricing Model (CAPM). This is because holders of small firm

stocks had higher transaction costs. Reinganum (1981) used the arbitrage pricing theory to show the inadequacy of the CAPM in explaining returns of small firms whilst Boot and Smith (1987) also used stochastic dominance. Nonetheless, results of both studies could not explain the significance of the small firm effect in relation to the CAPM.

More research began in testing the CAPM and other generalized pricing models as used by Banz (1981). Tests by Fama and Macbeth (1973) and Black, Jensen and Scholes (1972) supported CAPM but in the late 1970s, new evidence suggested that earnings-to-price ratio, firm size and Book to Market value of equity ratio (BTM ratio) had a better explanatory power than Beta. Fama and French (1993) developed a three-factor asset pricing model for estimating stock returns. The model included the usual market (beta) factor, size and book-to-market equity as additional risk factors. It was discovered that the model captured most of the cross-section of average returns earned by stocks.

Furthermore, Maroney and Protopapadakis (2002) used the Fama and French three-factor model to investigate the small firm effect on stock markets of UK, Australia, Germany, Canada, Japan, France, and the US. The negative relationship between size effect and the market value premium existed in all the nations studied. Gaunt (2004) found out that Fama and French three-factor model explains stock returns observed in Australia better than the CAPM does. Drew and Veeraghavan (2002) also found that size and value premium effect exists in Malaysia when they used the Three Factor Model.

Regardless of the attempts made by the different arguments to predict abnormal

returns with small firm size, there is no conclusive explanation that can determine if the anomaly exists on a market or not. Reilly and Brown (2011) thus describes the small firm effect as a crucial stock market anomaly, which cannot be explained by conventional theory. In addition, Griffin (2002) also asserts that tests for the small firm effect is best performed on a country-specific basis.

2.3.4 Evidence from Emerging Markets

In emerging markets, Chui and Wei (1998) investigated the relationship between stock returns and size in Korea, Hong Kong, Taiwan, Thailand and Malaysia. According to the study, beta was a weak explanatory variable for average stock returns in all the markets examined. The small firm effect was however present in all these emerging markets except Taiwan. Although, there is a lot of similarity among the characteristics of the tested markets, the study failed to explain why Taiwan did not show the size effect.

In Kenya, Oluoch (2003) tried to examine whether the small firm effect existed on the Nairobi Stock Exchange (NSE). The study used an OLS regression model to predict the presence of the anomaly on the NSE. However, the small firm effect was absent on the NSE and small firms showed higher returns than larger firms when the study used descriptive mean statistics. After Oluoch's (2003) study on small firm effect, Lukale (2007) examined the relationship between size effect and the January effect on the Nairobi Stock Exchange from 1999 to 2006. The study calculated monthly returns on 54 listed companies in ten portfolios, formed based on size. The study noted that stock returns was a decreasing function of firm size.

Ayadi et al. (1998) tested for the presence of the turn-of-the-year effect in low-income equity markets of Africa. The Friedman test used in the study confirmed that there was seasonality in stock returns on the GSE. The Wilcoxon-Mann-Whitney test and regression analysis with dummy variables also showed a January effect in Ghana. The study associated the presence of the anomalies on GSE with a spillover of the January effect in Britain. This was because Ghana was the most open amongst the countries in the study to foreign investors who were mostly British. However, the study did not attempt to find an economically relevant association with the small firm effect anomaly on the GSE like Bundoo (2006) did in Mauritius.

Alagidede and Panagiotidis (2006) investigated the possible presence of the day of the week effect and the month of the year effect in Ghana. The study used non-linear models from the GARCH group to test for irregularities in stock returns on the GSE. The study identified an April effect in Ghana unlike the January effect identified by Ayadi et al. (1998). It showed that the day of the week effect was present on the GSE. Due to the non-linear models used in the study, the asymmetric volatility was shown to be better than the benchmarks of linear estimates. However, this study did not investigate further to find out if the April effect had an impact on small firm effect in Ghana. This was not consistent with Keim (1983) who found the January effect on the US market and went further to test for its impact on the small firm effect. Thus, most literature on market anomalies in Ghana review calendar anomalies and there is little known literature on the small firm effect.

2.3.5 Conclusion

In a nutshell, although Patel (2012) asserts that small firm effect no longer exists on both developing and developed markets, there has still been discovery of the anomaly on these markets. The evidence on the small firm effect is numerous and mixed in developed markets. Also, the test of the anomaly is growing in emerging markets with varied results.

Another inconsistency in literature on small firm effect is the theories or possible explanations given by the different studies which do not hold generally among the studies. Thus, the small firm effect is described as an empirical evidence with no accepted theoretical foundation. This nature of the anomaly makes it difficult to predict it on a market. Thus, it necessitates an independent country study to test for its presence.

In Ghana, there has been research on calendar anomalies and little known research on the small firm effect. Thus, it was important for this study to test for the presence of the small firm effect on the GSE. This helps to fill the gap in literature.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter describes the approach used to achieve the objective of this study. The chapter entails the rationale behind the methodology used, the research design, the description of data used and limitations, the choice of population and sample size, sampling technique, justification and the model specification.

3.2 Research Design

This study was an explanatory study. It was based on a quantitative approach aimed at observing the behavior of stock returns of smaller firms. The study used the multiple linear regression model to test the relationship between stock size and its monthly returns. The study used the OLS method for the model estimation and regression analysis.

The study adopted the OLS regression analysis because it is consistent with the works of Oluoch (2003) and Mghendi (2014). These studies established statistically reliable results from their OLS regression analysis. The use of asset pricing models is common in most studies like that of Banz (1981), Fama and French (1993) and Reinganum (1981). However, these studies used the asset pricing models to estimate future returns of stocks based on some risk characteristics of the stocks and then used an OLS regression analysis to test the relationship between the risk adjusted expected returns and firm size. The use of asset pricing models did not apply to this study because

the study used historically calculated returns of stocks rather than expected returns of stocks. Thus, it was statistically appropriate to use an OLS regression analysis to test for the small firm effect once historical data was readily available and historical returns were calculated (Korolenko and Baten, 2005).

Also, the study did not focus on exploring theories that could possibly influence the higher returns of smaller firms as done by most studies. As such, it did not incorporate theories on arbitrage pricing models, informational efficiency and some risk measures as seen in most studies in the analysis. Reilly and Brown (2011) describe the size effect as a phenomenon which cannot be rationalized by a standard theory.

3.3 Data

The data used in this study comprised share prices over the study period, GSE-CI, number of shares outstanding of selected stocks, inflation rates (monthly Consumer Price Index), exchange rates (cedi to dollar rates) and interest rates (91 Day treasury bill rates) of Ghana. The sources of the data were the Annual Reports Ghana (ARG) Share Price History 2016, Ghana Statistical Services, Bank of Ghana and the GSE website. ARG was a reliable source of information as it acquires its data directly from the GSE and from financial firms like Databank. However, the accuracy of the data cannot be verified since it is secondary. The ARG dataset had information on all listed and delisted firms on the GSE and their monthly share prices since the GSE's inception. This dataset was appropriate as monthly share prices were needed in the study to calculate monthly returns of firms and firm size. However, annual total shares outstanding of the firms were

retrieved from the GSE website directly to calculate size of firms. Ghana Statistical Services and Bank of Ghana were credible sources of data for monthly inflation rates, interest rates and exchange rates of Ghana.

3.4 Population

The population of the study included all equity stocks listed and traded on the GSE from the period September 1, 2008 to 31 December 2016. As at December, 2016, there were 42 listed equities on the GSE (Ghana Stock Exchange, 2016).

3.5 Sample

The study was conducted on 30 listed firms on the GSE that had continuously traded on the GSE from 2008 to 2016. The GSE currently has 42 listed equities. Thus, the sample size of 30 firms was appropriate. The small size of the GSE made it impossible for the study to use a larger number of companies as seen in the use of 482 companies on the Indian bourse (Sehgal & Tripathi, 2005). However, studies on the small firm effect by Lukale (2007) and Mghendi (2014) conducted in similar markets like Kenya used 52 and 30 companies respectively. In addition, the study period covered nine years which is more than the six-year period used by Mghendi (2014) and the seven-year period used by Lukale (2007). Furthermore, the year 2008 was the beginning of the study period because it was the earliest year that gave a sample size of at least 30 companies that have been trading consistently till date. Time influences results of studies on small firm effect (Sweeney et al., 1996).

In addition, the study adopted the quartile portfolio method used by Berk (1997). The market price of shares and the number of outstanding shares as at the end of the year were used to calculate market value. Then, listed firms were arranged based on market value from the lowest to the highest. This list was further divided into four portfolios; the first portfolio contained the 8 smallest firms and the last portfolio contained the 8 largest firms. In order to ensure a significant difference between the portfolios of large size firms and small size firms, the middle portfolio of 14 firms were dropped. This process was repeated in every year of the study period. Moore (2005) argues that this is an efficient way of reducing cross-over bias. Mghendi (2014) also adopted this convenient sampling technique because it is effective in selecting companies based on availability and convenience.

3.6 Model Specification

The multiple linear regression analysis using Ordinary Least Squares method was used to find the relationship between monthly returns of the GSE and the returns of small and large firms. The study adopted the general regression model used by Mghendi (2014). The general form of the equation is shown below as equation (1). However, it was modified by adding more relevant independent variables to estimate a model for the study in equation (2).

$$y = \beta_0 x_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + \mu \dots \dots \dots (1)$$

where β_0 is the intercept, β_1 is the parameter associated with x_1 , β_2 is the parameter

associated with x_2 , β_k is the parameter associated with x_k and so on, μ is the error term.

Mghendi (2014) specifies his model function from the general model as:

$$R = f(S, L)$$

Where R is the monthly returns of the Nairobi stock exchange, S represents the monthly returns of small sized firms and L represents the monthly returns of large sized firms.

Thus, the model specified for this study is shown below as:

$$R_t = \beta_0 + \beta_1 AVRS_t + \beta_2 AVRL_t + \beta_3 INFL_t + \beta_4 EXCH_t + \beta_5 INTR_t + \varepsilon_t \dots (2)$$

Where R_t is the monthly returns of the GSE Index, $AVRS_t$ is the monthly returns of small firm portfolio, $AVRL_t$ is the monthly returns of large firm portfolio, $INFL_t$ represents monthly inflation rate, $EXCH_t$ is the monthly exchange rate of Ghana and $INTR_t$ is the monthly interest rates of Ghana at time, t . The incorporation of other relevant factors aside those in Mghendi's (2014) model was justified in the next section based on theory and empirical evidence.

3.7 Definition of Variables

3.7.1 Dependent Variable (Monthly Returns of GSE)

The dependent variable in the study is the monthly returns of GSE which was calculated using the GSE-CI. The GSE-CI was used as a proxy for stock market returns. Stock market returns were calculated by finding the percentage change in the GSE-CI monthly over the study period. Mghendi (2014), Oluoch (2003) and Lukale (2007) used

this approach to calculate market returns since there is a consensus on using this approach to calculate market returns for this study (Korolenko & Baten, 2005).

3.7.2 Independent Variables

The independent variables of the study include the monthly returns of small size firms and large size firms based on market capitalization and the control variables; monthly exchange rates, inflation rates and interest rates.

3.7.2.1 Small and Large Firm Size Returns

In calculating firm size, the study adopted market capitalization as used by Oluoch (2003). Firm size was calculated as a product of total number of shares outstanding at year end and share prices at year end. The firm sizes were ranked from lowest to highest and divided into four portfolios with the lowest and highest portfolios having 8 firms each and the middle portfolios with 7 firms each. The middle portfolios were then dropped to clearly define the large firm size portfolio and small firm size portfolio.

Adopting Mghendi (2014) model, monthly stock prices were used to compute monthly returns of the stocks in the portfolios created using the following formula:

$$R_{it} = (P_{it+1} - P_{it}) / P_{it} \text{ Where:}$$

$$R_{it} = \text{Return on stock } i \text{ for month } t, \text{ where } t = 1, 2, \dots, 12.$$

$$P_{it} = \text{Market price of stock } i \text{ at the beginning of the month.}$$

P_{it+1} = Market price of stock i at the end of the month.

The study used monthly returns as used by Banz (1981) because daily returns have been shown to overstate the small firm effect (Blume, 1980). Also, dividend was not included in the calculation of the returns. Lakonishock and Smidt (1988) and Draper and Paudyal (1997) assert that biases arising from the absence of dividend in returns calculations are so small and negligible. Thus, the absence of the dividend data does not affect the statistical significance of the overall results.

3.7.2.2 Inflation

There was the need to control for inflation in the model of the study because inflation affects a firm's worth. When inflation increases, the worth of a firm falls and this affects stock prices which in turn reduce stock returns and vice-versa (Kuwornu, 2012). However, other studies contradict the negative relationship between stock returns and inflation. For instance, Choudhry (2000) discovered that in four countries with high inflation, inflation showed a positive relationship with stock returns. This was attributed to the government's active role in controlling prices after the 1997 financial crises. In Ghana, Winful et al. (2012) assert that inflation dictates the behavior of stock returns. Due to this, inflation makes it difficult to clearly measure the effect of risk on returns without deflating stock returns (Winful et al., 2012).

Inflation rates were extracted from Ghana Statistical Services website. Inflation was calculated as the percentage change in monthly consumer price indexes. This is an

appropriate measure of inflation because it measures variations over time in the general price level of commodities that individuals purchase to consume, with respect to the price level in different base years over the study period.

3.7.2.3 Exchange rates

It was important to control for exchange rates in the model because of its theoretical relationship with stock returns. Exchange rate influences stock prices in a similar fashion to inflation. This is because it is an indicator of a currency and as such, if the local currency falls in value against foreign currencies, it decreases prices of export products which then, leads to an increase in the volume of a country's export, assuming demand for this product is elastic.

On the other hand, an increase in value of a country's currency enables the country to import more production inputs at a cheaper cost. This stimulates economic activity and thus, generates more local returns in the country (Kuwornu, 2012). Empirical work by Mukherjee and Naka (1995) asserts that there is a positive relationship between exchange rates and stock prices in Japan and Indonesia. Eita (2011) found a significant relationship between stock prices and exchange rates in Namibia. Exchange rates were measured by the monthly Ghana Cedi to US Dollar exchange rate extracted from Bank of Ghana.

3.7.2.4 Interest rates

Another important control variable was interest rate. In theory, when interest rates

increase, stock prices reduce. This is because, increase in interest rates make discounted cash flows less worthy. Therefore, the value of investment decreases and stock market returns fall (Eita, 2011). The average of the 91 Day Treasury bill rates in each month over study period were used as a proxy for interest rates. The inverse relationship between interest rates and stock returns validates the use of Treasury bill rates as a proxy since treasury bills are alternatives or represent the opportunity cost of investment in stocks.

3.8 Diagnostic Tests

The study conducted diagnostic tests such as heteroscedasticity test and multicollinearity test. This was done by testing the assumptions of the OLS regression and finding out whether the quantitative results of the relationship between the variables in the hypothesis could be accepted in describing the data. For instance, Roll (1981) found no size effect after correcting for auto-correlation in returns of portfolio in the study. Thus, there was the need to do these diagnostic tests.

The Breusch–Pagan test of heteroscedasticity was used to test whether the model's variance of errors depends on the independent variables. The study also used the correlation matrix to detect multicollinearity in the regression model. The Jarque-Bera normality test was also used to test for normality in the distribution of the residual errors. These tests helped to establish the reliability of results from the OLS regression analysis.

CHAPTER 4: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter shows how the test for the small firm effect on GSE was analyzed. It also discusses the results from such analysis. The chapter includes a descriptive analysis to explain the characteristics of the sample and an inferential analysis to test the hypothesis of the study. The discussion of the results involves an evaluation, explanation, comparison and contrasting of results to other studies.

4.2 Descriptive Statistics

This section describes the characteristics of the stock returns of small firms, large firms and the market returns. The mean, median, kurtosis, standard deviation, skewness and other descriptive measures of the sample are discussed below. Table 1 shows the summary of the descriptive statistics of the different sample variables.

Table 1

Descriptive Statistics of Variables

	MKR	EXCH	INTR	AVRL	AVRS	INFL
Mean	0.0122	2.4328	0.2021	0.0131	-0.0065	0.0102
Median	0.0098	1.9267	0.2278	0.0095	0.0000	0.0110
Maximum	0.1695	4.3274	0.2589	0.1913	0.1172	0.0460
Minimum	-0.1452	1.4168	0.0925	-0.0745	-0.1042	-0.0153
Std. Dev.	0.0483	0.9998	0.0534	0.0438	0.0333	0.0114
Skewness	0.2570	0.5348	-0.8580	1.0187	0.2435	0.0928
Kurtosis	5.1688	1.6292	2.2046	5.5283	6.5092	4.0363
Jarque-Bera	18.2148	11.0858	13.1175	38.6573	46.0240	4.0639
Probability	0.0001	0.0039	0.0014	0.0000	0.0000	0.1311
Sum	1.0763	214.0869	17.7809	1.1499	-0.5676	0.8977
Sum Sq. Dev.	0.2029	86.9657	0.2482	0.1670	0.0965	0.0112
Observations	88	88	88	88	88	88

Source: Author's Estimate

4.2.1 Stock Returns of Small Firms

The study calculated the stock returns of small firms based on market capitalization. In every month of each year, stocks were grouped into quartiles based on ascending order of market capitalization. The average returns of the stocks in the first quartile of each month constituted stock returns of small firms. The study sought to

evaluate the stock returns of small firms. From Figure 1, the average monthly return of small firms (AVRS) between 2009 and 2016 was -0.6451%. The highest and lowest monthly returns of small firms were 11.7188% and -10.4167% respectively during the past nine years.

The standard deviation of 0.033308 shows that the deviations of small firm monthly returns from its average return were small. The returns of small firms have a skewness of 0.2436 meaning that the distribution is approximately symmetrical because it is within the rule of thumb of ± 0.5 . Also, the kurtosis value of 6.509238, which is greater than 3 indicates that the distribution is peaked (leptokurtic) relative to the normal. The trend of the returns of small firms over the study period is shown in Figure 1 below.

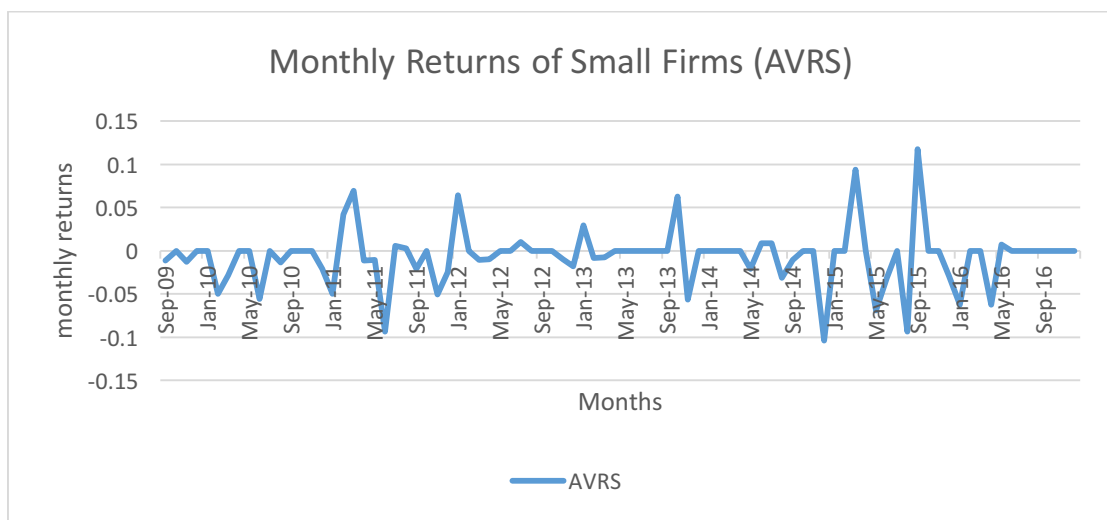


Figure 1. Trend of Small Firm Returns

Source: Author's Estimates

4.2.2 Stock Returns of Large Firms

The stock returns of large firms were computed from the average monthly returns of the large firms' portfolio using the quartile portfolio approach discussed earlier. The study sought to describe the nature of returns of large firms. From Figure 2, the average monthly return of large firms between 2009 and 2016 was 1.3067% which was higher than that of small firms over the period. The highest and lowest monthly returns over the study period were -7.4503% and 19.1273%. Therefore, large firms recorded the highest returns as compared to small firms. However, small firms recorded the lowest returns as compared to large firms. The low standard deviation of 0.043815 shows that most of large firm returns are close to the mean or average return. Also, the skewness of large firms' returns which was 1.018673 shows that the distribution is highly skewed. The kurtosis value of 5.528 which is above 3 shows that the distribution is leptokurtic relative to the normal. The trend of the large firm returns is shown in Figure 2 below.

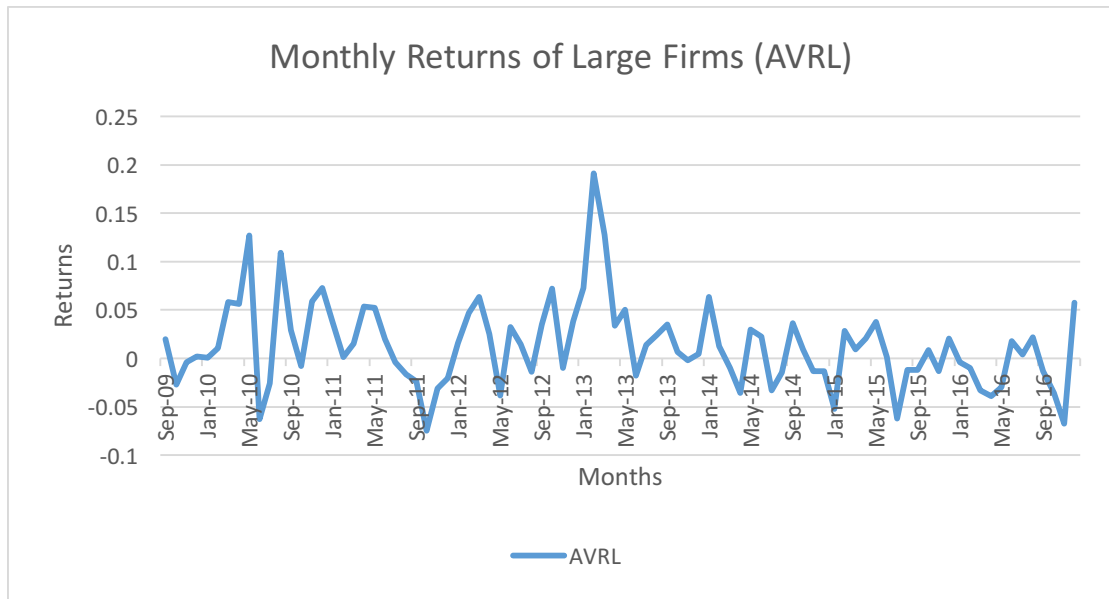


Figure 2. Trend of Returns of Large Firms

Source: Author's Estimates

4.2.3 Stock Market Returns

The study sought to describe the nature of stock market returns. The GSE Composite Index was used as proxy for computing stock market returns. The stock market returns from 2009 to 2016 were analyzed monthly. From Figure 3, the highest return of the stock market was 16.9477% and the lowest market return was negative 14.5168%. The average market return for the study period was 1.2230% which is higher than that of small firms but lower than that of large firms. The skewness of GSE returns is 0.257 thus, the distribution of GSE returns is said to be fairly symmetrical. Also, the kurtosis value of 5.169 shows that the distribution is leptokurtic relative to the normal like small and large firm returns. The trend of GSE returns is shown in Figure 3 below.

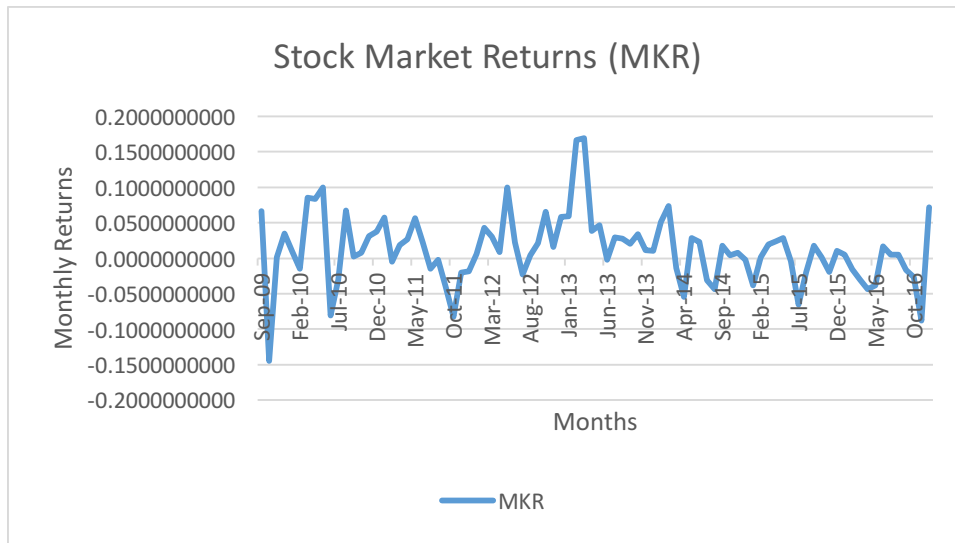


Figure 3. Trend of GSE Returns

Source: Author's Estimates

4.2.4 Factors That Affect Stock Returns

The study used monthly exchange rates, inflation rates and interest rates as control variables. This section sought to describe the characteristics or nature of these variables. From Table 1, the monthly average of exchange rate, inflation rates and interest rates over the study period were 2.43, 1.02% and 20.21% respectively. The distribution of inflation rates was also found to be fairly symmetrical whilst exchange rate and interest rate were moderately skewed. Also, exchange rate and interest rates tend to be platykurtic relative to the normal whilst inflation rates tend to be leptokurtic relative to the normal.

4.3 Inferential Statistics

The study aimed at establishing the relationship between market returns and

returns of small firms. GSE Composite Index served as the proxy for stock market returns. The dependent variable, stock market returns was regressed against returns of small firms and large firms. The monthly exchange rates, inflation rates and interest rates of Ghana were used as control variables. The Ordinary Least Squares regression analysis was used with the aid of Microsoft Excel and EViews statistical package (Student Version).

4.3.1 Unit Root Test

To analyze time series data, it is very crucial to find out if there is stationarity in the series or not. That is, whether the series has a unit root or not. Non-stationarity often causes the R^2 to be high even if the variables do not have a significant and meaningful relationship. It also leads to spurious regression results. Spurious regression is a phenomenon where regression output shows a statistically significant relationship between variables although such a relationship does not actually exist (Patterson, 2000). Thus, before the linear regression was conducted using the data, the Augmented Dickey-Fuller (ADF) Test was used to test for stationarity and ensure that the data was stationary prior to usage. The null hypothesis of the test was as follows:

$$H_0: \rho = 1 \text{ unit root}$$

or the variable has a unit root or is not stationary. The decision criterion is that if the difference of the co-efficient of the variable from one is significant, then the null hypothesis that the variable has a unit root is rejected. Also, when the p-values of the variable is greater than 5%, then we fail to reject the null hypothesis. The ADF Results

are shown below in Table 2.

Table 2

Augmented Dickey-Fuller(ADF) Test at Level

ADF Test at Level					
Variable	Co-efficient	Standard Error	T Statistic	Prob.	Null Hypothesis
AVRL	-0.634318	0.101648	-6.240341	0.0000	Reject
AVRS	-1.129244	0.107566	-10.49819	0.0000	Reject
EXCH	-1.462103	0.096855	-15.09576	0.0000	Reject
INFL	-10.02182	0.85093	-11.77749	0.0001	Reject
INTR	-0.657302	0.100366	-6.549041	0.0000	Reject
MKR	-0.691624	0.103362	-6.691268	0.0000	Reject

Source: Author's Estimate

The above results of the ADF test at level shows that all variables have no unit root as such, they are stationary at level. The probability of all the variables is less than the critical level (5%) thus the null hypothesis is rejected. The co-efficient of the variables are less than one. Therefore, all variables are stationary at level.

4.3.2 Multicollinearity Test

Another important test carried out on the data before running the regression was the correlation matrix. The correlation matrix was used to test if there were any strong

linear relationships between the independent variables. The presence of strong multicollinearity increases the standard errors of coefficients thus making the regression results less reliable (Talla, 2013). The results of the correlation tests are shown in Table 3 below.

Table 3

Correlation Matrix

	INTR	INFL	EXCH	AVRS	AVRL
INTR	1.000000				
INFL	0.025063	1.000000			
EXCH	0.023912	-0.144993	1.000000		
AVRS	0.015056	0.137945	-0.171360	1.000000	
AVRL	0.055986	-0.076360	0.117074	0.035855	1.000000

Source: Author's Estimates

From Table 3, the test for correlation shows that there is no perfect correlation between any two variables. Thus, the data is appropriate for use in the regression model.

4.3.3 Regression Output

To test for the small firm effect on the GSE, it was necessary to test for the relationship between stock market returns and returns of small firms and large firms. The output of the OLS equation used is shown in Table 4 below:

Table 4

Regression Output

Variable	Coefficient	Standard Error	t-Statistic	Probability
AVRL	0.915002	0.068120	13.43223	0.0000
AVRS	0.056366	0.090650	0.621802	0.5358
EXCH	0.009124	0.022286	0.409397	0.6833
INFL	0.257849	0.220802	1.167784	0.2463
INTR	-0.004662	0.197395	-0.023619	0.9812
C	0.000303	0.003172	0.095497	0.9242
R Square	0.694430			
Adjusted R Square	0.675798			
F Statistic	37.270160			

Source: Author's Estimates

From table 4 above, the estimated model for the study is shown as equation 1 and the model with results from regression is shown as equation 2 below.

$$R_t = \beta_0 + \beta_1 AVRS_t + \beta_2 AVRL_t + \beta_3 INFL_t + \beta_5 EXCH_t + \beta_6 INTR_t + \varepsilon_t \dots (1)$$

$$R = 0.0003 + 0.0564AVRS + 0.915AVRL + 0.2579INFL + 0.0091EXCH - 0.0047INTR \dots (2)$$

4.3.3.1 Co-efficient of Determination

Co-efficient of determination, denoted by R^2 represents the extent to which the variance in the dependent variable is predicted by the independent variables. It is a measure of goodness of fit. As shown in the regression output in Table 4, the R-squared was 69.44% and the adjusted R-square was 67.58%. This implies that the changes in the independent variables (returns of small firms and large firms, inflation rate, exchange rate and interest rates) explain 68% of variations in the dependent variable, stock market returns. This shows that the regression model has high goodness of fit. This is because other variables not included in the model contributes to 32% of variation in stock market returns.

4.3.3.2 Standard Error

Table 4 shows the estimated standard errors of the co-efficient of the variables used in the model. The higher the standard error, the higher the statistical noise in the estimates. Thus, the standard error shows the statistical reliability of the estimated co-efficient. From Table 4, the standard errors of the co-efficient of inflation rate and interest rate were 0.2208 and 0.1974 respectively. The standard error of the co-efficient of the other variables are very low. This shows that the co-efficient of the variables used in the model can be relied upon because their standard errors are generally low.

4.3.3.3 Effect of Variables on Stock Market Returns

Table 4 shows that the co-efficient estimated for returns of large firms (AVRL) is

0.951002. This shows a positive relationship between stock market returns and returns of large firms. Since the p-value of 0 is less than the significant level 0.05, it is statistically significant that returns of large firms affect stock market returns positively. Thus, a unit increase in returns of large firms will lead to a 0.951002 units increase in stock market returns.

Furthermore, Table 4 shows that the co-efficient of returns of small firms is 0.056366. This shows a weak positive relationship between stock market returns and returns of small firms. Thus, if there is a unit increase in returns of small firms, there will be a 0.056366 units increase in stock market returns. However, the positive relationship between stock market returns and returns of small firms is not statistically significant. This is because the p-value of 0.5358 is not less than the significant level of 0.05. Thus, we fail to reject the null hypothesis that there is no relationship between stock market returns and returns of small firms.

In addition, the co-efficient of exchange rate and inflation rate are 0.009124 and 0.257849 respectively which shows a positive relationship with stock market returns. The positive relationship between inflation and stock market returns is consistent with Choudhry (2000) who found this relationship in countries with high inflation. Also, the positive relationship between exchange rates and market returns corroborates Mukherjee and Naka (1995) findings in Japan and Indonesia. However, the p-values of inflation and exchange rates are greater than the significant value, 0.05. Thus, exchange rates and inflation rates have no statistically significant positive relationship with stock market

returns. Interest rate on the other hand has a statistically weak and insignificant negative relationship with stock market returns. This is because its p-value of 0.9812 is greater than 0.05. The negative relationship between stock market returns and interest rates is consistent with the findings of (Eita, 2011) which posits that an increase in interest rates reduces investment value and returns.

4.4 Residual Diagnostics

Residual diagnostics are important tests which are conducted to test the adequacy of a regression model used in a study. This is because it is important to find out whether assumptions of the model are correct before making inferences. This helps to increase the accuracy in rejecting or accepting the null hypothesis in a research. The following tests were thus conducted on the residuals from the OLS regression analysis.

4.4.1 Test for Autocorrelation

The Breusch-Godfrey serial correlation LM test was used to test for the presence of serial correlation. Autocorrelation or serial correlation occurs when there is correlation between residuals and their lagged variables (Ouma & Muriu, 2014). The presence of serial correlation in residuals is not suitable. The null hypothesis for the test is as follows:

H_0 : There is no autocorrelation

Table 5 summarizes the results of the serial correlation test used in EViews.

Table 5

Breusch- Godfrey Serial Correlation LM Test

F-Statistic	2.205314	Prob. F (5,77)	0.0622
Observed R-squared	11.02324	Prob. Chi-Square (5)	0.0509

Source: Author's Estimates

Since the p-value of 5.09% is slightly greater than the 5% significant level, the study fails to reject the null hypothesis. Thus, there is no autocorrelation in the model.

4.4.2 Heteroscedasticity Test

To show the robustness of the output of the regression, another test conducted was the test for heteroscedasticity. Results of an OLS cannot be relied upon if heteroscedasticity exists. Thus, the study used the Breusch-Pagan-Godfrey test on the null hypothesis:

H_0 : There is no heteroscedasticity

Table 6 presents the EViews output from the Breusch-Pagan-Godfrey test.

Table 6

Breusch-Pagan-Godfrey Heteroscedasticity Test

F-Statistic	0.300086	Prob. F (5,82)	0.9115
Observed R-squared	1.581283	Prob. Chi-Square (5)	0.9035
Scaled explained SS	8.137953	Prob. Chi-Square (5)	0.1488

Source: Author's Estimate

The p-value is 0.9115 which is greater than the significant level, 0.05. Thus, the study fails to reject the null hypothesis. This shows that there is homoscedasticity hence the t-test results of the OLS is reliable.

4.4.3 Normality Test

Another important test carried out on the residuals of the regression was the normality test. This was done to find out if the error term follows a normal distribution.

Hence, the hypothesis are as follows:

H_0 : there are normally distributed residuals

H_1 : there are no normally distributed residuals

A histogram of the residual distribution is generated from EViews in Figure 4 below.

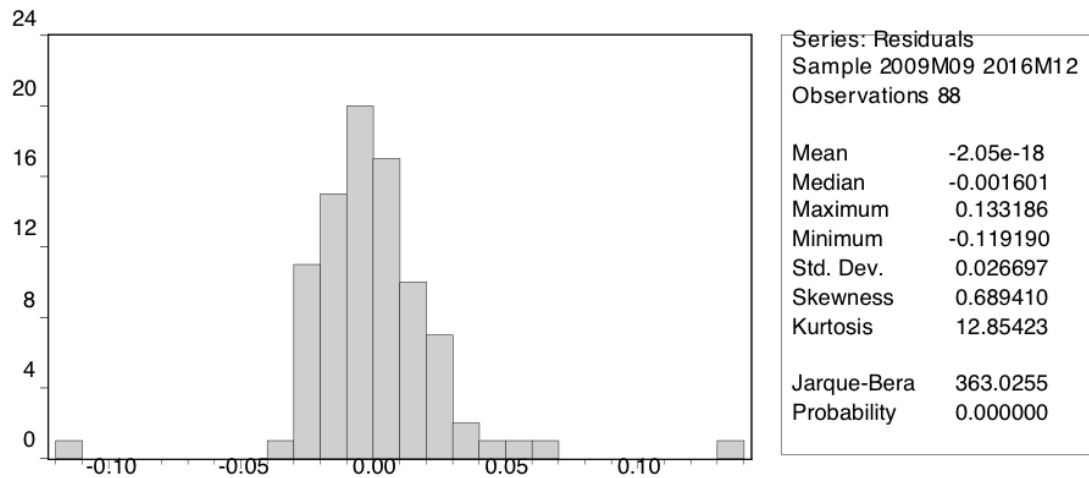


Figure 4. Histogram of Residuals and Jarque-Bera Test

Source: Author's Estimates

From the histogram, residuals are not normally distributed. Also, the Jarque-Bera test was used to confirm the normality of residuals. The p-value of 0 is less than the significant value of 0.05. Thus, the null hypothesis of the Jarque-Bera test that residuals are normally distributed is rejected. Despite the non-normality of residuals, the t-tests results can be relied on. This is because it is very difficult to find a model which has complete normally distributed residuals especially when the sample size is relatively small (Talla, 2013). In the case of the GSE which has a small population and few firms consistently trading for the study period, it was likely to have a non-normal distribution for the residuals.

4.5 Discussion

Once residual tests are performed on a regression analysis and problems like

autocorrelation and heteroscedasticity are corrected for, the model becomes more appropriate for inference. It also increases the reliability of the model. The residuals in the regression model used in the study were homoscedastic and showed no autocorrelation. Thus, the regression output in the study can be relied upon. Furthermore, the study established that the adjusted R squared value of 0.6758 implies that 68% of variations in GSE returns can be explained by returns of small firms and large firms and macroeconomic variables like inflation, exchange rate and interest rates.

It can be inferred from the results of the regression output that, there was a statistically insignificant positive relationship between the returns of small firms and stock market returns. Returns of small firms have a weak positive impact on stock market returns. The positive relationship between the returns of the small firms and stock market returns is consistent with empirical literature. Banz (1981), Lukale (2007), Reinganum (1981) and Sehgal & Tripathi (2005) postulated that there is a positive relationship between returns of small firms and stock market returns in their studies. Thus, these studies suggest that there is a negative relationship between a firm's size and its returns. However, the regression output shows that the small firm effect is statistically insignificant. This is consistent with (Handa et al, 1989) where small firm effect was found to be statistically insignificant on the US market. Also, the impact of the returns of small firms on the GSE is lower than that of large firms. Thus, the study fails to reject the null hypothesis of the study that there is no relationship between small firm size and stock market returns on GSE.

Furthermore, contrary to the small firm effect, returns of large firms were seen to have higher returns than small firms on GSE. The study established that there was a statistically significant and strong positive relationship between returns of large firms and stock market returns. This finding corroborates the empirical evidence from (Oluoch, 2003; Patel, 2012; Roll, 1981) that small firms do not show higher returns than large firms. Oluoch (2003) used an OLS regression analysis to test for the presence of the size effect on the Nairobi Stock Exchange and found no small firm effect. Roll (1981) also rejected the presence of the small firm effect on the US market due to autocorrelation. Patel (2012) used the T-test and Wilcoxon Signed Rank test statistics to test for the presence of the small firm effect and concluded that small firms no longer show any statistically significant abnormal returns.

The difference in the results of this study from Banz (1981), Keim (1983) and Mghendi (2014) which showed a small firm effect might be due to methodology used. Banz (1981) conducted the test of small firm effect with a generalized asset pricing model and over a longer period of time than this study. Keim (1983) also used portfolios divided into ten for grouping unlike the quartile portfolio grouping done in this study. Also, Mghendi (2014) used ANOVA to test for the difference in means of small firm and large firm returns. The difference in statistical procedures is one reason why there are variations in results of small firm anomaly (Sweeney, Scherer & Goulet, 1996). However, the methodology used in this study is consistent with (Oluoch, 2003) who used an OLS estimation model as well as the quartile portfolio grouping to test for the small firm effect on the NSE. Handa et al (1989) also used an OLS estimation model to test for the small

firm effect on the US market.

4.6 Limitations

Furthermore, dividends were not used in calculating the returns of the firms. Adding dividend to the study could have made it more informative however, it's absence in the study did not invalidate the results. It is difficult to use dividend to find monthly returns since dividends are most suitable for calculation of annual returns. Also, Lakonishock and Smidt (1988) assert that ignoring dividends in calculating stock returns have a negligible or small effect on results of the study. Thus, the use of no dividends in the study is statistically suitable and reliable.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the results from the study. It also presents the conclusions of the study and recommendations for further research and policy formulation. This section is divided into summary of findings, conclusion, recommendations and suggestions for further research.

5.2 Summary

The objective of the study was to test for the presence of small firm effect on the GSE. To achieve this, the study used quartile portfolios and a multiple linear regression model to test for the presence of the small firm effect on the GSE. The regression results showed that there is a statistically insignificant and weak positive relationship between stock market returns and returns of small firms. However, returns of large firms showed a stronger positive relationship with stock market returns than returns of small firms. The returns of large firms also had a statistically positive significant relationship with stock market returns. Thus, an increase in returns of large firms indicates an increase in returns of GSE. This result was contrary to the small firm effect found in other markets.

5.3 Conclusion

The study rejects the small firm effect on the GSE and concludes that small firms do not show larger returns than large firms on the GSE. The study rather identifies a

positive relationship between size of a firm by market capitalization and the firm's returns. This result is consistent with the results of (Handa et al, 1989; Oluoch, 2003; Patel, 2012) who reported the absence of the small firm effect in their studies.

Furthermore, the evidence of large firms showing larger returns than small firms on the GSE might be due to the frequency and magnitude of stock price fluctuations. On the GSE, stock prices of small firms do not change as regularly as stock prices of large firms and as such, there is little and most at times, zero or negative appreciation on stock prices. Another possible explanation for the positive relationship between size and returns of a firm might be due to financial performance. Large firms in Ghana could be performing better than small firms.

In summary, the size of a firm cannot be used as a proxy to estimate stock returns in Ghana because both small firms and large firms have a positive relationship with stock market returns. The only difference is that large firm returns are more significant. The inconsistency in results of the test of small effect across the world and this study posit that investment based on size is not a predictable and fully reliable strategy.

5.4 Recommendations

Moreover, the study recommends that the Securities and Exchange Commission, the Ghana Stock Exchange and other regulatory bodies develop a policy to reduce the impact of large firm returns on the GSE.

It is also recommended that incentives are given to help smaller firms catch up

with larger firms in terms of market capitalization so that investors cannot use size as an investment strategy. For instance, incentives can be given to help small firms perform better financially through tax cuts and easy access to credit facilities so that they increase their firm value in terms of share price.

In addition, the study recommends that investors invest in large firms on the GSE as they are more likely to give higher returns than small firms.

5.5 Suggestions for Future Studies

The study recommends that future studies use different methodologies to test for the presence of small firm effect on the GSE. For instance, dividends should be used in calculating returns of stocks. Also, returns can be calculated on daily and annual basis. Future studies on the small firm effect can also use different measures of firm size like asset values, sales values or net working capital as used by Sehgal and Tripathi (2005). Moore (2005) also used total assets value to represent firm size in his study. From literature, different methodologies give different results most of the time. Thus, the use of these alternative methodologies might help to further test for the possible presence of the small firm effect.

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Appendix I

List of Companies that Traded Consistently on GSE from 2009 to 2016

Golden Web
African Champions Industries
Camelot Ghana
Sam Woode Limited
Clydestone Ghana
Pioneer Kitchenware
Transol Solutions Ghana
Mechanical Llyod
Starwin Products
Ayrton Drugs
Produce Buying Company
Aluworks
PZ Cussons Ghana
Cocoa Processing Company
AngloGold Ashanti
Trust Bank Limited
Benso Oil Palm Plantation
Total Petroleum Ghana
HFC Bank

Societe Generale Ghana
CAL Bank
Ghana Oil Company
Guiness Ghana Breweries
Unilever Ghana
Ghana Commercial Bank
FanMilk Limited
Standard Chartered Bank Ghana
Ecobank Ghana
Ecobank Transnational
AngloGold Ashanti