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Model Behavior Analysis of Stock Market Indicators and Listed Companies: Evidence from the Ghana Stock Exchange: Automated versus Floor Trading

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Abstract

This article studies the model behavior analysis of stock market indicators and listed companies on the Ghana Stock Exchange (GSE) over a five year period. The Ghana Stock Exchange transferred from floor trading to automation in June 2009. The GSE operates an up to date market for recurrently traded securities and an auction call for rarely traded securities. Data for this study was extracted from GSE's profile of listed companies (fact book) for the period under investigation. The study results show a significant progress on stock market indicators within 2007 to 2011 in dividend yield, volume traded, share price, market capitalization and market returns following the automation in mid 2009, equity premium however, decreased and no significant effects on liquidity were detected. The study further revealed that, the introduction of the electronic trading system has significantly increased the tempo of trading activities on the Ghanaian Stock Market. The study recommends the GSE to accommodate all quoted securities as this will promote and improve fund raising for investors.

Keywords: automation, liquidity, trading systems, GSE, floor versus automation trading, capitalization

1. Introduction

The development of technology in telecommunications and the internet are modernizing the conventional business model in all spheres of trade. The decade of the 2000s witnessed an incredible increase in the use of fully automated or computerized trading, clearing and settlement of financial instruments on the markets around the world. Generally, the introduction of computerized trading systems provides major advantages such as speed and accuracy of operations, and perhaps most importantly, the ability to acquire an up-to-date information and see real-time state of the companies' financial position for all stakeholders.

The issue of market-trading systems has gained increasing attention in recent years, especially for emerging markets where a need exists to build a financial infrastructure. Advances in technology have led to the development of highly sophisticated computerized trading systems, which can both improve liquidity and reduce trading costs. The technological advance like electronic trading has trickled down from exchanges in developed countries to stock exchanges in emerging markets, where major efforts to improve structure and liquidity have been undertaken.

In recent years technology has increased tremendously in almost all spheres of business, and the automation of Stock Exchanges globally is no exception. The effects of automation recorded on many Stock Exchanges globally cannot be over emphasized (Jain, 2008). Empirical study indicates that, the use of electronic trading systems has grown rapidly due to advancement in technology and share market deregulation, to the extent that the fully automated trading systems' share in securities trading has expanded widely and plays a significant role in determining corporate liquidity (Brockman & Chung, 2000).

Contemporary empirical evidence from Mailafia, (2011) in a study using the key capital market indicators revealed that the performance in capitalization, turnover by volume and value of shares has significantly improved with computerization. Despite the extensive move towards the automation of trading systems, the issue is far from resolved. There is ongoing controversy (Venkataraman, 2001; Madhavan, 2001; Jain, 2005) concerning the relative merits of floor versus electronic trading systems, and to what extent these merits affect market characteristics such as liquidity, equity premium and price efficiency.

Using data from the Ghana Stock Exchange (GSE), this study examines the effects of the adoption of an electronic trading system on market indicators such as dividend yield, volume traded, equity premium, share price change, market capitalization, risk free and market return. In July 2009, the Ghana Stock Exchange was fully automated. The exchange completely computerized its trading system, from order entry to order execution, and traded alongside the traditional trading floor on which brokers exchange securities. Securities listed on the GSE were gradually transferred from the traditional system (quotation on panels) to the new electronic trading system.

The main features of the new trading system adopted by the GSE include: (i) trading automation; (ii) market opening with a call auction based on temporal consolidation of orders; (iii) two trading methods: call 'fixing' and continuous auction systems; and (iv) enhanced transparency. Regarding (i) and (ii), firms transferred to the 'fixing' system represent 90% of our sample and the five best limit selling and buying orders in the order book are public information.

The proponents of floor trading argue that these systems are better than electronic systems. For example, professional relationships may evolve during floor trading because of repeated trading and result in the sharing of information about order flows, thus reducing the level of information asymmetry and increasing liquidity (Venkataraman, 2001; Jain, 2005). Also, the role of human intermediaries such as specialists and brokers in floor trading systems could provide certain benefits for the trading process, through their quick reaction to different market conditions and the execution of sophisticated trading strategies, and thus reduce trading costs and market impact (Venkataraman, 2001).

However, there are arguments based on the anonymity of electronic trading systems which suggest that adverse selection is a more severe problem in electronic trading systems and, therefore, the bid-ask spreads may be higher. Theissen (1999) addressed the issue of transaction costs in floor and computerized trading systems empirically in the German Stock exchange, where floor and screen trading for the same stocks exist in parallel. Both markets were liquid and operate simultaneously for several hours each day. An analysis of the market shares of the competing systems reveals that the electronic trading system was relatively less attractive for less liquid stocks and in the presence of higher return volatility. Also, an analysis of the bid-ask spreads reveals that the electronic trading system was relatively less attractive for less liquid stocks. The market share of the electronic trading system was negatively related to the total trading volume of the stock, was positively related to the difference between spreads on the floor and in the screen trading system and is at least partially negatively related to assess return. They further documented that spreads in the electronic trading system respond more heavily to changes in assess return and that the adverse selection component of the spread was larger.

On the other hand, proponents of electronic trading systems argue that the latter is more efficient and may reduce problems associated with human error. Earlier, Weber, (1999) examined the design of one screen-based futures market on the Cartor Financial Futures Exchange and its capabilities relative to the rival, floor-based market in Chicago and found that electronic "order matching" leads to faster completion of desired trades and about a one-third reduction in transaction cost.

Electronic trading systems do offer lower operating costs and the possibility of remote access to the market. In addition, these systems are able to attract new pools of liquidity by providing remote access to investors (Freund & Pagano, 2002; Venkataraman, 2001; Jain, 2005)

The Member survey by the International Securities Association for Institutional Trade Communication [ISITC] (2012), confirmed that, many investment firms on both the buying side and selling side are increasing their spending on technology for electronic trading, consequently, removing many floor traders and brokers from the trading process.

These claim and others on the benefits of automation need to be substantiated by worldwide empirical studies. This study seeks to empirically assess the performance of listed companies before and after automation of the Ghana Stock Exchange using key stock market performance indicators.

Hence, the study seeks to answer the following questions: Does electronic trading improve stock market liquidity and performance? Does electronic trading reduce the cost of transactions for listed companies? Is there a positive price reaction when stocks move from floor to electronic trading for listed companies?

To answer these questions, this study contributes to the growing literature that examines the impact of automation on stock exchanges. The main hypothesis tested in this paper is that the automation of the trading process leads to improved liquidity, positive price reaction and a reduction in equity premium which investors require. The study gathers information on listed companies from the GSE and includes all listed companies two

years data before automation, during the automation and two years after the automation for consistency and uniformity of the analysis.

The academic literature often focuses on technical questions of trading (e.g. appropriate trading method) without paying attention to the potential influence of automation on certain key indicators for profitability of the exchange (Naidu & Rozeff, 1994). Finally, greater knowledge of the effects of automation on trading provides valuable information for exchanges contemplating changes in trading methods.

2. Literature Review

A Stock Exchange is a place where securities of companies are traded. Berk & DeMarzo (2008) define Stock Exchanges as organized markets on which the shares of many corporations are traded. Domowitz (1996), explained that an exchange provides ways by which financing is raised by the sale of shares to outside investors. It provides a mechanism for the valuation of companies through the process of price discovery and a means by which such information is disseminated.

The Ghana Stock Exchange (GSE) is the principal stock exchange of Ghana. The GSE was incorporated in July, 1989 as a private company limited by guarantee under Ghana's companies Act, 1963 (Act 179). The Exchange was given recognition as an authorized stock exchange under the Stock Exchange Act of 1971 and commenced trading on November 12, 1990. In April 1994, the Exchange became a public company limited by guarantee. The GSE was a private sector initiative; not funded by government but has enjoyed the support of the Government of Ghana. The objectives of the GSE include; providing the facilities and framework to the public for the purchase and sale of bonds, shares and other securities, coordinating stock dealing activities of members and facilitate the exchange of information including prices of securities listed and also co-operate with associations of stockbrokers and Stock Exchanges in other countries; to obtain and make available to members information and facilities likely to be useful to all market participants.

Similar to most stock exchanges around the world, for a company to be listed on the GSE, the listing requirements on capital adequacy, profitability, spread of shares, years of existence and management efficiency has to be met before listing. The GSE until October 2008 used the manual system of trading which involved the use of floor clerks and other floor traders who negotiate among themselves to buy or sell securities that is on offer from various brokers and brokerage firms.

The floor trading is essentially a system where traders and brokers meet at a specific venue referred to as a floor trading or pit to buy and sell financial instruments using open outcry method to communicate with each other. These venues are typically stock exchanges where transactions are executed by members of such an exchange using specific language or hand signals. Open outcry allows for floor traders to understand the emotions of the other traders on the floor when orders are being called in. This intangible information is essential for many of the traders on the floor, as being able to see a trader's greed or fear offers much more than watching a chart on the computer. Many traders will key off the "noise" in the pits to determine the volatility in the markets at a specific price point. Comparatively, there are a few services on the web that offer this live feed from the pits. One key drawback to the open outcry system or any floor based trading system is that traders are not privy to the limit order book which will give the trader an insight into the depth of the market place. This is especially useful during periods of low volatility when pit noise is not useful.

During the 1980s and 1990s electronic trading replaced physical floor and phone trading in most exchanges around the world. Historically, stock markets were physical locations where buyers and sellers met and negotiated. With the improvement in communications technology in the late 20th century, the need for a physical location became less important, as traders could transact from remote locations (Bowley, 2011).

Electronic trading, sometimes called e-trading, is a method of trading securities (such as stocks, and bonds), foreign exchange or financial derivatives electronically. Information technology is used to bring together buyers and sellers through electronic trading platform and networks to create virtual market places such as National Association of Securities Dealers Automated Quotation Systems (NASDAQ), New York Stock Exchange (NYSE) Arca and Globex which are also known as Electronic Communications Networks (ECNs).

Several stock exchange floors, on which brokers manually matched orders using an open-cry system, have been replaced by or are being converted to electronic trading systems. In these markets, information technology is also being adopted to globalize trading and settlement activities, enabling investors to trade in different markets regardless of time and location. Amihud and Mendelson (1989) established in their study that market liquidity could be enhanced through the proper use of information technology.

The increase of electronic trading in contrast to floor and phone trading has had some important implications including: Reduced cost of transactions, Greater competition, increased transparency, Tighter spreads, Improve liquidity and significant increase in the amount of publicly available information in the secondary markets.

Empirically, Automation of capital markets has also been found to have instilled or enhanced transparency in market activities to an extent, with respect to price and trade information (Picot, Bortenlaeger & Roehrl, 1997). Brailsford et al. (1999) found that the automation of the stock market resulted in an increase of around 77% in contemporaneous public information transfer. With the entire bid-and-ask schedule and course of sales available on an almost real-time basis through e-trading directly to all market participants, investors do not have to rely on brokers for this information. On the part of brokers, they do not have to undertake a physical search for the appropriate party to fulfill a sell or buy order raised by their clients in these markets.

The types of trading systems are sometimes differentiated by the form of market intermediation provided by entities with direct access to the system. The nature of competition between exchanges is a defining feature, since exchanges may adopt varying market structures in order to compete in different fashions, for instance, according to Zhong (2002), the China Securities Regulation Commission's (CSRS) implementation of new rules in 2002 was to lower the price cap on brokerage fees, introduce price competition among securities brokerage firms thus prompting brokerage services to adopt online trading as a mean of lowering transaction or operation costs in the face keen market competition.

According to Brailsford, T. J., Frino, A., Hodgson, A., and West, A., (1999), automation of equities trading has a three-fold effect on the market including: The transparency of the market with respect to price and trade information improves radically with participants being able view the entire bid and ask schedule and course of sales in real time; Reporting lags and errors reduced due to instantaneous dissemination of all market activity via electronic signals thereby producing a cleaner price feed for the market; and Faster trade execution is achieved for large portfolios of shares as parties to transactions no longer had to physically search each other out.

Biais, Glosten and Spatt (2005), in their study noted that automation can lead liquidity to decrease because it does not allow the direct negotiation between traders for transactions and does not allow them to preserve a certain control on trading conditions. Contrarily, an argument raised in a study by Pirrong (1996) has shown that automated stock exchanges can be deeper and more liquid than manual stock exchanges.

In this regard, Naidu and Rozeff (1994) also observed an increase of volatility and liquidity as well as an improvement in efficiency following the automation of the Singapore stock exchange. They observed that automation speeds up the dissemination of prices, forcing volatility to increase, as well as potentially altering trading volumes especially when information is hitting the market.

Moreso, Sioud and Hmaied (2008), in their work established an increase in trading volume after the transfer of shares to the new trading system. Conversely, they found that the new trading mechanism does not reduce pricing error and hence does not improve market efficiency.

Jain (2008) however concluded that automation appears to reduce transaction cost and make emerging markets more accessible to foreign traders hence increasing the liquidity and market capitalization of the firms and the economy.

Empirical and theoretical researches have also found the effects of the trading mechanism on market characteristics. Schwartz and Steil (1991) suggests that call auctions permitting the determination of a single price for all transactions permit investors to post limit orders, which improves market liquidity. Mendelson & Tunca (2004) shows that increasing the number of participants in an auction increases price precision. However, he suggests that beyond some minimal number of traders the benefits of concentrating trade in an auction are practically exhausted and a second stage of continuous trading can be employed to further increase traders' opportunities. Madhavan (2001) established that in the presence of asymmetric information, continuous markets fail. Nevertheless, call-auction markets continue to function because of the averaging effect of all traders' prices rather than bilateral trading.

Pagano and Roell (1996) compared liquidity and the price-formation processes in several trading systems with different degrees of transparency. They suggest that a greater transparency in the trading process improves market liquidity by increasing opportunities for less-informed traders to participate in a system with reduced spreads, volatility and pricing errors. Nevertheless, investors with private information tend to prefer less-transparent systems to take advantage of their situation.

The adoption of electronic trading has become one of the major changes that have occurred in the market design and structure in recent years. The change (moving from floor to electronic trading system) is an important issue

in market microstructure, and deserves thorough investigation for several reasons. For investors, financial services on the web offer great crucial benefits such as reduced cost of transactions for all concerned as well as the ease and the convenience in trading.

2.1 The Stock Market Description

For a long time, insufficient financing retarded economic growth in Ghana. The production sectors could not meet the developing needs of firms facing severe international opposition due to market liberalization. Since 2001, the Ghanaian government implemented several reforms to stimulate sectors like the financial market and favor the creation of new sources of financing.

As a result of these reforms, the Ghanaian stock exchange increased its order flow. However, due to the inadequate financial information and the dearth of enhanced market activity, the increased demand has not been accompanied by a similar increase in supply. As a result, stock prices increased steadily, sustained by the dominating group behavior of small investors. For five successive years, the Ghanaian stock market displayed a rise in the GSE index from 18 in 2007 to 34 in 2011. By the end of 2009, investors realized that stock prices did not reflect true intrinsic values and they became reluctant to buy at the offered prices, which ensured a progressive fall in stock demand.

Fearing a fast downfall of the stock market, the authorities decided to adopt corrective measures. From June 2009 until May 2010, minimum transaction amounts were required to allow a stock price change. Unfortunately, this proposed remedy did not work out as expected. To address the crisis, the GSE decided to eliminate the traditional trading floor on which brokers exchange securities and introduced an automated trading system that was expected to enhance market liquidity and efficiency. Securities listed on the GSE were gradually transferred from the traditional system to the new electronic trading system.

2.2 The E-Trading System

From 2001 until June 2009, a system based on an electronic compromise gradually replaced the physical quotation on panels. A replication point was initiated from March to June 2010 to enable stock operators to be familiar with the new trading system. From July to September 2010, the required infrastructure was set up.

Since the transfer, in 2011, the Ghana Stock Exchange implemented some major changes in its trading activities. To complement the automated trading regime, the Exchange extended its trading hours to afford dealers increased contact hours with their clients during the trading day and also to afford non-resident investors in time zones different from Ghana, greater opportunity to reach out to their local brokers. The new trading hours become 09.30 hours GMT to 15.00 hours GMT from the existing 09.30hours GMT to 13.00hours GMT. This was expected to also help improve liquidity in the market place.

The Ghana Stock Exchange (GSE) also introduced a new method of calculating closing prices of equities on the market. Closing prices of listed equities from January 4, 2011 were calculated using the volume weighted average price of each equity for every given trading day. Hitherto, closing price was based on the last transaction price of listed equities. Two new indices were introduced on January 4, 2011 to replace the GSE All-Share Index which tracks price changes in the listed equities. The new indices were the GSE Composite Index (GSE-CI) and the GSE Financial Stocks Index (GSE-FSI).

The GSE operates a continuous auction market for frequently traded securities and a call auction for infrequently traded securities. During the pre-opening point, buy and sell orders are accumulated in the central order book without any transactions taking place and a price is displayed systematically. This price must maximize the number of stocks traded. If this price is not unique, the system chooses the one that minimizes the number of securities not served.

Despite the difficult year the Exchange still had crossed a watershed in 2009. The Automated Trading System (ATS) and the Electronic Clearing/Settlement both went live to complement the Depository system which went live in November 2008. With that move all the operations are fully automated now. Dealers now have access to trading from the Exchange's Trading Floor; the offices of Dealers; and through a secured internet facility at any location. Bi-lateral settlement between brokers ended with the introduction of Electronic Clearing and Settlement. Therefore trades are settled electronically on T+3 and the underlying securities also credited to the Depository accounts of buying investors. The GSE Securities Depository Company which became fully operational in November 2008 had 34,000 depository accounts opened at the end of 2009. Through resolutions and public education at the various AGMs, the Exchange's listed companies have amended their company regulations not to issue any paper share certificates. Indeed, under the automated environment, an investor (whether buying or selling)

must have a Securities account in the Depository. The new system has daily price limits of the previous day's price when a stock reaches its price limit, trading in the stock is halted for 30 minutes.

3. Methodology

This section presents our data, empirical methods and findings of the effects of the automated system adopted by the GSE on liquidity, stock returns, volatility and pricing error. Since the decision to automate the TSE was made by the exchange itself and not by managers of companies, the transfer of stocks to the new trading method represents a pure market-microstructure event.

3.1 The Data

This study employed data on listed firms at the Ghana Stock Exchange over a period of five years spanning from 2007 to 2011. It made use of the list of thirty seven listed companies data published in the annual reports of the Ghana Stock Exchange both before and after the automation.

The data were collected from different sources including audited accounts of the listed companies as well as from the fact book of the Ghana Stock Exchange published from 2007 to 2011. The fact book provides financial reports of the companies as well as other relevant statistics of all the listed companies. Data on Dividend yield, Return on equity, Total traded volume, Market capitalization, Risk free rate, Share price change, Market return and Equity premium were extracted from GSE's profile of listed companies for the period under investigation. In all, the data consists of the 37 listed firms on the GSE, however, few companies were included even though not all available of certain information on them were obtained. Final analysis was not affected in view of the fact that the means of the data was employed.

3.2 Liquidity Indicator Measures

Hypothetically, the trading volume of a given security is a rising utility of its liquidity, all other conditions being equal. Accordingly, an increase in the trading volume of a stock after its transfer to the new trading system reflects an increase in its liquidity indicator. Liquidity in the GSE cannot be measured by bid-ask spreads. While it is possible to impute a bid-ask spread from the best limit prices of the buy-and-sell orders, data are unavailable. Therefore, we use dividend yield, volume traded, share price, market capitalization and market return shares as the liquidity measures unlike Amihud et al. (1997) who used only traded volume as their liquidity measure.

4. Results and Discussion

4.1 Return on Equity

Return on equity (ROE) measures the rate of return on the ownership interest (shareholders equity) of the common stock owners. It measures a firm's efficiency at generating profits from every unit of shareholders' equity. ROE shows how well a company uses investment funds to generate earnings growth.

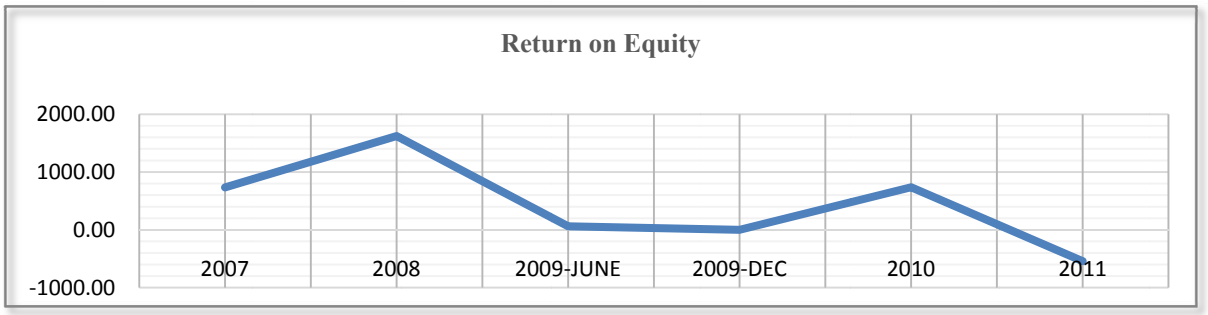

Figure 1. Yearly relative return, calculated over listed companies

From figure 1, it is indicating clear fluctuating negative returns both before and after automation and this was due to the fact return on equity varies substantially across different listed companies.

When a stock's return on equity is negative, shareholders are losing, rather than gaining, value. This is usually a very bad sign for investors and managers try to avoid a negative return as aggressively as possible. Most rational investors avoid placing their funds in a company that fails to consistently deliver positive returns, but in this instance GSE investors overlooked a negative return for the tough years since managers made them to believe that

the GSE is well-positioned for long-term growth. Besides, the global financial crises in the year 2008 greatly impacted on the activities of Exchanges around the world was predicted to recover shortly and this also motivated investors despite the negative returns.

While the negative return is rarely desired, the GSE explained that, they actually post a negative return in the years as shown in figure 1, due mainly to the significant costs of start-ups, including capital expenditure, investments in equipment and other major assets in moving completely from the floor trading to the electronic trading system that the companies had to incur. Economic downturns and recessions also contributed to the negative returns on equity. To understand the impact of larger economic trends on the GSE's equity, the study compared the results with the Tunisian Stock Exchange (TSE), which indicated a similar performance. (Amihud et al., 1997).

Looking at short-term performance trends the return on equity has decreased in the GSE over time, but shows long-term growth potential after automation and therefore its negative return is an opportunity.

4.2 Dividend Yield

The dividend yield of a share is a financial ratio that shows how much a company pays out in dividends each year relative to its share price. In the absence of any capital gains, the dividend yield is the return on investment for shareholders. For the GSE, dividend yield is calculated as Annual dividend paid per share divided by the Price per share.

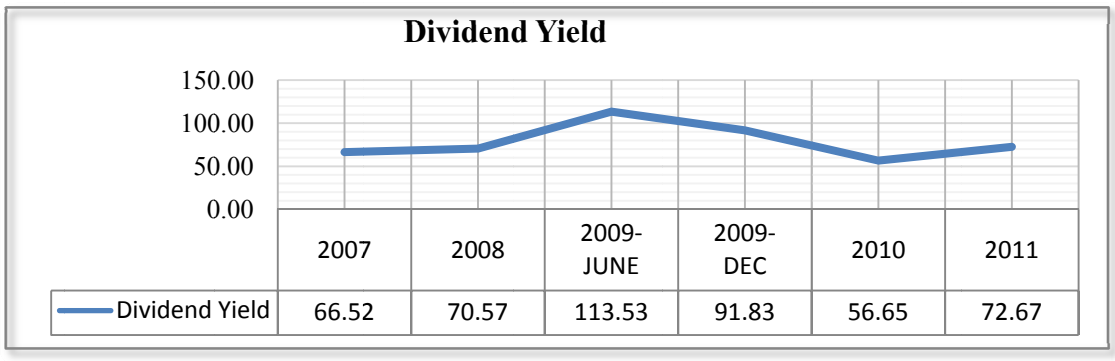

Figure 2. Listed companies and dividend yield

There is quite a consist link between listed companies dividend payout and the period of trading (before or after automation). Figure 2 shows the five years relationship between dividend yields over the trading period. We see that, year after year, dividends paid to shareholders by firms listed on GSE are almost better from 2009 to 2011. However, the figure showed a decreased in 2010 due to economic factors which affected the country as a whole. The sort of firm listed on the GSE exchange are more established and, therefore, somewhat are more likely to pay dividend. Whichever ways we slice it, with data, the figure 2 points out that dividend yield over time are fairly steady with respect to the automation period than it was in the floor trading. This is an important finding and could be due to market speculation and expectation about the relevance of automation from the management perspective and also to boost investors confidence as high dividend payout may indicate that a company is doing well with automation, though it is often not very obvious. The total dividend cash flow paid to shareholders by companies listed on the GSE's stock market is quite constant (Fama & French, 2001).

4.3 Total Traded Volume

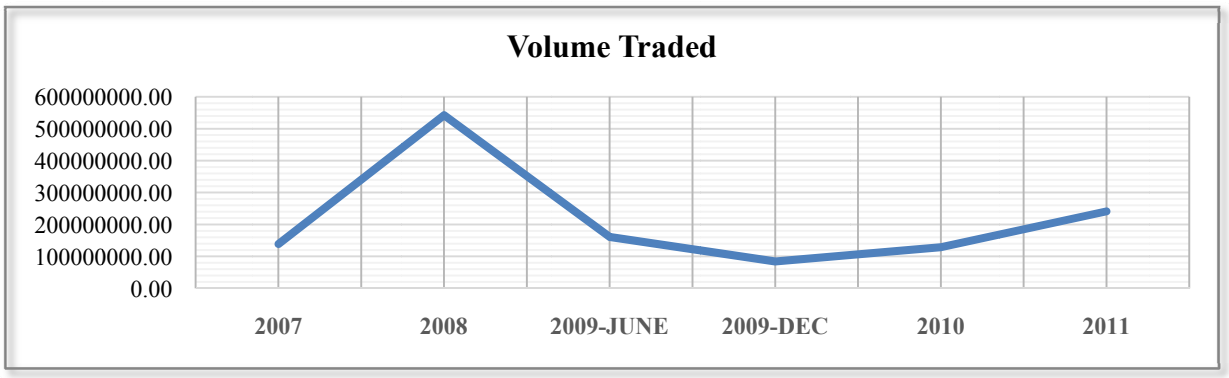

Figure 3. Listed companies and volume traded

Total traded volume represents the total number of shares traded for a given timeframe. Volume is a measure of liquidity in a stock or index. The higher the volume, the more the liquidity and the more competitive the market will be, "all things equal". Volume traded is an important indicator in technical analysis as it is used to measure the worth of a market move. If the markets have made strong price move either upwards or downwards, the perceived strength of that movement depends on the volume traded for that period. The higher the volume traded during that price move, the more significant the move. Higher volume typically results in narrower spreads, less slippage, and less volatility.

It is evident from figure 3 that the brisk business on the floor of the Exchange made a positive impact on turnover of shares traded on the Exchange during the period under study. Volume traded for the year stood at 545.8 million shares valued at GH¢380.35 million. The value of shares traded in 2008 is the highest value traded in the history of the Exchange. The turnover figures recorded are clearly increases of 90% over the volume and 170% over the value for 2007. Volume and value traded for 2009 were 97 million shares worth GH¢74.19 million. The value of GH¢74 million was just about 20% of the value traded in 2008 these changes notwithstanding, trading volume and values of 419.79 million shares and GH¢446.56 million respectively recorded over the period of January - December 2011 were significantly higher than the volume of 330.13 million shares and value of GH¢151.13 million recorded over the same period in 2010. The volume of shares traded went up 27% while value of shares traded in 2011 represented 295% over the volume and values achieved in 2010 respectively. This result showed a strong proof of the impact on the GSE after automation and it has allowed for ease of transaction with trading activities and increase in information availability.

4.4 Market Capitalization

In GSE, market capitalization is equal to a company's shares outstanding multiplied by the current market price of a share. Investors use this figure to determine a company's size, as opposed to sales or total asset figures. Market capitalization could also be used as a proxy for the public opinion of a company's net worth and is a determining factor in some forms of Stock valuation as in the case of the GSE.

Figure 4. Listed companies and market capitalization

Results obtained from the analysis of data for this study show from figure 4 that the introduction of automation in the Ghana Stock Market acted as a catalyst for market capitalization from 2009 to 2011, dipping continuously in the subsequent years. The market capitalization of the Exchange declined by 11% to end the year at GH¢15.94 billion down from GH¢17.90 billion in 2008. The decline in the value of Ghana's market was mainly due to price depreciation. It can be observed that the GSE has been relatively small in the early and late 2000s compared with the world average partly because it has not been in existence for long. However, the introduction of the automated system has consummated on the floors of the exchange from a market capitalization went up by 136.59% from the December 2010 value of GH¢20.12 billion to GH¢47.35 billion. The increase was due mainly to the listing of Tullow Oil Plc and some additional listings.

In terms of primary issues, Tullow Oil Plc was the only IPO to be listed on the Exchange during the period under review. The company sold 3.53million shares at the IPO and raised GH¢109.48 million. This listing brought the number of listed companies to 34.

4.5 Share Price Change

The GSE securities which experience very large intra-day gains and losses swings measured relative to their opening and closing prices for the day.

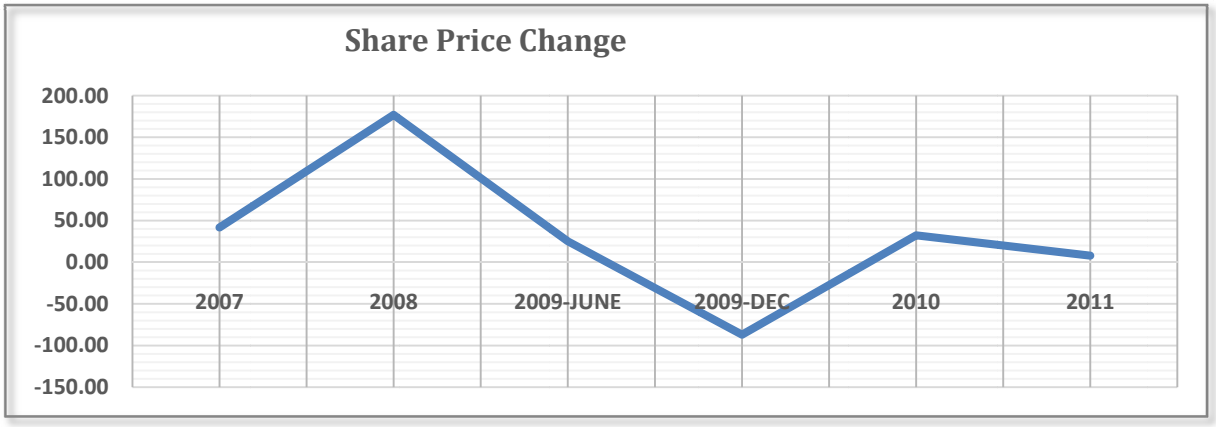

Figure 5. List of companies over share price change

From the figure 5, it is important to consider that a year to date gain of 58.06% on the share price change was achieved by end December 2008. The GSE All- Share index ended the year with 10,431.64 points compared to 6,599 points in 2007. This gain was well above the 24.66% interest equivalent on 91-day Treasury bills. The US dollar in 2008 rose by 24% against the Ghana cedi. Therefore the market outperformed Treasury bills, bank fixed deposits and investment in the US dollar.

It is worth noting that the index gained 65.02% with an all time high of 10,890.80 points in September 2008. The year to date gain of 58.06% in 2008 is also far above the year to date gain of 31.84% of 2007. With a drop of -46.58% in the GSE All-Share index, the Ghana Stock Exchange ended the year 2009 as the least performing market in Africa. In the previous year 2008, the gain in the GSE All-share Index of 58% put Ghana ahead of all the African markets. It is interesting to note that Tunisia led the African markets in 2009 with a return on index of 46.60%. The GSE-CI recorded -3.10% with 969.03 points whiles the GSE-FSI recorded -13.69% with 863.09 points at the end of December 2009. The lone gainer on the market for the year 2009 was Fan Milk Ltd which recorded a gain of 23% on its share price. Twelve companies maintained their share prices while twenty three (23) companies recorded declines in their share prices. The GSE-CI however recorded its highest return of 18.89% (1188.91 points) in June 2010. It is clear that the movement from the floor to the automation did not impact strongly on the market share price change during the period of the study.

4.6 Market Return

For this study, Market return represent the amount of revenue an investment generates over a given period of time as a percentage of the amount of capital invested on the overall theoretical market portfolio which includes all assets and having the portfolio weighted for value.

Figure 6. List of companies over market return

The market started in the GSE 2007-8 with a positive note as the share price index starting from 12.3 million to 24million. The market and price share reached its lowest level of -18.4 million in 2009 December and closed at a 13.7million at the close of the financial year in 2010, then had a fast decline to almost negative in 2011. Local investors remained jittery while seeking clarity on the modalities of capital gain. The behavior of the market return in figure 6 above indicates that the average stock price is not consistent with the GSE price volatility. This simply meant that to determine whether a listed company performed better before or after automation the impact of the market return is not a significant indicator. This also means that the long-term performance of the stock market is insignificant and that these indicators have no relationship with stock return of listed companies on the GSE.

4.7 Risk Free Rate

Risk-free rate is the theoretical rate of return of an investment with no risk of financial loss. One interpretation is that the risk-free rate represents the interest that an investor would expect from an asset that is considered to have absolutely no risk over a given period of time. If GSE expects that the higher the risk free rate of return, the higher the return equity holders will demand to compensate for their increase in risk and vise visa.

Figure 7. List of companies performance verses risk free rate

The figure 7 shows that there is negative investment in risk- free return most of the investors borrowed at the risk free rate and this called for leveraged position in the risky return whiles some of the investment is financed by borrowing and in short risk free return as a performance indicator performed better within the period of before automation. Primary market activities during the year were not as active as that of 2008 and 2009. However, three companies completed an “offer for sale” and listed on the Exchange during the year under review. The Exchange

strongly hold the belief that raising capital and listing on the stock market is a sure way of success for companies operating in Ghana.

In 2008, UT Financial Services, SIC Insurance Co. Ltd and Golden Star resources were listed on the Exchange having successfully completed the offer for sale to the general public. The Bond market however did not record much activity. The value of listed Government of Ghana Bonds on the Exchange amounted to GH¢1,509.60 million while that for corporate bonds was GH¢6.40 million and GH¢35.00 for SCB Medium Term Notes showing a strong risk free exchange both before and after automation.

5. Conclusions

This paper analyzed the model behaviour of stock market variables on the GSE. The study extends previous research on changing trading mechanisms by focusing on the automation of an emerging market. Our findings provide support for the results of Theissen (2002) on the German Stock Market, and Hendershott and Moulton (2011) on the New York Stock Exchange. The introduction of the electronic trading system has increased the tempo of trading activities on the Ghanaian Stock Market. Automation have increased substantially the indices, market turnover, transparency, investor's confidence, foreign investments, liquidity, vibrancy of the market and prompt inter-broker money and stock settlement.

6. Recommendations

This study makes the following recommendations so that the Ghanaian Stock Market can enjoy fully the dividends of automation.

- The Ghana Stock Exchange should accommodate all quoted securities. For now only equities are traded through the GSE: other securities such as government stocks, industrial loans, bonds and preference stocks are yet to be accommodated in the current automation process.
- The transaction cycle should use of a single settlement automation bank as opposed to several settlement banks being used now.
- The trading hours should be extended beyond the present closing time of 5:00 p.m. for the normal government working hours.
- There should be a separation of functions between jobbers and dealers and finally the GSE should float new development stocks for capital projects instead of other forms of borrowing.
- These recommendations should further advance the automation process thereby enhancing performance of listed companies on the Ghanaian Stock Exchange.

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References

Amihud, Y., Mendelson, H., & Lauterbach, B. (1997). Market microstructure and securities values: Evidence from the Tel Aviv Exchange. *Journal of Financial Economics, 45,* 365–390. http://dx.doi.org/10.1016/S0304-405X(97)00021-4

Amihud, Y., Mendelson, H., & Pedersen, L. H. (2005). Liquidity and asset prices. *Foundation and trends in Finance, 1,* 269–360. http://dx.doi.org/10.1561/0500000003

Amihud, Y., & Mendelson, H. (1991). Volatility, Efficiency, and Trading: Evidence from the Japanese Stock Market. *The Journal of Finance, 46*, 1765–1789. http://dx.doi.org/10.1111/j.1540-6261.1991.tb04643.x

Berk, J. B., & DeMarzo, P. M. (2008). *Corporate Financ*e (2nd ed.). Boston: Pearson Education Inc Publishing.

Biais, B., Glosten, L., & Spatt, C. (2005). Market microstructure: A survey of micro foundations, empirical results, and policy implications. *Journal of Financial Markets*, *8*, 217–264. http://dx.doi.org/10.1111/j.1540-6261.1991.tb04643.x

Bowley, G. (2011). Clamping down on rapid trades in stock market. *The New York Times,* P. A1.

Brailsford, T. J., Frino, A., Hodgson, A., & West, A. (1999). Stock market automation and the transmission of information between spot and futures markets. *Journal of Multinational Financial Management, 9*(3–4), 247–264. http://dx.doi.org/10.1016/S1042-444X(99)00011-0

Brockman P., & Chung, D. Y. (2000). Informed and uninformed trading in an electronic, order-driven environment. *Financial Review, 35*, 125–146. http://dx.doi.org/10.1111/j.1540-6288.2000.tb01417.x

Fama, E. F., & French, K. R. (2001). Disappearing dividends: changing firm characteristics or lower propensity to pay. *Journal of Financial Economics*, 3–43. http://dx.doi.org/10.1016/S0304-405X(01)00038-1

Freund, W. C. (1989). Electronic trading and linkages in international equity markets. *Financial Analysts Journal*, *45*, 10–15.

Freund, W. C., & Pagano, M. S. (2002). The stock price-volume linkage on the Toronto Stock Exchange: Before and after automation. *Review of Quantitative Finance and Accounting, 19*, 335–349. http://dx.doi.org/10.1023/A:1021109325128

Hendershott, T., & Moulton, P. C. (2011). Automation, speed, and stock market quality: The NYSE's hybrid. *Journal of Financial Markets*, *14*(4), 568–604. http://dx.doi.org/10.1016/j.finmar.2011.02.003

Hmaied, D. M., Grar, A., & Sioud, B. O. (2006). Dynamics of Market Liquidity of Tunisian Stocks: An Analysis of Market Resiliency. *Electronic Markets*, *16*(2), 140–153. http://dx.doi.org/10.1080/10196780600643977

International Securities Association for Institutional Trade Communication. (2012). *Industry Uncertainty around Future of Financial services*. Retrieved from http://isitc.org/pressroom/index.cfm?id=press_releases

Jain, P. K. (2005). Financial Market Design and the Equity Premium: Electronic versus Floor trading. *The Journal of Finance*, *60*, 2955–2985. http://dx.doi.org/10.1111/j.1540-6261.2005.00822.x

Mailafia, L. (2011). Effect of automation of the trading system on performance of the Nigerian Stock Exchange. *International Journals of Marketing and Technology, 2*(10), 12–24.

Madhavan, A. (2000). Market microstructure: A survey. *Journal of Financial Markets, 3*, 205–258. http://dx.doi.org/10.1016/S1386-4181(00)00007-0

Madhavan, A. (2001). Automated versus Floor Trading: An analysis of execution costs on the Paris and New York Exchanges: Discussion. *The Journal of Finance, 56*, 1485–1488. http://dx.doi.org/10.1111/0022-1082.00376

Malone, T., Yates, J., & Benjamin, R. (1987). Electronic markets and electronic hierarchies: Effects of information technology on market structure and corporate strategies. *Communications of the ACM, 30*(6), 484–497. http://dx.doi.org/10.1145/214762.214766

Mendelson, H., & Tunca, T. (2004). Strategic trading, liquidity and information acquisition. *Review of Financial Studies, 17*, 295–337. http://dx.doi.org/10.1093/rfs/hhg047

Naidu, G. N., & Rozeff, M. S. (1994). Volume, Volatility, liquidity and efficiency on the Singapore Stock Exchange before and after automation. *Pacific-Basin Finance Journal*, *2*, 23–42. http://dx.doi.org/10.1016/0927-538X(94)90027-2

Pagano, M., & Roell, A. (1996). Transparency and liquidity: a comparison of auction and dealer markets. *Journal of Finance, 51*, 579–612. http://dx.doi.org/10.1111/j.1540-6261.1996.tb02695.x

Picot A., Bortenlaenger, C., & Roehrl, H. (1997). The Automation of capital markets. *Journal of Computer-Mediated Communication, 1*(3).

Pirrong, C. (1996). Market liquidity and depth on computerized and open outcry trading systems: A comparison of DTB and LIFFE bund contracts. *Journal of Futures Markets*, *16,* 519–543. http://dx.doi.org/10.1002/(SICI)1096-9934(199608)16:5<519::AID-FUT2>3.0.CO;2-J

Schwartz, R. A., & Steil, B. (2002). Controlling institutional trading costs. *The Journal of Portfolio Management*, *28*(3), 39–49. http://dx.doi.org/10.3905/jpm.2002.319841

Sioud, O. B., & Hmaied, D. M. (2008). The effect of automation on liquidity, volatility, stock returns and efficiency: evidence from the Tunisian stock market. *Review of Middle East Economics and Finance, 1*(20), 141–154.

Theissen, E. (2002). Floor versus Screen Trading: Evidence from the German Stock Market. *Journal of Institutional and Theoretical Economics, 158,* 32–54. http://dx.doi.org/10.1628/0932456022975484

Venkataraman, K. (2001). Automated versus floor trading: An analysis of execution costs on the Paris and New York Exchanges. *The Journal of Finance, 56*(4), 1445–1485. http://dx.doi.org/10.1111/0022-1082.00375

Weber, B. (1999). Screen-Based Trading in Futures Markets: Recent developments and research propositions. Proceedings of the 32nd Hawaii International Conference on System Sciences, *IEEE Computer Society*, *7*, 1–10.

Zhong, W. (2002). Online stock trades rises. *Hong Kong iMail (China)*. Retrieved from http://0search.epnet.com.library.vu.edu.au:80/direct.asp?an=2W81772820145&db=buh