

The Evolution of Stock Markets in the Caribbean: From 1969 and Beyond

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1. *Abstract*

This paper represents the first of three papers which seeks to examine various aspects of stock market development within the Caribbean. The focus of this paper is primarily to discuss the general nature of the regional stock markets. This would involve an in depth analysis of the three main facets of stock markets: (1) market size, (2) market depth and liquidity, and (3) market risk (volatility) and return. While reference will be given to the many stock exchanges in existence within the region, the analysis will be limited to the three major regional stock exchanges: (1) The Barbados Stock Exchange (B.S.E), (2) The Jamaica Stock Exchange (J.S.E), and (3) The Trinidad & Tobago Stock Exchange (T.T.S.E). The progress made in these areas by these markets will then be compared to those attained by following equity markets: (1) the New York Stock Exchange (N.Y.S.E), (2) the London Stock Exchange, (3) the Singapore Stock Exchange (SGX), (4) the Oslo Børs (Norway), (5) the Johannesburg Stock Exchange (South Africa) and (6) the BM&FBOVESPA S.A (Brazil). The three CARICOM markets seem to still be in a state of underdevelopment with many of its indicators still well below those of the more advanced emerging markets such as Singapore.

2. Introduction

The role of a stock exchange has experienced a tremendous metamorphosis from since the days when “courtiers de change” began their trading in eleventh century France. It is no longer a simple marketplace where brokers managed, regulated and traded the debts of agricultural communities on behalf of banks. The stock exchange has become a major hub for stimulating the economic development of nations. Today, billions of dollars exchanges hands involving a multitude of transactions. These include trading in equity stock as well as futures and options contracts for numerous commodities. The New York Stock Exchange has become a symbol for the engine which drives the “Capitalist Machine”: a veritable “Mecca” for individuals in pursuit of the elusive “American Dream.” Its operations and performance are the benchmarks by which most countries’ policymakers try to emulate their market development projects, especially those from emerging markets such as the Caribbean.

The Caribbean has long been of strategic importance to the global superpowers. During colonial times, they provided Western Europe with the resources and finance in order to fund their imperial conquests. Even in today’s global economy, the Caribbean forms part of what is known as the “doorway to Latin America.” Yet today, these island nations are facing the same challenges that plague many developing countries. A major facet of the development dilemma being faced is the strategic planning of their respective capital markets. Currently there are ten stock exchanges and seven bond markets in existence within the Caribbean.¹ While they have made strides in their development progress, the regional equity markets are still considered to be embryonic by most scholars when compared to more developed markets such as the New York Stock Exchange. The markets have not offered investors the required levels of liquidity to make

¹ Existing stock exchanges are a) The Bahamas Stock Exchange, b) The Barbados Stock Exchange, c) Bermuda Stock Exchange, d) Bolsa de Valores de la República Dominicana, e) The Cayman Islands Stock Exchange, f) The Eastern Caribbean Securities Exchange, g) The Guyana Stock Exchange, h) The Haitian Stock Exchange, i) The Jamaican Stock Exchange, j) The Latin American International Financial Exchange and k) The Trinidad and Tobago Stock Exchange. Harripaul (2008) states that there are currently bond markets in the Bahamas, Barbados, Belize, Costa Rica, Dominican Republic, Jamaica, the O.E.C.S., Panama and Trinidad & Tobago.

them attractive. Additionally, there is a pervasive business culture within the Caribbean which views as equity financing as a last resort. On the other hand, the government bond markets in the region are relatively advanced due to the “*the traditionally high financing needs of the public sector and various arrangements which force institutional investors to hold government securities to meet statutory requirements*” [Williams 2005]. However, the corporate bond markets are noted as being not as active as its Asian and Latin American counterparts.

Whenever there is discussion concerning the state of development in Caribbean equity markets, a single CARICOM stock exchange always comes to the forefront. The concept has long been a goal of regional policymakers since the Grand Anse Declaration of 1989. It is seen as a vital component of the regional integration process. There have been steps taken towards its implementation. As of November 2008, there has been USD \$150,000 invested into the Caribbean Exchange Network by the stock exchanges of Barbados, Jamaica and Trinidad & Tobago.² Additionally, the three aforementioned stock exchanges have also taken steps towards regulatory harmonization. However, there are mixed opinions on whether the establishment of the single stock exchange is what is best suited for regional development. What is agreed upon is the impact of capital market development on economic growth, poverty alleviation and income distribution. Among the authors that espouse such a view include King and Levine (1976), Levine (2001) and de la Torre and Schmukler (2007).

3. Literature Review

The focus of this literature review for this paper will be two-fold. Firstly, it will examine the literature available which discusses the role of stock markets in the Economic Development process. Secondly, it will provide a brief synopsis on the literature on the relevant histories of the three major stock exchanges in the Caribbean. Discussion on these related topics is pivotal for the development of a tangible and cohesive plan for sustained capital market development within the Caribbean. This is believed to have specific ramifications for regional economic growth prospects, as there is a segment of the literature which expounds upon the relationship between stock market development and economic growth [See Schumpeter (1911), Goldsmith (1969), Shaw (1973), Levine and Zervos (1998) and Mohtadi and Agarwal (2004)].

²³ See Yarde (2008).

Section 3.1 – Stock Market Development and Economic Growth

The development of strong capital markets has been argued to be a prerequisite for successful economic policy planning. Schumpeter (1911) establishes a relationship between financial and economic development, although causality is not determined. Lewis (1954) and Keynes (1964) explain the critical role that investment (a major contributor to a country's financial development) plays in economic development. King and Levine (1976), Drake (1977) and Gill (1990) also discuss the importance of stock markets to a country's prospects. Gill states that the domestic equity market plays a pivotal role in an economy's development. Samitas (2005) argues that the secondary market is an alternative for the financing of new start-up enterprises. He also argues that there are eight characteristics that it must possess in order to support the economic growth of a country.³ Thomas and Watson (2005) investigate the relationship between stock market development and economic growth in the CARICOM sub region through the use of a VAR/VECM framework. Blackman (2006) discusses the elements that make up an appropriate climate for savings and investment; two key ingredients for capital market development. In their contributions, de La Torre and Schmukler (2007) cite growing empirical evidence in the literature which supports the notion that financial development is a precursor to economic growth and has a positive impact on poverty alleviation and income distribution.

There have been many factors which have impacted upon the development of global financial markets. De La Torre and Schmukler (2007) noted that the establishment of the Eurodollar market had a significant role in the erosion of capital controls that characterized the Bretton Woods system. In fact, they summarized this phenomenon as follows:

“As capital mobility rose in tandem with the growth of the Eurodollar market, the scope for monetary policy autonomy was curtailed. That in turn increasingly limited the developed countries' ability to pursue domestic policy objectives by delinking their domestic business cycle from international developments...”

What resulted from this were the countries opening the borders to foreign investment and increased cross-border capital flows. Indeed, Rajan and Zingales (2003b) noted that the

³ They are (1) efficiency, (2) liquidity, (3) transparency, (4) cost efficiency, (5) market access, (6) orderly markets, (7) innovation and (8) effective use of technology.

abandonment of the gold backing of the dollar effectively brought about the collapse of the Bretton Woods system:

“With the largest economy of the world [the United States] not willing to control capital flows and with substantial activity already taking place across their borders with the Euromarket, countries had little choice but to open to cross-border capital flows.”⁴

The consequences of the demise of the Bretton Woods system were multi-layered. The increased mobility brought about increased pressures on countries to adopt policies of liberalization and deregulation within their domestic financial sectors. This in turn stimulated the growth of securities markets, in particular by paving the way to financial innovation. Merton (1992) coined the term “financial innovation spiral⁵,” which described the rapid pace of financial innovation and how it enabled international securities markets to dynamically transform themselves. The development of new financial instruments and the implementation of structured finance⁶ greatly impacted the fortunes of securities markets. Other factors which contributed to the rapid transformation of capital markets include advances in communications and trading technologies, demand-side factors (such as greater financial individual wealth and buoyant economic prospects), and the emergence of privately managed pension funds as well as a fast-growing mutual funds industry.⁷

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Section 3.2 - The History of Stock Exchanges in the Caribbean

Stock exchanges in the Caribbean have enjoyed a fairly short lifespan when compared to the ‘behemoths’ residing within the developed world (i.e. the New York and London Stock Exchanges). In fact, they have only been conceptualized within the late twentieth century and the first was not established until 1969 when the Jamaican Stock Exchange opened its doors. Trinidad and Tobago soon followed suit in July 1970 when the Government decided as a matter of policy to localize the foreign owned commercial banking and manufacturing sectors of the economy. The thrust of the policy was to get such companies to divest and sell a majority of their

⁴ See Rajan and Zingales (2003b), p. 263.

⁵ Merton used this term to describe how innovative financial products satisfy previously unmet market demand and promote the research of further innovation and new markets.

⁶ This is defined by de la Torre and Schmukler (2007) as a process in which assets are pooled and transferred to a third party, which in turn issues securities backed by this asset pool.

⁷ See de la Torre and Schmukler (2007), p. 29.

shares to nationals.⁸ The last among the three largest exchanges, it operated first as the Securities Exchange of Barbados (SEB). It was established in 1987, under the Securities Exchange Act, Cap 318A, of 1982. On August 2nd 2001, the Barbados Stock Exchange was then re-incorporated simultaneously with the enactment of the Securities Act 2001 -13, which repealed and replaced the original Act of 1982.⁹

Since then, there have been a total of seven additional exchanges which have been established within the Caribbean Basin. These include:

- a) The Bahamas Stock Exchange;
- b) The Bermuda Stock Exchange;
- c) Bolsa de Valores de la República Dominicana;
- d) The Cayman Islands Stock Exchange;
- e) The Eastern Caribbean Securities Exchange;
- f) The Guyana Stock Exchange¹⁰;
- g) The Haitian Stock Exchange.

Only the Eastern Caribbean Securities Exchange comes close to matching the size of the three major regional exchanges in terms of market capitalization.¹¹ Yet, it continues to be overshadowed by the ‘giants’ of the Caribbean: Trinidad and Tobago, Jamaica and Barbados. Now there shall be analysis on the three major stock exchanges in the region, starting with the one that pre-dates them all: Jamaica.

3.1.1 Jamaica

The academic literature on the performances of these markets is scanty at best. Kitchen (1986) and Jackson (1986) provide insight into the performance of the Jamaican Stock Exchange.

Kitchen intimates that the Jamaican stock market is “*a quiet backwater, very much on the fringe*”

⁸ “History of the Trinidad Stock Exchange” on the Trinidad and Tobago Stock Exchange website - <http://www.stockex.co.tt/stockex/about/profile.aspx>

⁹ This can be found on the home page of the Barbados Stock Exchange - <http://www.bse.com.bb/index.html>

¹⁰ Guyana factors into this discussion because of its membership in CARICOM despite its geographical location.

¹¹ Gitman and Joehnk (2004) define market capitalization as the market value of a firm which can be calculated by multiplying the prevailing market price of the stock by the number of shares outstanding. Thus, it is easy to broaden this definition in terms of the stock market itself.

of the financial sector.”¹² He further notes that there was a rapid rise in share prices from 1983 up until the time that the article was written. Additionally, it is further noted that (at the time of writing) the Jamaican Stock Exchange has only just begun to fulfill its role as a capital market and that its performance is comparable to those of the London and New York Stock Exchanges. In fact, Kitchen (1986) states that the real rate of return¹³ offered by the Jamaican Stock Exchange are actually higher than those on offer by London and New York. However, there is a trade-off as Jackson notes that there is a fundamentally higher risk attached to any investment in the Jamaican market.

Further analysis on the Jamaican Stock Exchange can be found in articles written by Jackson (1986), Koot, Miles and Heitmann (1989) and Agbeyegbe (1995). In his article, Jackson writes that the stock market is an integral part of the mobilization of long term capital in Jamaica. In his analysis over the period 1978 – 1986, Jackson illustrates these findings through tables on two key indicators of stock market development:

- 1). the market index; and
- 2). the volume and value of stocks traded.

From its position of 41.59 as at its closing on December 1978, the Jamaican stock market is said to have begun its upward trend (at first gradually) until it eventually reaches its index high¹⁴ of 1491.87 as at December 1986. This represents a staggering increase of 3487.09% over a nine year period! Interestingly, Jackson reports that the volume of stocks traded fluctuates over the same time period. During the period 1978 – 1983, trading tends to be in a cyclical pattern with downturns occurring in 1979, 1981 and 1983 being immediately followed by upswings in years 1980, 1982 and 1984. From 1984, however, the volume of stocks traded continues on its upward trend in 1985 and reaches its high of 50,841,000 during 1986.¹⁵ Consequently, the value of the stocks traded also displays a cyclical pattern throughout the same period. It is interesting to note that the Jamaican Stock Exchange experiences growth during 1984 and 1985, despite the fact that there was a major devaluation of the Jamaican dollar, relatively high inflation and contraction in consumption in many areas of the economy.¹⁶

¹² See Kitchen (1986).

¹³ This is the rate of return after it has been adjusted for inflation.

¹⁴ It should be noted that this was at the time of the article’s writing.

¹⁵ This figure was given by Jackson (1986) to be as at 30th October, 1986.

¹⁶ See Jackson (1986).

Agbeyegbe (1995) seeks to investigate the autocorrelation structure of excess returns on the Jamaican Stock Market Common Index during January 1970 to December 1991. Agbeyegbe postulates that he wishes to continue the tradition of investigation into the behaviour of stock prices on the Jamaican Stock Exchange, by providing evidence on the speculative dynamics of stock returns on the exchange. It is noted that there seems to be mounting evidence in support of the view that stock market returns are predictable. Ultimately, the focus of this paper is to examine the efficiency of the Jamaican Stock Exchange based on the serial correlation of excess returns. It concludes that there seems to be inefficiency in the market as evidenced by a temporary drifting away in prices from the fundamentals. However, the author notes that this may not be the case as a result of the test's low statistical power. Still, stock returns tends to be positively correlated at high frequency, while they are "weakly negatively correlated" over long horizons. Thirdly, it is noted that lagged short-term interest rates are positively correlated with excess returns. Finally, Agbeyegbe (1995) concludes that stock returns are positively correlated for short and long horizons over the period, January 1970 to December 1992.

In their paper, Koot, Miles and Heitmann (1989) estimate the beta coefficient through the use of a standard market model¹⁷ for a sample of 28 firms that are continuously listed on the Jamaican Stock Exchange. As an indicator of market risk, the beta coefficient can then be used to develop a risk classification of individual stocks. Indeed, this is accomplished by comparing individual security performance to the rate of return of a market portfolio. Consequently, these stocks can then be categorised under the following:

- a) Aggressive (Risky);
- b) Neutral (Follows the market);
- c) Defensive (Stable and less risky).¹⁸

Like Agbeyegbe (1995), these authors are interested in determining the level of market efficiency within the Jamaican Stock Exchange. This is accomplished through the use of non-parametric tests for the period from 1969 to 1986. As indicated by Jackson (1986) and Kitchen (1986) previously, and reaffirmed by Koot, Miles and Heitmann (1989), they note a number of

¹⁷ See Jensen (1972).

¹⁸ See Koot et al. (1989).

structural changes that have occurred in the Jamaican market from 1983 - 1984. They argue that these conditions are necessary conditions for the development of an efficient market. These conditions include:

- a) A large number of new investors;
- b) A large increase in trading, both in volume and in value;
- c) A more effective use of information by market agents; and
- d) A tendency for stock prices to more readily reflect important market information.

In testing for the efficient market hypothesis for the Jamaican stock market, the authors make certain assumptions. First, they assume that the market for stocks is cleared continuously and that the market clearing price is dependent upon the stock's expected return. This then reflects both the dividend yields and the capital gains during the time period. Secondly, the price of a stock in any period reflects all available information in the market at that specified time. As such, prices are formed rationally. Consequently, the actual stock price should differ from its expected price by a forecast error; a serially uncorrelated random variable with a mean zero.¹⁹ The implication for the random walk structure found in the efficient market hypothesis is that any best predictor for the future price of a stock is the current market price. It states that there are no trading rules that exists under this hypothesis which allow market agents to earn more than normal economic profits.

According to Koot, Miles and Heitmann (1989), the results of testing for randomness of stock price differences indicate the level of efficiency within the market. They reject the null hypothesis of an efficient market for the entire sample period. In addition, while a rejection of the same null hypothesis occurs for the sub-periods July 1969 to December 1976 and January 1977 to December 1982; they are not able to reject the null hypothesis at any reasonable level of statistical significance for the period January 1983 to December 1986. In addition, the paper concludes that when beta are estimated by regressing Jamaican security returns against returns to the overall Jamaican market, there is a positive relationship between beta and average return. There is also evidence found that suggests the slope coefficient is significant at the 1% level. Finally, betas are estimated by regressing security returns against changes in the Standard &

¹⁹ See Koot et al. (1989).

Poor's 500 (S & P 500)²⁰. A positive relationship is also found here between beta and average return with the slope coefficient being significant at the 5% level. The analysis of the Jamaican stock market in Batchelor et al. (1997) is not as detailed as the previous articles. Instead, they detail the objectives and operational aspects of the market. However, the authors also highlight the evolution of the Jamaican stock exchange from 1986 to 1996. It is noted that the number of listings has not grown significantly but growth in market capitalization is much more pronounced. It is interesting to note that Jamaica was the best performer globally in 1992 with respect to growth in the market index.²¹

3.1.2 *Trinidad and Tobago*

Surprisingly, there have been few articles on the performance of the Trinidad and Tobago Stock Exchange. Bourne (1998) contrasts the economic influences of commercial banks and the stock market in Trinidad and Tobago. He also analyses the performance and potential of the country's stock market. Finally, there is discussion on its size and structural characteristics, price volatility, the risk-return profiles as well as the market's efficiency. Bourne is able to draw the following conclusions:

- a) Stock market development can be regarded as being complementary to the growth and improvement of the formal financial sector, rather than being a substitute for commercial banks;
- b) Stock ownership in Trinidad and Tobago tends to be highly concentrated thereby resulting in a stock market of limited size. This is attributed to a number of demand and supply factors such as:
 - i) Low personal incomes;
 - ii) Relative financial naïveté among the general population;
 - iii) Strong preference towards commercial bank credit which can be sourced relatively cheaply. In addition, many established enterprises are usually guaranteed a ready supply of bank credit because of credit criteria and partly because of interlocking directorates;
 - iv) Great reluctance to dilute family ownership, thereby relinquishing control of their firms. It is believed that the strong preference towards commercial bank

²⁰ Standard & Poor's 500 is a common indicator of market performance for the New York Stock Exchange.

²¹ See Batchelor et al. (1997), 349.

credit among firms and the reluctance to dilute family ownership are inextricably linked. However, there have not been studies on this topic;

v) The desire to minimize public availability of information about company operations, finance and profitability; and

vi) “*The small size and limited investment horizons of many local businesses*”²² in less developed countries.

c) Bourne (1998) does find several weaknesses prevailing within Trinidad and Tobago’s capital markets. It is determined to be narrow and thin based on the criteria of volume of transactions, the number of market participants and the degree of price volatility.

Furthermore, the market is deemed to be inefficient with respect to offering equal prospect of gain to all market participants. However, he notes that his study does not analyze the reasons for the non-random behaviour of stock prices and for the absence of inflation effects on stock prices and rates of return.

O’Brien (1983) also provides insight into the development of the securities market in Trinidad and Tobago. Additionally, he identifies the factors which shape the market’s character and its course of development. Furthermore, Forde et al. (1997) discusses the role that the stock exchange has in the evolution of the country’s financial sector. Fuelled by the government’s divestment programme during that time, it has seen the development of an extremely buoyant market, especially at the time of its inception. Investors are willing to pay high premiums in order to capitalize on opportunities. However, the establishment of the stock market has not resulted in any substantial mobilization of new investment funds. During the period 1982 -1986, the market has raised \$52.6 million in new capital (with two-thirds being raised in its first year of operation). Between the time periods 1986 to 1995, a grand total of four new issues have been made. All of these issues occurred during 1991 – 1995. Forde et al. (1997) also note that the timing of the arrival of the Exchange had the unfortunate providence of coinciding with the onset of the downturn in the economy after the first “Oil Boom.” The strength of the stock market in 1996 is reported to be as a result of the high liquidity being experienced in the financial system. This liquidity forces the depression of interest rates earned on bank deposits, thereby enhancing the stock market’s attractiveness. Recently, Burnett (2008) interviewed Wain Iton of the Trinidad

²² See Drake (1977).

and Tobago Stock Exchange. Iton stated that the Composite Index appreciated between 19 to 20 per cent from January to June 30, 2008. However, it depreciated by 14 per cent for the remainder of the year. He also stated that it has been extremely challenging to inveigle private enterprises to list their company shares on the local stock exchange.

3.1.3 *Barbados*

While its place in the academic literature is sparse, Barbados has not been forgotten by scholars. Craigwell and Murray (1998) analyze the capital structure of firms in Barbados in order to determine the factors which influence the choices that firms make between debt and equity financing. They conclude that the more established firms in Barbados also seem to have a preference towards debt financing over equity. This is in accordance with the pecking order theory postulated by Myers (1984).²³ It is argued that perhaps the stock market has yet to establish itself as a viable method of capital financing. The authors also state that the investment has not risen according to expectations in proportion to the country's Gross Domestic Product. It can be implied that there are hidden factors that are hindering the development of the stock market which need to be addressed. The consensus is that there seems to be a need for modifying the market's structure in order to promote the required confidence for future growth. The authors also affirm James' (1996) view of the Barbados market being inefficient. This inefficiency is argued to have the potential to undermine the financial system, thereby resulting in an increased cost of capital to firms. This can have dire repercussions for the economic prospects of the country. Lower investment levels can then lead to cutbacks in production capacity, higher unemployment, and a decreased incentive for innovation. Ultimately, there could arguably have the nasty effect of "plunging" the country into the pains of an economic recession.

Haynes (1997) provides a little more insight into the operations of the Securities Exchange of Barbados. He reports that, as at the end of 1995, only eighteen companies were listed on the exchange [that figure has since risen to 23] and that the shares are closely held by investors. It is also reported that the volume of transactions has averaged forty seven (47) per month, as compared to fifty three (53) in 1991 (its peak year) and thirty three (33) in 1988 (its full year of operations). Haynes notes that prices dropped dramatically in 1992 but recovered in 1993 after a

²³ See Myers (1984).

decline in interest rates.²⁴ However, in 1995, there is erosion in the capital gains acquired as there seems to be an adjustment for a perceived overvaluation of certain stocks in the market.

4. *Data and Methodology*

This paper represents an analytical framework by which the performances of the three major stock exchanges of the Caribbean i.e. Barbados, Jamaica and Trinidad and Tobago could be evaluated. It seeks to use the available relevant data in order to analyze the trends occurring within the markets. Thereafter, the use of statistical techniques could then be employed in order to develop reasonable predictions of future performance for the various markets. Data for this section will come from the market data available from each of the respective stock exchange's websites and a plethora of statistical databases. The stock price index, market turnover and other market-related data for the various countries were available from the annual statistical digests of the respective countries as well as the websites of their respective stock exchanges. The data will be used in order to provide description into the nature of these capital markets. The variables that will be looked at include the following:

- Market Index figures for Barbados, Jamaica and Trinidad from their inceptions (if possible).
- Volume of shares traded on the aforementioned exchanges.
- Value of shares traded.
- The number of listings each (CARICOM) exchange has.

The aforementioned three statistics from these markets will then be compared with the New York Stock Exchange, the London Stock Exchange, Singapore, Brazil, the Johannesburg and Norway Stock Exchanges. These comparisons will span the period from 1990 – June 30, 2009. The first two represent the “pinnacles” of stock market development: the benchmarks by which all markets are judged. The remaining three exchanges can be used to represent emerging stock markets from each of the continents. First, the data to be gathered will then be used to develop graphical interpretations of trends occurring within the aforementioned markets. These are to include line graphs and bar charts which will accurately detail their natural progressions. Additionally, attention will also be paid to the regulatory frameworks each country possesses.

²⁴ Haynes (1997) refers to 1992 as the year of stabilization and high interest rates.

The purpose of this will be to determine the steps taken by regulators in order to stimulate market development. Analyses of these two disparate phenomena will effectively illustrate the depth of CARICOM capital markets. The end result of this analysis should be insight into the stage of capital market development attained by countries within the CARICOM region.

It shall follow the methodologies by Jackson (1986), Kitchen (1986) and Sergeant (1995) as this essay can be partly seen as an update of the work done by these papers. Additionally, in order to determine the levels of stock market development for each exchange, the four following market indicators will be employed as prescribed by Yartey and Adjasi (2007).²⁵ These include: (1) the number of companies listed on the exchange; (2) market capitalization as a percentage of Gross Domestic Product; (3) value of shares traded as a percentage of Gross Domestic Product and (4) the turnover rate.²⁶ The number of listed companies and the turnover rates for each company are well-known measures of stock market size and growth. These measures can be argued to be representative of management's success in achieving their various administrative and operational objectives. The value of shares traded as a percentage of the Gross Domestic Product can be seen as a measure of the population's propensity to invest in equity stocks. Additionally, one can argue that it can give an insight into (1) the risk tolerance profile of a country's investors and (2) the level of financial sophistication of the country's population. It should be noted that this paper will not investigate the efficiencies of the various stock markets as it was performed by the three aforementioned papers. Its main focus shall be on determining the indicators of development and its returns.

In order to develop a return profile for the respective exchanges, the holding period return (HPR) will be calculated from the data collected for the three major regional indices as well as the selected benchmark stock markets. This paper will determine the HPR using a similar methodology employed by Sergeant (1995) and Hallerbach (2003). Hallerbach (2003) combines the "discretely compounded price return" (capital appreciation or "price relative") and the "discretely compounded dividend yield" to estimate the "discretely compounded total return"

²⁵ These were used to evaluate the stages of development attained by a number of stock markets on the African continent.

²⁶ This refers to the value of shares traded in a year as a percentage of the average market capitalization of each stock exchange.

(“value relative”).²⁷ The capital appreciation p_t as well as the dividend yield y_t over the period t are defined by (1) and (2) respectively:

$$(1) \quad 1 + p_t = \frac{PI_t}{PI_{t-1}};$$

where PI_t and PI_{t-1} represent the price index at the end of period t and $t - 1$, respectively.

$$(2) \quad y_t = \frac{D_t}{PI_{t-1}};$$

where D_t is the cash dividend paid at the end of period t . The combination of the two equations results in the total return as denoted by:

$$(3) \quad 1 + r_t = 1 + p_t + y_t = (1 + p_t)(1 + d_t)$$

where d_t denotes the dividend ratio:

$$(4) \quad d_t = \frac{y_t}{1 + p_t} = y_t \frac{PI_{t-1}}{PI_t} = \frac{D_t}{PI_t};$$

As prescribed by the International Financial Corporation’s Emerging Stock Market Factbook, Sergeant’s (1995) methodology involves the calculation of all the dividend yields on the exchange’s ordinary stocks during a year, and dividing by the sum of the prices of the aforementioned stocks at the start of the year. Ideally, this paper would have included the dividend yield aspect of the HPR as denoted in both Sergeant (1995) and Hallerbach (2003). However, due to time and financial constraints, focus will be placed on the capital appreciation aspect of the methodology. Even in its abridged version, the HPR still represents an important aspect for the regional stock market development as investors would be able to compare the rates of return for each market. This allows investors to weigh their options and come to an informed decision when they are determining the investment portfolio strategies and allocations. It becomes decidedly more useful when it is combined with fundamental and technical investment analysis techniques.

²⁷ See Hallerbach (2003).

In this paper, two additional indicators of market return were calculated for the three CARICOM equity markets: The Compound Annualized Growth Rate (CAGR) as well as the Sharpe Ratio. The CAGR and the Sharpe Ratio add some dimensions into the analyses and evaluations of the various stock market performances in order to gain a more holistic perspective. The calculation of the CAGR was accomplished by first calculating the annual stock market returns as noted earlier. Then hypothetical starting market portfolios of \$100 were used for each of the markets. Year-end market portfolios were calculated by multiplying the annual return with the previous year's figure. Once the figures as at June 30, 2009 are calculated, the following formula will be used to calculate the CAGRs:

$$\text{CAGR}^{28} = (\text{Ending amount of asset} / \text{Beginning amount})^{(1 / \# \text{ of years})} - 1$$

The Sharpe Ratio, as developed by Sharpe (1966), is also known as the reward-to-variability ratio. It has been used by fund managers to determine the excess return of an investment portfolio. It is defined as “a measure of the excess return (or Risk Premium) per unit of risk in an investment asset or a trading strategy.” It is calculated by subtracting a predetermined risk-free indicator rate from the rate of return of the chosen asset or (in this case) stock index. This remainder is then divided by the standard deviation of the aforementioned asset's returns. It can be denoted by the following formula:

$$\text{Sharpe Ratio} = \frac{(\text{Asset's rate of return} - \text{Risk-free return rate})}{\text{Standard deviation of asset's rate of return}}$$

Theoretical discussions offer two versions of this measure: the *ex post* and the *ex ante*. Sharpe notes that the *ex ante* Sharpe Ratio takes into account both the expected differential return and the associated risk, while the *ex post* version takes into account both the average differential return and the associated variability. He further notes that neither ratio incorporates information about the correlation of a fund or strategy with other assets, liabilities, or previous realizations of its own return. As such, he states that the ratio may need to be supplemented in certain applications.

²⁸ This was obtained on the Experiments in Finance website: <http://www.experiglot.com/2006/01/28/compound-annual-growth-rate-cagr/>

With financial systems already deep in the throes of globalization and the inherent push within the globalization process towards integration, today's investors have a myriad of investment options (both local and abroad) available to them. In real-world practice, fund managers usually see a Sharpe ratio of 0.75 and higher as an indicator of a well-functioning investment portfolio. Additionally, they also tend to use the 90-day U.S. Treasury bill as its risk-free indicator rate for their Sharpe ratio calculations. Thus, it makes sense to mirror real world practice for any calculations made for the study with respect to the Sharpe ratios of the three CARICOM equity markets. The use of the U.S. Treasury 90-day bond rate should suffice as a universal benchmark rate for two main reasons. Firstly, there is no singular CARICOM Treasury bond market with each country's offering carries its own unique rate schedule. This will lead to difficulty in performing comparisons across markets. Furthermore, the use of bank savings deposit rates as the risk-free indicator rate is also fraught with the same difficulties mentioned earlier as the rates also tend to vary from country to country within the region. Secondly, the Treasury bond data for each of the CARICOM country are available only for a specified time frame and pre-1990 data is difficult to obtain. However, more extensive data for the 90-day U.S. Treasury bond is readily available online. Consequentially, it is for these reasons that this study has chosen it as its risk-free indicator rate.

5. *Empirical Analysis*

The empirical data for the three markets suggest that not much has changed with the regional markets since Jackson (1986), Kitchen (1986) and Sergeant (1995). They still suffer from a number of deficiencies such as a lack of market depth and liquidity as evidenced by the dearth of company listings and relatively low market turnover ratios. This paper will now look at these areas to analyze the level of stock market development in the Caribbean. This will start by looking at one of the most fundamental areas of development: the number of company listings on the stock exchange.

5.1 *Market Size*

Number of company listings

As can be seen in Table 1 in the Appendix, the administrations for the three exchanges have not been able to attract a significant number of companies to list their shares on their respective

securities markets. The Jamaica Stock Exchange has only just begun to inch closer to its high of fifty one company listings in 1995. The mean number of listings on the JSE was calculated to be 43 with a standard deviation of 5. Indeed, despite achieving an absolute increase (of eleven) in its listings throughout its lifespan, the JSE has seen many more de-listings than company listings. Within the last decade (2000 – June 2009), the number of listings has fluctuated as the exchange experienced declines from the previous year's totals in 2000, 2001, 2002, and 2004. It experienced increases in 2003, 2005, 2006, and 2008. The net effect of these fluctuations is that the JSE has had the same number of listings since the end of 1999 (i.e. 45).

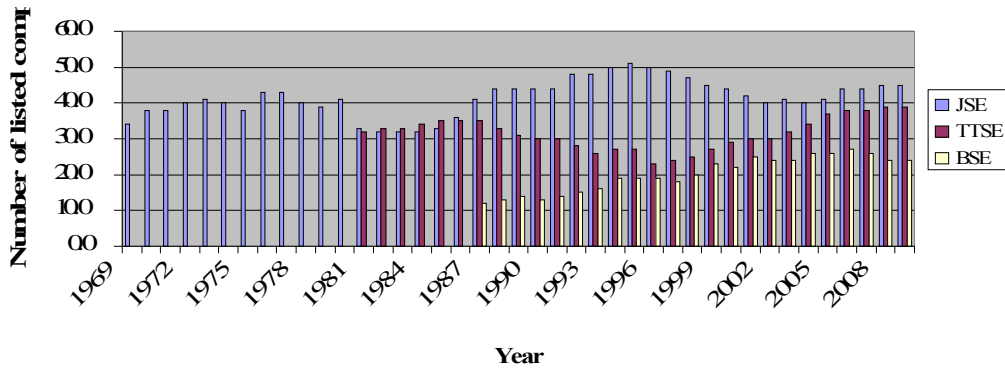
The Barbados and Trinidad and Tobago Stock Exchanges have not fared any better when “put under the microscope.” Each of the two aforementioned markets has seen their respective totals climb throughout their respective lifetimes. From 1987, the BSE has seen its listings increase from a paltry twelve (12) to a more respectable twenty four (24) as at June 30, 2009, while the TTSE has had its ranks raise from thirty two (32) (in 1981) to thirty nine (39) as at June 2009. It is noted that the average number of companies listed on the BSE is twenty one (21) with a standard deviation of five (5), as compared to the TTSE's thirty one (31) and five (5) respectively. The BSE achieved its maximum number of listings most recently with twenty seven (27) listings in 2006, while the TTSE has managed to maintain its maximum as of the time of writing this paper. It achieved the thirty nine (39) listings mark during the previous year. If one was to analyze the aforementioned 2000 – 2009 period, one would note that the BSE began with twenty (23) listings while the TTSE had twenty seven (27). The BSE then experienced declines in 2000, 2002, 2007, and 2008, while increases occurred in 2001, 2004, and 2007. Within the last decade, the TTSE has yet to experience any declines,²⁹ while its number of listings increased in 2000, 2001, 2003, 2004, 2005, 2006 and 2008.

Although significant strides have been made during the last decade, it should be noted that the TTSE and the BSE have only had net increases of seven and eight since their respective inceptions. What is also troubling is the fact that both equity markets seem to be having difficulty in surpassing their high limit markers. This is evident as the TTSE has yet to surpass

²⁹ It must be noted that there is presently an application by the TTSE to delist two companies: Valpark Shopping Plaza Limited and Furness (Trinidad) Limited. This application has been ratified by the Trinidad and Tobago Securities and Exchange Commission. Delisting is set to take effect on October 4, 2009. See <http://www.ttsec.org.tt/publications/pub090528.pdf>

forty company listings in its lifetime while the BSE has not surpassed the thirty company mark. Even the JSE has had difficulty in this regard as it has only surpassed the fifty company listings mark three times in its forty years of its existence. Figure 1 illustrates the graphical progression in the number of companies listed for the three regional exchanges.

Figure 1: Number of Companies Listed on JSE, TTSE and BSE



Clearly, there is still work to be done in attracting firms onto the various regional stock exchanges. This becomes clearly evident when comparisons were done with traditional benchmarks from developed markets (such as the New York and the London Stock Exchanges) and those from emerging equity markets (such as Singapore, Brazil, Norway and South Africa). The three regional markets are woefully undersized in comparison. One only needs to compare the group total of the three CARICOM markets with that of the six aforementioned in order to get a glimpse of the existing stagnation within the CARICOM markets. In 1990, the total number of listed companies within the major CARICOM exchanges was 87 as compared to 5,974 companies on the six aforementioned exchanges. The 1990 ratio is comparatively better than the 108 to 7,936 ratio in 2008 as well as the 108 to 7876 achieved in June 30, 2009. However, these are unflattering statistics given the push towards regional economic development and the stock market’s perceived major role within the process. Even the exclusion of the NYSE and the LSE does not significantly improve the outlook for the regional markets. As at June 30, 2009, the collective total of listed companies for the Singapore, Brazil, Norway and South Africa

equity markets still dwarfed the CARICOM giants in terms of company listings by a ratio of 17:1! Table 2 in the Appendix illustrates the comparisons of the three CARICOM equity markets with those of the selected benchmark markets.

One of the obstacles to attracting firms to list could be the minimum listing requirements for each exchange as well as all of its associated costs. For example, there are four requirements stated in a “Going Public” Prospectus produced by the JSE.³⁰ They include:

- (1) Total issued share and loan capital of the company should be \$200,000 or more with the share capital portion being not less than \$100,000.
- (2) Ordinary Shares/Stock
 - The issued nominal value should be \$100,000 or more
 - There should be a minimum of 100 share/stockholders holding in their own right not less than 20% of the issued ordinary capital [this percentage being not less than \$50,000 nominal value excluding the holding(s) of one or more controlling share/stockholder (s)].

Or there are arrangements then in place, which Council approves in writing as likely to result in such minimum holding (as to number of holders and their total holdings) being achieved by the end of business on the first day the securities are listed.

- (3) Irredeemable Preference Shares and/or Preference Shares convertible into Ordinary Shares/Stock
 - The issued nominal value should be no less than \$ 100,000. If the application is for a combination of both classes of securities, provided no one class is of an issued nominal value of less than \$50,000, the total issued nominal values may be aggregated in meeting the minimum requirements of \$100,000 of issued share capital.
- (4) Redeemable Preference Shares and/or Debenture Stock
 - The issued nominal value should be no less than \$ 100,000. If the application is for a combination of both classes of securities, provided one class is of an issued nominal value of \$50,000 or more, the total issued nominal values may be aggregated in meeting the minimum requirements of \$100,000 of issued share capital.

³⁰ http://www.jse.com.jm/website/download_pdf2.php?filename=../website/pdf/gopub.pdf

Depending on the value of the issued share capital, the initial listing fee ranges from a minimum of JCA \$50,000 to \$1,000,000. Additionally, the aforementioned fees become due annually as the cost of membership. This excludes the costs of broker/dealer selection, associated legal and accountancy fees, printing fees, etc incurred prior to listing. The market access fee for the issuance of any security (debt, equity, etc) on the TTSE is equal to 0.01% of the value of the issue. There is also an annual fee for reporting issuers of \$5,000 as well as a \$30,000 annual fee for enrollment into the Trinidad and Tobago Central Depository. Listed companies are also required to pay 0.02% of the aggregate dollar value of transactions occurring on the Exchange in the immediate previous financial year.³¹ On top of the aforementioned expenses, there are also those expenses which are associated with the adherence to the exchanges' reporting standard regulations. These can all prove to be formidable deterrents to a company, especially the medium-sized ones, that is seeking new capital for expansion projects. The managements of these companies tend to believe that it is cheaper and less harassing to acquire debt financing for their projects through their bankers. Table 3 in the Appendix highlights an example of the estimated costs that a company would face when seeking to raise \$500 million in a common equity initial public offering in Trinidad.

Volume of shares traded

While the three major CARICOM equity markets have grossly underperformed, there have been areas of vast improvement from which solace can be taken. The volume of shares traded is one such area. Indeed, the volume traded in Jamaica has risen exponentially from 7,450,000 in 1969 to 820,101,700 as at June 30, 2009. This represents an increase of 10,908 percent over a forty year period! The annual average percentage change throughout the lifetime of the JSE was 54.4 percent, which can be argued to be indicative of the growth attained by the Jamaican equity market. The last decade (from 2000 – 2009) was a period of instability with the JSE experiencing fluctuating volumes of trading activity. Yet, its equity market still managed an 18 percent increase from its 2000 total, despite the onset of the global financial crisis and its resulting economic pitfalls. Similarly, the TTSE has seen its volume increase from its initial 16,100,000

³¹ See Fee Schedule as outlined in the Securities Industry (Amendment) By-Laws on the Trinidad and Tobago Securities Commission website.

(in 1980) to a high of 436,467,500 in 2003. Since then, the TTSE's volumes have been steadily declining. Its half year volume traded for 2009 was calculated to be 35,981,000; a precipitous decline of almost 92 percent from its all time high. Overall, the TTSE expanded its trading volume by 123 percent since its inception. The annual average percentage change in share volume traded was calculated to be 21.2 percent, which may indicate that the TTSE is less volatile than its Jamaican counterpart.

The Barbados equity market has seen its trading volumes fluctuate wildly since its inception. Since its initial trading volume of 1,536,900 in 1987, it has been marked by intermittent periods of growth and decline. In 2002, the BSE experienced massive trading volumes which culminated with its year-end total reaching 514,495,800 shares. The exchange's trading activity in 2009 (2,918,458) is relatively muted when compared to the relatively heavy volumes experienced in 2007 (154,894,700) and 2008 (71,832,300). These two latter years were marked by a number of companies being the targets of takeovers, which may explain the elevated volumes. Additionally, the drastic drop-off in trading volume for the half-year in 2009 may be the result of investors becoming risk-averse in their investment portfolios due to the pervasive global recession. Overall, the region has recorded total trading activity of 41,897,725,300 shares. As Table 4 in the Appendix starkly evidences, there is a vast disparity among the three regional equity markets in terms of the lifetime average trading volumes, with Jamaica experiencing a fairly heavy trading volume while the other two being miniscule in comparison. The sum totals of the annual averages for the TTSE and the BSE represent a mere 16.9 percent of the annual average for the JSE!

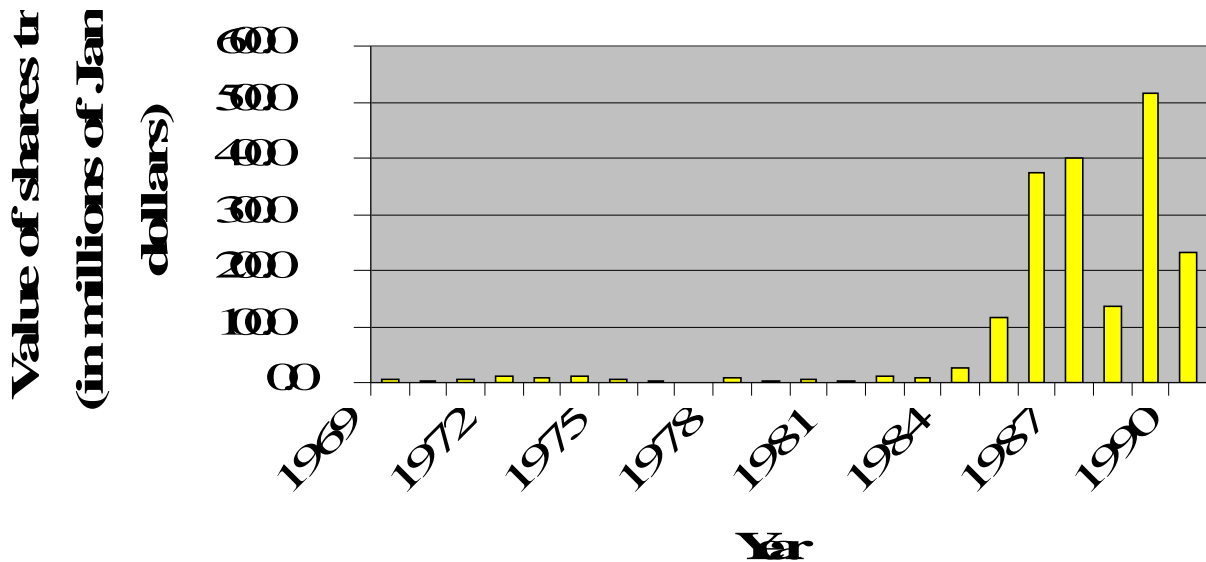
Value of shares traded

The three regional stock exchanges have also seen improvements in their respective values of shares traded since their inceptions. The JSE has recorded a significant rise in its trading value, up from JAD \$6.5 million attained in 1969 to JAD \$3,422.6 million in 2009.³² Additionally, the JSE has had an average annual percentage in its value of shares traded of 71.3 percent over its forty years of operations. The JSE's value of trading activity has been steadily climbing since 1991 when it surpassed the JAD \$1,000 million mark for the first time in its history. However,

³² As at June 30.2009

prior to 1991, the value of shares traded was miniscule, averaging a mere JAD \$86.3 million over the period 1969 to 1990. Indeed, trading did not surpass the JAD \$100 million mark until 1985. The period from 1986 to 1990 is highlighted by two interesting characteristics: greater volumes accompanied with a semblance of volatility. A look at Figure 2.1a below illustrates the sparsity of trading occurring during the aforementioned period.

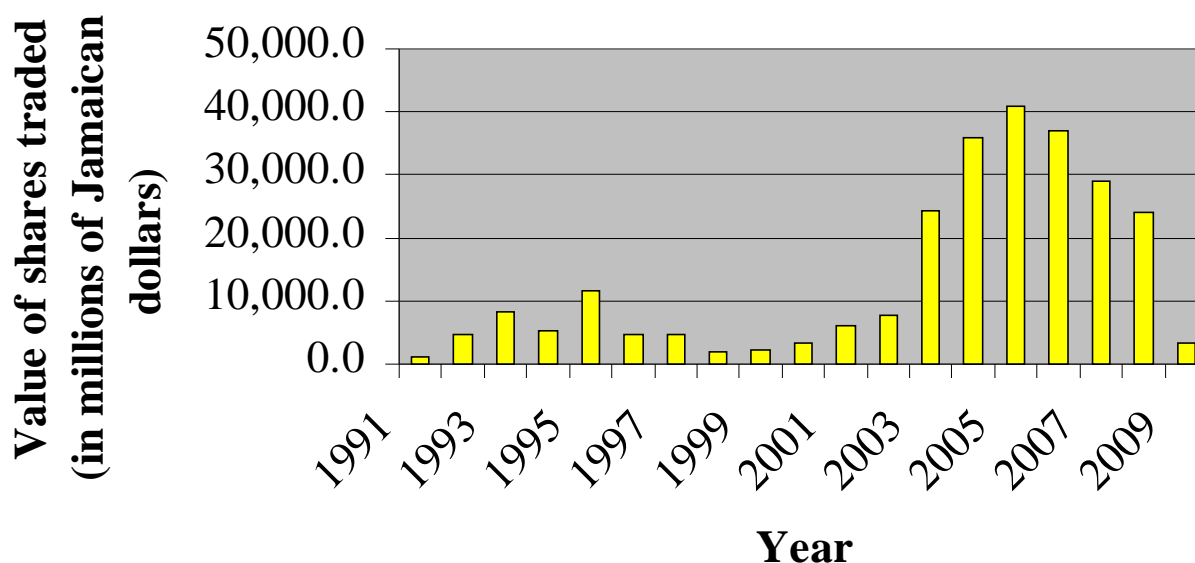
Figure 2.1a: Value of shares traded on the JSE (1969 – 1990)



Source: The Jamaican Stock Exchange website and its annual reports

Since then, the exchange has averaged JAD \$13,473.4 million in trading which represents a massive turnaround in fortunes from its earlier years. However, the equity market still suffered from instability. Figure 2.1b below shows the progression of the Jamaican Stock Exchange’s values of shares traded from 1991 to June 30, 2009. From 1991 – 1997, the JSE experienced fluctuating volumes with a similar pattern occurring from 2001 to 2009. As one can glean from the figure below, there is a span of relative inactivity (1998 – 2000) where trading volumes were posting modest gains. It was from 2001 that the JSE began a mini “bull run” (2001 – 2005). At the height of its “bull run,” the JSE achieved its all-time high in 2005 with a trading value of JAD \$40,746.7 million in shares changing hands. However, the JSE has since been experiencing steady declines in its share trading values, which commenced in 2006 and has culminated in a sharp drop-off for the first half-year in 2009.

Figure 2.1b: Value of shares traded on the JSE (1991 – 2009) (in millions of local currency)

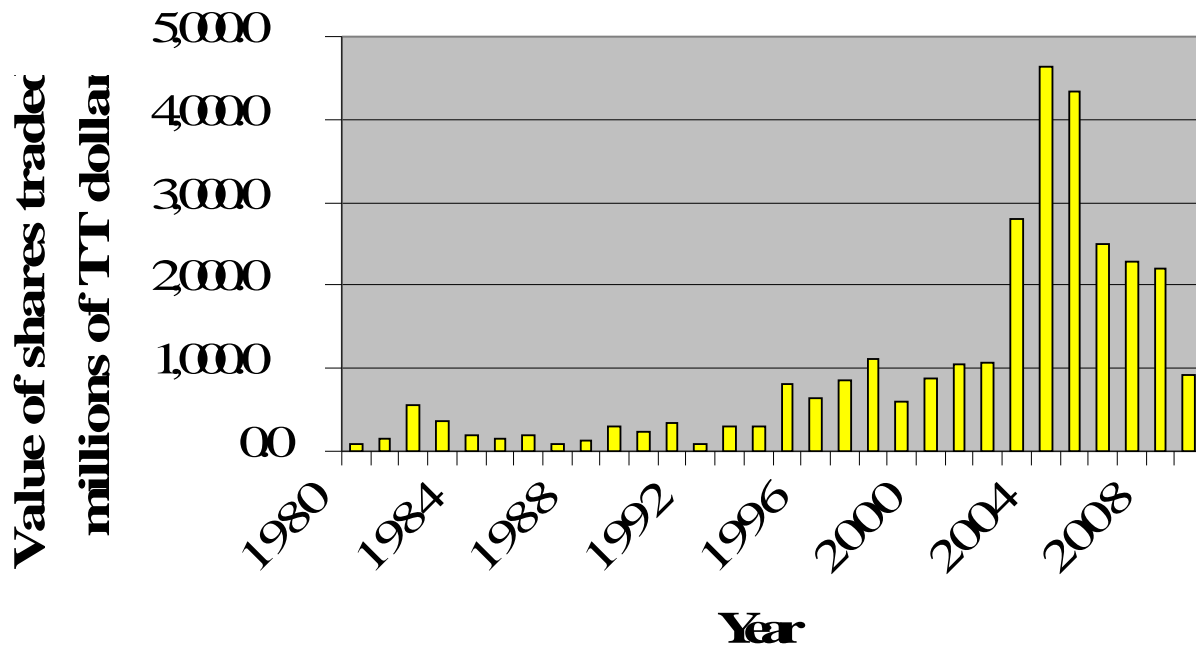


Source: The Jamaican Stock Exchange website and its annual reports

The TTSE also has recorded significant gains in its share value traded, up from TTD \$87.5 million in 1980 to TTD \$922.4 million in 2009. This represented an increase of TTD \$834.9 million over its twenty nine year existence. Pre-2001, the trading value was relatively muted, which may have been characteristic of an exchange still in its “infancy.” Its citizenry may also have been either unaware of this investment option or hesitant to invest their savings into the stock market due to a perceived higher risk of financial loss. Consequently, the value of shares traded did not cross the TTD \$1 billion mark until 1999. Indeed, the 1980 – 1999 period saw the TTSE with an average value traded of TTD \$372.25 million. From 2001 – 2004, the TTSE experienced a mini-period of growth which culminated in its all-time high of TTD \$4,628 million in shares being traded. However, the market has experienced a steady decline similar to that of the JSE. If one was to assume the same assumptions made earlier (in this paragraph) for the JSE in estimating the TTSE’s 2009 value of shares traded, there would not be as sharp a decline in share value traded for the TTSE (an estimated TTD \$1,800 million as opposed to TTD \$2,209.7 million). The TTSE experienced an average annual percentage change of 29.2 percent, much lower than its regional counterparts. Figure 2.2 represents the value of shares traded from

its inception in 1980 to June 30, 2009. What is interesting to note in Figures 2.1 and 2.2 is that the JSE and the TTSE seem to follow a similar progression pattern, especially from the latter 1990's to today.

Figure 2.2: Value of shares traded on the TTSE (in millions of local currency)

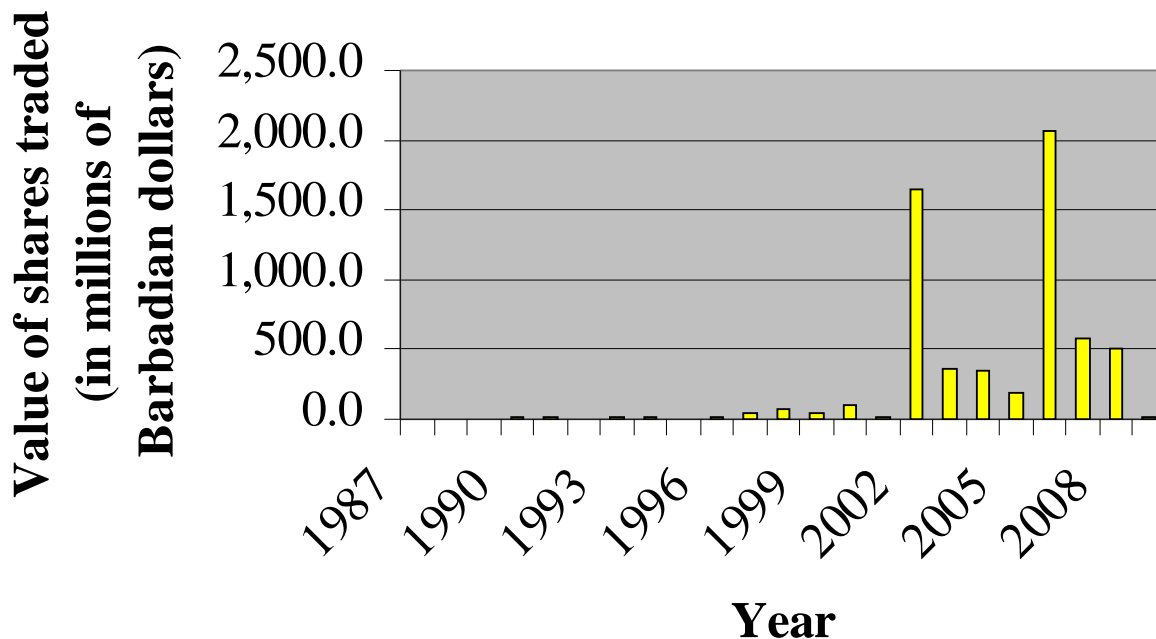


Source: The Trinidad and Tobago Stock Exchange website and its annual reports

The BSE unfortunately has not enjoyed the types of gains which its two regional counterparts have had. Indeed, a comparison between its initial and its latest trading values would denote an increase of a mere BBD \$8.1 million. That is not to say that trading activities have been miniscule throughout its operational tenure. From 2002 to 2008, the values of shares traded have recorded amounts ranging from BBD \$183.9 million (2005) to BBD \$2,072.9 million (2006). The amount attained in 2006 represents the all-time high achieved by the BSE and its lifetime average value of shares traded was calculated to be BBD \$270.5 million. The BSE has experienced an average annual percent change of 417.6 percent, which may be indicative of a highly volatile equity market. This volatility may have resulted from the high incidence of company takeovers over the last five years. Overall, the three regional stock exchanges have recorded total lifetime values of shares traded of JAD \$257,894.2 million, TTD \$30,029.1

million and BBD \$6,086 million respectively. Figure 2.3 represents the values of share trading for the Barbados Stock Exchange from 1987 to June 30, 2009.

Figure 2.3: Value of shares traded on the BSE (in millions of local currency)



Source: The Barbados Stock Exchange website and its annual reports.

Table 5 in the Appendix below depicts the comparison of share trading values among the nine markets analyzed earlier in this paper. It shows trading on the three Caribbean stock markets³³ as being woefully miniscule when compared with the selected benchmark markets. They collectively represent a mere fraction of the benchmark markets’ total trading values. This is reflective of markets which still have a long road in front of them if they wish to reach developed country economic status. Case in point, the BSE’s total trading is a mere 0.15 percent of Singapore’s: the lowest of the chosen benchmark markets and among the more developed emerging equity markets globally. Likewise, the totals of three exchanges are made to look very miniscule when they are compared to each of the selected benchmarks, and even more so when compared with the New York Stock Exchange.

³³ For an overview of the regional stock exchanges’ trading activities (volumes and values), one can view Table 6 in the Appendix.

Market Capitalization: Growth and Ratio

Market Capitalization and its two related measures (growth and ratio) can provide specific insight into the performance of a stock market. A look at Figure 3 below can be interpreted to denote some degree of volatility in the rates of percentage changes in the CARICOM stock markets' capitalizations.³⁴ The markets seem to mirror each other in the directions of their fluctuations, except during 1999 – 2000, when the BSE was the only market among the three major regional exchanges to experience contractions in its capitalization. The other two markets simply had a slowdown in its growth rate. This could possibly be partly explained by the number of listings and de-listings that have occurred as it would have directly impacted the exchange's capitalization. Another possible explanation could be the economic fortunes of the listed companies and those of its home base and its export markets. As these fluctuated over time, so did the market prices for the listed securities.

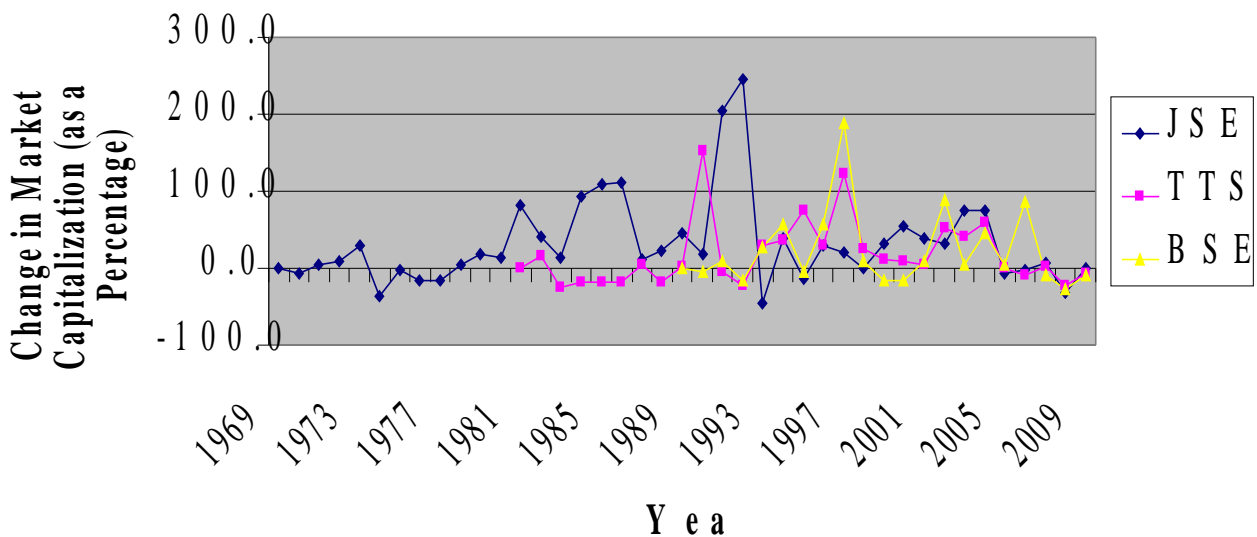
This may be especially true for Jamaica, an economy which has suffered from socio-economic instability and currency devaluations, the latter being a constant news-maker since 1991. The TTSE can be argued to be a “victim of poor timing” as its nascent years was subjected to a number of turbulent events, which would have significantly impacted upon its operations. Firstly, its formation immediately followed the fallout from the post-oil boom recession in the 1980s. This was immediately followed by the strict fiscal discipline of the N.A.R.³⁵ political regime from 1986 – 1990, when the government placed a wage freeze on public servants and implemented the much maligned Value Added Tax system. All of these events combined would have severely restricted the population's ability to save, far less for propagating any desire to invest in the fledgling equity market. This would have been compounded even further when the N.A.R. government became the target of an ill-fated coup by the Jamaat al-Muslimeen in 1990. One would imagine that the political instability experienced during that time would have severely hampered the growth prospects of Trinidad's stock market. Yet, the TTSE ironically experienced an increase of nearly 152 percent in its 1990 end-of-year market capitalization, contradicting some of the views held in the literature [such as Erb et al. (1996)] that a high level of political risk would negatively impact a market's development.

³⁴ Table 7 denotes the annual market capitalisation figures for the JSE, TTSE, and the BSE from their respective inceptions, beginning with the JSE in 1969. As noted earlier, the BSE's figures for 1987 and 1988 were unavailable.

³⁵ This stands for the National Alliance for Reconstruction, which gained political power following its defeat of the ruling People's National Movement in the 1986 General Election.

The BSE's volatility may stem from its economy's dependence on the tourism industry, its main revenue earner. The fortunes of a tourism-based economy tend to fluctuate with those of the developed countries and its CARICOM neighbours, from which many of its citizens represent a major percentage of their tourist arrivals. When their respective economies experience downturns, many of the BSE's listed companies would be adversely affected in its sales revenues and profit margins as a result of cut-backs in tourist spending. This is also true for the small businesses. This has the net effect of reducing disposable incomes in many Barbadian households, thereby effectively reducing their propensities to invest and their interests in investing through the stock market. Recently, all three economies were severely affected by the global financial meltdown which emanated from the U.S. sub-prime mortgage market. Each market recorded declines around the time of the meltdown's onset in 2008. Currently, the TTSE and the BSE posted smaller declines in its capitalizations, while the JSE posted less than a percentage point increase for the half year in 2009.

Figure 3 – Percentage Changes in Market Capitalizations of the three regional stock exchanges³⁶



Source: Author's calculations based on data derived from the Stock Exchanges' websites.

³⁶ The period in question is from 1969 to June 30, 2009.

The MCR represents an important analytical tool in the evaluation of a stock market's development as it shows the relative significance of the respective stock exchanges to their national economies [see Demirgüç-Kunt and Levine (1995), Sergeant and Stephen (2006) and Yartey (2008)]. Sergeant and Stephen (2006) note that if a stock exchange accounts for all of the domestic production, then the MCR would have a theoretical value of 100 percent, a value to which a securities exchange aspires to achieve. Non-domestic production is said to account for MCRs which are in excess of the benchmark, while unaccounted domestic production will result in MCRs lower than 100 percent. The three CARICOM giants have had a lifetime average MCR of around 50 percent, well below the theoretical 100 percent benchmark noted above. In particular, the JSE and the TTSE have underperformed with average MCRs of 36 and 38 percent respectively. This is particularly troubling for the TTSE, which resides in arguably one of the stronger economies within the CARICOM region. A possible explanation for the TTSE's low ratio could be the fact that there are no company listings from its economy's main revenue stream, i.e. the energy sector. Much of the island's drilling and exploration revenue streams are siphoned off by large multinational companies, which then expatriate the majority of its profits to its home country with arguably little trickle-down effect to the local public. Unlike its two contemporaries, the BSE has creditably maintained an average MCR of 90.6 percent, just slightly short of the benchmark. Indeed, the regional exchanges have seen recent improvements in their MCRs. The JSE achieved its all-time high MCR of 165.9 in 2004, while the TTSE and the BSE achieved theirs in 2004 and 2006 respectively with MCRs of 129.8 and 321.5. The global financial crisis has had a significant impact on these figures with the JSE's MCR declining from 102.95 in 2007 to 57.16 in 2008, and the TTSE's from 71.8 to 49.14. During the same timeframe, the BSE had its MCR decline from 276.6 to 185.4.

The MCRs of the CARICOM giants outperformed with those of the Brazil and Norwegian markets, attaining better ratios throughout the comparative time span, as evidenced in Table 8 in the Appendix. They were, however, outperformed by the Singapore and the Johannesburg Stock Exchanges. Interestingly, the three regional exchanges' ratios compare favourably with those from the NYSE and the LSE. In particular, the BSE has had higher MCRs than those of the two traditional behemoths since 2002. The JSE and the TTSE's ratios lagged slightly behind those of the NYSE and the LSE, but the disparity was not overwhelming.

5.2 Market Depth and Liquidity

Market Turnover Ratio

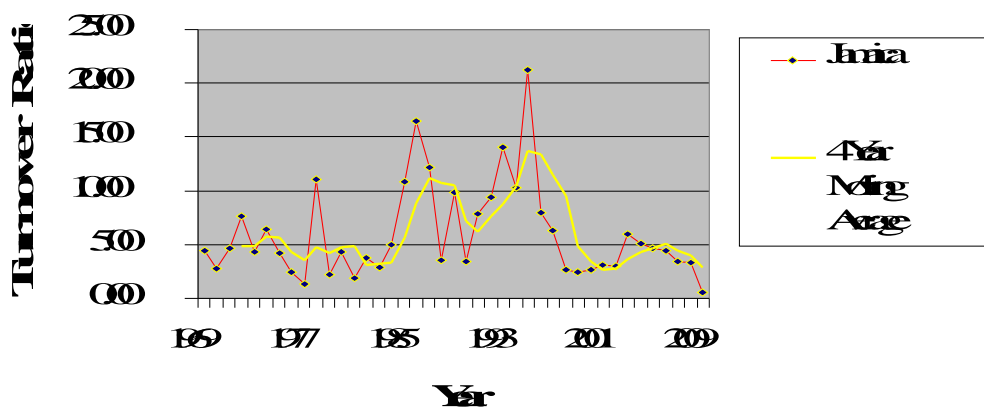
A statistic which is used to evaluate the state of development within a country's equity market is the market turnover ratio. According to the IMF's Compilation Guide on Financial Soundness Indicators (2004), the turnover ratio represents "*an indicator of market depth, a dimension of market liquidity.*" It is calculated by dividing the total value of shares traded by the average market capitalization³⁷. Levine (1996) notes that this ratio measures trading relative to the size of the stock market. Additionally, he also states that greater turnover is a predictor of faster economic growth. Schultz (2006) uses market turnover ratios to explore three ways in which turnover can increase while volatility remains unchanged. Schultz also states that the one advantage of using turnover over volume is that it is not affected by the number of outstanding shares, thus removing a potential source of non-stationarity. He also notes two papers which espouse the advantage of using market turnover over trading volume when conducting analysis on stock markets. Tkac (1999) shows that an implication of the intertemporal capital asset pricing model is that turnover ratios should be equal across stocks. Thus market turnover, unlike market volume, should provide information about the trading of individual stocks as well. Lo and Wang (2000) consider the implications of portfolio theory for trading volume. With $k+1$ fund separation, Lo and Wang show that the turnover of each stock should be approximated by a k -factor linear structure.

The JSE has had market turnover ratios which have averaged 5.8 percent throughout its tenure. Figure 4.1 below provides a visual depiction of the JSE's turnover ratios since its inception with a corresponding 2 period moving average trend-line. As noted in Figure 3.1 below, there has been no real clear-cut trend developing until after 1996. There have been wild fluctuations throughout the JSE's lifetime, with its ratios seemingly operating within a range and rarely surpassing ten (10) percent during the time span 1969 - 1992. After reaching all-time highs in 1993 (19.93) and 1995 (22.78), there has generally been a downward trend which began with a precipitous decline in 1996. Essentially, during this period, the JSE was a montage of "peaks and valleys," which may be indicative of the market's inherent volatility. Currently, the JSE is currently an all-time low (as at June 30, 2009) with a miniscule turnover ratio of **0.57%** and has had an overall variance of 4.56%! During its first decade of operations (1969 – 1979), the market turnover varied by 2.88. From 1980 – 1988, it had a variance of 3.91; while from 1989 – 1998, its variance was at 6.85. From 1999- 2009, the standard deviation for the JSE was calculated to be 1.34. One

³⁷ This is the average of the financial year's initial and ending market capitalizations.

can conclude from the data that the JSE suffers from market illiquidity (especially within the last decade) as evidenced by the low ratios. Figure 3.1 represents a graphical presentation of the movement in the market turnover ratios for the JSE. One can notice that while the trend-line is not as jagged as the ratio line, it does seem to mirror the various trends which have occurred in the JSE's history. If one was to extend the trend-line in order to do some predictive forecasting, the turnover ratio could see that the line is trending downwards.

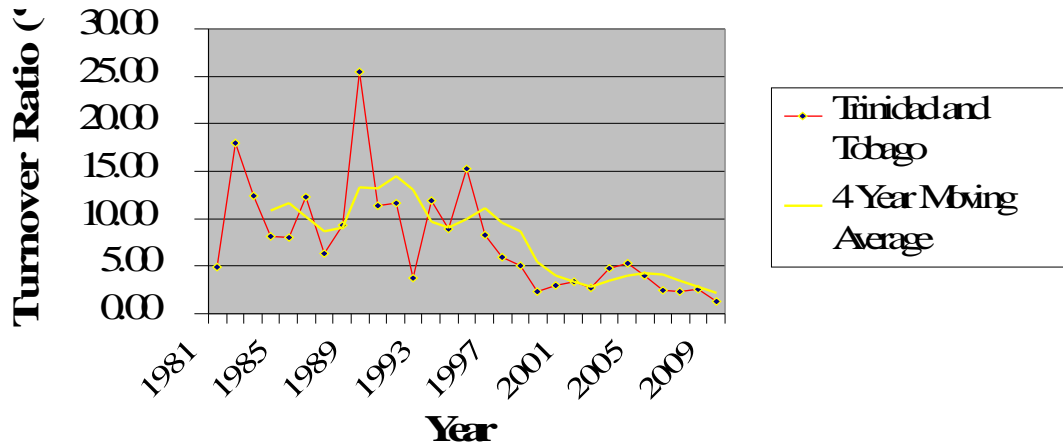
Figure 4.1 - Market Turnover Ratio (%) with trend-line for JSE: 1969 – 2009



The turnover ratio for the TTSE has averaged around 7.2 percent since its inception in 1981, which is marginally better than its Jamaican counterpart. Its turnover ratio also fluctuated greatly very similarly to the JSE from 1981 to 1997. During its first decade of operations (1981 – 1990), the ratios had a variance of 5.98 as compared to the 3.9 variance achieved by the JSE during the same period. Indeed, the TTSE also experienced its all-time high during the same time period; with a ratio of 25.05 % in 1989. Since then, the ratio has been steadily declining and its graph line seems to be operating in a range pattern with the 5 percent marker acting as an upper limit. During its second decade, the TTSE experienced a variance of 3.43 which was dwarfed by the JSE's variance of 7.27 for the same time frame. Most recently, the TTSE had a variance of 1.02 during the period 2001 – 2009, which is comparable to the JSE's 1.37. Its 1.3 percent turnover ratio (as at June 30, 2009) could possibly be associated with the global financial crisis and its resultant recession, which seems to have severely affected investor confidence and resulted in an erosion of the capital gains achieved during the recent economic boom. The half year result for 2009 may indicate that the TTSE, like its Jamaican counterpart, also seems to suffer from a systemic liquidity

problem. Figure 4.2 provides a graphical representation of the movement in the market turnover ratios for the TTSE from 1981 - 2009.

Figure 4.2 - Market Turnover Ratio (%) with trend-line for TTSE: 1981 - 2009

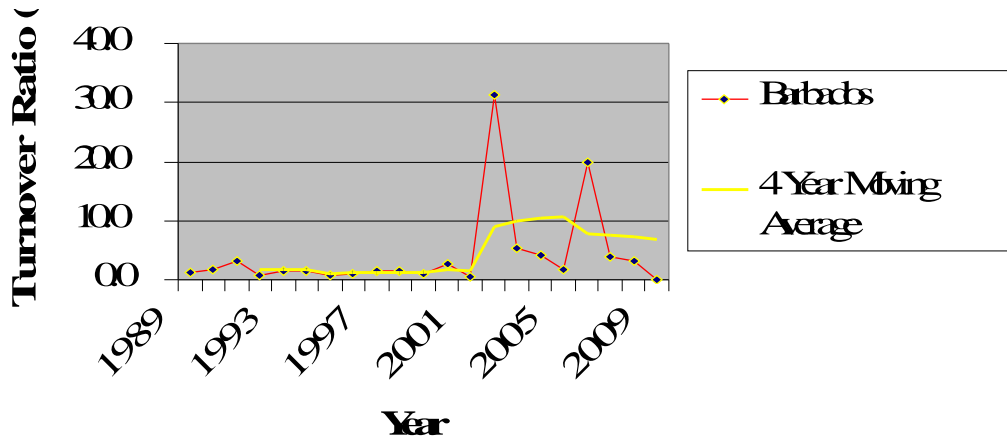


As evidenced by Figure 4.3 below, the BSE has suffered from historically low turnover ratios throughout its tenure. This is especially apparent in its early history (1989³⁸ – 2001) as it rarely ever got close to crossing the 5 percent marker with its highest within this period being 3 percent in 1991. However, the turnover ratio spiked significantly to 31.4 percent in 2002, which represents the BSE’s all time high. This was a year marked by a number of mergers and acquisitions as well as the demutualization of the Barbados Mutual Life Assurance Society to become Sagicor Life Inc.,³⁹ which may explain the significant spike in the turnover ratio. The following years (2003 – 2005) showed a return to its historic levels with turnover averaging an anemic 3.41 percent. In 2006, the BSE again experienced increased turnover activity which corresponded with increased mergers and acquisitions activity. The BSE has also seen a significant drop-off in its market turnover for the half year in 2009, registering a ratio of 0.1 percent as at June 30.

Figure 4.3 – Market Turnover Ratio (%) with trend-line for BSE: 1989 – 2009

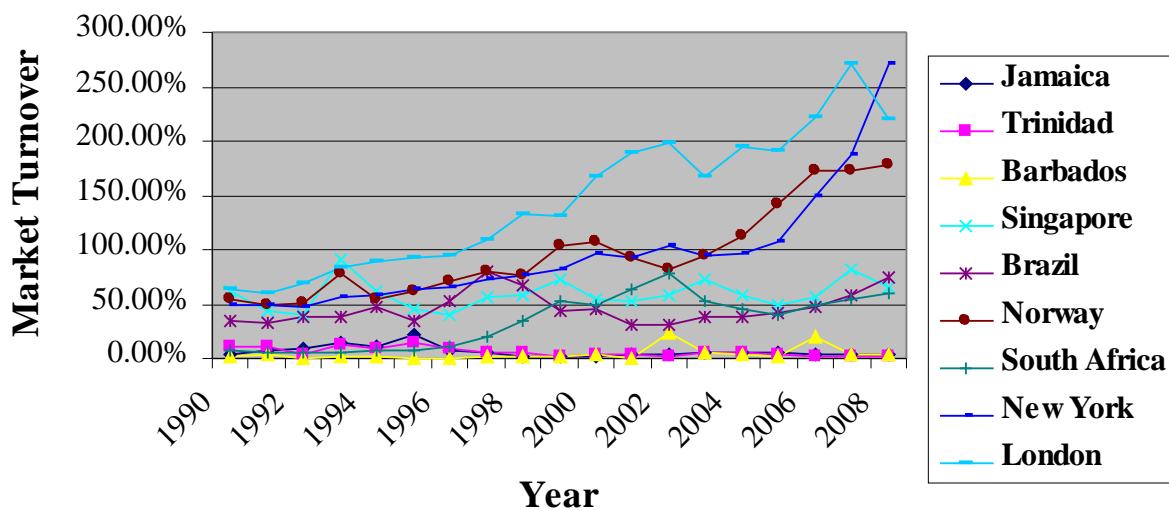
³⁸ Unfortunately, data for 1987 and 1988 was unavailable from the BSE at the time of writing.

³⁹ See the 2002 year end report for the BSE: <http://www.bse.com.bb/YearEnd/Pdf/Dec2002.pdf>



Overall, each of the three regional exchanges has historically suffered from low market turnover rates, and has tended to be trending downwards throughout its natural history. A look at Appendix Table 9 and Figure 5 below will each give a clearer picture of how the CARICOM markets matches up in terms of market turnover. When compared with the market liquidity indicators of the benchmark markets over the last twenty years, the CARICOM equity markets can be considered to be extremely illiquid. The London Stock Exchange, the Oslo Børs and the New York Stock Exchanges had the highest average market turnover ratios among the benchmark markets. Surprisingly, the average for the Oslo Børs was higher than New York's. This following statistic puts the startling realization concerning the CARICOM's illiquidity within its markets into clear perspective. Based on this author's calculations, the average turnover ratio for the six benchmarks from 1990 – 2008 (**79.3 percent**) is approximately 14 times larger than a similar ratio calculated for the three CARICOM nations (**5.53 percent**). However, the causes of this systemic illiquidity within the CARICOM equity markets are not investigated in this paper and can be the focus of future research.

Figure 5 – Market Turnover Ratios (1990 – 2008)



Settlement Cycles

This represents a significant facet of market liquidity as the settlement cycle refers to the period of time specified for the settlement of transactions between member firms. Theoretically, the shorter the settlement cycle, the greater the reduction in financial risk faced by investors during their transactions. A shortened settlement cycle should theoretically stimulate demand for shares within the relevant equity market due to investors who are seeking a higher return on their investments, but wish to mitigate risk as well as maintain liquidity within their portfolios. Currently, the three major CARICOM stock markets all operate under a T+3 system with the Eastern Caribbean Stock Exchange being the only regional stock exchange operating under a T+1 system. With many of the exchanges in developed and emerging economies having already converted to a T+1 settlement system, this systemic disparity can become a major deterrent to investors who may be considering investing their funds in the CARICOM equity markets, especially for those who require immediate liquidity of their investments.

Value of shares traded as a percentage of Gross Domestic Product⁴⁰

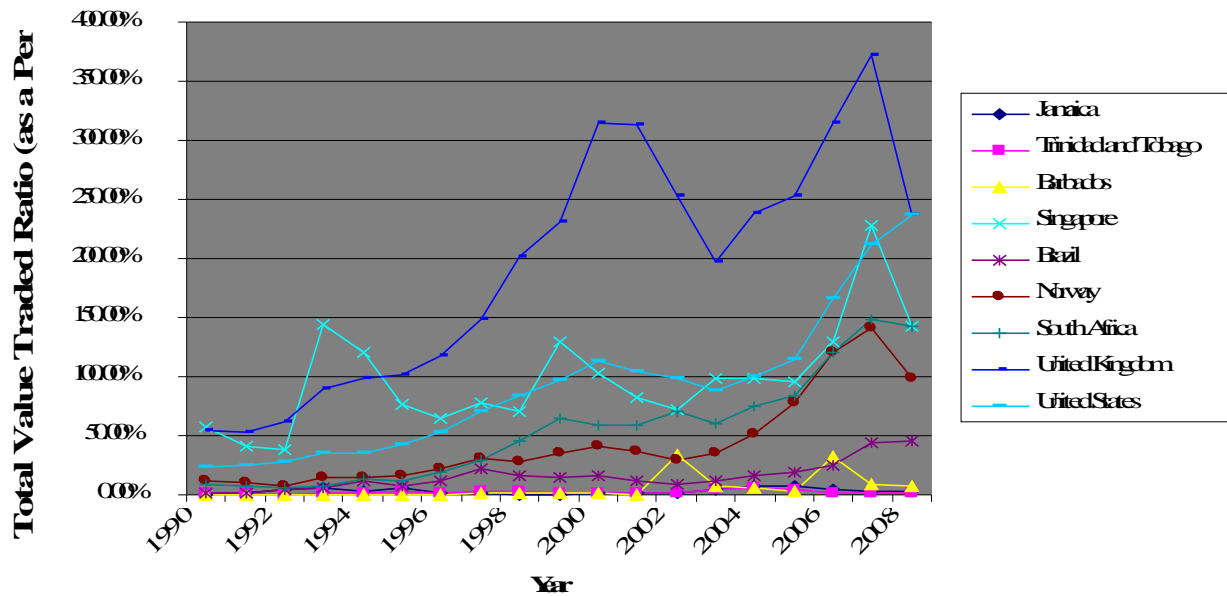
As noted by Mohtadi and Agarwal (2004), this ratio measures the organized trading of firm equity as a share of national output. As such, they state that it should positively reflect liquidity on an economy-wide basis. They also note that the total value traded ratio complements the market capitalization ratio in gauging both the size and activity of an equity market. When one

⁴⁰ This is also referred to as the Total Value of Shares Traded Ratio in Mohtadi and Agarwal (2004).

looks at the ratios for the three CARICOM nations, it is easily recognizable to see that the ratios are woefully undersized as the average ratios for each market were under 5 percent. In particular, the JSE and the TTSE each had ratios of 1.9 and 1.8 respectively; hardly a respectable figure for the Caribbean's supposed "leading lights." The BSE registered a ratio of 4.8 percent; the highest among the trio of equity markets.

When compared with the benchmark markets over a twenty year period, the three CARICOM stock markets were dwarfed by all. Among the benchmark markets, Brazil registered the lowest average ratio over the timeframe with a 15.49 percent. The London and Singapore Stock Exchanges had the highest with ratios of 192.13 percent and 98.45 percent respectively. Indeed, the London Stock Exchange has had ratios over 100 percent since 1996. The New York Stock Exchange has enjoyed an average ratio of 90.8 percent, which ranks it third among the selected markets. A look at Figure 4 below shows the progression of the total value traded ratios since 1990. It is interesting to note that Brazil had ratios which were similarly low to the three Caribbean markets in 1990. Yet, by the end of December 2008, it was enjoying a ratio of 44.91 percent. Perhaps a look at the strategies implemented by the Brazilian authorities can provide an operational model which the CARICOM authorities can follow in order to expedite their respective capital market development processes.

Figure 6 – Value Traded Ratios for selected stock markets (1990 – 2008)



5.3 Market Risk and Return

Stock Index Trends and Returns

All in all, the market indices of the three regional equity markets have trended upwardly since their various inceptions. Additionally, the indices seemed to move in tandem with each other as evidenced by the similarities in the movements of the respective indices. The JSE and the TTSE Composite Indices both experienced a similar pattern towards the tail-end of the graph (which corresponded with the 2004 – June 2009 time period). Coincidentally, they both had a period of appreciation shortly before the aforementioned 2004 – 2009 period. However, Jamaica did experience a more extended span than that which had occurred in Trinidad and Tobago (1993 – 2003 for Jamaica as opposed to 1996 – 2003 in Trinidad). For Trinidad and Tobago, the market’s growth (from 1996 – 2003) and volatility (from 2004 – June 2009) each coincided with the rapid economic growth spurred on by spiraling crude oil prices, which was immediately followed by the slowing of the U.S. economy which later escalated into the subsequent global financial meltdown. The global economic downturn and its resulting decline in demand were significant factors behind the plummeting commodity prices as well as the loss of valuable tax revenues for many governments, especially the energy dependent Trinidad. Figures 6.1 – 6.3 highlight the stock market indices for the three CARICOM equity markets from their respective inceptions.

Figure 6.1 – The Jamaican Composite Index (1969 – June 2009)

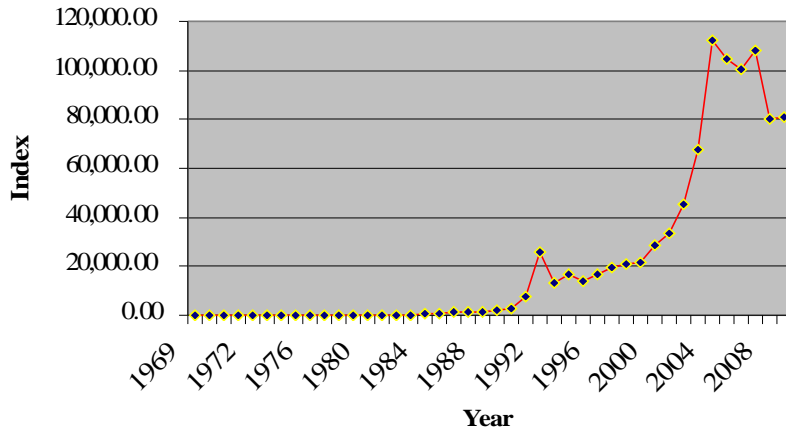


Figure 6.2 – The TTSE Composite Index (1981 – June 2009)

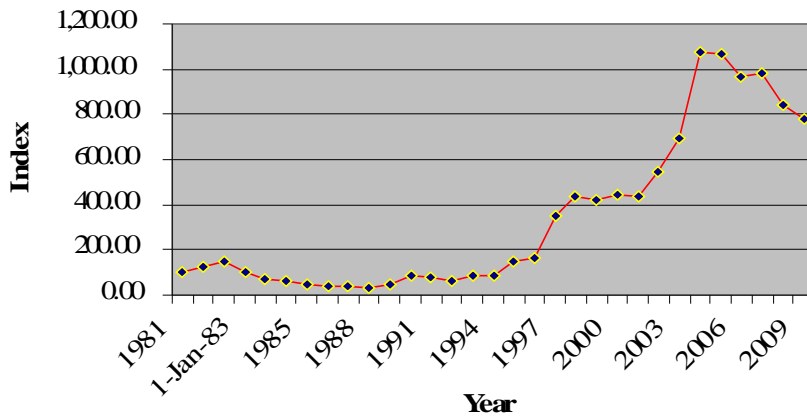
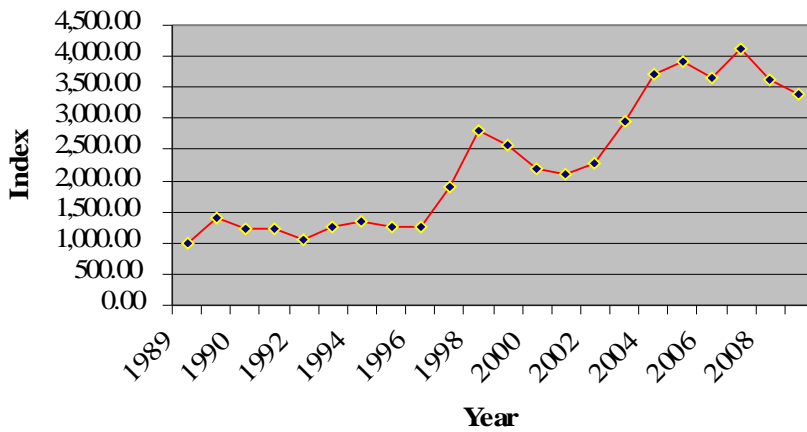


Figure 6.3 – The BSE Local Index (1989 – June 2009)



A cursory glance at the post 1990 stock index patterns for the three CARICOM markets (in Figures 6.1 – 6.3 above) and the six benchmark markets (in Figures 6.4 – 6.9) shows that they have generally been trending upwardly. The Strait Times Index does seem to exhibit signs of market volatility based on the jaggedness of the line graph in Figure 6.4. Meanwhile, the Bovespa Index also seems to have exhibited volatility though the graph in Figure 6.5 is not as jagged as its Asian counterpart. The Benchmark Price Index for the Oslo Børs seems to be exhibiting signs of stagnation during this timeframe based on the relative flatness of its Index graph. Interestingly, the NYSE Composite and the FTSE All Share (London) Indices seem to have identical trend patterns in their respective patterns. This may be used to infer a greater degree of integration between these two capital markets. Also of interest is the recoveries made by the Strait Times and the Bovespa Indices in the first half of 2009, especially the Bovespa, as it has recovered most of the losses incurred following the fallout from the global financial meltdown.

Figure 6.4 – The Strait Times (Singapore) Index (1990 – 2009)

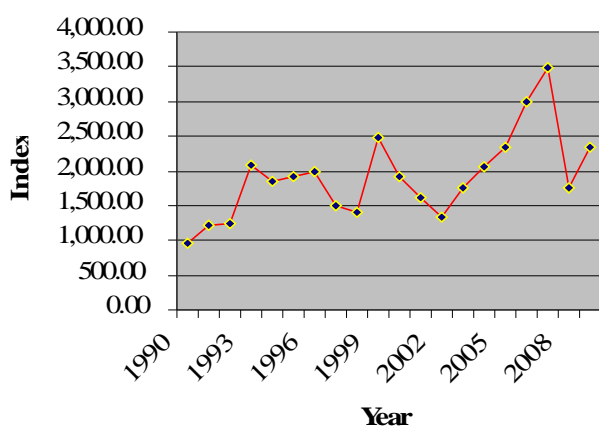
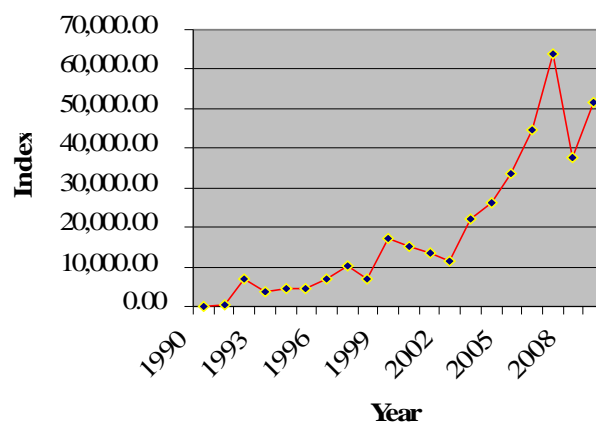
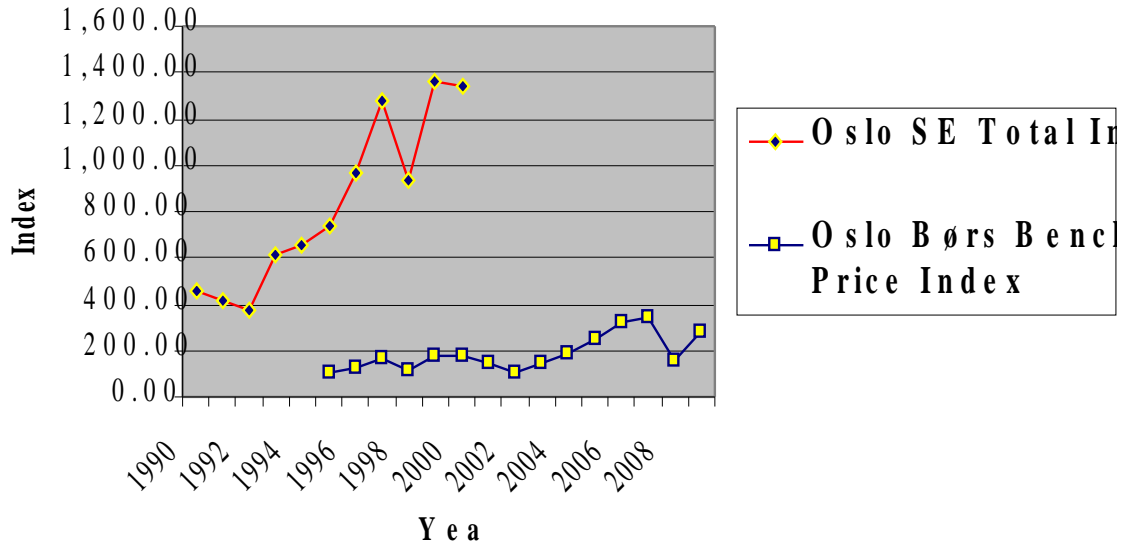


Figure 6.5 – The Bovespa (Brazil) Index (1990 – 2009)



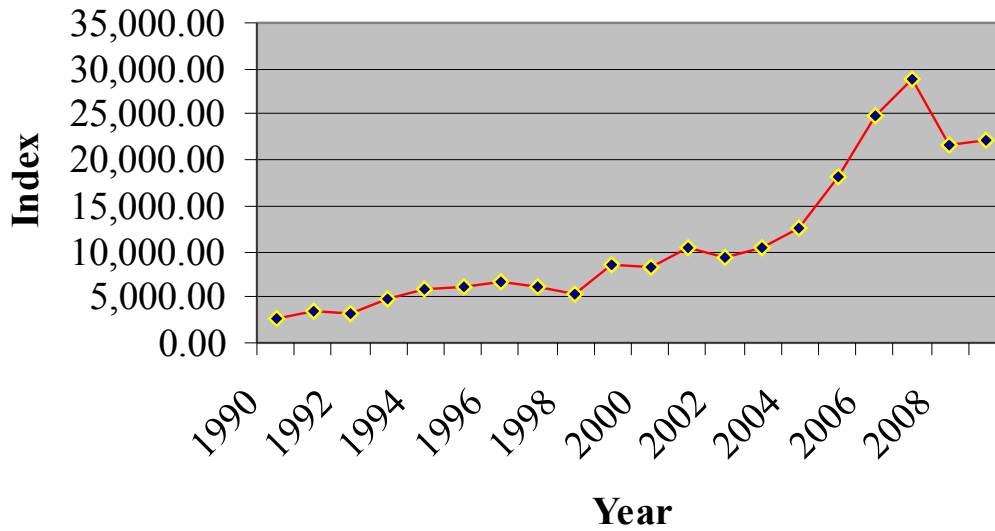
Source: The World Federation of Exchanges website – Statistics section.

Figure 6.6 – The Oslo Børs (Norway) Indices (1990 – 2009)



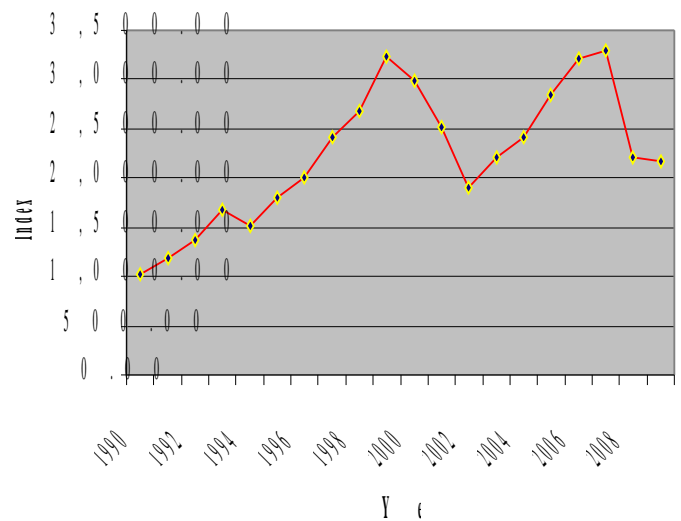
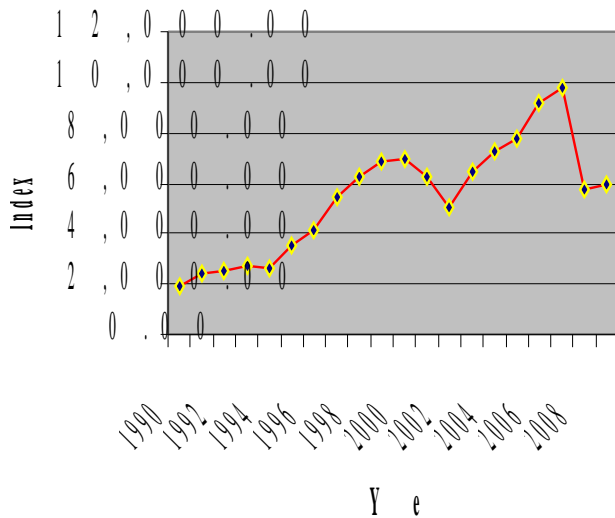
Source: The World Federation of Exchanges website – Statistics section.

Figure 6.7 – The FTSE/JSE All Share (South Africa) Index (1990 – 2009)



Source: The World Federation of Exchanges website – Statistics section.

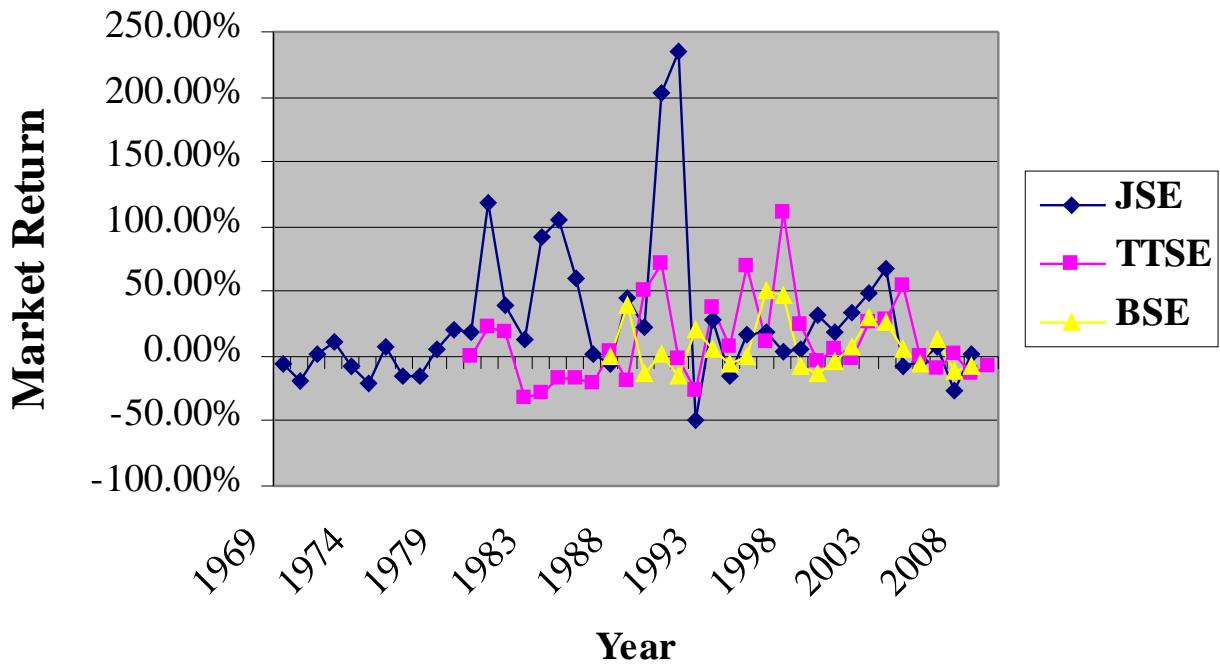
Figure 6.8 – The NYSE Composite Index (1990 – 2009) **Figure 6.9 – The FTSE All Share (London) Index (1990 – 2009)**



Source: The World Federation of Exchanges website – Statistics section.

The three CARICOM markets have endured a “rollercoaster ride” in terms of the returns it gave to its investors. As can be seen in Figure 7 below, the JSE can be clearly seen as being in a cyclical pattern up until 1978 when its market return pattern became more jagged. The jagged pattern could be used to make the inference that the Jamaican Stock Exchange was becoming a more volatile stock market prone (perhaps) to the “whims and fancies” of the market makers. This could also be evidence of inefficiency within the market as noted by Koot, Miles and Heitmann (1989) and Agbeyegbe (1995). The TTSE and the BSE have experienced similar return patterns throughout their respective lifetimes. From 1993, all three markets tended to mirror each other in their index movements, especially around the period 2006 – 2009. This could suggest that there may be a certain degree of financial integration occurring within the region. The determination of the extent to which the CARICOM equity markets are integrated with each other and the global financial system is definitely a fascinating topic and will be the research focus of the third installment of this thesis.

Figure 7 – Market Returns for the JSE, TTSE and the BSE (1969 – 2009)



Source: Author’s calculations from data collected from the respective stock exchanges

Upon calculating the ex-dividend average market returns for the respective stock exchanges, it becomes abundantly that Brazil is the best performer among the markets chosen in this study. Interestingly, both the Jamaican and Trinidad stock exchanges did outperform all bar the Brazilian Stock Exchange in this category for each of the time periods highlighted in the information notes of Figure 8 below. Both the JSE and the TTSE each had the highest average market return during the time period (1990 – 2001) with figures of 43.2 and 25.2 percents respectively. Of special interest is the similarity in the performances of the JSE and the Brazilian Stock Exchanges during the period (2000 – June 30, 2009). The JSE garnered an average return of 17.9 percent, which is marginally lower than Brazil’s (18.6 percent). All three CARICOM stock markets both achieved average returns which were higher than those of the NYSE and the FTSE (London) All Share Indices. In fact, investors who had planned their investment strategies based on the FTSE All Share Index would have experienced a decline of 2.5 percent in their portfolios.

Figure 8 - Table of Market Returns (exclusive of dividends) for selected equity markets

Information notes: (i) (--): Declines; (ii) --: No figure required; (iii) N/A: Not Available;

Year	Jamaica	Trinidad	Barbados	Singapore	Brazil	Norway		South Afric a	New York	London
						(a)	(b)			
1990	22.3	70.7	(13.2)	(36.8)	308.4	(13.5)	--	N/A	(7.5)	N/A
1991	202.5	(1.6)	1.6	28.2	2,316.0	(9.4)	--	26.5	27.1	15.1
1992	235.2	(26.4)	(15.4)	2.1	1,015.6	(10.0)	--	(5.3)	4.7	14.8
1993	(49.1)	37.0	19.9	68.2	(44.6)	64.8	--	50.1	7.9	23.4
1994	27.3	7.5	6.3	(11.2)	16.0	7.1	--	19.9	(3.1)	(9.6)
1995	(14.5)	69.6	(5.4)	3.4	(1.3)	11.6	--	6.2	31.3	18.5
1996	16.5	11.4	(0.03)	3.9	63.8	32.1	28.9	6.9	19.1	11.7
1997	19.4	110.4	50.5	(24.3)	44.8	31.5	29.3	(6.8)	30.3	19.7
1998	3.8	23.9	47.6	(7.6)	(33.5)	(26.7)	(28.4)	(12.4)	16.6	10.9
1999	6.3	(4.3)	(8.4)	78.0	151.9	45.5	46.0	57.3	9.2	21.3
2000	30.9	5.8	(14.2)	(22.3)	(10.7)	(1.7)	1.1	(2.5)	1.0	(8.0)
2001	18.1	(1.7)	(4.1)	(15.7)	(11.0)	(17.2)	(16.2)	25.4	(10.2)	(15.4)
2002	34.4	25.7	8.0	(17.4)	(17.0)	--	(32.7)	(11.2)	(19.8)	(25.0)
2003	48.5	27.2	29.0	31.6	97.3	--	42.5	12.0	28.8	16.6
2004	66.9	54.8	26.4	17.1	17.8	--	32.0	21.9	12.6	9.2
2005	(7.2)	(0.7)	5.8	13.6	27.7	--	34.2	43.0	7.0	18.1
2006	(3.7)	(9.2)	(6.8)	27.2	32.9	--	28.4	37.7	17.9	13.2
2007	7.2	1.3	12.6	16.6	43.7	--	8.1	16.2	6.6	2.0
2008	(25.8)	(14.2)	(11.9)	(49.4)	(41.2)	--	(55.7)	(25.7)	(40.9)	(32.8)
2009	0.9	(7.5)	(6.9)	32.5	37.1	--	83.5	2.5	2.6	(1.7)
Average A	32.8	19.5	6.2	7.1	205.8	N/A	N/A	N/A	7.2	N/A
Average B	33.4	16.7	7.3	9.4	200.3	N/A	N/A	14.1	8.0	5.5
Average C	43.2	25.2	5.4	5.5	318.0	9.5	N/A	N/A	10.5	N/A
Average D	16.0	16.5	9.4	6.2	29.9	N/A	14.9	12.2	6.0	2.9
Average E	17.9	8.6	4.0	3.6	18.6	N/A	13.2	12.6	0.6	(2.5)

Average A = Market Return (1990 – June 30, 2009);

Average B = Market Return (1991- June 30, 2009);

Average C = Market Return (1990 – 2001);

Average D = Market Return (1996 – June 30, 2009);

Average E = Market Return (2000 – June 30, 2009).

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges and the World Federation of Exchanges website.

Sharpe Ratio

Preliminary evidence shows little movement in the Sharpe Ratios for the three CARICOM equity markets. This seems to be the case especially for Jamaica, where its ratios also seem to cluster around the x axis of Figure 9.1. In 1977, the JSE seemed to experience an “aberration” with a ratio of **-162.98**. As a result, the average Sharpe Ratio (from 1969 – June 30, 2009) with its inclusion was calculated to be **-3.1**. Excluding the outlier resulted in an average ratio of **0.87**, which is higher than the traditional **0.75** benchmark. The Sharpe Ratio for the TTSE over its lifetime (1981 – June 30, 2009) was **-1.33**. It is noteworthy to mention that the TTSE did experience three years in which its Sharpe Ratio did spike over (and under) its traditional range which can be seen in Figure 9.2: 1983, 1985 (a significant drop to **-40.76**) and 2003. The exclusion of these three specific years shows the TTSE possessing a Sharpe ratio of **-0.14**. Besides those three years, the TTSE’s pattern closely resembles those of the JSE’s. Surprisingly, the BSE was the only stock market to record a positive ratio (**1.24**), which was calculated from 1989 – June 30, 2009. This can be attributed to the spikes which occurred in 1998 and 2004. The exclusion of these two outliers paints a more somber portrait, with the BSE possessing a ratio of **-0.44**. A glance at Figure 9.3 shows that the BSE’s Sharpe Ratio also tends to fluctuate around the x-axis, very much like its two Caribbean counterparts. It can therefore be deduced from the above data that investors, who invested their funds in a portfolio containing the listed stocks from the JSE and the BSE, would possess portfolios that performed better than the relatively safe U.S. 90-day Treasury bond. Meanwhile, a portfolio of TTSE listed stocks can be argued to be underperforming when compared with the performance of the same 90-day bond.

Figure 9.1 – Graph showing Sharpe Ratios for the JSE (1969 – 2009)

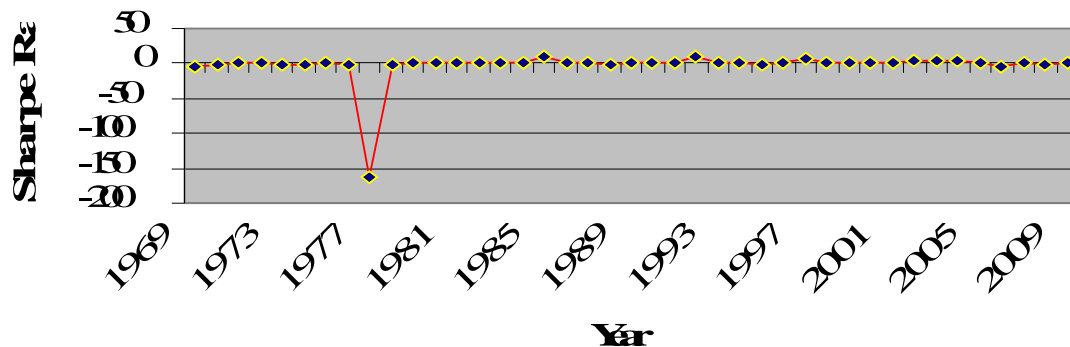


Figure 9.2 - Graph showing Sharpe Ratios for the TTSE (1981 – 2009)

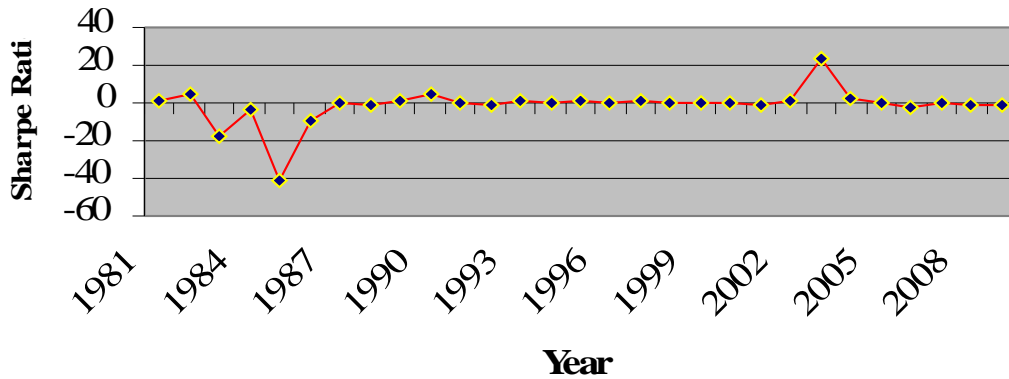
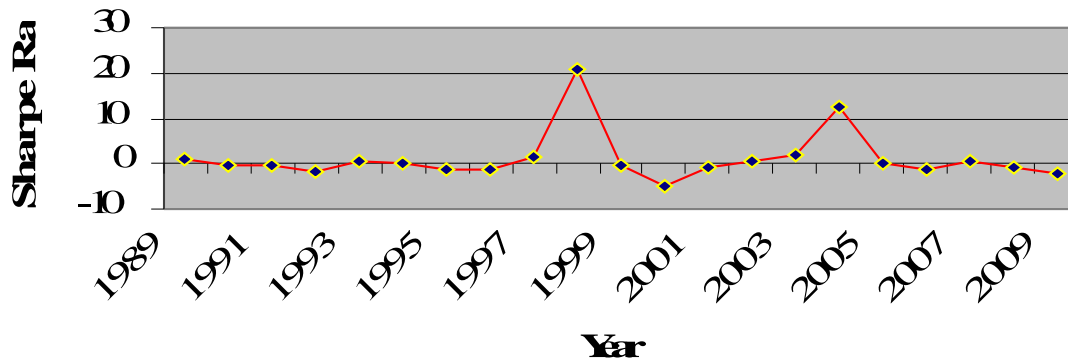


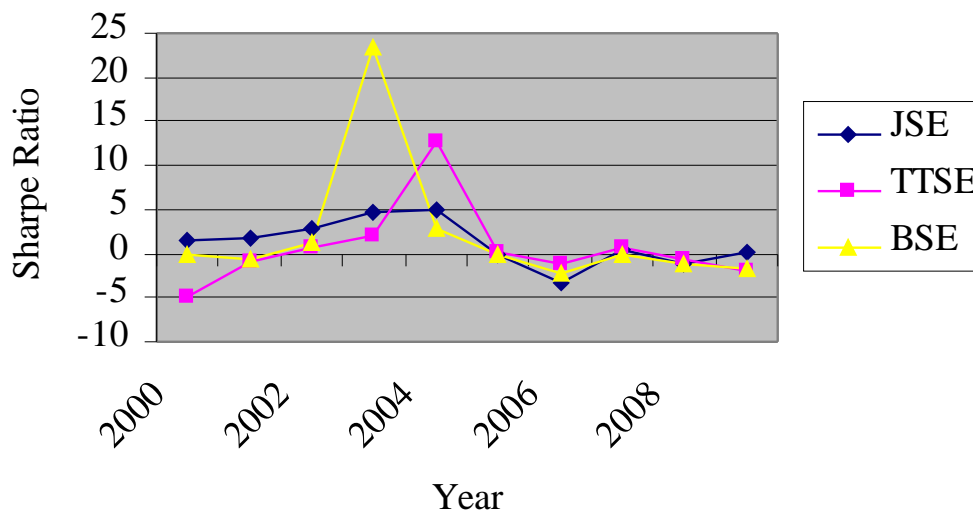
Figure 9.3 - Graph showing Sharpe Ratios for the BSE (1989 – 2009)



Further examination (as evidenced by Figure 9.4) reveals that there may be a developing pattern which could be interpreted as integration of the regional stock markets. The literature which supports the use of an equity market's Sharpe Ratio as evidentiary support for integration is readily available. Berdot (2008) sought to evaluate the performance and the integration process of the Euro zone stock market. One aspect of that study examined whether there was convergence in the various selected stock markets' Sharpe Ratios and if so, did it indicate that market integration was occurring within the same. In another example, Bekaert (1995) proposed a return-based measure of market integration for nineteen emerging economies in which the calculations of Sharpe Ratios were included within the evaluation process. From the middle of 2005 onwards, the graphs of the three CARICOM stock markets bear striking resemblances with each other. As can be seen on the graph below, the patterns of the TTSE and the BSE almost mirror each other

during 2005 – 2009, while the JSE only differs from these two markets by an infinitesimal amount. The convergence of these graphical patterns can be a precursor for further study into the extent of integration occurring within the CARICOM region.

Figure 9.4 – Sharpe Ratio for the three CARICOM equity markets (2000 – June 30, 2009)



Market Volatility

In the context of this paper, volatility is the relative change in the movements of the stock price indices. Generally, it refers to the standard deviation of the continuously compounded returns of a financial instrument with a specific time horizon. The concept is often used to quantify the risk of the instrument (or index) over that time period. According to calculations conducted for this paper, which were based on the annual stock market index figures for the three CARICOM markets throughout their respective lifetimes, the equity markets in the Caribbean have been noted to have shown varying degrees of volatility. The market volatility ratio for the JSE was calculated to be 55.93 percent for the period 1969 – June 30, 2009. This works out to be an annual average variance of approximately **1.38 percent**, a remarkably minute figure. This can be used as evidence that the Jamaican stock market may be categorized as being relatively stagnant and inefficient. This view of market inefficiency was espoused by Kitchen (1986), Agbeyegbe (1987) and Koot et al. (1989).

The picture for the other two CARICOM markets does not brighten the outlook. During the period 1981 – June 30, 2009; the overall market volatility for the TTSE was calculated to be 33.43. This represents an annual average variance of approximately **1.13 percent**; while the BSE's was calculated to be 20.45 percent. This works out to be an average variance of **1 percent** per annum. This could be evidence that there may not be much activity occurring within the CARICOM equity markets. As such, the lack of market activity may have an adverse effect on attracting investment funds into the region. If investors are consistently absorbing losses on their investments, it will be difficult to inveigle them into future investment opportunities. This lack of volatility may also be construed as there being either insufficient effective demand for securities or a shortfall in its supply within the Caribbean equity markets. The most likely explanation is a combination of both as the investing public is relatively naïve within the region. Those who do invest are more likely to take “long positions” (i.e. purchase shares in listed companies and hold on to them for dividend payments before they are bequeathed to their heirs in estate) rather than engage in speculative trading. The absence of options trading (a staple within more developed stock markets) in any of the CARICOM markets may be viewed as further testimony which affirms the aforementioned statement as the exchange's administrations will not engage in activities which do not have sufficient demand to cover its administrative (and operating) costs.

6. *Limitations and Scope of Study*

The aim of this study is to provide a fairly comprehensive overview of the ‘health’ of the regional equity markets. By looking at the three basic concepts of market size, liquidity and market risk/return, one should be able to gain deeper insight into the machinations of the respective markets. These form the basis for any analytical framework when studying the performance of any equity market. Hopefully, this paper could become helpful in ascertaining the best path forward towards meaningful progress.

Yet, there are some limitations from which this study suffers that need to be stated. The issue of data availability became a significant obstacle that was encountered during preliminary data collection. As such, there are certain areas which can be expanded upon in future research. One such example is the calculation of regional market return, which excluded dividend payout due to a lack of available data. The collection of the relevant data would have necessitated some form of financial burden. Another example where data availability became a factor was the collection

of daily stock index levels for the early years of the Jamaican Stock Exchange. It became apparent that endeavouring to acquire anything other than the year-end index level for 1980 and earlier would have become a herculean task. Financial constraints and a suspicion (albeit, this is only a suspicion and not a condemnation of any organization's record keeping processes) of record mismanagement inveigled the author to use the available data in his market volatility calculations. Standard practice suggests that the use of daily index levels would have "painted a truer picture" of the regional markets' volatility patterns.

One may question the reason for this paper's focus on the three major regional equity markets rather than taking a more holistic view of the CARICOM region (through the inclusion of other CARICOM equity markets). The inherent dilemma with including more of the regional markets is that these are even less active than the JSE, TTSE and the BSE. Consequentially, little insight would be gained from their inclusions into the analysis. Additionally, the choices that were made for this study's benchmark markets (New York, London, Singapore, Brazil, Norway, and Johannesburg) may be a source of contention. One could put forth the argument that these markets have differing characteristics than those of the CARICOM Big Three, with the regional markets considered to be too small to be compared with these 'behemoths.' It can be argued that this renders any comparison moot. However, this analysis becomes helpful especially since a few of the regional governments have outlined the achievement of developed country status as one of their development goals. It is already known that a well-functioning stock exchange is an important facet in spurring economic growth and development. With the benchmarks either attaining developed status or are emerging economies that are on the cusp of its attainment, it would bode the regional exchanges well to perform the necessary comparative analyses with these countries in order to determine how close the administrations are to achieving their goals. If not, they can highlight the areas in which improvement is needed and can be guided accordingly by the Capital Market Development policies used by these countries to attain said status. They also add to the analysis as it enables comparison across a broad spectrum of the global equity markets.

7. *Conclusions*

The CARICOM equity markets still suffer from a number of inadequacies which hamper its development. Lack of market liquidity and inadequate market size (as evidenced by low market turnover ratios and company listings) are serious hindrances which need to be addressed by the relevant authorities. Illiquidity in the markets only serves to discourage investors who may require more immediate access to their funds. The dilemma of the small market sizes within the CARICOM stock markets become increasingly exacerbated when one realize that the listed companies mostly come from a limited range of industries (e.g. Banking and Financial institutions represent almost one-third of the listings held on the Trinidad and Tobago Stock Exchange with Manufacturing and Trading companies being another 27 percent). While these may be safe investments, they hardly seem to whet the appetites of the more savvy investors. As such, market volatility seems to have been hampered as a result. However, there have been some signs of encouragement when one looks at the region's market capitalization ratios and (ex-dividend) returns. They compared favourably with many of the benchmark markets in these areas. Yet, there remains much to be done in order for there to be progress made.

There are a plethora of avenues that can be explored for improvement. Firstly, the various administrations need to widen the range of products offered. Feasibility studies into how lucrative the introduction of options, derivatives, and futures contract trading should be done. In addition, there needs to be greater collaboration between the various administrations and the government. This should be tackled in a two-fold manner: (1) encouraging the government to place divested public companies onto the Stock Exchange, especially holdings held within the energy sector, and (2) the establishment of various fiscal policies for the supply side (e.g. tax moratoriums for listing) as well as the demand (e.g. tax credits and/or allowances for individuals that have invested in the Stock Exchange), which would make a listing as well as investing in it more attractive. Executives should also seek to establish strategic alliances with markets from more established economies. One such example is the reported alliance being sought between the TTSE and the Toronto Stock Exchange. This should provide regional investors with access to a wider range of investment options. The financial literacy program that the Ministry of Finance in Trinidad and Tobago has embarked upon is also a step in the right direction, as it will educate and bring awareness to the options that are available. However, the deeply engrained culture of risk aversion with the populace of the Caribbean is one that cannot be overcome easily and the

benefits of such a program may not be seen until many years down the road. There is no sure-fire path to success in stock market development. It is simply a matter of formulating development strategies that are in line with the goals of the various administrations.

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Appendix of Statistical Tables

Table 1: Number of listed companies (1969 – 2009)

Year	Jamaica	Trinidad & Tobago	Barbados
1969	34	N/A	N/A
1970	38	N/A	N/A
1971	38	N/A	N/A

1972	40	N/A	N/A
1973	41	N/A	N/A
1974	40	N/A	N/A
1975	38	N/A	N/A
1976	43	N/A	N/A
1977	43	N/A	N/A
1978	40	N/A	N/A
1979	39	N/A	N/A
1980	41	N/A	N/A
1981	33	32	N/A
1982	32	33	N/A
1983	32	33	N/A
1984	32	34	N/A
1985	33	35	N/A
1986	36	35	N/A
1987	41	35	12
1988	44	33	13
1989	44	31	14
1990	44	30	13
1991	44	30	14
1992	48	28	15
1993	48	26	16
1994	50	27	19
1995	51	27	19
1996	50	23	19
1997	49	24	18
1998	47	25	20
1999	45	27	23
2000	44	29	22
2001	42	30	25
2002	40	30	24
2003	41	32	24
2004	40	34	26
2005	41	37	26
2006	44	38	27
2007	44	38	26
2008	45	39	24
2009 ⁴¹	45	39	24
<i>Average</i>	<i>42</i>	<i>32</i>	<i>20</i>

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges, own calculations (for average).

⁴¹ As at June 30, 2009.

Table 2: Comparison of Numbers of listed companies for JSE, TTSE, BSE with selected benchmark stock exchanges

Year	Jamaica	Trinidad	Barbados	Singapore	Brazil	Norway	South Afric a	New York	London
1990	44	30	13	172	579	121	769	1,774	2,559
1991	44	30	14	182	570	112	728	1,989	2,572
1992	48	28	15	195	565	123	671	1,750	2,440
1993	48	26	16	216	551	135	631	1,945	2,412
1994	50	27	19	251	549	146	624	2,128	2,416
1995	51	27	19	272	544	165	638	2,242	2,502
1996	50	23	19	296	551	172	626	2,476	2,623
1997	49	24	18	334	545	217	642	2,626	2,513
1998	47	25	20	358	535	235	669	2,670	2,423
1999	45	27	23	408	487	215	658	3,025	2,274
2000	44	29	22	480	467	214	606	2,468	2,374
2001	42	30	25	492	441	212	532	2,400	2,332
2002	40	30	24	501	412	203	451	2,366	2,824
2003	41	32	24	560	391	178	411	2,308	2,692
2004	40	34	26	633	388	188	389	2,293	2,837
2005	41	37	26	686	381	219	373	2,270	3,091
2006	44	38	27	708	350	229	389	2,280	3,256
2007	44	38	26	762	404	248	411	2,297	3,307
2008	45	39	24	767	392	259	411	3,011	3,096
2009	45	39	24	762	388	243	402	3,155	2,926
Average	42	32	20	463	487	197	566	2,435	2,742

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges and the World Federation of Exchanges website.

Table 3: Estimate of Fees for Issuance of \$500 Million Common Equity IPO⁴²

Type of Fee	Estimated Fee Payable
TTSEC Registration Fee	\$ 35,000
TTSEC Amended Registration Fee	\$ 500
Legal	\$ 200,000
Stamp Duty	\$ 2,000,000
Brokerage	\$ 20,000
Listing Fees: Annual Charge TTSE	\$82,500
Listing Fees: Annual Charge TTCD	\$11,000
<i>Estimated Initial Cost</i>	<i>\$ 2,349,000</i>
<i>Estimated Annual Registration Cost</i>	<i>\$ 94,000</i>

Source: The Trinidad and Tobago Securities and Exchange Commission

Table 4: Average Annual Trading Volumes for the JSE, TTSE and the BSE

Country	Average Volume Traded Annually (000s)
Jamaica	948,664.3
Trinidad and Tobago	113,007.9
Barbados	47,806.8

Source: Author's calculations derived from data collected from the three stock exchanges.

⁴² See Development of the Securities Market in Trinidad and Tobago, 1997 to 2003, with Prospects for the Future, p.83.

Table 5: Comparison of values of share trading for JSE, TTSE, BSE with selected benchmark stock exchanges (in billions of U.S. dollars)

Year	Jamaica	Trinidad	Barbados	Singapore	Brazil	Norway	South Africa	New York	London
1990	0.032	0.055	0.005	21.1	4.0	14.1	10.5	1,325.3	543.4
1991	0.096	0.08	0.009	18.1	6.9	11.6	8.7	1,520.2	553.9
1992	0.386	0.022	0.002	18.9	14.8	10.1	7.8	1,745.5	663.0
1993	0.336	0.053	0.005	83.5	27.1	17.6	10.4	2,283.4	865.9
1994	0.158	0.051	0.006	84.8	66.4	17.7	17.6	2,454.2	1,029.3
1995	0.341	0.138	0.003	64.0	57.0	24.9	17.4	3,082.9	1,153.2
1996	0.039	0.105	0.006	60.3	97.5	36.3	27.0	4,063.7	1,413.2
1997	0.074	0.135	0.023	74.1	190.7	49.6	44.7	5,777.6	1,989.5
1998	0.041	0.178	0.034	58.5	139.6	42.9	61.8	7,317.9	2,888.0
1999	0.039	0.095	0.02	107.4	83.8	56.7	86.8	8,945.2	3,399.4
2000	0.076	0.139	0.048	95.2	101.5	69.2	77.4	11,060.0	4,558.7
2001	0.126	0.169	0.01	71.1	63.5	62.8	69.3	10,489.0	4,520.2
2002	0.15	0.171	0.827	63.0	46.3	56.1	78.4	10,310.1	4,001.3
2003	0.4	0.45	0.184	91.9	66.4	78.2	101.1	9,691.3	3,609.7
2004	0.584	0.74	0.177	107.3	104.0	134.8	161.1	11,618.2	5,169.0
2005	0.631	0.695	0.092	116.5	165.3	234.4	201.8	14,125.3	5,677.7
2006	0.545	0.399	1.036	180.2	276.1	405.9	311.0	21,789.5	7,571.7
2007	0.412	0.365	0.286	381.3	598.0	548.1	423.4	29,113.8	10,333.7
2008	0.299	0.354	0.256	259.9	724.2	442.6	395.2	33,638.9	6,271.5
2009	0.039	0.147	0.006	108.9	247.1	113.1	147.9	9,528.2	1,803.8
Total	4.800	5.704	3.043	2,066.0	3,080.	2,426.7	2,259.	199,880.	68,016.
					2		3	2	1

Exchange rates: Jamaica / USD - ;

Trinidad and Tobago / USD – (December 1990 – 1992): 4.2447,

(December 1993): 5.7304, (December 1994): 5.8431, (December 1995): 5.867,

(December 1996): 6.1627, (December 1997): 6.2677, (December 1998): 6.2428,

(December 1999): 6.237, (December 2000): 6.2561, (December 2001): 6.194,

(December 2002): 6.2429, (December 2003): 6.2432, (December 2004): 6.2542,

(December 2005): 6.2342, (December 2006): 6.2672, (December 2007): 6.2728,

(December 2008): 6.2348, (June 2009): 6.2606

Barbados / USD – \$2.00.

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges and the World Federation of Exchanges website. Exchange rate data for conversions came from the respective countries' Central Banks.

Table 6: Volume and Value of Shares Traded (1969 – 2009)

Year	Jamaica		Trinidad & Tobago		Barbados	
	<i>Volume (000s)</i>	<i>Value (\$M)</i>	<i>Volume (000s)</i>	<i>Value (\$M)</i>	<i>Volume (000s)</i>	<i>Value (\$M)</i>
1969	7,450	6.5	N/A	N/A	N/A	N/A
1970	5,070	3.9	N/A	N/A	N/A	N/A
1971	8,418	6.5	N/A	N/A	N/A	N/A
1972	12,134	11.5	N/A	N/A	N/A	N/A
1973	9,450	7.8	N/A	N/A	N/A	N/A
1974	19,400	10.7	N/A	N/A	N/A	N/A
1975	6,930	5.3	N/A	N/A	N/A	N/A
1976	5,650	2.8	N/A	N/A	N/A	N/A
1977	2,185	1.3	N/A	N/A	N/A	N/A
1978	13,818	10.1	N/A	N/A	N/A	N/A
1979	4,833	2.2	N/A	N/A	N/A	N/A
1980	7,390	5.1	16,100	87.5	N/A	N/A
1981	4,198	3.3	32,000	140.3	N/A	N/A
1982	5,542	10.2	90,300	555.5	N/A	N/A
1983	5,185	9.8	71,600	362.2	N/A	N/A
1984	9,744	26	53,700	182.9	N/A	N/A
1985	37,640	117.1	48,500	148.5	N/A	N/A
1986	59,252	374.6	85,000	186	N/A	N/A
1987	71,877	400	58,900	87.5	1,536.9	3.6
1988	43,522	136.7	62,900	117.7	1,480.1	4.2
1989	95,202	516.5	143,700	294.2	2,118.8	6.4
1990	57,960	230.8	66,400	235.3	3,774.4	10.1
1991	144,258	1,156.6	103,400	338.7	7,207.6	18.3
1992	395,606	4,687.3	34,200	94.6	1,897.2	4.4
1993	567,454	8,346.8	77,900	301	3,532.8	8.9
1994	741,754	5,155.5	67,600	300.8	6,132.9	11.5
1995	3,565,607	11,560.5	131,500	812.4	3,013.1	6.3
1996	560,528	4,629.4	121,300	645.9	5,482	12.4
1997	905,387	4,594.1	100,300	846.1	9,860.9	46.6
1998	604,545	2,064.2	100,500	1,113.9	17,501.6	68
1999	520,531	2,218.7	73,600	594	12,402	40.6
2000	694,897	3,441.1	80,158.8	869.8	30,202.4	95.8
2001	2,845,199	5,948.4	122,200	1,044.9	9,118.9	20.4

2002	1,604,591	7,636.9	97,487	1,070.4	514,495. 8	1654
2003	4,290,433	24,237.3	436,467.5	2,807.1	56,648.6	368.2
2004	5,194,558	35,994.9	345,802	4,628	110,757. 8	352.9
2005	2,498,028. 4	40,746.7	209,955	4,331	41,638.1	183.9
2006	5,639,412	37,041	221,891	2,498	7,206.7	2,072.9
2007	2,433,487. 6	29,047.4	123,210	2,290.4	154,894. 7	572.4
2008	2,953,011. 3	24,066.17	137,280	2,209.7	71,832.3	512.6
2009 ⁴³	820,101.7	3,422.6	35,981	922.4	2,918.5	11.7

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges, own calculations (for average).

Table 7: Year-end Market Capitalization (in Millions of country's local currency) (1969 – 2009)

Year	Jamaica (\$M)	Trinidad & Tobago (\$M)	Barbados (\$M)
1969	146.1	N/A	N/A
1970	137	N/A	N/A
1971	143.2	N/A	N/A
1972	157.1	N/A	N/A
1973	203.6	N/A	N/A
1974	129.7	N/A	N/A
1975	126.5	N/A	N/A
1976	106.4	N/A	N/A
1977	89.8	N/A	N/A
1978	93.5	N/A	N/A
1979	109.6	N/A	N/A
1980	124.1	N/A	N/A
1981	225.8	2,852.2	N/A

⁴³ As at June 30, 2009.

1982	316	3,321.3	N/A
1983	359.2	2,484.4	N/A
1984	697.7	2,030.9	N/A
1985	1,456.6	1,667.6	N/A
1986	3,085.8	1,346.4	N/A
1987	3,468.7	1,397.9	N/A
1988	4,290.3	1,136.1	N/A
1989	6,228.4	1,174.4	583.6
1990	7,321.3	2,956	563.1
1991	22,214.7	2,852	616.5
1992	76,974.3	2,185	518.3
1993	41,879.3	2,851	656.3
1994	58,018.1	3,874	1,035.4
1995	50,755.8	6,751	988.8
1996	66,116.3	8,772	1,540.1
1997	79,619.6	19,634	4,444.4
1998	79,038.7	24,681	4,824.1
1999	104,041.5	27,514	4,015.3
2000	160,135.7	30,100	3,379
2001	222,006.2	31,767.6	3,656.2
2002	292,297.9	48,099.3	6,882.5
2003	512,884.4	67,979.6	7,125.3
2004	897,297.3	107,560.1	10,407.3
2005	839,852.8	107,227	10,970.6
2006	822,862.4	96,838.3	20,516.1
2007	876,690.6	98,177.3	18,857.7
2008	597,277	76,432.9	13,648.9
2009 ⁴⁴	602,120	70,692.9	12,518.7
<i>Average</i>	<i>162,812.6</i>	<i>28,961.2</i>	<i>6,231.6</i>

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges.

⁴⁴ As at June 30, 2009.

Table 8: Comparison of Market Capitalization Ratios for JSE, TTSE, BSE with selected benchmark stock exchanges

Year	Jamaica	Trinidad	Barbados	Singapore	Brazil	Norway	South Afric a	New York	London
1990	19.6	13.7	15.9	93.1	3.6	22.2	123.2	46.8	85.4
1991	37.8	12.9	17.7	110.3	10.5	18.4	139.7	58.6	94.8
1992	82.5	9.7	15.9	98.2	11.6	13.9	79.7	60.4	86.0
1993	32.6	11.6	19.3	228.2	22.7	23.2	131.9	63.8	118.9
1994	35.9	13.2	29.7	190.3	34.6	29.3	166.4	59.1	109.4
1995	24.9	21.3	26.4	175.6	19.2	29.9	185.6	77.0	118.0
1996	27.3	25.4	38.6	162.3	25.8	35.9	168.1	88.1	136.9
1997	30.2	54.7	101.2	110.9	29.3	42.0	155.9	107. 6	149.4
1998	27.9	64.8	101.8	114.6	19.1	31.1	126.8	118. 2	165.5
1999	34.4	64.2	81.0	240.2	38.8	40.0	197.1	124. 1	193.5
2000	47.2	58.6	66.0	164.8	35.1	38.6	154.2	118. 1	180.0
2001	59.5	57.8	71.6	137.0	33.6	40.4	118.0	109. 4	149.9
2002	71.3	85.5	139.0	115.4	24.6	35.1	166.5	86.5	117.3
2003	108.5	95.5	132.2	246.0	42.5	42.1	160.7	103. 9	134.7
2004	165.9	129.8	184.3	252.6	49.8	54.7	210.9	109. 3	132.1
2005	138.8	106.2	182.5	261.8	53.8	63.2	232.9	110. 2	136.1
2006	109.3	79.2	321.5	198.5	65.3	83.4	277.4	117. 4	157.9
2007	103.0	71.8	276.6	211.7	102.8	92.0	293.8	113. 8	138.9
2008	57.2	49.1	185.4	98.9	36.6	28.0	177.5	64.8	70.6
Average	63.9	53.9	98.7	169.0	34.7	40.2	171.9	91.4	130.3
Standard Deviatio n	42.8	35.8	90.3	59.0	22.6	20.5	53.4	25.7	32.6

Table 9: Market Turnover Ratios (as a percentage)

Year	Jamaica	Trinidad	Barbados	Singapore	Brazil	Norway	South Africa	New York	London
1990 ⁴⁵	3.2	8.0	1.8	61.5	35.4	53.8	7.7	49.2	63.9
1991	5.2	11.9	3.0	44.2	32.0	48.4	5.7	49.2	60.3
1992	6.1	4.3	0.8	39.2	38.1	50.9	4.9	47.9	69.3
1993	19.9	10.6	1.4	90.8	38.1	77.5	5.7	57.0	83.3
1994	8.9	7.8	1.1	62.5	46.4	55.3	7.7	58.7	89.7
1995	22.8	12.0	0.6	44.6	33.9	61.5	6.7	62.9	92.6
1996	7.0	7.4	0.8	39.6	53.5	71.6	10.5	65.0	94.6
1997	5.8	4.3	1.0	57.2	80.7	80.4	19.8	73.5	109.4
1998	2.6	4.5	1.4	57.7	67.1	76.2	34.1	76.4	132.2
1999	2.1	2.2	1.0	72.9	43.1	103.2	52.5	82.4	130.0
2000	2.2	2.9	2.8	53.9	44.7	107.4	49.7	96.3	166.8
2001	2.7	3.3	0.6	52.2	30.8	93.3	64.3	93.0	189.3
2002	2.6	2.2	24.0	57.6	30.1	81.6	78.1	102.9	199.0
2003	4.7	4.1	5.2	73.5	38.2	95.4	53.6	95.3	167.3
2004	4.0	4.3	3.4	58.6	37.4	113.5	45.8	96.7	194.1
2005	4.9	4.0	1.7	49.0	41.1	141.0	40.7	107.3	191.7
2006	4.5	2.6	20.9	56.2	46.6	172.4	49.4	150.0	221.0
2007	3.3	2.3	4.0	82.6	57.5	173.1	55.0	187.4	270.3
2008	4.0	2.9	3.2	64.6	73.8	177.3	60.3	270.6	219.3
Average	6.4	6.1	4.2	58.9	45.7	96.5	34.3	95.9	144.4

⁴⁵ Due to the unavailability of market capitalization data for 1989, the turnover ratio for the six selected benchmarks was calculated without using an average of the previous and current year's figures. The use of the 1990's capitalization was deemed to be sufficient as the actual ratio would not have deviated too much had data for 1989 been available.

**Table 10: Total Value Traded Ratios (as a Percentage) for the JSE, the TTSE and the BSE
(1969 – 2008)**

Year	Jamaica	Trinidad & Tobago	Barbados
1969	0.7	N/A	N/A
1970	0.3	N/A	N/A
1971	0.5	N/A	N/A
1972	0.8	N/A	N/A
1973	0.5	N/A	N/A
1974	0.5	N/A	N/A
1975	0.2	N/A	N/A
1976	0.1	N/A	N/A
1977	0.04	N/A	N/A
1978	0.3	N/A	N/A
1979	0.1	N/A	N/A
1980	0.1	N/A	N/A
1981	0.1	0.8	N/A
1982	0.2	2.8	N/A
1983	0.1	1.9	N/A
1984	0.3	1.0	N/A
1985	0.9	0.8	N/A
1986	2.6	1.1	N/A
1987	2.5	0.5	0.1
1988	0.7	0.7	0.1
1989	2.2	1.6	0.2
1990	0.6	1.1	0.3
1991	2.0	1.5	0.5
1992	5.0	0.4	0.1
1993	6.5	1.2	0.3
1994	3.2	1.0	0.3
1995	5.7	2.6	0.2
1996	1.9	1.9	0.3
1997	1.7	2.4	1.1
1998	0.7	2.9	1.4
1999	0.7	1.4	0.8
2000	1.0	1.7	1.9
2001	1.6	1.9	0.4
2002	1.9	1.9	33.4

2003	5.1	3.9	6.8
2004	6.7	5.6	6.3
2005	6.7	4.3	3.1
2006	4.9	2.0	32.5
2007	3.4	1.7	8.4
2008	2.3	1.4	7.0
<i>Average</i>	<i>1.9</i>	<i>1.8</i>	<i>4.8</i>

Source: Annual reports from the Barbados, Jamaica and Trinidad & Tobago Stock Exchanges.

Table 11: Comparison of Total Value Traded Ratios (as a percentage) for JSE, TTSE, BSE with selected benchmark stock exchanges

Year	Jamaica	Trinidad	Barbados	Singapore	Brazil	Norway	South Afric a	New York	London
1990	0.6	1.1	0.3	57.2	0.9	12.0	9.4	23.0	54.6
1991	2.0	1.5	0.5	41.9	1.7	9.7	7.2	25.6	53.3
1992	5.0	0.4	0.1	38.0	3.8	7.9	5.9	27.8	61.5
1993	6.5	1.2	0.3	143.6	6.2	14.9	8.0	34.6	89.5
1994	3.2	1.0	0.3	120.0	12.2	14.2	13.0	35.0	98.3
1995	5.7	2.6	0.2	75.9	7.4	16.7	11.5	42.0	101.1
1996	1.9	1.9	0.3	65.1	11.6	22.7	18.8	52.4	117.8
1997	1.7	2.4	1.1	77.3	21.9	31.4	30.0	70.0	148.9
1998	0.7	2.9	1.4	71.0	16.5	28.4	46.1	84.2	201.4
1999	0.7	1.4	0.8	130.0	14.3	35.7	65.2	97.1	230.4
2000	1.0	1.7	1.9	102.6	15.8	41.1	58.3	113. 3	314.2
2001	1.6	1.9	0.4	83.0	11.5	36.8	58.5	104. 1	313.0
2002	1.9	1.9	33.4	71.4	9.2	29.2	70.7	99.0	252.9
2003	5.1	3.9	6.8	98.6	12.0	34.7	60.7	88.9	197.7
2004	6.7	5.6	6.3	97.8	15.7	52.1	74.6	99.9	238.4
2005	6.7	4.3	3.1	96.3	18.7	77.6	83.1	114. 1	252.7
2006	4.9	2.0	32.5	129.5	25.4	120.4	120.7	165. 9	315.1
2007	3.4	1.7	8.4	228.4	44.9	141.1	149.2	211. 7	372.8
2008	2.3	1.4	7.0	142.8	44.9	98.4	142.8	236. 8	237.1
<i>Average</i>	<i>3.3</i>	<i>2.2</i>	<i>5.5</i>	<i>98.5</i>	<i>15.5</i>	<i>43.4</i>	<i>54.4</i>	<i>90.8</i>	<i>192.1</i>
<i>Standard Deviation</i>	<i>2.2</i>	<i>1.3</i>	<i>10.0</i>	<i>44.5</i>	<i>12.2</i>	<i>38.5</i>	<i>45.4</i>	<i>60.8</i>	<i>100.2</i>