



Munich Personal RePEc Archive

Convergence of Caribbean Stock Exchanges

Stacia Howard and Roland Craigwell

Research Department, Central Bank of Barbados, Department of
Economics, University of the West Indies, Cave Hill Campus,
Barbados

2010

Online at <http://mpra.ub.uni-muenchen.de/40930/>

MPRA Paper No. 40930, posted 29. August 2012 04:31 UTC

Convergence of Caribbean Stock Exchanges

Stacia Howard¹

Research Department
Central Bank of Barbados
P.O.Box 1016
Bridgetown
Barbados

and

Roland Craigwell

Department of Economics
University of the West Indies
Cave Hill Campus
Barbados

November, 2010

¹ Corresponding author; email: sphoward@centralbank.org.bb

Convergence of Caribbean Stock Exchanges

Stacia Howard and Roland Craigwell

Abstract

This paper uses daily data for market returns as well as for the cross-listed securities on the three main stock exchanges in the Caribbean: the Barbados Stock Exchange, the Trinidad and Tobago Stock Exchange and the Jamaica Stock Exchange to examine the beta-convergence and sigma-convergence of the markets. The results suggest that with respect to sigma-convergence, while the markets are becoming increasingly integrated, the convergence of the returns of the cross-listed securities is debatable, indicating some degree of information asymmetry. The results of the beta-convergence imply that the speed of convergence is still rather slow in comparison to other markets throughout the world.

JEL No: G29; O47; O54

Keywords: Stock Exchanges; Convergence; Caribbean

Introduction

The three main stock exchanges in the Caribbean – the Barbados Stock Exchange (BSE), the Jamaica Stock Exchange (JSE) and the Trinidad and Tobago Stock exchange (TTSE) – have struggled with inefficiency in their 30 odd years of existence. One main factor contributing to this lack of efficiency has been less than optimum liquidity levels, which are partially the result of extremely small markets by international levels. The largest market of the three is the JSE, with 39 ordinary shares listed at the end of 2008, while the smallest market, the BSE, has only 24 ordinary shares listed.

There are a number of reasons why there are so few companies opting to list on the exchanges. One reason that has been debated publicly is the difficulty some companies face when trying to meet the listing criteria. Since the vast majority of Caribbean companies are small, and the total number of companies operating in a given country is limited, there is a dearth of eligible companies. Moreover, within an industry there is sometimes only one eligible company, which makes analysis of the company difficult because there is no industry benchmark and no comparison company.

Another reason is the culture of the Caribbean businesses. In general, many companies are reluctant to go public, as they perceive it as a loss of control in the enterprise as well as potentially risky from a takeover standpoint. As such, most companies still source the bulk of their financing from banks and, to a limited extent, bond issuance. While the exchanges have been doing quite a bit of public relations to address this perception, the number of new securities listing each year continues to be very small if any at all.

A limited investor base offers yet another concern in Caribbean stock markets, an obstacle that has also been raised as a hindrance for companies that are considering listing on the exchanges. The populations in these countries are very small – Jamaica has the largest at 2.8 million while Barbados has a mere 276,000 people – and have lower income levels compared to more established markets – the gross domestic product (GDP) per capita of Jamaica and Barbados are

US\$7,400 and US\$19,300, respectively relative to US\$47,000 in the US². The combination of these factors significantly limits the investor pool of the stock markets. The JSE has made strides in addressing this constraint by aggressive marketing in developed markets and has succeeded in attracting a substantial amount of foreign investors to their market.

In recognition of these constraints, the BSE, JSE and TTSE have been seriously considering combining their markets into one Caribbean stock market. In addition to technical harmonisation, one tangible step in this direction was the decision to allow securities listed on one exchange to also list on one or both of the other exchanges. The commencement of cross-border trading in April 1991 allowed investors in these countries to have access to cross-listed securities without having to register with all three exchanges, while the cross-listed securities would have access to funds from an expanded investor pool. The intention was to create a larger market without necessitating the formal combination of the three exchanges, even though the ultimate goal remains one stock market instead of three.

This policy has been in place for more than a decade and to date, to the authors' knowledge, no work has been done to study whether this policy has indeed fostered greater convergence. Research undertaken so far has focused on investigating market efficiency (see Craigwell and Grandbois (1999), Robinson (2001) and Alleyne and Craigwell (2007) who studied the BSE; Koot et al. (1989), Agbeyegbe (1994) and Robinson (2005) who looked at the JSE; Sergeant (1995), Singh (1995) and Bourne (1998) who investigated the TTSE; and, Greenidge and Arjoon (2007), Watson (2009) and Lorde et al. (2009) who analysed all three exchanges). Some of these are quite dated but, except for Robinson (2001) and Watson (2009), all conclude that these markets show signs of weak form efficiency. No formal work has been found, however, that investigates the convergence of these markets and this paper is the first that attempts to shed some light in this area.

Research on stock market convergence in the literature usually approaches the topic by examining the betas for each market at the country level, i.e. the focus is on market betas and not individual stocks (as pioneered by Blume (1971)). For example, Jayasuriya and Shambora (2008)

² CIA World Factbook 2008

in a recent paper investigated the relationship between eleven emerging stock markets and the U.S. stock market using country level betas, estimated from a GARCH model while Gangemi, Brooks and Faff (1999) considered the convergence of eighteen developed markets using cross-sectional, mean reversion-based estimations of OLS-obtained country betas.

The preference in the literature for country level analysis is perhaps a result of little or no stocks that appear on all the markets under investigation. In our case, however, where the cross-listed stocks represent as much as 40% of the total number of listed securities³, it would be interesting to investigate convergence through the behaviour of these common securities, which would in turn shed some light on the convergence of the three markets involved. Conceptually, it is expected that while the absolute returns earned for a given security on the three exchanges may differ, the direction should be the same (i.e. the return is expected to be positive/negative regardless of the exchange) and the magnitude should be similar. Theoretically, therefore, it is irrelevant which exchange the security is listed on. In reality, differences in the returns of the cross-listed securities are observed, but a simple mapping of the percentage changes in the market indices suggests some level of co-movement. Thus, it is yet unclear if the markets are becoming increasingly integrated.

This study attempts to develop the work on Caribbean stock market convergence by examining whether there is β -convergence and σ -convergence amongst the cross-listed securities on the three exchanges in question. The remainder of the paper would therefore present some stylised facts on the three markets under investigation, explain the methodology and data to be used, discuss the results of the study and conclude with some suggestions for policymakers based on the findings.

Stylised Facts on the BSE, JSE and TTSE

Established in 1987, the BSE was the last of the three stock exchanges in the region to be formed. It followed the Jamaica Stock Exchange (JSE) in February 1969 and the Trinidad and Tobago Stock Exchange (TTSE) in October 1981. The types of securities traded on the three

³ The proportions of cross-listed securities on the BSE, TTSE and JSE are 33%, 40% and 26%, respectively.

exchanges include ordinary shares, preferred shares and fixed income securities, however, the BSE and TTSE allow the trading of government securities while the JSE does not. Trades were initially done using a manual open auction outcry method two days per week, on Tuesdays and Fridays, and then three days a week when Wednesday was added to the trading week. Effective March 2007, the BSE extended its number of trading days to a full working week, while the TTSE made the change in April 2008.

The stock market size as indicated by the number of companies listed on the stock market and the market capitalisation to GDP ratio are two measures of stock market development. The number of companies listed on the BSE increased from 13 to 24 over the period of 1989 to 2008. The growth for the other two exchanges are not quite as spectacular, with the number of companies listed on the TTSE rising from 36 in 1984 to 39 in 2008, while those listed on the JSE totalled 39 in 2008, slightly down from 40 in 1986. With respect to market capitalisation, the BSE also outperforms the other two exchanges, with a market capitalisation to GDP ratio of 185.6% in 2008 (compared to 16.2% in 1984) versus 98.6% for the JSE (up from 45.7% in 1991) and 49.2% for the TTSE, up from 45.7% in 1991 and 10.7% in 1984, respectively.

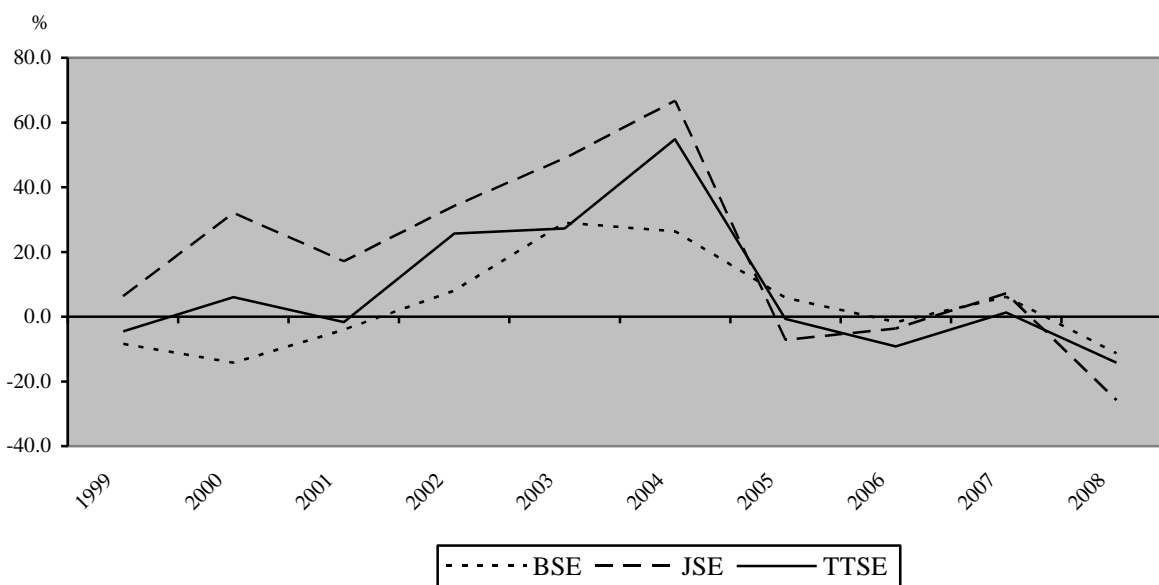
Despite the faster growth of the BSE in terms of the increase in the number of companies and the market capitalisation, Table 1 and Chart 1 show that on average the indices and market capitalisation of the JSE and TTSE grew at faster annual rates, than those of the BSE. Furthermore, the JSE and TTSE had higher average turnover ratios than the BSE. In contrast, the average rate of growth in the number of companies listed on the BSE exceeded those of the JSE and TTSE. The above results indicate that the JSE and TTSE are the more active exchanges and have experienced faster growth. Recently, Alleyne and Craigwell (2004) also noted that the volatility in Barbados is relatively low, possibly due to the share ownership on the BSE.

Table 1: Average Annual Growth Rate for the Performance Indicators of the Regional Stock Exchanges: 1989-2003

| Stock Exchange | Number of Listed Companies | Turnover Ratio | MCAP | Index |
|----------------|----------------------------|----------------|-------|-------|
| BSE | 4.9% | 1.7% | 25.5% | 7.3% |
| JSE | 0.8% | 5.9% | 37.1% | 30.9% |
| TTSE | 0.8% | 5.9% | 36.4% | 13.8% |

Notes: MCAP is defined as market capitalisation, that is, the value of all outstanding shares on the stock exchange. Turnover ratio is defined as turnover divided by market capitalisation; turnover being the market value of all shares traded during the year.

Chart 1: Returns of Caribbean Stock Markets (1999-2008)



Methodology and Data Description

The methodology to be utilised in this study considers two measures of stock market convergence, β -convergence and σ -convergence, which stem from the economic growth literature.

σ -convergence

The use of σ -convergence will allow the measurement of the degree of integration of the three stock markets and involves calculating the cross-sectional dispersion in the return spread of the cross-listed securities. When the cross-sectional standard deviation of a variable is trending downwards, the degree of financial integration is increasing. If the standard deviation converges to zero, it implies that full integration has been achieved. The calculation to be used is as follows:

$$\sigma_t = \sqrt{\left(\frac{1}{N-1}\right) \sum_{i=1}^N [\log(y_{it}) - \log(y_t)]^2}$$

where y_{it} is the yield on asset i at time t and y_t is the cross-section mean yield at time t . For our purposes, N can equal either two or three depending on the number of exchanges that the security is listed on.

β -convergence

Once the degree of integration is established using σ -convergence, β -convergence will be used to determine the speed of convergence of returns of the cross-listed securities by estimating the following regression:

$$\Delta R_{i,t} = \alpha_i + \beta R_{i,t-1} + \sum_{l=1}^L \gamma_l \Delta R_{i,t-1} + \varepsilon_{i,t}$$

where $R_{i,t}$ represents the return spread of specific assets (cross-listed securities or market indices) between market i and the benchmark market at time t (the regression is run using each market as the benchmark market given that there is no clear justification for the choice of one market over another), Δ is the difference operator, α_i is the country-specific constant, and $\varepsilon_{i,t}$ is the white-noise disturbance. β -convergence, however, does not imply integration and could in

fact be associated with σ -convergence. In the case of this study, both measures are used to give a more thorough understanding of the level of integration between the markets.

The dataset to be utilised is based on daily prices for each cross-listed stock for each market as well as the daily index for each market from 1998-2008, for which daily returns are calculated and then summarised in a monthly series. The start date for a particular series may differ from January 1, 1998, depending on when a stock first listed on a given market. For example, a security may not have been listed on more than one exchange until May 2005. In that case, the start date of the series would be May 1, 2005. Chart 1 shows the development of the returns for the markets as well as the cross-listed securities.

Results

σ -convergence

Table 2 presents the findings for each combination of market integration while Chart 2 illustrates them graphically. The results suggest that there are signs of convergence, as evidenced by the reduction in the standard deviation for all three markets from an average of 0.43 in 1998 to 0.10 in 2008. There are also some differences with respect to the convergence of certain markets. The results suggest that the BSE and the TTSE were the most integrated from the beginning of the dataset and have steadily become even more integrated, while the JSE has been becoming increasingly integrated with both the TTSE and the BSE over time.

The results for the cross-listed securities are displayed in Tables 3 –5 and Charts 3 – 5 and imply that the degree of integration is not as strong as at the market level. Nonetheless, there are signs of convergence as most of the securities have experienced declining standard deviations over time across the markets that they participate in. The only exceptions are TCL and SFC (as listed on the BSE and the TTSE), whose standard deviations started to rise again in the latter half of the 2000s, and CCMB and DBG, where no clear pattern can be observed.

β -Convergence

The results for β -convergence are presented in Tables 6 – 8. They indicate that all combinations of the benchmark markets and securities are significant. All of the values are negative, which implies that there is convergence of stock market returns. In general, the coefficients are between 1 and 1.5, indicating that the speed with which the differences in return differentials are levelled is reasonably fast. The only exceptions are DBG, RBTT and SFC, whose results have values above 2, suggesting a much slower response rate and GKC and OCM, which are between 0.7 and 0.9.

When compared to studies that considered international markets, the results indicate that the speed of convergence in the Caribbean region is relatively slow in comparison. The study conducted by Babetskii et al (2007) found that while the convergence between the new EU member states and the euro zone countries was also fast, averaging roughly 1 period, which in their case was one week as opposed to one month in the case of the Caribbean. It would therefore be useful to re-run the regressions using weekly data, rather than monthly data, to ascertain whether there would be any notable differences in the results.

Conclusion

The results suggest that while the BSE, JSE and TTSE are showing signs of integration at the market level, the results are less conclusive with respect to the cross-listed securities. This implies that it could be a situation where the economic development of the countries in question follow similar patterns, as the stock markets should be tied to the macroeconomy, but the stock markets themselves are not integrated to a sufficient enough degree that the returns of the cross-listed securities conclusively suggest integration. This may be due to the weak efficiency found in previous studies as well as information asymmetries across the various markets, as posited by Leon, Nicholls and Noel (2001) in their study which, amongst other aims, attempted to determine whether volume is a sufficient proxy for information flow on the TTSE. Market participants also suggest that liquidity differences in the various markets results in most of the trades being conducted in the most liquid market. This situation has implications for the speed of the price adjustment in the less liquid markets. To encourage further integration, therefore, policymakers should endeavour to improve the efficiency of the markets as well as foster faster

information dissemination. Further work should be aimed at revising the dataset to reflect daily or weekly values as opposed to monthly values given that stock markets have short memories.

References

- Agbeyegbe, T. (1994), “*Some Stylized facts about the Jamaican Stock Market*” Social and Economic Studies. 43 (4): 143-156.
- Alleyne, K. and Craigwell, R. C. (2007), “*Information efficiency and volatility in the Barbados Stock Exchange*” Central Bank of Barbados (mimeo).
- Babetskii, I., Komárek, L. and Komárková, Z. (2007), “*Financial Integration of Stock Markets Among New EU Member States and the Euro Area*” Czech National Bank, Working Paper Series 7
- Blume, M. (1971), “*On the Assessment of Risk*” The Journal of Finance Volume XXVI No. 1
- Bourne, C. (1998) “*Economic Aspects of the Trinidad & Tobago Stock Market*” In *Money and Finance in Trinidad & Tobago*, edited by C. Bourne and Ramesh Ramsaran. Institute of Social & Economic Research, University of the West Indies, Jamaica.
- Craigwell, R.C. and Grandbois, C. (1999) “*The performance of the Securities Exchange of Barbados*” Savings and Development 23(4): 434-455.
- Fama, E.F. (1970) “*Efficient capital markets: a review of theory and empirical work*” The Journal of Finance. 25(2): 383-417.
- Gangemi, M., Brooks, R. and Faff, R.W. (1999) “*Country Betas, Their Time Sensitivity And The International Crash of October 1987*” International Journal of Finance 11, pp. 1390-1399.
- Gangemi, M., Brooks, R. and Faff, R.W. (1999) “*Mean Reversion and the Forecasting of Country Betas: A Note*” Global Finance Journal 10, pp. 231-245
- Greenidge, K. and Arjoon, V. (2007) “*The Efficiency of Caribbean Stock Markets*” Central Bank of Barbados Working Paper
- Jayasuriya, S. and Shambora, W. (2008), “*The World is Shrinking: Evidence for Stock Market Convergence*” Economics Bulletin Volume 7
- Karamera, D., K. Ojah and J.A. Cole. (1999) “*Random walks and market efficiency tests: evidence from emerging equity markets*” Review of Quantitative Finance and Accounting. 13: 171– 188.
- Koot, R. J. Miles and G. Heitmann. (1989) “*Security risk and market efficiency in the Jamaican Stock Exchange*” Caribbean Financial Management. 5(2): 18-33.
- Leon, H., Nicholls, S. and Noel, D. (2001) “*Nonlinear Behaviour of Returns in an Emerging Stock Market*” Central Bank of Barbados Working Paper

Lorde, T., B.Francis and A. Greene. (2009) "Testing for Long-Run Co-movement, Common Features and Efficiency in Emerging Stock Markets: Evidence from the Caribbean", *Economic Issues*. 14, Part 2, 55-80.

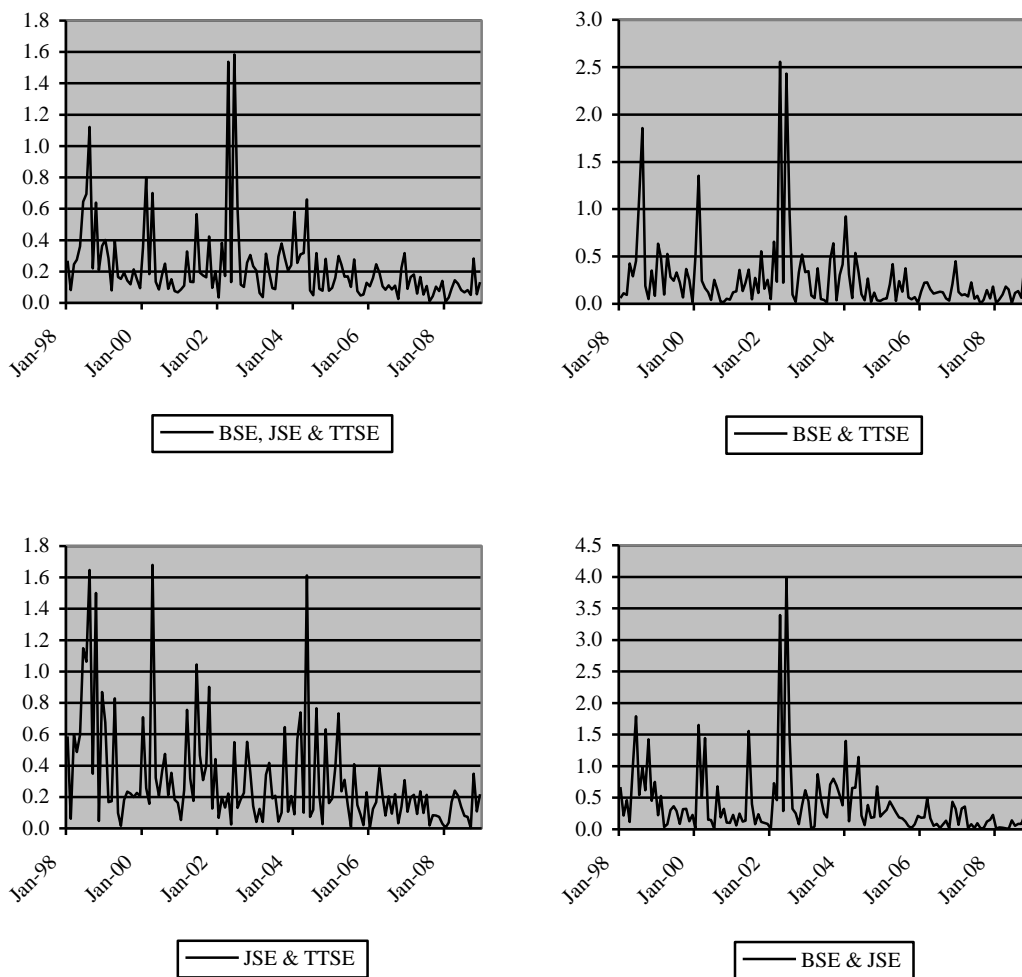
Rajan, R.G. and Zingales, L. (1998) "*Financial Dependence and Growth*" *The American Economic Review*. 88(3): 559-586.

Robinson J. (2001) "*Stock Price Behaviour in a Small Emerging Market: Tests for Predictability and seasonality on the Barbados Stock Exchange*" *Savings and Development*. 1: 103-113.

Robinson J. (2005) "*Stock Price Behaviour in Emerging Markets: Tests for Weak Form Market Efficiency in the Jamaican Stock Exchange*" *Social and Economic Studies*. 54(2): 51-69

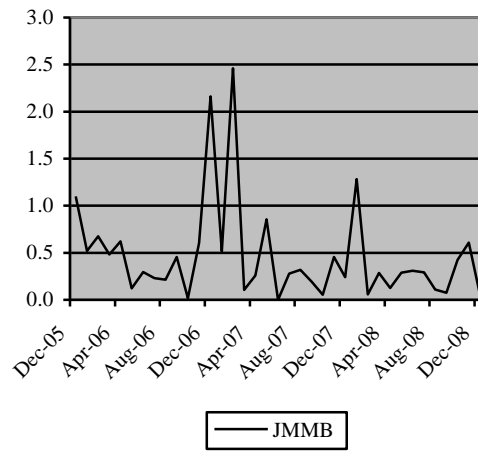
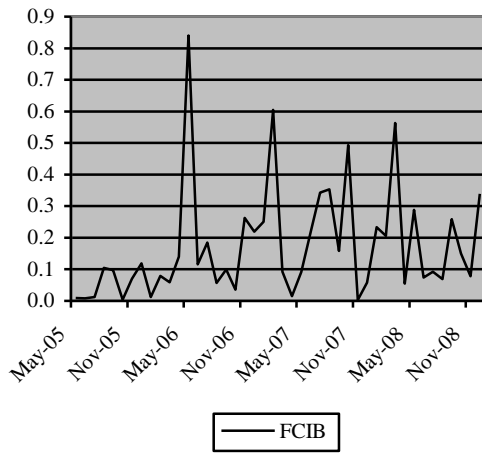
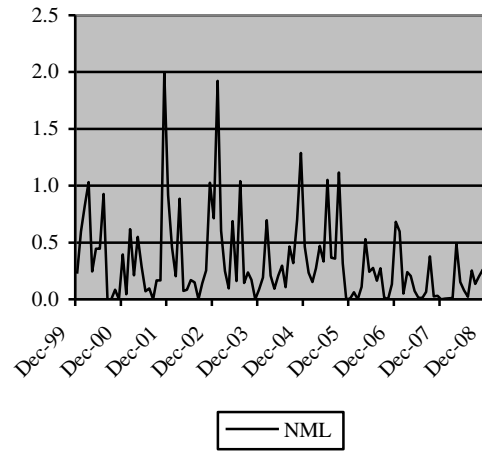
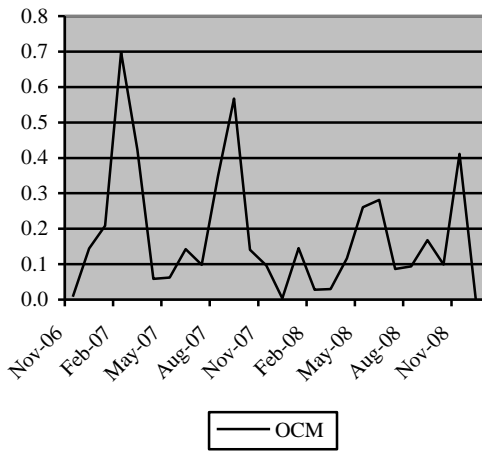
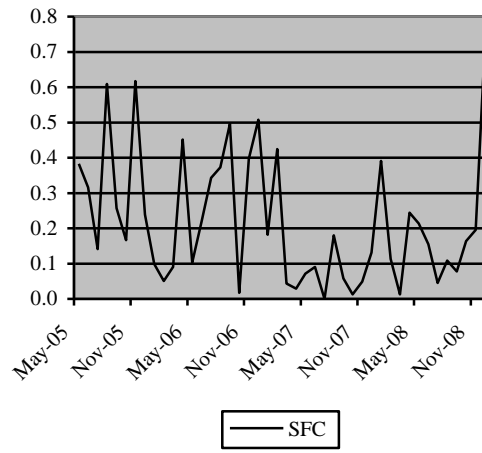
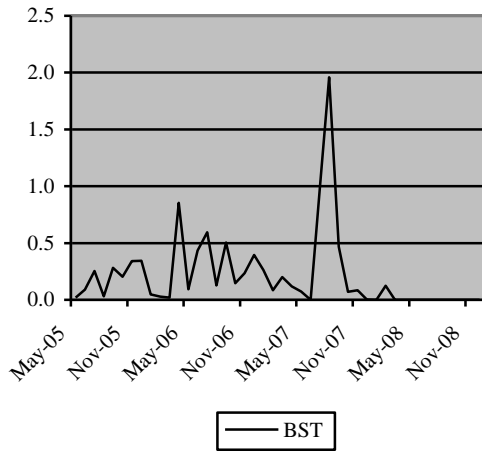
Sergeant, K. (1995) "*The Trinidad & Tobago Stock Exchange*" In *Insights into an emerging financial structure: the experience of Trinidad & Tobago*, edited by R. Ramsaran. Caribbean Centre for Monetary Studies. 189-226.

Singh, R.O. (1995) "*An examination of return predictability on the Trinidad & Tobago Stock Exchange*" In *Insights into an emerging financial structure: the experience of Trinidad & Tobago*, edited by R. Ramsaran. Caribbean Centre for Monetary Studies. 227-244.

Chart 2: σ -Convergence Results for Market Indices**Table 2: Summary of Sigma Convergence Results for Market Indices**

| | BSE, JSE & TTSE | BSE & TTSE | JSE & TTSE | BSE & JSE |
|------|-----------------|------------|------------|-----------|
| 1998 | 0.85 | 0.43 | 0.75 | 0.75 |
| 1999 | 0.40 | 0.30 | 0.27 | 0.24 |
| 2000 | 0.51 | 0.25 | 0.42 | 0.44 |
| 2001 | 0.44 | 0.23 | 0.44 | 0.28 |
| 2002 | 0.91 | 0.70 | 0.23 | 1.00 |
| 2003 | 0.40 | 0.24 | 0.21 | 0.45 |
| 2004 | 0.52 | 0.23 | 0.42 | 0.49 |
| 2005 | 0.30 | 0.14 | 0.24 | 0.21 |
| 2006 | 0.29 | 0.16 | 0.16 | 0.18 |
| 2007 | 0.20 | 0.10 | 0.12 | 0.13 |
| 2008 | 0.19 | 0.10 | 0.14 | 0.08 |

Chart 3: σ -Convergence Results for Securities Cross-listed on the BSE and TTSE



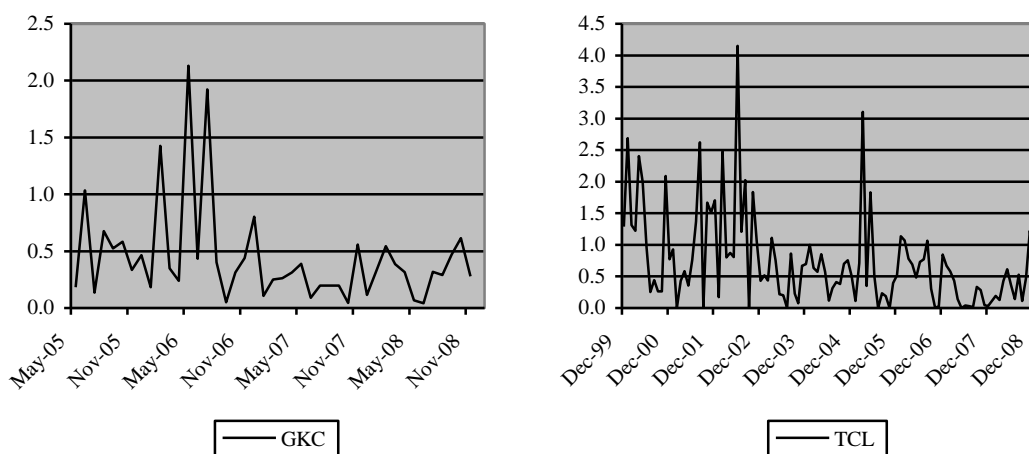
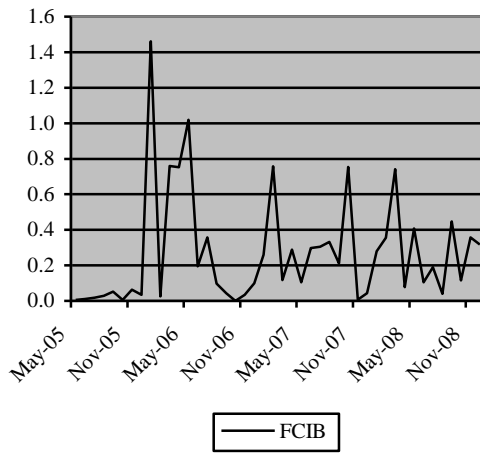
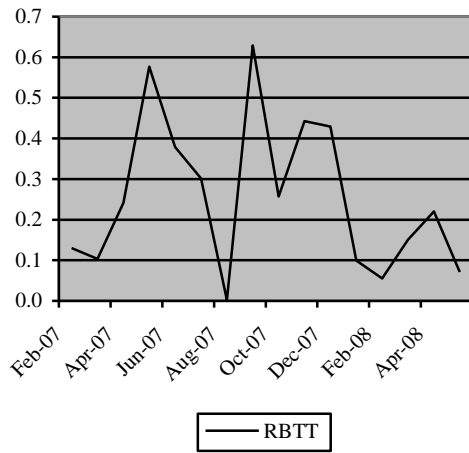
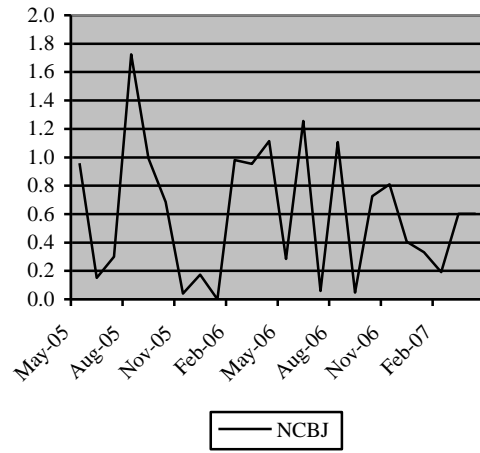
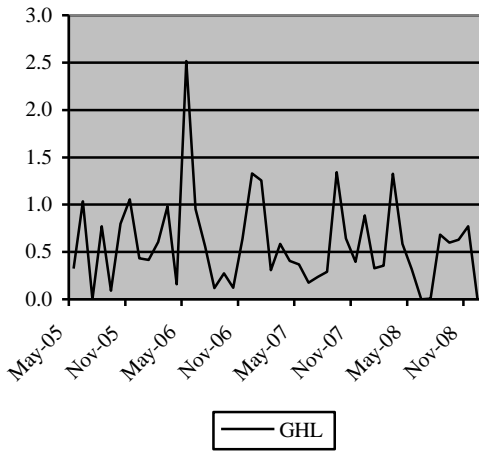
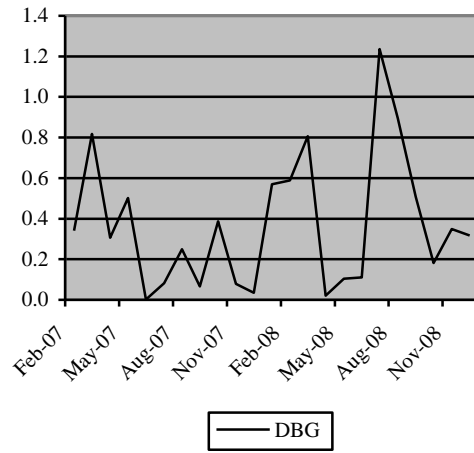
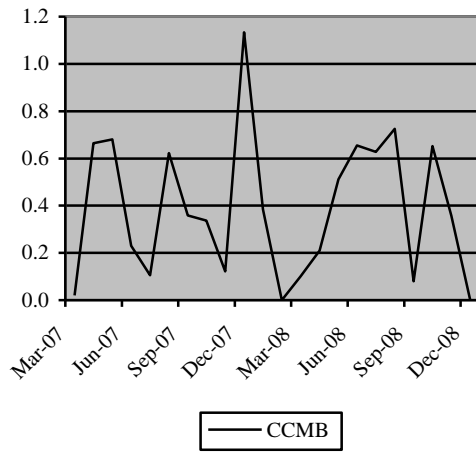


Table 3: Summary of σ -Convergence Results for Securities Cross-Listed on the BSE and TTSE

| | BST | SFC | OCM | NML | FCIB | JMMB | GKC | TCL |
|------|------|------|------|------|------|------|------|------|
| 1998 | | | | | | | | |
| 1999 | | | | 0.23 | | | | 1.29 |
| 2000 | | | | 0.42 | | | | 1.22 |
| 2001 | | | | 0.43 | | | | 0.99 |
| 2002 | | | | 0.35 | | | | 1.32 |
| 2003 | | | | 0.45 | | | | 0.48 |
| 2004 | | | | 0.42 | | | | 0.57 |
| 2005 | 0.20 | 0.34 | | 0.39 | 0.05 | 1.10 | 0.49 | 0.66 |
| 2006 | 0.29 | 0.26 | 0.08 | 0.21 | 0.18 | 0.53 | 0.72 | 0.66 |
| 2007 | 0.36 | 0.11 | 0.24 | 0.14 | 0.22 | 0.48 | 0.23 | 0.22 |
| 2008 | 0.01 | 0.20 | 0.14 | 0.14 | 0.20 | 0.33 | 0.33 | 0.42 |

Chart 4: σ -Convergence Results for Securities Cross-listed on the JSE and TTSE



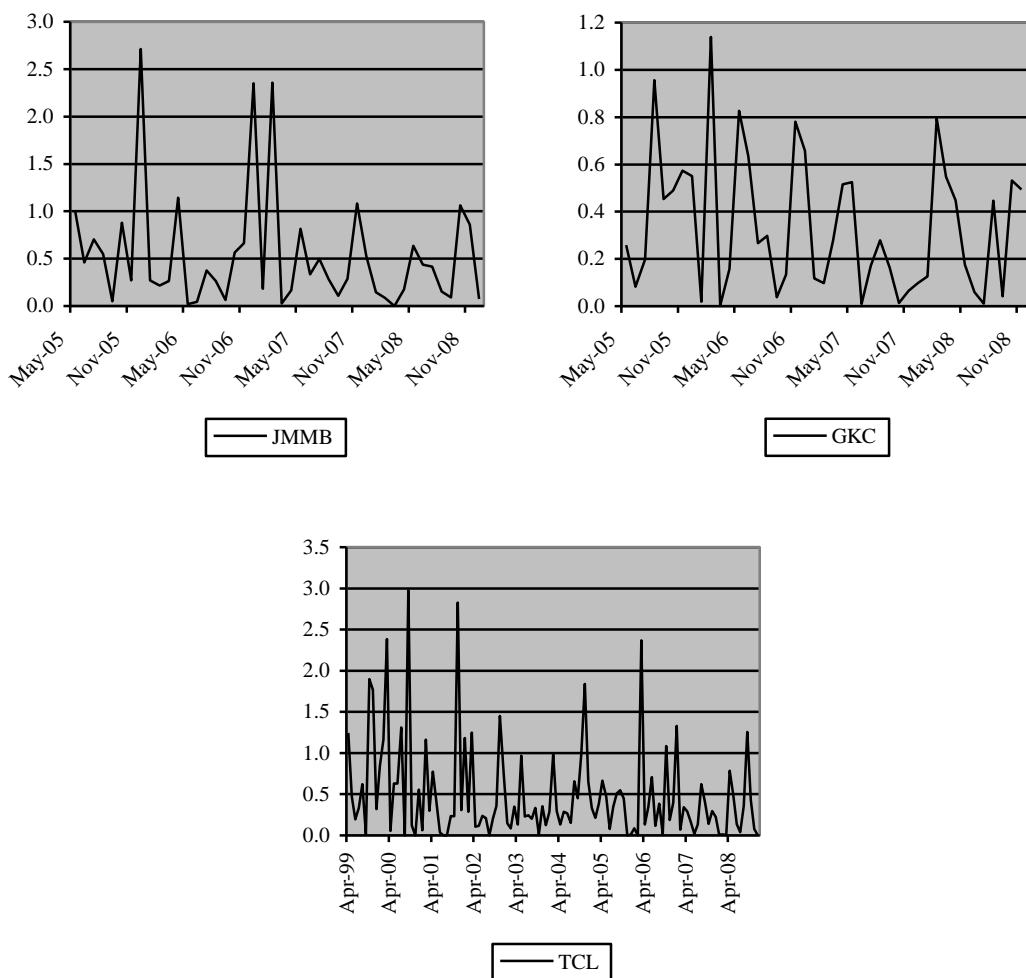
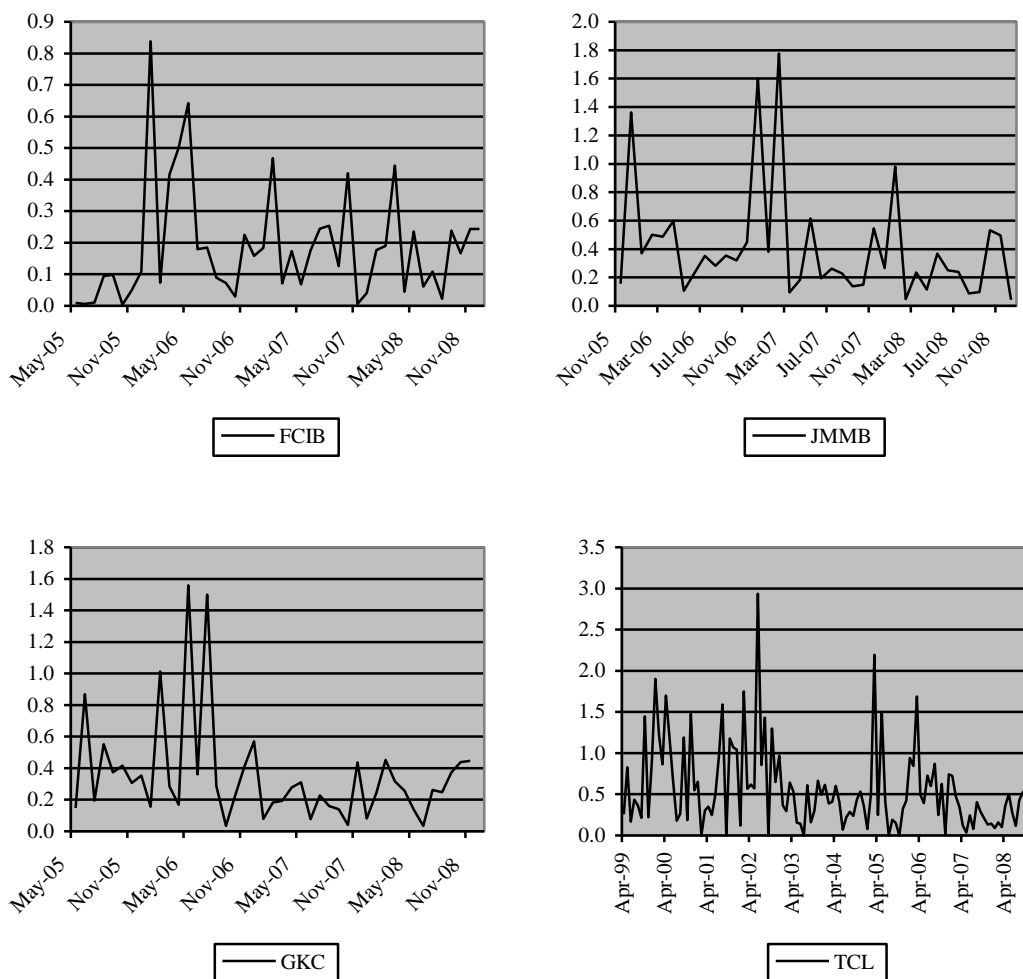


Table 4: Summary of σ -Convergence Results for Securities Cross-Listed on the JSE and TTSE

| | CCMB | DBG | GHL | NCBJ | RBTT | FCIB | JMMB | GKC | TCL |
|------|------|-----|-----|------|------|------|------|-----|-----|
| 1998 | | | | | | | | | |
| 1999 | | | | | | | | | 0.8 |
| 2000 | | | | | | | | | 0.9 |
| 2001 | | | | | | | | | 0.5 |
| 2002 | | | | | | | | | 0.5 |
| 2003 | | | | | | | | | 0.3 |
| 2004 | | | | | | | | | 0.6 |
| 2005 | | | 0.6 | 0.6 | | 0.0 | 0.8 | 0.4 | 0.3 |
| 2006 | | | 0.7 | 0.6 | | 0.4 | 0.5 | 0.4 | 0.5 |
| 2007 | 0.4 | 0.3 | 0.6 | 0.4 | 0.3 | 0.3 | 0.6 | 0.2 | 0.3 |
| 2008 | 0.4 | 0.5 | 0.5 | | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 |

Chart 5: σ -convergence Results for Securities Cross-listed on the BSE, JSE and TTSE**Table 5: Summary of σ -Convergence Results for Securities Cross-Listed on the BSE, JSE and TTSE**

| | FCIB | JMMB | GKC | TCL |
|------|-------------|-------------|------------|------------|
| 1998 | | | | |
| 1999 | | | | 1.08 |
| 2000 | | | | 1.90 |
| 2001 | | | | 1.32 |
| 2002 | | | | 1.96 |
| 2003 | | | | 0.73 |
| 2004 | | | | 0.76 |
| 2005 | 0.10 | 1.52 | 0.80 | 1.00 |
| 2006 | 0.57 | 0.94 | 1.09 | 1.36 |
| 2007 | 0.37 | 0.81 | 0.37 | 0.53 |
| 2008 | 0.36 | 0.58 | 0.58 | 0.79 |

TABLE 6: β -Convergence Results Using JSE as Benchmark Market

| <u>SECURITY</u> | | <u>TTSE</u> | <u>BSE</u> |
|-----------------|-------------|-------------|------------|
| Markets | Coefficient | -0.956433 | -1.023610 |
| | P-value | 0.0000*** | 0.0000*** |
| FCIB | Coefficient | -1.312780 | -1.511339 |
| | P-value | 0.0002*** | 0.0000*** |
| JMMB | Coefficient | -1.344889 | -0.852332 |
| | P-value | 0.0002*** | 0.0046*** |
| GKC | Coefficient | -1.257467 | -0.879507 |
| | P-value | 0.0011*** | 0.0000*** |
| TCL | Coefficient | -1.017916 | -1.091550 |
| | P-value | 0.0000*** | 0.0000*** |
| CCMB | Coefficient | -0.999181 | |
| | P-value | 0.0437** | |
| DBG | Coefficient | -2.174537 | |
| | P-value | 0.0018*** | |
| GHL | Coefficient | -1.376182 | |
| | P-value | 0.0001*** | |
| NCBJ | Coefficient | -1.089251 | |
| | P-value | 0.0368** | |
| RBTT | Coefficient | -2.147626 | |
| | P-value | 0.0368** | |

Notes: * Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

TABLE 7: β -Convergence Results Using BSE as Benchmark Market

| <u>SECURITY</u> | | <u>TTSE</u> | <u>JSE</u> |
|-----------------|-------------|-------------|------------|
| Markets | Coefficient | -1.097069 | -1.023610 |
| | P-value | 0.0000*** | 0.0000*** |
| FCIB | Coefficient | -1.311539 | -1.511339 |
| | P-value | 0.0001*** | 0.0000*** |
| JMMB | Coefficient | -1.063046 | -0.852332 |
| | P-value | 0.0015*** | 0.0046*** |
| GKC | Coefficient | -0.703604 | -0.879507 |
| | P-value | 0.0092*** | 0.0000*** |
| TCL | Coefficient | -1.267742 | -1.091550 |
| | P-value | 0.0000*** | 0.0000*** |
| NML | Coefficient | -0.943862 | |
| | P-value | 0.0000*** | |
| SFC | Coefficient | -2.426674 | |
| | P-value | 0.0000*** | |
| OCM | Coefficient | -0.877907 | |
| | P-value | 0.0370** | |
| BST | Coefficient | -1.499775 | |
| | P-value | 0.0001*** | |

Notes: * Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

TABLE 8: β -Convergence Results Using TTSE as Benchmark Market

| <u>SECURITY</u> | | <u>BSE</u> | <u>JSE</u> |
|-----------------|-------------|------------|------------|
| Markets | Coefficient | -1.097069 | -0.956433 |
| | P-value | 0.0000*** | 0.0000*** |
| FCIB | Coefficient | -1.311539 | -1.312780 |
| | P-value | 0.0001*** | 0.0002*** |
| JMMB | Coefficient | -1.063046 | -1.344889 |
| | P-value | 0.0015*** | 0.0002*** |
| GKC | Coefficient | -0.703604 | -1.257467 |
| | P-value | 0.0092*** | 0.0011*** |
| TCL | Coefficient | -1.267742 | -1.017916 |
| | P-value | 0.0000*** | 0.0000*** |
| CCMB | Coefficient | N.a. | -0.999181 |
| | P-value | | 0.0437** |
| DBG | Coefficient | N.a. | -2.174537 |
| | P-value | | 0.0018*** |
| GHL | Coefficient | N.a. | -1.376182 |
| | P-value | | 0.0001*** |
| NCBJ | Coefficient | N.a. | -1.089251 |
| | P-value | | 0.0368** |
| RBTT | Coefficient | N.a. | -2.147626 |
| | P-value | | 0.0368** |
| NML | Coefficient | -0.943862 | |
| | P-value | 0.0000*** | |
| SFC | Coefficient | -2.426674 | |
| | P-value | 0.0000*** | |
| OCM | Coefficient | -0.877907 | |
| | P-value | 0.0370** | |
| BST | Coefficient | -1.499775 | |
| | P-value | 0.0001*** | |

Notes: * Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

Appendix I: Cross-Listed Securities

| | |
|------|--|
| BST | Barbados Shipping and Trading Co. Ltd. |
| CCMB | Capital and Credit Merchant Bank Limited |
| DBG | Dehring Bunting & Golding Limited |
| FCIB | FirstCaribbean International Bank |
| GHL | Guardian Holdings Limited |
| GKC | Grace, Kennedy & Company Limited |
| JMMB | Jamaica Money Market Brokers Limited |
| NCBJ | National Commercial Bank Jamaica Limited |
| NML | Neal and Massy Holdings Ltd. |
| OCM | One Caribbean Media |
| RBTT | RBTT Financial Holdings Limited |
| SFC | Sagicor Financial Corporation |
| TCL | Trinidad Cement Limited |