

# Testing for Long-Run Comovement, Common Features and Efficiency in Emerging Stock Markets: Evidence from the Caribbean

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## ABSTRACT

*This study investigates comovement, common features and efficiency in CARICOM stock markets. The stock markets of Barbados, Jamaica and Trinidad and Tobago are examined for the period 1991:1-2006:12, using the techniques of cointegration and common feature testing. No evidence is found of long-run or short-run comovement, or common features. These findings imply that (1) the BSE, JSE and TTSE are weakly efficient; (2) markets are segmented; and (3) there may be benefits from regional diversification of asset portfolios.*

## 1. INTRODUCTION

SINCE THE SIGNING OF THE REVISED TREATY OF CHAGUARAMAS in July, 2001 by CARICOM Heads of Government, establishing the CARICOM<sup>2</sup> Single Market and Economy (CSME), efforts have accelerated for regional economic integration and harmonisation of regulatory frameworks. One of the proposals high on the regional agenda is to have a regional stock exchange, which would facilitate easier cross-listing and cross-border trading of securities, as it is widely viewed as an essential step in deepening the integration process of the region.

Benefits of the proposed Caribbean stock market, it is hoped, include: increased market depth to involve a pool of more than 15 million people across the region; more and easier access to financing for firms; more merger opportunities and thus increased prospects of benefiting from economies of scale; lower liquidity risks; lower transaction costs; increased investment opportunities and national treatment for CARICOM financial institutions wishing to do

business in neighbouring member states. The increased ease of investing in regional securities would also allow investors to diversify their asset portfolios more readily, reducing country risk in addition to firm risk. Harvey (1993) points out that emerging markets have high average returns, low overall volatility, and low exposure to world factors. Higher returns and lower risk could therefore be obtained by investors incorporating stocks from other Caribbean countries in their portfolios. This risk/return trade-off, however, depends on the degree of comovement in stock markets across the Caribbean.

For the majority of investors and asset managers in the Caribbean - who are restricted by law in many countries to mainly regional investment - the questions of whether there is comovement of CARICOM equity markets, and whether the phenomenon, if it exists, is permanent or temporary, are critical. The issue is an important one in terms of the benefits of portfolio diversification, since comovement and the presence of common trends imply that in the long run markets will move together, with the consequence that benefits to diversification would be eradicated over the long run (Kasa, 1992); that is, international or regional diversification is only beneficial if stock markets in different countries do not move together. Further, comovement enhances the effects of spillovers and can increase the risk of local market disruptions spreading to other countries.

The literature on the comovement of international markets has grown rapidly. It includes, among others, Shiller (1989), Hamao *et al* (1990), Kasa (1992), Longin and Solnik (1995), Karolyi and Stulz (1996), Engsted and Lund (1997), and Engsted and Tanggaard (2002). Shiller (1989) undertook a study of the comovement between United States (US) and United Kingdom (UK) stock markets from 1919-1987, and found that stock prices and dividends in the two countries exhibit comovement over time. Engsted and Tanggaard (2002), analysing the same data as Shiller (1989) but updated to 1999, also find evidence of comovement between US and UK stock markets and attribute this comovement to common real shocks to both countries. Hamao *et al* investigate the relationships between stock exchanges in New York, London and Tokyo using an ARCH-type model and find significant spillovers of prices and price volatility. Kasa (1992) and Engsted and Lund (1997) examine comovement among several countries and find that international stock prices are cointegrated. Using a GARCH model, Longin and Solnik (1995) find evidence of an increasing trend in the correlations among international equity markets and that the correlation between these returns is dynamically changing. Karolyi and Stulz (1996) study the indices in the US and Japan and discover evidence of changing correlations in the daily returns of these countries.

The aforementioned studies, like most in the literature on the international comovement of stock prices, have focussed on developed countries. The literature on emerging countries is much smaller. Studies include: Choudry (1997), Christofi and Pericli (1999), Scheicher (2001), Chen *et al* (2002), Fujii (2005), and Beine and Candelon (2007). Choudry (1997) uses cointegration

and error correction models to examine the long-run relationship between six Latin American markets and the US market, and finds evidence of a long-run relationship and significant causality among these markets. Christofi and Pericli (1999) find evidence of significant cross-market linkages in Argentina, Brazil, Chile, Columbia and Mexico using a vector autoregressive (VAR) model with a multivariate exponential GARCH process. Chen *et al* (2002) also investigate the relationship of equity markets in Argentina, Brazil, Chile, Colombia and Mexico, along with Venezuela, and report that diversification benefits are limited when investing in these markets, in particular because of their high comovement. Using a similar methodology to Christofi and Pericli (1999), Scheicher (2001) studies the regional and global integration of stock markets in Hungary, Poland and the Czech Republic. The main result is the existence of both regional and global shocks in market returns, but only regional innovations to volatility. Fujii (2005) studies the intra- and inter-causal linkages among eight emerging stock markets in Asia and Latin America. Using standardised residuals from an autoregressive process and a GARCH(1,1) model to calculate the residual correlation functions for the first and second moments of stock returns, the author finds the existence of significant causal linkages both within each region and across the two regions. In addition, the causal linkages are found to be stronger during the time of major financial crises. Finally, Beine and Candelon (2007) investigate the impact of trade and financial liberalisation on the degree of stock market comovement using a panel of 25 emerging economies. Their results offer evidence which suggests that trade and financial liberalisation reforms have a positive impact on the degree of cross-country stock market linkages.

While studies on stock market comovement in emerging economies have increased, to the best knowledge of the authors, none have been conducted on stock markets in the Caribbean. In this paper, we investigate this issue for three stock markets in the Caribbean, Barbados, Jamaica, and Trinidad and Tobago, using monthly observations from 1991 to 2006. These countries were chosen because their exchanges have existed for a much longer period of time than the other exchanges in CARICOM, and hence more data are available for investigation.

The study addresses three main questions: whether there is long-run or short run comovement among or between stock prices on the indexes of Barbados, Jamaica, and Trinidad and Tobago; whether there are any common features between these markets; and whether any or all of the markets are efficient. The study also adds to the sparse body of literature on stock market dynamics in emerging economies.

The paper proceeds as follows. Section 2 will provide a select overview of the stock markets in Barbados, Jamaica and Trinidad and Tobago. Section 3 will describe the data used in the study and outline the statistical methods employed. In Section 4 we present the results and analysis and in Section 5 provide some concluding remarks.

## 2. OVERVIEW OF CARIBBEAN STOCK MARKETS

This section discusses the status and evolution of the exchanges in the Caribbean. The three major stock exchanges in the Caribbean are the Jamaica Stock Exchange (JSE), Trinidad and Tobago Stock Exchange (TTSE) and the Barbados Stock Exchange (BSE). Other much less established exchanges in the region can be found in The Bahamas, Belize, the Eastern Caribbean<sup>3</sup>, Guyana and Suriname. This study, however, focuses on the BSE, JSE, and TTSE.

### *Listing requirements*

The youngest market, the BSE, commenced operations in June, 1987. To be listed on the BSE, companies must (1) be public companies, defined as a corporation with share capital which is or was part of a distribution to the public or is intended for distribution to the public; (2) must a for-profit entity with net assets of at least BDS\$1,000,000 (BBD\$2 = USD\$1);<sup>4</sup> (3) demonstrate adequate working capital; (4) have had a positive dividend profile over the three preceding years; and be incorporated in Barbados.

The TTSE commenced operations in October 1981 and is the second oldest exchange in the Caribbean. A company wishing to make its stocks available for trading must generally meet the following criteria: (1) it must be a public company, with more than 50 stockholders; (2) more than 25 per cent of the equity securities should be in public hands; (3) must have its securities registered by the Securities and Exchange Commission (TTSEC); (4) must enter into a listing agreement with the TTSE and Trinidad and Tobago Central Depository (TTCD); and the company must have a minimum market capitalisation of TTD\$4,000,000.<sup>5</sup>

The JSE is the oldest exchange, its trading activities officially commencing in February, 1969. To be listed on the JSE, a company must be (1) incorporated or registered in Jamaica; (2) the listing must be common shares, preference shares or corporate bonds; (3) the total issued share and loan capital of the company must be at least JMD\$200,000; the share capital portion being not less than JMD\$100,000; (4) in the case of ordinary shares, there must be a minimum of 100 shareholders holding at least 20 per cent of the issued ordinary capital; and (5) all of the issue of the security which the company wishes to list on the exchange is to be issued and fully paid, at the date the application is received at the exchange.

Each exchange is privately owned and run by boards consisting mainly of brokers and representatives from the business communities and legal fraternity and, in some cases, government or central bank representatives.

### *Trading on the exchanges*

When the BSE opened in 1987, trading occurred on Tuesday and Friday. In February 2003, the number of trading days increased to three; Tuesday, Wednesday and Friday. This three-day trading week continued up until the

end of February, 2007 when a five-day trading week was introduced. The market opens at 10 a.m. and closes at 1:00 p.m. Since 2001, trading on the BSE has been conducted on a continuous electronic basis, having switched from the manual, open auction outcry method of trading.

In 1991, the first year of the sample under study, trading on the JSE occurred three days each week, Tuesday, Wednesday and Thursday. By October of the same year, another trading day was added, Monday. This lasted until January 2001, when daily trading commenced. The market runs from 9:30 a.m. to 1:30 p.m. each day. Trading on the JSE became automated in 2000.

Trading on the TTSE took place on Tuesday, Wednesday and Friday from 1991 until the end of 2006, the last year of the sample under study and thence until the end of March, 2008; daily trading commenced in April 2008. The market opens at 9.30 a.m. and trading is done on a continuous basis until the market closes at 2:00 p.m. Until 2005, when trading became automated, securities were traded on a trade-for-trade basis with movements of physical paper between brokers.

Brokers on each exchange tend to act in two capacities, both to execute trade orders and to trade based on their own inventory. However, none of the exchanges allow short sales. Further, on each exchange, trades must take place through registered brokers and there are few in each market: eight in Barbados; eleven in Jamaica; and six in Trinidad and Tobago.

#### *Listed companies*

At the end of 1969, 34 companies were listed on the JSE. Since then the number has fluctuated (Table 1). The number peaked in 1995 and has been on a downward trend since; although the smallest number of listed companies was in the period 1982-1984. By the end of 2006, companies listed came from seven main sectors and a residual group classified as Other (Table 2). Finance comprises the largest portion (25 per cent) of all listed companies, followed closely by Manufacturing (21 per cent).

Similar to the JSE, there has been marked fluctuation in the number of listed companies on the TTSE (Table 1). From 1984-1985, the number of companies listed reached its peak of 36, declined over the next decade, but has recovered somewhat over the last 10 years. By the end of 2006, companies were drawn from seven main sectors and a residual group classified as Other (Table 2). Non-Banking Finance (19 per cent) and Banking (14 per cent) are the two largest groups of listed companies.

In contrast to the JSE and TTSE, the number of companies listed on the BSE has grown steadily from 12 in 1987 to 27 in 2006 (Table 1). These companies are classified into eight main sectors and Other by the BSE (Table 2). The largest is Conglomerates (24 per cent) followed by Manufacturing (14 per cent).

**Table 1: Number of Listed Companies**

Year	BSE	JSE	TTSE	Total	Cross listings				Total	% Cross-Listed Companies
					BSE & JSE Only	BSE & TTSE Only	JSE & TTSE Only	BSE & JSE & TTSE		
1969		34		34						
1970		38		38						
1971		38		38						
1972		40		40						
1973		41		41						
1974		40		40						
1975		38		38						
1976		43		43						
1977		43		43						
1978		40		40						
1979		39		39						
1980		41		41						
1981		33	28	61						
1982		32	33	65						
1983		32	34	66						
1984		32	36	68						
1985		33	36	69						
1986		36	34	70						
1987	12	41	34	75						
1988	12	44	34	90						
1989	13	44	31	88						
1990	14	44	30	88						
1991	14	44	29	87						
1992	15	48	28	91						
1993	16	48	26	90						
1994	18	50	27	95						
1995	18	51	27	96						
1996	19	50	27	96						
1997	18	49	25	92						
1998	20	47	26	93	0	2	0	0	2	2.15
1999	22	44	28	94	1	3	0	1	5	5.32
2000	22	44	28	94	0	4	0	1	5	5.32
2001	25	42	30	97	0	4	0	2	6	6.19
2002	23	40	30	93	0	4	0	3	7	7.53
2003	24	41	32	97	1	4	1	3	9	9.28
2004	24	40	34	98	0	4	1	4	9	9.18
2005	26	41	34	101	0	4	1	5	10	9.90
2006	27	44	33	104	0	4	1	5	10	9.62
Avg.	19.1	41.29	30.54	72.24	0.22	3.67	0.44	2.67	7.00	7.17
S. Dev.	4.84	5.22	3.37	24.72	0.44	0.71	0.53	1.80	2.74	2.62
Min.	12	32	25	34	0	2	0	0	2	2.15
Max.	27	51	36	104	1	4	1	5	10	9.9

Sources: Barbados Stock Exchange, Jamaica Stock Exchange and Trinidad and Tobago Stock Exchange.

**Table 2: Sectoral Distribution of Companies on BSE, JSE and TTSE**

<i>BSE</i>	<i>Fraction (%)</i>	<i>JSE</i>	<i>Fraction (%)</i>	<i>TTSE</i>	<i>Fraction (%)</i>
Tourism	4	Tourism	10	Trading	11
Trading	7	Finance	25	Non-Banking Finance	19
Utilities	7	Communications	5	Banking	14
Banking	11	Conglomerates	7	Property	6
Conglomerates	24	Insurance	3	Conglomerates	11
Insurance	11	Manufacturing	21	Manufacturing I	17
Manufacturing	14	Retail	10	Manufacturing II	11
Mutual Funds	4	Other	19	Other	11
Other	18				

Sources: Barbados Stock Exchange, Jamaica Stock Exchange and Trinidad and Tobago Stock Exchange.

Overall, there is a strong presence of financial companies on each exchange. In Barbados, 26 per cent of the companies are financials (Banking, Insurance and Mutual Funds); in Jamaica, 28 per cent (Finance and Insurance); and in Trinidad and Tobago, 33 per cent (Non-Banking Finance and Banking). Interestingly, even though Barbados and Jamaica depend heavily on the tourism sector for job creation and economic growth, very few firms in each country's tourism sector are listed. Only 4 per cent and 10 per cent respectively of the listed firms on the BSE and JSE belong to this sector. It has been suggested the reason may lie in the fact that most of the equity capital invested in this sector originates from outside of the Caribbean, or because of direct investments by governments who are not inclined to privatise and list their shares in these entities on the stock exchange (CARICOM Secretariat, 2005). Another reason advanced is that several tourism-based companies are family-owned and/or controlled and the principal partners in these firms have ready access to commercial bank credit where they are able to obtain financing on preferential terms for working capital and other purposes.

To get a better sense of the size of the market in each country, the number of listed firms is compared with the number of registered firms in 2004. Comparison is also made with the United States (US), the United Kingdom (UK) and Canada (Table 3). While all registered firms from each country obviously do not meet the minimum requirements to be listed, it is interesting to note that the proportions of listed companies in Barbados, Jamaica and Trinidad and Tobago respectively are very similar to those from the US, UK and Canada.

The reluctance of firms in Barbados, Jamaica and Trinidad and Tobago, specifically, and the Caribbean in general, to list on stock exchanges, is as a result of a conflation of three major issues related to the Caribbean business environment. These are: (1) the legacy of ownership of the firms; (2) the structure of the capital markets; and (3) the regulatory framework of the respective domestic capital markets. Most firms in the Caribbean utilise private ownership primarily as a means of retaining effective control by familial interests.

Firms in the Caribbean have a history of using debt to finance their enterprises. Family concerns are generally reluctant to adopt the governance systems, especially the disclosure requirements for publicly owned and controlled firms. Moreover, these firms are even more reluctant to remove the restrictions on share ownership required for public companies. Many of these concerns find the carrying cost of such a governance system unnecessary and onerous.

**Table 3: Listed and Registered Firms in Barbados, Jamaica and Trinidad and Tobago 2004**

<i>Country</i>	<i>No. of Listed Firms</i>	<i>No. of Registered Firms</i>	<i>Fraction Listed (%)</i>
Barbados	24	47,691	0.050
Jamaica	40	48,528	0.082
Trinidad and Tobago	34	28,621	0.119
United States	1,539	5,767,127	0.027
United Kingdom	3,088	2,155,063	0.143
Canada	2,800	2,377,107	0.118

Sources: Barbados Stock Exchange, Jamaica Stock Exchange, Trinidad, Tobago Stock Exchange, US Census Bureau, *UK Government Register of Companies*, *Canada Business Register* and *CARICOM Trade and Investment Report 2005*.

Another characteristic about the legacy of ownership of firms in the Caribbean is the fact that a significant number of locally registered firms are branches of larger metropolitan firms. For example before independence (in the 1960s for Barbados, Jamaica and Trinidad and Tobago), most firms in the Caribbean were owned by foreign interests. Since independence, that has changed, but significant foreign ownership still exists. This means that the decision on whether or not a firm should list is sometimes highly dependent on the global strategy of the parent firm.

The securities markets of the countries of the Caribbean have not had a long history. The average age of the BSE, JSE and TTSE at the end of 2006 is 27 years. Therefore, the supportive institutional structures of the securities market have only recently emerged and in large measure are yet untested by the market. There is also a prevailing view by entrepreneurs from various regional firms that information asymmetries exist. Therefore there is a lack of confidence in utilising the securities markets in the Caribbean in order to access capital.

Another feature of Caribbean capital markets is that they are perceived as being non-transparent and controlled by a few major market players. These perceptions arise partly as a result of the number of interlocking directorships that exist within the respective countries' markets. For Barbados, Beckles (1989) provides empirical evidence of significant concentration of shareholding and overlapping directorships in the hands of 34 Barbadian families. In Trinidad and Tobago, work by the TTSEC has shown that, of 34 listed com-



panies surveyed, 10 directors sat on boards controlling 55 per cent of the total assets and 67 per cent of the total market capitalisation of the surveyed companies. This case of interlocking directorates in Barbados and Trinidad and Tobago is expected to be the same for Jamaica and other Caribbean countries, given their similar historical and economic backgrounds. One possible explanation for this is that there are a limited number of independent experts with requisite skills; and the economies are small. The skills and experience which are available therefore have to be shared by a number of enterprises. A much less charitable explanation is that the 'old boy network' exists.

While the BSE, JSE, and TTSE entered into an agreement to cross-list and cross-trade stocks in 1991, it was not until 1998 that any companies actually did so (Table 1). Since 1998, the total number of cross-listed stocks grew from two to ten by the end of 2006. As a fraction of the total number of listed companies across all three exchanges, the number of cross-listings increased from just over two per cent in 1998 to just under ten per cent by the end of 2006.

In general, there are more cross-listings between the BSE and TTSE, than between any other pair of exchanges, or amongst all three exchanges simultaneously, except for 2005-2006 when five companies were cross-listed on each exchange concurrently. At the end of 2006, the BSE had the greatest proportion of cross-listed firms, with 33 per cent of the listed firms being cross-listed entities, followed by the TTSE with 30 per cent, and the JSE with 14 per cent. However, the TTSE had the greatest number of cross-listed firms, with ten. Indeed, all companies which are cross-listed between the three exchanges either pairwise or across all three simultaneously are listed on the TTSE.

#### *Stock market indicators*

Table 4 presents summary statistics for each index for the length of time from when it came into existence until 2006, except where noted. There is very infrequent trading on each exchange, particularly on the BSE which only averages 1900 transactions a year. In comparison, the average number of transactions is nine times higher on the JSE and five times higher on the TTSE. The volume of trading is also significantly higher on average on the JSE (822,779,947 shares) and TTSE (105,788,786 shares) than on the BSE (62,284,580 shares). Thin trading and low trading volumes may be a result of the fact that share ownership is highly concentrated, a point alluded to earlier.

Despite a much smaller number of transactions and lower volume, the average annual value of traded shares on the BSE is higher than on both the JSE and TTSE. This suggests that share prices on the BSE are generally higher than share prices on the other two exchanges. In the same vein, even though there are substantially more companies on the JSE than on the other two exchanges, market capitalisation on the TTSE (USD\$3,393,667,095) is substantially higher on average than the JSE (USD\$2,467,070,098); market capitalisation on the BSE averages USD\$1,942,300,082.

**Table 4: Stock Market Indicators**

	BSE	JSE	TTSE	Total
<i>No. of Transactions<sup>a</sup></i>				
Average	1,900.67 (7.7%)	17,787.95 (72.0%)	9,241.46 (37.4%)	24,711.26
Std. Dev.	1,980.46	21,695.30	8,449.11	29,418.85
Min	428	420	1,256	420
Max	6,390	86,875	34,946	128,211
<i>Volume traded</i>				
Average	62,284,580 (6.7%)	822,779,947 (88.7%)	105,788,786 (11.4%)	927,943,106
Std. Dev.	131,200,891	1,510,517,059	99,700,862	1,622,867,115
Min	1,480,057	2,185,000	5,580,494	2,185,000
Max	514,495,823	5,639,412,000	436,467,503	5,873,091,066
<i>Value Traded (US\$)<sup>p</sup></i>				
Average	177,472,966 (52.8%)	123,824,596 (36.8%)	157,620,910 (46.9%)	336,258,012
Std. Dev.	345,762,516	177,892,782	196,491,235	519,391,480
Min	1,781,773	1,259,659	9,578,084	1,259,659
Max	1,036,434,843	651,946,896	737,251,821	1,998,485,100
<i>Market Cap. (US\$)<sup>q</sup></i>				
Average	1,942,300,082 (30.9%)	2,467,070,098 (39.3%)	3,936,667,095 (62.7%)	6,281,368,596
Std. Dev.	1,834,613,739.06	3,857,418,100.46	5,346,103,239.09	10,261,259,785.85
Min	259,233,428	62,272,898	297,462,386	62,272,898
Max	5,485,321,928	14,334,810,825	17,248,967,510	36,705,019,312

Note: Numbers in parentheses are the per centage of each indicator as a fraction of the total across the three exchanges.

<sup>a</sup> Barbados' statistics are based on data from 1995-2006.

<sup>b</sup> Jamaica's statistics are based on data from 1971-2006.

<sup>c</sup> Barbados' statistics are based on data from 1989-2006.

Sources: Barbados Stock Exchange, Jamaica Stock Exchange, and Trinidad and Tobago Stock Exchange.

Liquidity on each exchange is low by international standards. Between 2000 and 2004, liquidity on the BSE averaged 7.4 per cent (when 2002, an anomalous year due to takeover and merger activity is removed, liquidity averages 3 per cent); on the JSE, 2.9 per cent; and the TTSE, 3.6 per cent (CARICOM, 2005). In general, however, it appears that increasing liquidity in recent years has occurred, as the number of cross-listings on the exchanges has increased.

### *Challenges*

Several significant challenges exist with respect to cross-listing, cross-border trading and cross-border merger and acquisitions activities. The main challenges to cross-listing revolve around listing and compliance requirements as well as the entire legislative framework of the jurisdictions in which the firms operate. Generally, the regulatory environments of Barbados and Trinidad and Tobago are not far apart, and share more similarities than differences. But different laws, listing rules, interpretations and practices (take-over rules, disclosure and filing obligations, and so on) converge to create an environment in which a particular issuer in the cross-border market must incur the cost of becoming knowledgeable in, or getting advice on, the different regulatory and listing requirements; must make repetitive and sometimes different disclosures and filings; faces different reporting requirements particularly as they relate to the periodicity of reporting; confronts different requirements with respect to restrictions on shareholding; must deal with multiple regulators or stock exchanges on identical issues; and faces differences with respect to takeover codes on each exchange.

For example, the takeover code is triggered in Barbados at 25 per cent; in Jamaica at 50 per cent; and in Trinidad and Tobago at 30 per cent. Barbados requires central bank permission to facilitate the expatriation of capital, a feature of its fixed exchange rate regime, while the others do not. Another example is shareholder restrictions. The BSE allows publicly traded companies to place in their bye-laws provisions which restrict individuals from holding above a certain amount of issue share capital of a public company. In contrast, the TTSE requires that any such restriction be removed before a company may be listed, although there is discretion to allow the listing notwithstanding the prohibition. However, state enterprises in Trinidad and Tobago which are listed on the stock exchange are allowed to have restricted shareholding.

The differences in the minimum capital requirements for listing have obvious implications for the ability of the exchange to attract cross-listed issues. Even the amount of shares which must be made available for trading on the stock exchanges varies from country to country. In Trinidad and Tobago 25 per cent of the shares of the company must be widely held, while for Jamaica the figure is 20 per cent. The implication of this is that companies must have enough authorised capital to issue the required amount of shares in the different jurisdictions.

Another major issue relates to the accounting standards used in the various exchanges for public disclosures. In all the exchanges, disclosure is very important and the adoption of some standard for presentation of financial statements is mandatory. However, neither of the BSE, JSE, nor TTSE specified the accounting standard which must be used in its listing rules.

The level of intermediary support is another major factor that influences the level of cross-listing and cross-border trading on the various exchanges. Market intermediary skill is often limited in the exchanges. Indeed, the pool of brokers, investment advisers, traders and other market actors is relatively small in the Caribbean. This phenomenon is exacerbated by the fact that the financial sector in each country competes for the same skills-set. Consequently, intermediaries command a high premium.

#### *Measures for harmonisation of capital markets in the Caribbean*

Harmonisation of capital markets in CARICOM falls under Article 44(1)(e) of The Revised Treaty of Chaguaramas, calls for 'convergence of macro-economic performance and policies through the coordination or harmonisation of monetary and fiscal policies, including, in particular, policies relating to interest rates, exchange rates, tax structures and national budgetary deficits' (CARICOM Secretariat, 2002). According to CARICOM Secretariat (2005), some of the regulatory issues which need to be harmonised are:

- **Regional stock exchange:** The proposals under consideration range from the designation of an existing national stock exchange as the regional stock exchange, to providing for the electronic interconnectivity of all the existing stock exchanges, as well as a hybrid of these two. The issue is complicated by the fact that many of the existing stock exchanges are owned by the private sector.
- **Listing of securities with restrictions in shareholding:** Companies listed should have no restriction on shareholdings, except Government entities.
- **Trading days and settlement cycles:** Currently, the BSE, JSE and TTSE trade daily, though this is a recent phenomenon; the Eastern Caribbean Stock Exchange (ECSE) also trades daily. However, in Guyana trading is only on Monday and in Suriname it is twice per month. Additionally, there is a time difference of one hour between Jamaica and Barbados, countries in the Eastern Caribbean, Guyana, and Trinidad and Tobago (which are in the same time zone), which should be factored into the set times for trading. Settlement cycles also vary from one exchange to the next with the ECSE settling at T+1, Barbados, Jamaica and Trinidad and Tobago at T+3, while in Guyana it is T+5.
- **Currency:** Given the absence of a single currency for the Caribbean, the currency in which net settlement obligation is normally to be decided.

- **Central clearing:** A central securities depository for the region or solutions for the integration of the existing securities depository systems would be required.
- **Minimum aggregate market value of securities:** Both currency and value will need to be standardised.
- **Payment of dividends-Ex/Cum dates:** Currently the period in Jamaica is three days, and in Trinidad and Tobago it is seven days. There should be coordination in the trading of securities ex-dividend, to avoid unreasonable arbitrage opportunity. Withholding taxes will also need to be addressed in this area.
- **Accounting and standardised financial reporting:** Disclosure of Information is important. Currently financial reporting is required quarterly in Barbados and Jamaica and half-yearly in Trinidad and Tobago.
- **Certification of all market actors cross-border:** A system of certification and accreditation of market players should be put in place by the industry associations and the regulators.
- **Exchange control:** There should be policy measures in place to ensure that trades are settled in a common currency, on a timely basis notwithstanding the Exchange Control regulations. Currently, (in addition to Belize) Barbados still operates under a system of exchange control, which implies that government intervention may be necessary to ensure that specific provisions are in place for clearing and settlement on a timely basis in the specified currency.
- **Regionalisation of ownership:** All participating countries in the regional exchange system would be required to implement vigorously the decision to remove restrictions on non-nationals holding assets, including real property and financial instruments.
- **Amendment to the Companies Act:** A standard procedure for a prospectus, audit trail on electronic systems, minimum liquidity requirements and the immobilisation and dematerialisation of securities certificates would need to be addressed and legislation developed/amended to reflect the standards. Bankruptcy regulations should also be examined.
- **Take-over code:** There should be consensus on the requirements for takeover/control via a standard takeover code.
- **Dispute resolution:** Provision should be made to have an independent tribunal, comprising participants from all countries to mediate in such circumstances where disputes may arise which cannot satisfactorily be resolved between the parties involved.

A crucial ingredient to achieving success in harmonisation is political will. Once a political consensus within each country is reached, and the role of capital markets clarified, further support could be directed to the development of the regulatory environment described above. It will also be necessary to educate the public about the benefits of capital market integration, the barriers to integration, and the methods to remove them.

Policy coordination amongst CARICOM countries has, to date, been rather weak notwithstanding the undertakings in both the Original and Revised Treaty of Chaguaramas. It has been suggested that 'the incentive to remove distortions' is not sufficient to drive this process because of the small (economic) size of the geographically-dispersed markets and low dependence on intra-regional trade (Inter-American Development Bank, 2002). Against this background, it is expected that progress on harmonisation to foster development of its capital markets is likely to be protracted.

### *Summary*

In sum, the evidence demonstrates that the BSE, JSE and TTSE exhibit all or most of the characteristics of emerging stock markets. These are: relatively small numbers of listed companies; illiquidity, low trading volumes and thin trading, as the number of listed stocks is not substantial; a lack of market participation, due to perceived asymmetries in information by the public; and until fairly recently, manual trading, which delays price discovery. On this basis, it is reasonable to expect that markets in the region are inefficient. On the other hand, this evidence offers no reasons to suspect that comovement exists among the stock markets in the Caribbean. Evidence to date in CARICOM suggests that policies for intended harmonisation will be slowly implemented.

### 3. DATA AND STATISTICAL METHODS

The empirical analysis begins by describing the data used in the paper, followed by an elaboration of the econometric methodology. Each index used in this study represents the broad market indicator for its respective country. Monthly observations of each index are obtained from the Caribbean Money Market Brokers Barbados Ltd (CMMB). The use of monthly observations is necessitated by the fact that the Barbados Stock Exchange (BSE) only reports the monthly close of its local index. The time period investigated is January 1991 to December 2006. All data have been converted to natural logarithms.

Prior to cointegration and common feature testing, the order of integration needs to be ascertained. The order of integration of the individual time series is determined using a battery of unit root tests. First, standard tests such as the ADF test (Dickey and Fuller 1981), the PP test (Phillips and Perron, 1988), and the KPSS test (Kwiatkowski, *et al* 1992) are employed. Since standard unit root tests have reduced power if they are applied to a time series with a structural break, we employ the unit root test by Lanne *et al*

(2002), which allows for the possibility of a structural break in a time series, denoted UR with Break. The test considers models with general nonlinear deterministic shift functions. In the first step of the test, the deterministic component is estimated and subtracted from the series. In the second step, the standard ADF unit root test is applied to the transformed series. Critical values can be found in Lanne *et al* (2002, p.678).

As the series used in the study are monthly, there may be the possibility of seasonal effects. Because the previous tests assume that there are no other roots in the system, we test for the presence of seasonal unit roots using the HEGY procedure developed by Hylleberg *et al* (1990). This test is used to assess the separate influence of seasonal and nonseasonal components. The null hypothesis of the HEGY test is that a variable is I(0,1), that is, the series is seasonally integrated only. As the HEGY procedure proposed by Hylleberg *et al* was for quarterly data, we use the monthly version proposed by Beaulieu and Miron (1993). The test regression has the form:

$$\Delta_{12}X_t = \sum_{i=1}^{23} \pi_i Y_{i,t-1} + \gamma t + \sum_{k=1}^{12} \delta_k D_{kt} + \sum_{i=1}^p \phi_i \Delta_{12}X_{t-i} + \varepsilon_t \quad (1)$$

where  $Y_{i,t-1}$  ( $i = 1, \dots, 12$ ) are linear transformations of  $X_{t-1}, \dots, X_{t-12}$  and are described in Beaulieu and Miron,  $t$  is a linear trend and  $D$  are seasonal dummies.

The I(0,1) null hypothesis implies that all  $\pi_i = 0$ ,  $i = 1, \dots, 12$ . This is tested with an  $F$ -statistic, as discussed in Taylor (1998) and is denoted  $F_{1-12}$ . The alternative hypotheses permitted in the HEGY framework are very general as some or none of the individual unit roots may be present. The behavioural implications when only some of the 11 seasonal unit roots are present are unclear (Dickey, 1993) and such models are rarely used (Osborn *et al*, 1999). The alternative hypotheses considered are that the process is I(1,0) or I(0,0). As discussed by Beaulieu and Miron (1993), the former is a Dickey-Fuller test of the conventional unit root, captured by a  $t$ -statistic on  $\pi_{t1}$ , denoted  $t_{\pi1}$ ; and the latter is a joint test of all 11 seasonal unit roots, captured by an  $F$ -statistic on  $\pi_i$ ,  $i = 2, \dots, 12$ , denoted by  $F_{2-12}$ . When the I(0,1) hypothesis is rejected ( $F_{1-12}$  is significant), then failure to reject  $\pi_1 = 0$  ( $t_{\pi1}$  is insignificant) combined with rejection of  $\pi_i = 0$ ,  $i = 2, \dots, 12$  ( $F_{2-12}$  is significant) implies that the series is I(1,0); that is, the series follows a unit root process only; rejection of  $\pi_1 = 0$  and  $\pi_i = 0$ ,  $i = 2, \dots, 12$  implies that the series is I(0,0), that is, the series is stationary. Critical values are taken from Franses and Hobijn (1997).

### Cointegration

The existence of a long-term relationship among stock market series will be tested using the maximum likelihood method developed by Johansen (1988,

1991) and Johansen and Juselius (1990) methodology for cointegration. The existence of a cointegrating relation would imply comovement of the stock indexes of Barbados, Jamaica and Trinidad and Tobago, which would provide evidence of the interconnectedness of their financial markets, since series that are cointegrated can be expressed with a causal ordering in at least one direction. Cointegration thus implies a greater degree of market integration while its absence implies a greater degree of market segmentation.

Tests for cointegration may also be interpreted as tests of the weak-form efficient market hypothesis (Richards, 1995). The concept of efficient markets can be traced back to Fama (1965), who described an efficient market as consisting of a large number of profit maximisers and in which prices will reflect all information available, so that no profit opportunities are left to be exploited. If cointegration among and/or between the stock market indexes is found to exist, not only would this indicate market inefficiency in the sense advanced by Fama (1965), it would also indicate that the potential benefits of long-run regional diversification would be limited since the systematic country risk could not be eliminated.

Johansen-Juselius propose two test statistics for testing the number of cointegrating vectors: the trace and the maximum eigenvalue statistics. The null hypothesis for the trace test is that there are at most  $r$  cointegrating vectors, while for the max eigenvalue test, the null  $r = 0$  is tested against the alternative that  $r = 1$ ;  $r = 1$  is tested against the alternative  $r = 2$ ; and so forth. The Schwarz Information Criterion (SIC) is used to select the number of lags required in the cointegration test.

#### *Common feature testing*

Cointegration investigates types of comovement which are nonstationary in nature. Parallel but less well-known advances have occurred in the determination of the common features and common cycles in stationary multivariate time series (Engle and Kozicki 1993; Vahid and Engle 1993). We utilise the tests for comovement known as common serial correlation feature tests, developed by Engle and Kozicki (1993). A finding of a common serial correlation between variables has several implications. First, it implies the existence of stationary comovement of stock indexes and, by extension, at least one-way causality. Second, it indicates that common shocks between stock markets are less persistent (than unit root shocks). Third, a finding of stationary comovement could also be interpreted as evidence of the interrelatedness of the financial markets of Barbados, Jamaica and Trinidad and Tobago on a macroeconomic level. Finally, similar to the detection of non-stationary comovement, a finding of stationary comovement would provide evidence of market inefficiency.

In this study, the common feature for which we test is serial correlation. We employ the common serial correlation test statistic developed by Engle and Kozicki (1993). The finding of a common serial correlation feature



between two stock indexes indicates persistence and (short-run) comovement in the system and implies at least one-way causality.

Common feature testing is performed among stationary variables. Given that many macroeconomic variables are nonstationary in their levels and stationary in their first differences (Nelson and Plosser 1982), it is usually necessary to perform common feature tests on the first differences of most variables.

To illustrate the basic idea of the serial correlation test by Engle and Kozicki (1993), it is assumed that the stock market indexes are stationary, for ease of exposition. Consider two stock market indexes,  $S_{1t}$  and  $S_{2t}$ , which are dependent on a single stationary variable,  $f_t$ , through the data generating process:

$$\begin{bmatrix} S_{1t} \\ S_{2t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} \beta_1 \\ \beta_2 \end{bmatrix} f_t + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (2)$$

where  $f_t$  is a serial correlation feature and the error terms are serially uncorrelated. If there exists a linear combination of  $S_{1t}$  and  $S_{2t}$  such that  $f_t$  is not a component of the linear combination, then  $f_t$  is a common feature. Specifically, let us write the linear combination of the two stock market indexes in the following manner:

$$S_{1t} - \varpi S_{2t} = \alpha_1 - \varpi\alpha_2 + (\beta_1 - \varpi\beta_2)f_t + \varepsilon_{1t} - \varpi\varepsilon_{2t} \quad (3)$$

If there is an  $\varpi$  such that  $\beta_1 - \varpi\beta_2 = 0$ , then  $f_t$  is not in the linear combination, implying that  $f_t$  is a common feature.

The first step in bivariate common serial correlation testing is to test for the existence of the serial correlation feature,  $f_t$ , within individual stock markets. This is done by estimating Equation 3 for either of the indexes. Second, if the serial correlation feature is identified as common between two stock markets, we must determine if the feature is caused by a common source of fluctuation underlying the fluctuations in both markets, that is, a common cycle. In this step the following equation is estimated:

$$S_{1t} = \alpha + \varpi S_{2t} + \xi_t \quad (4)$$

The relevant test statistic of the common feature test as proposed by Engle and Kozicki (1993) is  $TR^2$  (where  $T$  is the number of observations and  $R^2$  is the coefficient of determination) and is distributed chi-squared. For the test to be valid  $\varpi$  must be statistically significant. The null hypothesis of the test statistic is that the linear combination of the stock indexes does not have the feature; that is, the feature is common for the two indexes in question. The alternative

hypothesis is that the linear combination of the indexes does have the feature and therefore the feature is not common between the two indexes. If the feature is common, this implies at least one-way causality and therefore comovement among the stock indexes being investigated.

#### 4. EMPIRICAL RESULTS AND ANALYSIS

The procedures described in the previous section are employed to evaluate the long-run comovement, common features and efficiency of the BSE, JSE and TTSE. The data are monthly and run from 1991-2006. Before statistical tests are conducted, the monthly close of each exchange is converted to natural logarithms.

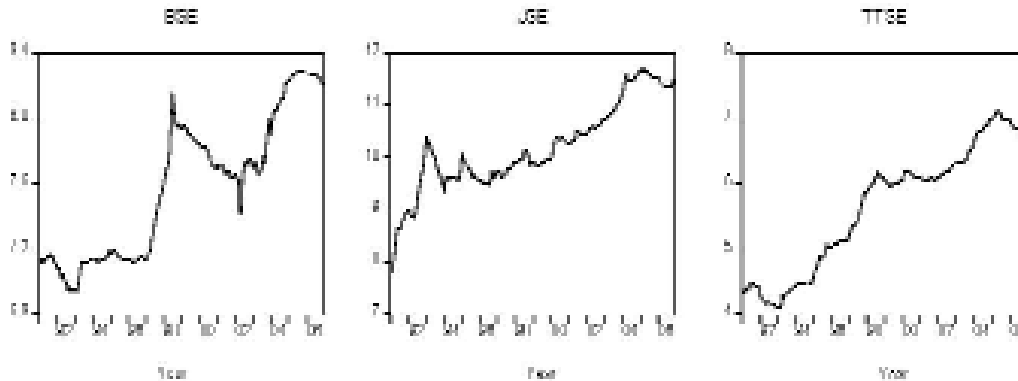
As a preliminary investigation of comovement in stock markets, Figure 1 plots the log of the monthly close for each index. A visual inspection of the figure reveals that while each market has trended upward over the period under study, there is evidence of structural breaks for the BSE. The BSE experienced a sharp upward break in its long-run trend starting at the beginning of 1997, peaking in the middle of 1998; the market almost tripling in value. The market immediately experienced a steep decline which bottomed out in the first half of 2002, the market losing just over half of its value from early 1997. Breaks in the overall trends on the JSE and the TTSE are far less pronounced.

**Table 5: Unit Root Tests**

		<i>BSE</i>	<i>JSE</i>	<i>TTSE</i>
ADF				
·	Level	-1.985	-3.526*	-1.957
·	1st Diff.	-9.904**	NA	-10.801**
PP				
·	Level	-2.122	-3.413	-1.957
·	1st Diff.	-10.170**	-9.885**	-10.801**
KPSS				
·	Level	0.084	0.163**	0.175**
·	1st Diff.	NA	0.172	0.113
UR with Break				
·	Level	-0.257	-1.558	-0.219
HEGY				
·	F1-12	15.859**	12.189**	20.596**
·	$t_{\pi 1}$	3.172	2.748	1.966
·	F2-12	15.207**	12.062**	20.095**

Notes: \*\* and \* indicate significance at 1% and 5% respectively. NA means 'not applicable'.

**Figure 1: Monthly Time Series Plots of BSE, JSE and TTSE 1991-2006**



Next, the study conducts unit root tests for each stock series using the ADF, PP and KPSS tests, the unit root test by Lanne *et al* (2002) which is robust in the presences of structural breaks, and the HEGY test. Results are presented in Table 5. Four of the five tests, the ADF, PP, UR with Break, and HEGY tests suggest that the BSE is  $I(1)$ ; the PP, KPSS, UR with Break and HEGY suggest that the JSE is  $I(1)$ ; while all five unit root tests indicate that the TTSE is  $I(1)$ . These findings provide evidence to suggest that each index follows a random walk, or is weakly efficient, corroborating the findings of Robinson (2001, 2004).

**Table 6A: Johansen Cointegration Tests for BSE, JSE and TTSE**

Trace test			
Null $H_0$	Alternative	Test statistic	P-value
$r = 0$	$r > 0$	28.956	0.201
$r \leq 1$	$r \geq 1$	14.279	0.271
$r \leq 2$	$r \geq 2$	2.944	0.591
Maximum eigenvalue test			
Null $H_0$	Alternative	Test statistic	P-value
$r = 0$	$r = 1$	14.677	0.402
$r = 1$	$r = 2$	11.335	0.228
$r = 2$	$r = 3$	2.944	0.591

Notes: In tables 6A-6D  $r$  denotes the number of cointegrating vectors. P-values are from Mackinnon, Haug and Michelis (1999).

Having established that each market is  $I(1)$ , we proceed to test for cointegration of the three markets using the Johansen-Juselius cointegration framework. Tables 6A, 6B, 6C and 6D report the results of the tests. Both the trace test and maximum eigenvalue test reveal the absence of cointegration, either among the three stock markets simultaneously, or pairwise.

This finding is consistent with the notion that the BSE, JSE and TTSE are segmented markets. An absence of cointegration also implies efficiency in the sense advanced by Fama (1965). This result runs counter to recent evidence from both developed and emerging economies, but is consistent with the institutional features of the markets across the Caribbean described in Section 2.

**Table 6B: Johansen Cointegration Tests for BSE and JSE**

Trace test			
Null $H_0$	Alternative	Test statistic	P-value
$r = 0$	$r > 0$	18.413	0.088
$r \leq 1$	$r \geq 1$	6.594	0.150
Maximum eigenvalue test			
Null $H_0$	Alternative	Test statistic	P-value
$r = 0$	$r = 1$	11.820	0.197
$r = 1$	$r = 2$	6.594	0.150

Next, tests for common features are undertaken using the bivariate common serial correlation test by Engle and Kozicki (1993). Since the variables have to be stationary to implement the test, the first difference of the log of each index is taken. The first step of the bivariate common serial correlation feature test is to establish the existence of the feature in each individual series. Equation 2 is estimated, where  $f_t$  is a vector of the lags of each differenced series. The null hypothesis is that the feature,  $f_t$ , does not exist within the series and the alternative hypothesis is that the feature does exist within the series. In Table 7, the LM test statistic is provided and is distributed  $\chi^2_{(df=2)}$ . For Barbados and Trinidad and Tobago pairing, the null is rejected, indicating the existence of the serial correlation feature *within* the individual markets. For Barbados' and Trinidad and Tobago's pairings with Jamaica, there is not enough evidence to reject the null in either case.

**Table 6C: Johansen Cointegration Tests for BSE and TTSE**

Trace test			
Null $H_0$	Alternative	Test statistic	P-value
$r = 0$	$r > 0$	16.389	0.157
$r \leq 1$	$r \geq 1$	4.249	0.376
Maximum eigenvalue test			
Null $H_0$	Alternative	Test statistic	P-value
$r = 0$	$r = 1$	12.140	0.178
$r = 1$	$r = 2$	4.249	0.376

**Table 6D: Johansen Cointegration Tests for JSE and TTSE**

Trace test			
<i>Null H<sub>0</sub></i>	<i>Alternative</i>	<i>Test statistic</i>	<i>P-value</i>
$r = 0$	$r > 0$	19.259	0.068
$r \leq 1$	$r \geq 1$	6.447	0.159
Maximum eigenvalue test			
<i>Null H<sub>0</sub></i>	<i>Alternative</i>	<i>Test statistic</i>	<i>P-value</i>
$r = 0$	$r = 1$	12.812	0.144
$r = 1$	$r = 2$	6.447	0.159

The second step in testing for common features is to determine if the feature is caused by a common cycle; we can only do this for Barbados and Trinidad and Tobago, because as indicated above the feature is not present in any pairwise test with Jamaica. Equation 4 is estimated using limited information maximum likelihood as the parameter estimate,  $\varpi$ , will be insensitive to the normalisation; the instrument list is an intercept and lags of the first difference of the log of each index. The test statistic  $TR^2$  is distributed as  $\chi^2_{(df=1)}$  with critical values of 3.84 and 6.64 at the 5 per cent and 1 per cent levels of significance respectively. The test statistic from estimating Equation 4 gives a value of 60.495; the estimate of  $\varpi$  is 0.125, significant at the 1 per cent level. The test statistic overwhelmingly rejects the null hypothesis that no feature exists for the linear combination of the two variables. Since the feature is still in the linear combination, this indicates that the feature is actually not common between the two stock market series. Thus there is no evidence to support short-run comovement between the BSE and TTSE.

**Table 7: LM Test for Serial Correlation within Individual Series**

<i>Bivariate Pairing (Dependent Variable First)</i>	<i>LM Statistic</i>	<i>Bivariate Pairing (Dependent Variable First)</i>	<i>LM Statistic</i>
Barbados and Trinidad & Tobago	10.934** (0.004)	Trinidad & Tobago and Barbados	6.092* (0.048)
Barbados and Jamaica	7.014* (0.030)	Jamaica and Barbados	0.600 (0.741)
Trinidad & Tobago and Jamaica	4.887 (0.087)	Jamaica and Trinidad & Tobago	6.935* (0.031)

\*\* and \* indicate significance at 1% and 5% respectively.

Several implications arise from our results which point to a lack of long-run comovement among, and short-run comovement between stock markets in CARICOM. First, there may be potential benefits from long-run and short-run regional diversification by investors, since the markets do not move together either in the short or long-run. From a portfolio standpoint, investors could use these CARICOM stock markets to reduce their investment correlation and thereby reduce risk. Second, the finding that each market is (weakly) efficient means that opportunities for arbitrage are scarce. The lack of arbitrage opportunities may also help to explain why regional investors in general invest most heavily in their domestic market, since this reduces their incentive to invest, even if temporarily, in other countries. Third, a finding of no cointegration indicates that financial markets in the Caribbean remain segmented. By extension, this finding implies that any contagion that might develop in one market would not spill over into other markets.

Taken together, our findings intimate the nascent potential of CARICOM stock markets to provide benefits to regional investors. The efficiency of individual markets and potential for diversification should signal to investors that while few opportunities for quick arbitrage profit exist, there are prospects for long-run growth in their portfolios through regional diversification. This would allow scarce capital in the region to gravitate towards the countries and sectors where the most benefits can be obtained. Governments and policymakers can assist by creating an enabling environment, so that investment is targeted to the sectors which have the most potential for economic development. The complete removal of barriers to the flow of intraregional capital under CSME is a step in the right direction. The establishment of a regional oversight body, along the lines of the Securities Exchange Commission (SEC) of the US, to ensure transparency and accountability would also increase the confidence of investors in investing in regional assets.

## 5. CONCLUDING REMARKS

This study has investigated comovement, common features and efficiency of CARICOM stock markets. To achieve this, the stock markets of Barbados, Jamaica and Trinidad and Tobago were examined for the period 1991:1-2006:12, using the techniques of cointegration and common feature testing. No evidence is found of long-run or short-run comovement, or common features. These findings imply that (1) the BSE, JSE and TTSE are weakly efficient; (2) markets are segmented; and (3) there may be benefits from regional diversification of asset portfolios.

However, the finding of weak-form efficiency in individual CARICOM stock markets remains a question of interest, since the institutional features of these markets, for example thin trading, infrequent trading and low liquidity, are some of the primary reasons cited for why emerging stock markets are not efficient. Appiah-Kusi and Menyah (2003) suggest that models that do not

account for time-varying risk premiums and non-linearity of returns in emerging markets are likely to be inappropriate. They argue that the characteristics mentioned previously may not determine the inefficiency of an emerging market. Future research in analysing efficiency of CARICOM stock markets will take time-varying risk premiums and non-linearity of returns into account.

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#### ENDNOTES

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2. CARICOM (Caribbean Community) is a grouping of the following Caribbean countries: Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.
3. This is a sub-grouping in CARICOM comprised of Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines.
4. Barbados maintains a fixed peg with the United States dollar.
5. Trinidad and Tobago maintains a flexible exchange rate regime. At the end of 2006, TTD\$6.3 = US\$1.
6. Jamaica maintains a flexible exchange rate regime. At the end of 2006, JMD\$67 = US\$1.

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