

POST NAFTA INTEGRATION OF NORTH AMERICAN STOCK MARKETS: IMPLICATIONS FOR FINANCIAL DECISION MAKING

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ABSTRACT

This paper investigates the degree of integration of in the North American equity markets in the post NAFTA period, 1994 to 2006 and two sub post NAFTA period: 1994 - 1999 and 2000 -2006 using daily stock closing price(s) indices. The Johansen and Juselius (1990) method for determining the presence of cointegration vectors in a set of non stationary time series was applied to the natural logs of the daily closing stock prices of North American equity markets using the following representative indexes: US S&P 500; Canada S&P 500; and Mexico, IPC, MXX. We find that the correlation of returns between the US S&P 500 and the Canadian S&P 500 is statistically insignificant while the correlation between the US S&P 500 and the Mexican IPC, MXX is statistically significant at the 10 percent level. The results of the ADF unit root test indicate that each of the series is stationary in their log first differences. The Maximum-eigenvalue and Trace test indicate the presence of one cointegrating (equation) vector at the 5 percent level in the case of the full sample and also during the two subsample periods (all the sample data). These results lead us to the conclusion of the presence a long-run equilibrium relationship (cointegration) among the North American equity markets in the post NAFTA period. Also, there is an indication that the degree of integration of the three equity markets remained the same immediately following the NAFTA implementation (1994-1999) and also during 2000-2006 as there is no change in the number of cointegrating vectors although the estimated coefficients appear to be quite different for the two sub periods.

JEL: F36; F15; G15

Key words: NAFTA: stationarity, cointegration, equity stock markets, and returns.

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I. INTRODUCTION

Correlation and cointegration of equity markets prices, returns and volatilities of returns are currently intriguing finance researchers especially in this era of globalization. The importance of price, return and risk are the motivating factors for this current interest in the implications of correlation and cointegration of equity markets prices, returns and volatilities of returns. The attraction of buying financial assets when prices are low and selling when prices are high contributes to the fascination with investing idle funds where returns are high against the back ground of the risk averse assumption nature of investors. In addition, because of the diversification theory in portfolio management, investors may see correlation and cointegration of equity markets prices or returns in a particular region to mean diversification indifference with respect to investment in equity in that region. In North America, the introduction of North American Free Trade Agreement (NAFTA) in November 1993, and implemented in January 1st, 1994 has important provisions that make finance scholars believe that over time cointegration of equity markets returns of North American stock markets should result. Thirteen years after the implementation of the North American Free Trade Agreement (NAFTA), it is important to explore the financial and economic impact of NAFTA on the three participating North American countries and the possible impact on cointegration of the returns in the North American equity for the full thirteen years since NAFTA .

The rest of the paper is structured as follows: Section II contains the background information. Section III contains the literature review. Section IV explains the data and methodology. Section V contains the discussion. Section VI contains the empirical results of the study and the analysis. Section VII concludes the paper.

II BACKGROUND INFORMATION

This liberalization of trade through the reduction of direct and indirect trade barriers, harmonization of commercial and legal framework, promotion of cross country investment and foreign direct investment and other provisions put in place by NAFTA among the US, Canada and Mexico should among other things achieve significantly increased welfare gains, economic convergence in terms of prices and volumes of trade, harmonization of business practices, labor market integration, increase in trade and financial/stock market integration. It is important to note that NAFTA did not introduce an economic union in North America. The main purpose of NAFTA is the reduction of barriers to regional trade in goods and services. According to Article 1109, IT should also promote cross country investment among the three economies because of such provisions as free and quick transfer of all payments relating to equity transactions such as

dividends, interest, and capital gains. However the countries in North America still have their individual national local economic and financial challenges. The US and Canada are developed economies. On the other hand, Mexico is still categorized as an emerging economy. We should therefore assume that Mexico, as is applicable to most emerging economies, is still embarking on economic reform programs that will lead it to stronger and more responsible, stable economic performance levels, as well as transparency and efficiency in the capital market, Hessel (2006). As a result, it is more likely than the other two countries in the North American region to experience political instability, exchange rate volatilities. For example according the International Monetary Statistics (1994-2005) and OANDA.com, at the beginning of 1994, the exchange rate of the Mexican pesos and the Canadian dollar vis a vis the US dollar (that is number of the currency that will purchase one US dollar) are 3.15 and 1.316 respectively. By the end of 2006 that exchange rate for the Mexican peso was 10.819760 and 1.6640 for the Canadian dollar. During the period 1994 to 2006 the Mexican peso depreciated by 243.48 percent and the Canadian dollar by 26.44 percent.

Mexico is also more vulnerable to experiencing volatilities or extreme changes in certain economic variables, such as inflation, interest rates on savings and loanable funds, unemployment level, foreign direct and portfolio investments, exports, imports and gross domestic product (GDP). Specifically, the GDP of Mexico, Canada and the US in 1997 were 3,174.28 million pesos, 882.73 billion Canadian dollars and 8,304.33 US dollars respectively. Their GDPs at the end of 2005 were for Mexico, 8, 374.35 million pesos; for Canada, 1,368.73 billion Canadian dollars; and for the US, 12,455.80 billion US dollars. Between 1997 and 2005, the percentage increases in the GDPs of Mexico, Canada and the US were 163.8 percent, 55 percent and 50 percent respectively. Granted that so many variables influence investors' decision to undertake portfolio investments in any country, developments in macro economic variables are important. Such developments will definitely contribute to financial integration within in North America. In trend analysis involving long periods of time, the true significance of this situation might not be easily observable. This is more so as every country in the North America has its own currency, still controls its monetary and fiscal policies. It is important to mention these as many studies on cointegration where emerging economies are concerned some times do not seem to consider these perspectives.

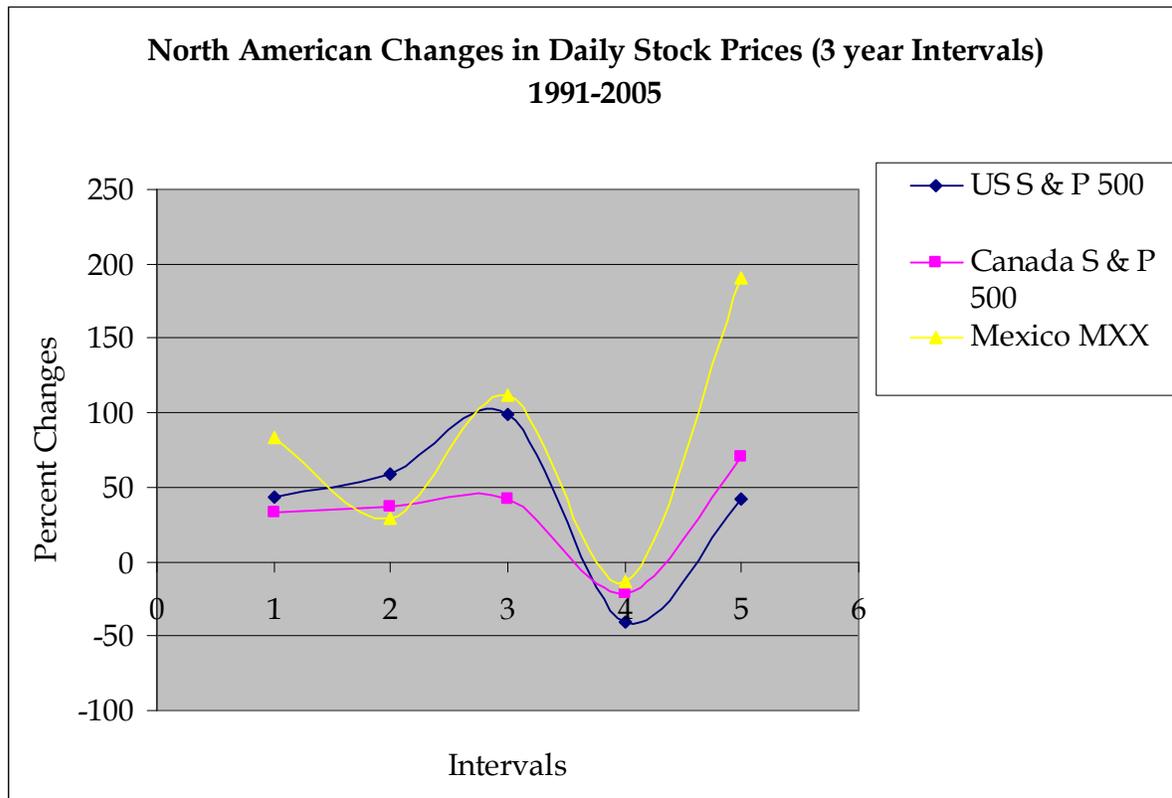
For example, the very high growth the in Mexican GDP may have contributed to the huge market index growth. Table 1 contains the 3 year intervals percent changes of the index values of US, S & P 500; Canada S & P 500; and Mexico, MXX. Mexico shows highest increases and the least declines. Figure

1 depicts these changes. Between 1991 and 2005, the US market surged 282.38 percent; Canada, 247.9 percent and Mexico 583.9 percent.

Table 1. North American Daily Stock Prices (3 Year Intervals) Percentage Changes 1991-2005.

Time interval	US S & P 500 Changes in %	Canada S & P 500 Changes in %	Mexico MXX Changes in %
1991-1993	42.89	33.36	83
1994-1996	58.8	37.15	29.12
1997-1999	98.35	41.93	112.1
2000-2002	-40.12	-21.38	-14.06
2003-2005	41.88	70.41	190.55

Figure 1: Changes in North American Daily Stock Closing Prices 1991-2005.



The objective of this paper is to investigate the possible existence of integration among the U. S., Canada and Mexico equity markets using longer span data and the daily stock prices for the period January, 1994 to December, 2006 and two sub periods; 1994-1994 and 2000-2006. The period 1994-2006 represents thirteen years since the introduction of NAFTA.

III. LITERATURE REVIEW

According to the North American Forum on Integration (NAFI), (2002), "The total trade between the three NAFTA partners increased by 128 percent and now is over \$US 676 billion a year. Every day, the NAFTA parties carry out about \$US 1.8 billion worth of trilateral business transactions. During the first seven years of implementing NAFTA, production in North America grew by more than 30 percent compared to a growth rate of a little less than 20 percent during the previous seven years". Some academic researchers seem to support this view. Gould, (1998); and Kouparitsas, (1997) find evidence to suggest that NAFTA has thus far succeeded in promoting trade in the region. Yet among academic researchers, there has been controversy on the impact of NAFTA on increased economic progress and economic integration of the participating countries.

Apparently unsatisfied with the impact of NAFTA on the North American regional, economic and financial integration, Chriszt, (2000); Salvatore, (2001) investigated the problem and recommended a monetary union in the region and the dollarization of Canada and Mexico. Some researchers examining different aspects of the impact of NAFTA on stock markets in North America and using historical stock data that dates up to 1999, find no significant impact of NAFTA on the North American markets: Hanson and Song (1998); and Aggarwal, Long, More, and Ervin (1998) find no significant impact of the formation of NAFTA for Canadian firms; Thompson (1994) find that the formation of NAFTA did not affect the relationship between the degree of multinationality and firm performance. However studies covering more recent period using daily, weekly, and monthly stock prices seem to show different results. For example, Aggarwal and Kyaw (2005) examined the integration of the three participating equity markets before and after the 1993 passage of NAFTA. Using daily, weekly, and monthly data from 1988-2001, they find that the daily, weekly, and monthly equity prices in the three NAFTA countries are cointegrated only for the post-NAFTA period. Darrat and Zhong (2005), using daily, weekly, and monthly data from June 1, 1989 to April 10, 2002, examined the impact of NAFTA on market linkage using cross-correlations, multivariate price cointegrating systems, speed of convergence, and generalized variance decompositions of unexpected stock returns and find intensified equity market linkage since the NAFTA accord.

In spite of these recent findings there is need to continue the research on the cointegration of financial markets in North America and linkages of stock markets returns and the significance of results to economic developments and financial decision making. For example, do these recent results represent a persistent pattern, especially as the periods covered by the recent two studies are only marginally more current than the period covered in previous studies?

Secondly, is this observation of intensified equity market cointegration and linkage since NAFTA accord a direct result of the introduction of the NAFTA accord or are the North American markets responding to the general correlation of global stock market prices and returns Chukwuogor-Ndu (2007)? Furthermore, what are the linkages of the observed stock market patterns to economic variables such as gross domestic product (GDP) growth, inflation rates and exchange rates?

Finally, even if after using econometric methods, we determine that indeed there exists persistent cointegration among equity markets in North America, and we can therefore argue that the gains from portfolio diversification among the North American equity markets will be significantly reduced, would that mean that investors should no longer diversify their financial portfolios in North America? What about risk and return and the inverse relationship that exists between them. These questions serve as pointers to the need for continued investigation of this topic and related variables. This paper examines the possible existence of equity market linkage among the U S, Canada and Mexico for the period January, 1994 to December, 2006 which represents all the thirteen years since the introduction of NAFTA.

IV. DATA AND METHODOLOGY

We use the daily data on stock prices of the US S&P 500 Composite Index, (US) the Canadian S&P/TSX Composite Index (Canada) and the Mexican IPC, MXX Index (Mexico). The S&P/TSX Composite Index has been the name of Canada's benchmark stock index since May 1, 2002 when it replaced the old TSE 300 Composite Index. Hereafter we will use the US to represent US S&P 500 Composite Index, Canada for the Canadian S&P/TSX Composite Index and Mexico for and the Mexican IPC Index.

The daily closing price data for this study (was) were collected for thirteen years, from January 4, 1994 to December 31, 2006 from Yahoo Finance (2007). The data series contained 3081 daily observations for the 1994-2006 sample; 1639 observations for the 1994-1999 sample and 1639 observations for the 2000-2006 sample.

The stock returns for the North American stock indices are calculated as follows:

$$\ln (P_t/P_{t-1}) \quad (1)$$

Where P_t is the stock price index at date t . We use the natural (calculated) logarithmic first difference of stock prices in the local currency of each country. The three daily closing price indices of the NAFTA member countries are not transformed to a common currency as some of the earlier studies have done some previous related work , for example, [Aggarwal and Kyaw (2005); and Darrat and Zhong (2005)]. Instead, we use the nominal price indices in domestic

currency to avoid the problem (associated with transformation) caused by fluctuations in cross-country exchange rates, and also to avoid the restrictive assumption that purchasing power parity holds. Alexander and Thillainathan (1995) had examined the Asian-Pacific equity markets and reported evidence of cointegration only when the equity price indices were expressed in local currency, not in a common currency. Alexander (2001) suggests that cointegration between equity markets should be examined using local currency indices.

We apply the Augmented Dickey-Fuller (ADF) (1979) unit root test to all the data series to determine stationarity of the data series. The ADF consists of running a regression of the first difference of the series against the series lagged once, lagged difference terms, and optionally, a constant and a time trend. This can be expressed as:

$$\Delta y_t = \alpha_0 + \gamma y_{t-1} + \alpha_2 t + \sum_{i=2}^p \beta_i \Delta y_{t-i+1} + e_i \quad (2)$$

Where y_t is a time series of t observations and e_i is the error term. The test for a unit root is conducted on the coefficient of y_{t-1} in the regression. β_i represent the lags; if the time series is correlated at higher lag, the augmented Dickey Fuller test constructs a parameter correction for higher order correlation, by adding lag differences of the time series. Akaike's information criterion (AIC) is used for automatic selection of lags and optimum estimation of the best number of lags. According to recent research findings, Liew (2004), indicate that Akaike's information criterion and final prediction error (FPE) are superior than the other criteria in the case of small samples (600 observations or below) in the manner that they minimize the chance of under estimation while maximizing the chance of recovering the true lag length. If the coefficient is significantly different from zero then the hypothesis that y contains a unit root is rejected. Rejection of the null hypothesis implies stationarity. The critical values used for the tests are the MacKinnon-Haug-Michelis (1999) p-values.

If the calculated ADF statistic is higher than McKinnon's critical value then the null hypothesis is not rejected and it is concluded that the considered variable is non-stationary, that is, it has at least one unit root. Then, the procedures are re-applied after transforming the series into the first differenced form. If the null hypothesis of non-stationarity can be rejected, it can be concluded that the time series is integrated of order one, $I(1)$.

For robustness of unit root test results, we also tested the series using the Phillips-Perron (PP) test:

$$y_t = \alpha_0 + \gamma y_{t-1} + \alpha_2 \left(t - \frac{T}{2}\right) + u_i \quad (3)$$

There is a fundamental assumption in the theory underlying the Dickey-Fuller unit root tests, that the errors are statistically independent and have a constant variance. The Phillips-Perron's test allows the error disturbances to be weakly dependent and heterogeneously distributed. To further support our results, we also applied The KPSS, Kwiatkowski et al. (1992) test statistic is based on the residuals of the following least squares regression of y_t on the exogenous variable x_t . The null hypothesis is that the series y_t is assumed to be trend-stationary.

$$y_t = x_t \delta + u_t \quad (4)$$

We use Johansen (1988) and Johansen and Juselius (1990) method for determining the presence of cointegration vectors in a set of non stationary time series. Johansen's unrestricted error-correction model is:

$$\Delta Y_t = \Gamma_1 \Delta Y_{t-1} + \dots + \Gamma_{k-1} \Delta Y_{t-k+1} + \Pi Y_{t-k} + \mu + \varepsilon_t \quad (5)$$

Where $Y_t = (p \times 1)$ vector of stock prices, $\Pi = (p \times p)$ parameter matrix, and $\mu = (p \times 1)$ intercept terms. The parameter matrix Π indicates whether vector of stock prices has (Y_t) long-run dynamic relationship or not. If the rank of Π equals the number of variables (n) that is if Π has full rank, the long-run equilibrium is given by n independent equations and all the stock price series are stationary in levels. If rank of Π is zero, the stock price series (Y_t) are unit root processes, there is no error correction and thus no cointegration. Cointegration is suggested if rank of Π is between zero and the number of stock price series (n). The unrestricted cointegration rank test (trace) and unrestricted cointegration rank test (maximum Eigenvalue) were determined.

V. EMPIRICAL RESULTS AND ANALYSIS

A. Descriptive Statistics

Tables 2 and 3 below present the first four sample moments of the daily closing equity price indices in log levels, daily returns of the price indices in their log first differences. Daily returns are the log first differences of the indices.

During the sample period, the Canadian S&P 500 index has the highest average daily closing price followed by the Mexican price index. The standard deviation of the daily closing price indices of the Mexican index is almost twice the standard deviation of the U.S. and the Canadian S&P 500 indices, and the daily closing prices of the US S&P 500 index exhibited a higher negative skewness compared to the Canadian S&P 500, and the daily closing price of the Mexican index is skewed to the right. All the closing price indices are non-normal in their daily closing prices.

Table 2. Descriptive Statistics of the daily closing prices of the indices (in natural logs) of NAFTA Member countries.

	S&P500 US	S&P 500 Canada	Mexico
Mean	6.8643	8.8626	8.6632
Std. Dev.	0.3471	0.2996	0.6286
Skewness	-0.8976	-0.1139	0.3036
Kurtosis	2.6097	2.2714	2.5633
Jarque-Bera (Probability)	433.6004 (0.0000)	74.8580 (0.0000)	71.8461 (0.0000)

Table 3. Daily returns on Equity Price Indices of the NAFTA members.

	S&P500 US	S&P 500 Canada	Mexico
Mean	0.00036	0.00035	0.00076
Std. Dev.	0.0108	0.00097	0.0171
Skewness	-0.1181	-0.6524	-0.0406
Excess Kurtosis ¹	3.3507	6.3449	5,6165
Jarque-Bera (Probability)	1718.6390 (0.0000)	5388.3490 (0.0000)	4051.8110 (0.0000)

Table 2 results indicate that the daily equity market returns are skewed to the left and none of the average daily return series exhibits normal distribution as all of the daily returns have excess kurtosis with the Canadian S&P500 topping the other two market returns. The negatively skewed returns and positive excess kurtosis are partly due to one or more extreme negative returns during the sample period. Returns are more leptokurtic for Canada compared to the other two markets indices. Volatility clustering and conditional non-normality, apart from a few extreme negative returns, are the primary reasons for the reported leptokurtic distribution of returns in the three markets. The observed autocorrelation of returns (not reported) is inconsistent with the efficient market models that assume no serial correlation in returns. In general, this autocorrelation is attributed to some key reasons, such as, non-synchronous trading, weekend and holiday effects, time varying risk premia, and to some extent, irrational over or under-reaction of investors Lo, and MacKinlay (1990) plus factors, such as, market opening and closing time differences.

B. Correlation of Returns

Table 4 provides the correlations of daily returns in the three stock markets. Correlation of average daily returns for the sample period between the markets is not uniform. The correlation of returns between the U.S. S&P 500 and the Canadian S&P 500 is statistically insignificant while the correlation between the U.S. S&P500 and the Mexican index is statistically significant at 10%. That is Mexican equity market returns are more closely correlated with the U.S. S&P 500 stock returns than with the Canadian S&P500 daily returns. This needs further investigation.

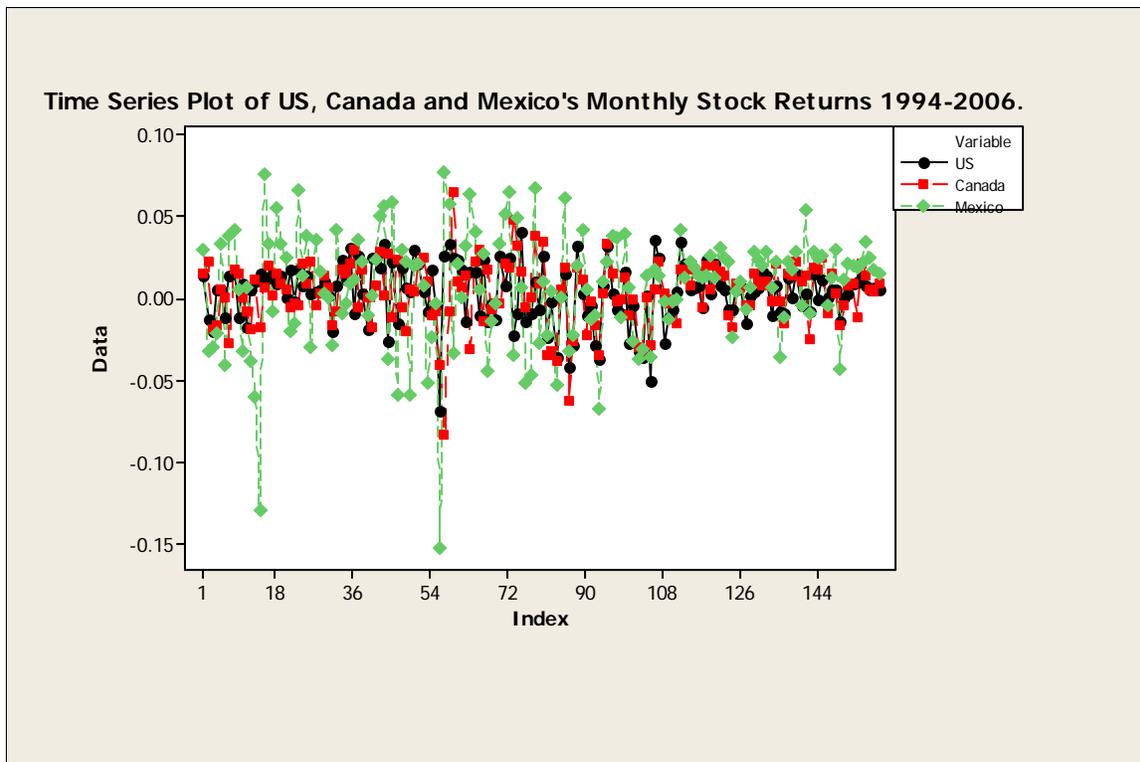
Table 4. Correlation Matrix of Daily Returns of the NAFTA Members.

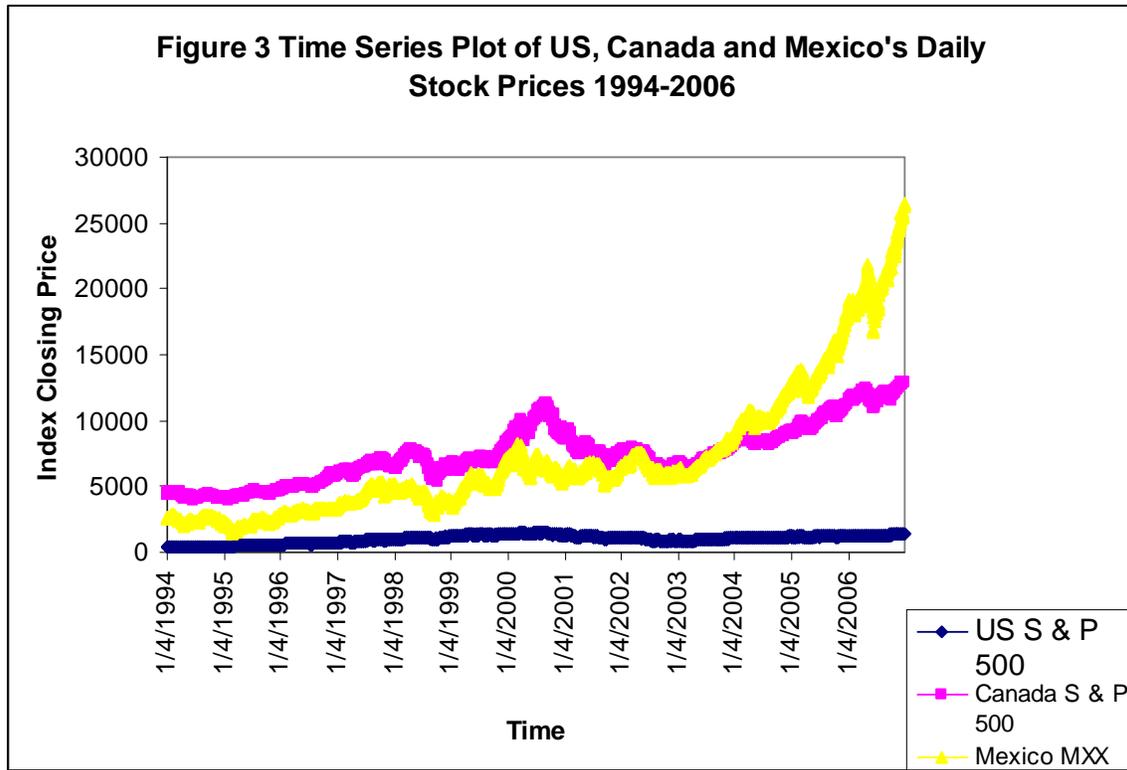
	S&P500 RETURNS US	S&P500 RETURNS CANADA	EQUITY RETURNS MEXICO
S&P500 RETURNS U.S.	1.000	0.0621	0.5188*
S&P500 RETURNS CANADA		1.000	0.0906
EQUITY RETURNS MEXICO			1.000

*significant at 10% level.

Figure 2 contains a time series plot of the US, Canada and Mexico’s monthly stock returns for the period 1994 to 2006. Each point represents 18 months. It shows the high volatility of the Mexican stock returns between 1994 and 1999 (approximately 90th month) in the time series. There seems to be greater convergence of the stock returns in the North American stock markets between 1999 and 2006. Figure 3 contains the plot of the time series of the US, Canada and Mexico’s daily stock prices for the period 1994 to 2006.

Figure 2





C. Unit Root Test Results

The results of the unit root tests for daily stock prices of the North American stock markets from 1994 to 2006 are presented in Table 5. The ADF null hypothesis that the time series in log levels contain one unit root could not be rejected for the three series. The null hypothesis in both the cases is rejected for each of the time series at 5% level of significance. As each of the series is stationary in their log first differences no further tests are performed. Our results agree with most of the earlier studies.

Table 5. Unit Root Test Results (Individual market price series).

ADF (Augmented Dickey-Fuller) Unit Root Test						KPSS Unit Root Test	
Time Series	Log levels $H_0 = I(1)$ ADF Test Stat.	Probability (Pr.) ¹	Log first differences $H_0 = I(1)$ ADF Test Stat.	Log first differences $H_0 = I(1)$ ADF Test Stat.	(Pr.) ¹	Log levels $H_0 = I(0)$ LM Test Stat.	Log first Difference $H_0 = I(0)$ LM Test Stat.
lsp500us	-1.5444	0.8142	Δ lsp500us	-56.2785	0.0001	1.3872	0.3013*
lsp500can	-1.8507	0.6796	Δ lsp500can	-51.2720*	0.0001	0.6336	0.0880*
lmexico	-2,2894	0.4391	Δ lmexico	-50.1713*	0.0001	0.5173	0.1649*
Phillips-Perron Unit Root Test							
Time Series	Log levels $H_0 = I(0)$ ADF Test Stat.	Probability (Pr.) ¹	Log first differences $H_0 = I(0)$ ADF Test Stat.	Log first differences $H_0 = I(0)$ ADF Test Stat.			
lsp500us	-1.5444	0.8142	Δ lsp500us	-56.2785			
lsp500can	-1.8507	0.6796	Δ lsp500can	-51.2720*			
lmexico	-2,2894	0.4391	Δ lmexico	-50.1713*			

D. Cointegration of the North American Stock Markets

The results of the Johansen & Juselius cointegration test results in detail are presented in Table 6 and 7. For the tests, we assumed an intercept and trend in the cointegrating equation (CE) and no trend in VAR (Vector Auto Regression). The lag intervals are 1 (4) Lags interval. The trace statistic is used to tests the null hypothesis of r cointegrating relations against k cointegrating relations, where k is the number of endogenous variables, for $r = 0, 1, \dots, k$. If there are k cointegrating relations it implies no cointegration among the three series. The maximum eigenvalue test tests the null of r cointegrating relations against the alternative of $r+1$ cointegrating relations. The results of trace and maximum eigenvalue test statistics indicated one cointegrating equation at the 5% percent level of significance among the three daily closing price indices during the sample periods of 1994-2006; 1994-1999 and 2000-2006. The critical values used for the tests are the MacKinnon-Haug-Michelis (1999) p-values which are slightly different from those reported in JJ (1990). The estimated cointegrating test results, normalized on the US S&P500 index, for the full sample and the two sub samples, are presented below. The results for the full sample do not indicate a one-to-one relationship between US S&P500 and the Canadian S&P500 or between US S&P 500 and the Mexican index. See Tables 6.

Table 6. Estimated Cointegrating Equation.

Full sample (1/04/1994 to 12/29/2006)

Normalized cointegrating coefficients (standard error in parentheses)

LSP500US	LSP500CAN	LEQNDXMEX	
1.000000	-2.688897	1.393280	
	(0.30094)	(0.22909)	Log Likelihood: 28595.45

First sub sample (1/04/1994 to 12/30/1999)

Normalized cointegrating coefficients (standard error in parentheses)

LSP500US	LSP500CAN	LEQNDXMEX	
1.000000	1.219523	-2.066067	
	(0.53127)	(0.56244)	Log Likelihood: 15244.39

Second sub sample: (1/04/200 to 12/29/2006)

Normalized cointegrating coefficients (standard error in parentheses)

LSP500US	LSP500CAN	LEQNDXMEX	
1.000000	-1.033849	0.255742	
	(0.03945)	(0.03922)	Log Likelihood: 13705.18

Table 7. Johansen Cointegration Test Results for the Presence of Long-run Equity Price Equilibrium among the North American Stock Markets.

1994 -2006								
Null	Unrestricted Cointegration Rank Test (Trace)				Unrestricted Eigenvalue)	Cointegration Rank Test (Maximum		
Daily	Eigenvalue	Trace statistics	0.05 critical value	Prob.**	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
r = 0	0.010164	43.22352	42.91525	0.0466	0.010164	31.47637	25.82321	0.0080
r ≤ 1	0.002582	11.74715	25.87211	0.8291	0.002582	7.966741	19.38704	0.8245
r ≤ 2	0.001226	3.780409	12.51798	0.7736	0.001226	3.780409	12.51798	0.7736
1994-1999								
Null	Unrestricted Cointegration Rank Test (Trace)				Unrestricted Eigenvalue)	Cointegration Rank Test (Maximum		
Daily	Eigenvalue	Trace statistics	0.05 critical value	Prob.**	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
r = 0	0.014399	29.97963	24.27596	0.0086	0.014399	20.81232	17.79730	0.0171
r ≤ 1	0.005451	9.167307	12.32090	0.1595	0.005451	7.843345	11.22480	0.1847
r ≤ 2	0.000922	1.323962	4.129906	0.2921	0.000922	1.323962	4.129906	0.2921
2000-2006								
Null	Unrestricted Cointegration Rank Test (Trace)				Unrestricted Eigenvalue)	Cointegration Rank Test (Maximum		
Daily	Eigenvalue	Trace statistics	0.05 critical value	Prob.**	Eigenvalue	Max-Eigen value	0.05 critical value	Prob.**
r = 0	0.027041	55.48247	24.27596	0.0000	0.027041	55.48247	24.27596	0.0000
r ≤ 1	0.004831	10.55154	12.32090	0.0972	0.004831	10.55154	12.32090	0.0972
r ≤ 2	0.001594	2.614419	4.129906	0.1251	0.001594	2.614419	4.129906	0.1251

**MacKinnon-Haug-Michelis (1999) p-values.

One key conclusion that emerged from our cointegration tests is that there is only one cointegrating vector found for each of the sub sample periods as well

as the full sample period. That means, in terms of the degree of integration of the three NAFTA member markets there is no significant difference between the early phase of NAFTA (1994 to 1999) and the latter phase (2000 to 2006) as the number of cointegrating vectors remained the same.

However, for the first and second subsamples there is a one-to-one relationship between the US S&P500 and Canadian S&P500 indices. Another interesting finding is that the estimated coefficient values of the cointegrating equations are significantly different in magnitude. The first and second subsample estimates of the coefficients are far less in magnitude than the full sample estimates. This is a clear indication that the estimated coefficients are not constant over time. As a result, we cannot conclude that the reported results reflect long-run structural equilibrium equation. This finding warrants structural stability tests in future studies. Another interesting finding of this study is the change in relationships of the three price indices. For the first sample period, the reported cointegrating equation above indicates a negative relationship between the US S&P500 index and the Mexican stock index while the relationship of the US index with the Canadian S&P500 index is shown to be positive. But, we observe that the results of the second subsample period show that the positive relationship between the US S&P500 and Canadian S&P500 turned negative and its relationship with the Mexican index is positive. This change in relationship of the other two indices with the US S&P500 warrants further investigation.

VI. DISCUSSION

This study examined the Post NAFTA Integration of North American Stock Markets: Implications for Financial Decision Making. The study covered the thirteen full years since the Introduction of NAFTA. There is evidence of cointegration among the North American equity markets. It is natural to assume that the policies introduced by NAFTA are responsible for this development. It is important to note that NAFTA may have contributed to this trend but may not be absolutely responsible for this observed convergence in equity prices trends among the North American equity markets. Figure 2 suggests greater convergence since around 2000. Cier (2006) observed greater convergence among the North American equity markets from the late 1990s. Cier (2006) argues that the comovement was caused by the global boom in information technology shares and the resulting change in the sector mix of the value-weighted benchmark indexes used in prior work. The global boom in information technology shares may have contributed to the cointegration of the North American equity markets but many developments in the last two decades may have directly or indirectly contributed to this observed convergence. Examples are the intensified movement towards the dismantling of trades barriers championed by the World Trade Organization (WTO) introduced in 1990, improved global literacy in equity trading, dismantling of communism, unilateral and bilateral trade agreements between the US and other countries and

among other countries fostering political, economic and business cooperation among countries. Further more, to determine if this observed convergence in the North American stock prices is exclusive to the North American region because of the introduction of NAFTA, it is necessary to examine the nature of the comovements between one or all of the North American equity markets with that of other equity market indexes in different parts of world.

It is also important to explore the implications of the findings of cointegration among the North American equity markets. The assumption of accompanying reduced equity portfolio diversification benefits may lead us to conclude that investors may decide to invest in their country only. However we must remember that the returns were higher in Mexico. The volatility of returns as shown by the standard deviations was also higher. Secondly the exchange rate of the Mexican peso deteriorated since the Mexican economic crisis in 1994. Thirdly it is important to remember that this study is a long-term time series analysis of stock movements. This means that stock returns during different short periods may vary for each country and totally different from the long run returns established here. As a result of all these considerations, it may therefore be financially naïve to conclude that the benefits of equity portfolio diversification are eliminated based on our current finding. Certainly this observation of cointegration of the of the North American Equity markets is of interest to investors, portfolio managers, policy makers and scholars of regional integration.

One key conclusion that emerged from our cointegration tests is that there is only one cointegrating vector found for each of the sub sample periods as well as the full sample period. That means, in terms of the degree of integration of the three NAFTA member markets there is no significant difference between the early phase of NAFTA (1994 to 1999) and the latter phase (2000 to 2006) as the number of cointegrating vectors remained the same.

VII. CONCLUSION

This study examined the Post NAFTA Integration of North American Stock Markets: Implications for Financial Decision Making. The study covered the thirteen full years since the Introduction of NAFTA

The examination of the stochastic properties of the daily closing price indices from 1994 to 2006 of the equity market in North America: US, Canada and Mexico. Results indicate that Mexico shows generally higher returns. It also shows highest volatilities of returns. All the average returns for all the countries were generally skewed to the left except for Mexico's daily return. As was observed in previous works, there is kurtosis and its presence was higher in the daily returns. The correlation matrices indicate various degree of correlation among the markets, all positive. Both the results Unrestricted Cointegration Rank Test (Trace) and the Unrestricted Cointegration Rank Test (Maximum Eigenvalue) in Johansen and Juselius (1990) cointegration test indicate a

rejection of the Null hypotheses of no integration among the North American equity markets. These results seem to indicate the presence of cointegration among the North American Equity markets.

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