

# Diversification versus Segmentation and Integration in Financial Markets

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## Abstract

This article examines the integration/segmentation between developed and emerging markets and its implications on the gains generated by international diversification. Both theoretical and empirical studies agree on the benefits of international diversification in terms of reducing total risk and increasing portfolio returns, showing that the gains from international diversification are superior to domestic diversification. However, the effectiveness of this strategy remains contingent on the level of market integration. Indeed, when markets are financially and economically integrated, potential gains will be low or even nonexistent. Conversely, when markets are segmented, gains will be significant.

The sample for our empirical analysis consists of thirty-five financial markets: nineteen markets in Europe and Central Asia, nine markets in East Asia and the Pacific, four markets in Latin America and the Caribbean, and two markets in North America. These countries are classified according to the World Bank. The study covers the period from 01/2006 to 12/2022. Our results show that the gains from international diversification, are statistically and economically significant for all countries in the sample.

**Keywords:** International Portfolio Diversification, Financial Integration, Emerging Markets

**JEL Classification:** F36, G11, G15

## 1. Introduction

The last decades have been marked by the expansion of globalization, which has seen the connections between economies of different countries strengthen over time, thanks to the widening and free flow of exchanges (of people, goods and services, capital, technologies, or cultural practices).

The financial sector has been impacted by liberalization characterized by the gradual removal of barriers to foreign direct investment through the international opening of financial institutions and the orientation towards new financial products and instruments. These changes are the result of the establishment of principles of deregulation, disintermediation, and market openness, as well as innovations in the field of new information technologies and telecommunications. Stock exchanges have become more linked, which has sparked the interest of academics and practitioners given the consequences of this strong correlation on international portfolio diversification strategies.

Indeed, as financial theory highlights, the substantial expected benefits of international portfolio diversification depend on the level of returns, volatilities, and correlations of national markets. In reality, these elements are influenced by various risk factors. In a perfectly integrated market, global risk factors determine returns. Conversely, in a strictly segmented market, national factors will have a greater impact.

As the degree of integration increases, financial assets become increasingly sensitive to international risk factors. Additional gains from international diversification are therefore conditioned by the level of market integration.

Financial integration thus implies that two or more markets evolve in a coordinated manner. In other words, markets are integrated if and only if assets with the same risk and traded on multiple markets generate the same return. In fact, financial integration ipso facto leads to the verification of the Law of One Price (LOP). This law states that two identical assets, in the presence of competition, cannot be traded at different prices.

Paradoxically, while the financial integration of national markets has developed and intensified within the framework of globalization, making international diversification strategies more consistent by facilitating the free movement from one market to another, on the other hand, this same financial integration would contribute to the increase in correlations and subsequently to the contagion transmission of volatility shocks between domestic financial markets, as highlighted by Longin & Solnik (1995), which would compress the gains associated with international diversification strategies. Thus, the effects of financial integration on gains related to international diversification are ambiguous.

It is in this perspective that this work will attempt to examine the integration of capital markets, both at the level of developed countries and at the level of emerging countries. The objective pursued is precisely to empirically evaluate the degree of market integration in order to determine the possibility of obtaining gains from international diversification. In other words, it is a matter of determining whether, in the case of integrated markets, potential advantages would be low or even nonexistent, while in the case of segmented markets, these gains would be significant.

More specifically, our work aims to pose the following questions and provide answers to them:

To what extent are international markets (Emerging and Developed) integrated? And what is the impact of the degree of integration on the marginal return caused by international portfolio diversification?

In reality, this question is of crucial importance in many decision-making processes; knowledge of the degree of integration of financial markets is fundamental for both companies, investors, and policymakers. For companies, financial integration reduces the cost of capital as it generates better risk sharing and thus improves project profitability (Bekaert and Harvey, 2000; Henry, 2000). For portfolio investors, a high degree of integration increases the relative weight of global risk factors and affects portfolio investment strategies (Longin and Solnik, 2001; Karolyi and Stulz, 2002 and Arouri, 2005). Finally, the effectiveness of actions taken by economic and monetary authorities largely depends on the level of financial integration.

The rest of the article is structured as follows: in the first part of this research, we will present a literature review on the origins of financial integration, international diversification, the interest of emerging markets, and the impact of financial integration on international diversification. In the second part, we will present the research methodology and the results obtained.

## 2. Financial Integration Versus International Diversification: A Literature Review

We attempt to review the literature concerning financial market integration (*See Appendix 1*). Two empirical analysis trends run through the literature:

- Studies based on asset pricing models;
- Studies focusing on the analysis of co-movements of stock prices in financial markets.

Analysis based on asset pricing models assumes the efficiency of markets as an underlying hypothesis. Studies on the co-movement of stock prices mainly rely on co-integration models to determine the degree of interdependence between national markets.

### **2.1. Analysis of Financial Market Integration Based on Asset Pricing Models**

There are two main asset pricing models: the International Asset Pricing Model (IAPM) and the International Arbitrage Pricing Theory (IAPT). Both are extensions of national models to the international context.

This trend focuses its analysis on the interaction between the evaluation of the risk premium and the degree of integration. Thus, financial market integration is manifested by the absence of a gap between risk premiums for similar financial assets traded in different financial markets (Stulz, 1981a, Adler and Dumas, 1983, Bordes, 1988, and Bourguinat, 1997). Indeed, when capital markets are integrated, financial assets with the same risk characteristics provide identical expected returns whether they are traded or not on the same national market. Conversely, if markets are segmented, identical financial assets in terms of risk do not necessarily provide identical expected returns if they are not traded on the same national market. Bekaert, Harvey, and Ng (2003) used the dynamic conditional beta asset pricing model to assess the degree of integration between European, US, and UK markets. They proved that European markets have the highest conditional correlation with the United States, confirming their integration with US markets.

### **2.2. Measures Based on Returns Correlation Coefficients**

The analysis of returns correlation coefficients between stock series represents the simplest technique for assessing financial market integration. Essentially, the closer this coefficient approaches unity, the more the integration hypothesis is accepted, as it indicates that markets assimilate information in a similar manner. In this case, international diversification is not useful, and there is no significant gain to be expected from such a strategy since these markets move in a similar manner. This method was implemented by Levy and Sarnat (1970) and Solnik (1974) to identify short-term benefits of international diversification.

### **2.3. Measures Based on Cointegration Method**

The foundations of cointegration theory can be traced back to the groundbreaking work of Clive Granger and Robert Engle, both Nobel laureates in economics in 2003. Their major contribution lies in the field of time series modeling, particularly in the development of methods aimed at dealing with non-stationary series. They demonstrated that applying a linear combination to two or more non-stationary series could result in a stationary series. If such a combination can be identified, the non-stationary series are said to be cointegrated. The notion of cointegration is fundamental because it suggests the existence of a long-term equilibrium relationship between the variables under study.

Several investigations have focused on the integration of international capital markets using the cointegration method. Allen and Macdonald (1995) examined the links between Asian markets and confirmed their segmentation. In contrast, Gallagher (1995) did not identify a cointegration relationship between the Irish, German, and British capital markets. These studies used the Engle-Granger cointegration method. Other researchers have used the Johansen cointegration method. For example, Chou, Ng et al. (1994) examined G7 markets, Kearney (1998) focused on the Irish market and European

markets, while Ratanapakorn and Sharma (2002) as well as Manning (2002) studied the American, European, and Southeast Asian markets, all identifying significant integration.

### 3. Methodology

To examine the interdependence relationships between markets (whether within groups or between groups) and their implications on the gains from international diversification, we employed the Johansen cointegration approach (1988). This method is more suitable for long-term time series, as simple correlation prevents the observation of long-term relationships between markets. It indicates whether stock indices from different national financial markets tend to vary similarly in a long-term perspective. Detecting such co-movement suggests that these indices have followed a common stochastic trend, potentially negatively impacting gains or losses associated with long-term international diversification. Conversely, the absence of co-movement indicates a certain segmentation between markets. In fact, the methodology operates in three steps. The first step involves examining the stationarity of stock index series using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Next, we determine the optimal number of lags to include in the level model. This number is determined based on the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) criteria. Specifically, we choose the lag that minimizes both criteria. Finally, the Johansen cointegration test is applied to identify the presence or absence of cointegrating relationships, i.e., long-term equilibrium relationships, between the series.

### 4. Data Description and Source

The sample used for our empirical analysis consists of thirty-five financial markets: nineteen markets in Europe and Central Asia, nine markets in East Asia and the Pacific, four markets in Latin America and the Caribbean, and two markets in North America (*See Appendix 2*). The index series used are those produced by MSCI (Morgan Stanley Capital International), covering a period of 17 years, from 01/2006 to 12/2022, and are expressed in a common currency, namely the US dollar, to eliminate any issues related to exchange rate fluctuations.

The choice of this sample is motivated by two considerations:

- The integration of developed markets is increasing. This prompts us to verify the continued superiority of international diversification over domestic diversification from these markets.
- In recent years, emerging markets have attracted growing interest from Western investors. This prompts us to question whether it is opportune to include emerging markets in the international portfolio.

### 5. Descriptive Statistics

Before proceeding to the econometric analysis, we first conduct a statistical analysis of data from our sample. The aim is to extract the essential characteristics of financial data. The tables (*See Appendices 3 and 4*) respectively present descriptive statistics of stock returns from the selected developed and emerging markets during the period 2006-2022. According to these tables:

- For developed markets (*See Appendix 3*), the highest average return is attributed to the Danish stock market at 0.77%, while the lowest is recorded at the Irish stock market, with a negative average of -0.36%. Furthermore, the maximum return in these markets ranges from 10.60% in Switzerland to 25.90% in Spain, while the minimum return varies from -45.60% in Belgium to -13.10% in Switzerland. As for emerging markets (see Annex 4), the maximum return ranges from 14.80% in

Malaysia to 94.4% in Poland. The minimum return fluctuates between -68.20% in Malaysia and -21.30% in Taiwan.

- In terms of risk, the standard deviation level in developed markets ranges from 4.31% for Japan to 8.12% for Norway. However, it is observed that emerging stock markets experience more significant fluctuations in their returns. From our sample, we note that Taiwan has the lowest risk, at 6.26%, while Greece's stock market reaches the highest risk with a standard deviation of 11.87%.
- The Kurtosis statistic values indicate that the series of stock indices have heavy tails or leptokurtic distributions, meaning their distribution is more spread out from the mean compared to a normal distribution. Moreover, the Skewness coefficients indicate that the distribution is left-skewed and reject normal distribution for all series. Therefore, the assumption of normality is not verified, and the Jarque-Bera test confirms this result, significantly rejecting the normal distribution of stock index returns for all markets in the sample.

## 6. Correlation matrix

The tables (*See Appendices 5, 6, and 7*) present the correlation matrix between the returns of stock indices from developed and emerging markets. It can be observed that:

- For developed markets (*See Appendix 5*), the highest correlation is 94.467% between Germany and France, while the lowest correlation is 50.082% between Ireland and Hong Kong. Financial theory has shown that developed stock markets are highly correlated with each other, which explains that a crisis appearing in one developed financial market systematically spreads to other similar markets, such as the consequences of the subprime crisis that emerged in the United States on industrialized economies (2007).
- In contrast, the correlation coefficients between the returns of stock indices from emerging markets (see Annex 6) are low and sometimes even negative. These coefficients range from -1.10% between Malaysia and Poland to 78.432% between South Africa and Poland. This result confirms the independence of these markets from each other. Thus, compared to developed markets, which show a strong correlation among themselves, implying their high integration, emerging markets show a weak dependence relationship both among themselves and with developed markets (*See Appendix 7*). This independence between developed and emerging markets presents an absolute advantage for investors seeking to minimize the risk of their international portfolios and perhaps achieve higher returns.

## 7. Résultats et interprétations

The unit root tests, performed individually for each market (*See Appendices 8-13*), reveal that the series of stock indices, for all 35 markets, are not stationary at the level but exhibit stationarity at first difference, indicating a first-order integration.

Furthermore, the estimations of VAR equations applied to each group (over the entire period) indicate minimal AIC and SC values for a lag  $p=1$  (*See Table 1*).

At this stage, it is possible to conduct cointegration tests, both within each group (intra-group integration) and between different groups (inter-group integration). The results of these tests rely on comparing the trace statistic with critical values established at the 5% threshold. If this statistic exceeds these values, it indicates the existence of at least one cointegration relationship between the markets; otherwise, no cointegration relationship is detected among these markets.



### 7.1. Cointegration tests

The results of the cointegration tests (*See Table 2*) show:

- The absence of cointegrating relationships for developed markets at the 5% statistical threshold. In fact, price variations in these markets do not follow a common long-term trend; there would probably be an opportunity for diversification among these developed markets. However, two cointegration relationships are observed at the 10% threshold.
- The absence of cointegrating relationships for European markets at the 5% threshold.
- The absence of cointegrating relationships for emerging markets at both the 5% and 10% thresholds. Thus, it can be said that the long-term price movements in these markets are not significantly linked, potentially opening up a diversification opportunity for investors in these markets.

The conclusions obtained show discrepancies with the results of previous studies on the integration of developed countries. This disparity could be attributed to significant events that have shaken these markets during the examined period (2006-2022):

- **Financial Crisis of 2007-2008:** This crisis began with the subprime crisis in the United States and quickly spread globally. It had a major impact on investor confidence, causing disruptions in global financial markets.
- **European Sovereign Debt Crisis:** Starting in 2009, several eurozone countries faced sovereign debt problems, leading to concerns about the stability of the eurozone. These concerns had repercussions on global financial markets.
- **Quantitative Easing (QE) Programs:** Several major economies, including the United States, Europe, and Japan, implemented quantitative easing programs to stimulate the economy after the financial crisis. These unconventional monetary policies influenced interest rates and global financial markets.
- **Brexit:** The decision of the United Kingdom to leave the European Union (Brexit) created political and economic uncertainties, affecting European financial markets and having global repercussions.
- **Covid-19 Pandemic:** The Covid-19 pandemic, which occurred in 2019-2020, caused a global health crisis, resulting in massive economic disruptions and reactions in financial markets. Lockdown measures and uncertainties related to the pandemic had significant consequences on market integration.
- **Monetary Policies:** The monetary policies of major central banks, including the Federal Reserve, the European Central Bank, and the Bank of Japan, played an extremely important role in shaping interest rates and global financial conditions.
- **Technology and Financial Innovation:** The emergence of financial technologies and innovations in the financial sector also influenced markets by facilitating new modes of transaction and altering traditional economic models.

These shocks could have disrupted integration patterns and influenced the study's results.

**Table 1: Determination of lag order (p)**

<i>Determination of lag order (p): Developed markets</i>				
Criteria	VAR (1)	VAR (2)	VAR (3)	VAR (4)
Akaike	209.1540	210.0327	210.3670	210.6898
Schwarz	216.0089	223.4623	230.4170	237.4061

<i>Determination of lag order (p): European countries</i>				
Criteria	VAR (1)	VAR (2)	VAR (3)	VAR (4)
Akaike	188.0422	188.8759	189.1924	189.4373
Schwarz	194.2443	201.0117	207.3030	213.5645
<i>Determination of lag order (p): Emerging markets</i>				
Criteria	VAR (1)	VAR (2)	VAR (3)	VAR (4)
Akaike	143.2352	143.7712	144.0276	144.0425
Schwarz	147.1523	151.3867	155.3673	159.1323

**Table 2: Johansen Multivariate Cointegration Test:**

The test hypotheses are: <b>H0: Presence of at least one cointegration relationship</b> <b>H1: Absence of cointegration relationship between the series</b>				
<i>Johansen Multivariate Cointegration Test: Developed Markets</i>				
Hypothesis	Eigenvalue	Trace Statistic	Critical Value at 5%	Probability**
EC N°				
None	0.495783	1035.140	NA	NA
<i>Johansen Multivariate Cointegration Test: European Countries Markets</i>				
Hypothesis	Eigenvalue	Trace Statistic	Critical Value at 5%	Probability**
EC N°				
None	0.501220	952.8566	NA	NA
<i>Johansen Multivariate Cointegration Test: Emerging Markets</i>				
Hypothesis	Eigenvalue	Trace Statistic	Critical Value at 5%	Probability**
EC N°				
None	0.366304	528.6484	NA	NA
<i>The symbols *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.</i>				

## 7.2. Tests de cointégration bivariée

The use of bivariate cointegration tests indicates the presence of long-term cointegration relationships, at the 5% significance level, between the markets of the United States and the United Kingdom, as well as between the markets of the United States and France. The results obtained are consistent with most previous studies on the integration of the financial markets of the United Kingdom and the United States, notably those conducted by Heimonen (2002) and Fraser and Oyefeso (2002). These links are evident due to strong economic and even political ties between these countries, and this long-term dependence can be justified by significant economic partnership relations among them.

- The United States, the United Kingdom, and France are all major players in international trade. They exchange a variety of goods and services, thus contributing to the global economy.
- As members of the World Trade Organization (WTO), these countries actively participate in international trade negotiations.
- There are significant direct investments between these three countries. American companies have operations and subsidiaries in the United Kingdom and France, and vice versa. These investments contribute to job creation and strengthening of respective economies.
- Financial centers such as Wall Street in New York, the City of London, and La Défense in Paris are among the most influential in the world. Financial institutions operate internationally, facilitating transactions and investments between these three economies.
- In addition to economic ties, political and diplomatic relations play a key role. The United States, the United Kingdom, and France have historical alliances and often cooperate on political, security, and defense issues.
- The United Kingdom and the United States negotiated a post-Brexit trade agreement aimed at strengthening bilateral economic relations.
- France, as a member of the European Union, participates in trade agreements concluded by the EU. However, bilateral relations with the United States may also be influenced by these negotiations.
- All three countries are members of various international organizations, such as the G7 and G20, where they collaborate on global economic and financial issues.
- There is also evidence of long-term cointegration relationships, at the 5% significance level, between the United States and China. This long-term dependence can be justified by significant economic partnership relations between these countries.
- The United States and China are significant trading partners. They exchange a wide variety of goods and services. However, the U.S. trade deficit with China has been a subject of concern and debate.
- There are significant direct investments between the two countries. American companies have subsidiaries and operations in China, and vice versa. Investments contribute to job creation and strengthening of respective economies.
- The United States and China are economically interdependent. Products manufactured in China are present in many sectors in the United States, and Chinese exports are essential for certain segments of the U.S. economy.
- The two countries have experienced trade tensions, including reciprocal increases in tariffs on imports. These tensions are often related to concerns such as the trade deficit, intellectual property rights, and perceived unfair trade practices.
- The financial markets of the United States and China are also linked. Financial transactions, investments, and capital movements have direct repercussions on stock markets and exchange rates.
- The United States and China also cooperate on certain economic aspects, such as combating climate change. However, disagreements persist, particularly on issues related to national security, technology, and human rights.
- Both countries are members of various international organizations, such as the G20, where they collaborate on global economic and financial issues.



<i>Table 3 : Determination of lag order (p)</i>				
<i>Determination of lag order (p): USA / UK</i>				
Criteria	VAR (1)	VAR (2)	VAR (3)	VAR (4)
Akaike	<b>22.31298</b>	22.34582	22.36888	22.38294
Schwarz	<b>22.41090</b>	22.50960	22.59896	22.67979
<i>Determination of lag order (p): USA / France</i>				
Criteria	VAR (1)	VAR (2)	VAR (3)	VAR (4)
Akaike	<b>23.30780</b>	23.34176	23.34045	23.37245
Schwarz	<b>23.40573</b>	23.50554	23.57054	23.66930
<i>Determination of lag order (p): USA / Chine</i>				
Criteria	VAR (1)	VAR (2)	VAR (3)	VAR (4)
Akaike	<b>17.80752</b>	17.84302	17.79348	17.82862
Schwarz	<b>17.90545</b>	18.00679	18.02356	18.12547

<i>Table 4: Bivariate Cointegration Tests</i>				
<b>The test hypotheses are:</b>				
<b>H0: Presence of at least one cointegration relationship</b>				
<b>H1: Absence of cointegration relationship between the series</b>				
<i>Bivariate Cointegration Tests : USA / UK</i>				
Hypothesis EC N°	Eigenvalue	Trace Statistic	Critical Value at 5%	Probability**
None	0.033813	7.191251	15.49471	0.05555
At most 1	0.001201	0.242815	3.841466	0.06222
<i>Bivariate Cointegration Tests : USA / France</i>				
Hypothesis EC N°	Eigenvalue	Trace Statistic	Critical Value at 5%	Probability**
None	0.037484	7.801079	15.49471	0.04869
At most 1	0.000415	0.083820	3.841466	0.07722
<i>Bivariate Cointegration Tests : USA / Chine</i>				
Hypothesis EC N°	Eigenvalue	Trace Statistic	Critical Value at 5%	Probability**
None *	0.082044	17.66593	15.49471	0.0232
At most 1*	0.001848	0.373586	3.841466	0.05411
<i>The symbols *, **, and *** represent significance levels of 10%, 5%, and 1%, respectively.</i>				

## 8. CONCLUSION

This research paper examines the integration/segmentation between developed and emerging markets and its implications for gains generated by international diversification. The choice of topic is motivated by two considerations: First, the integration of developed markets is increasing, prompting us to verify the continuity of the superiority of international diversification over national diversification from these markets. Second, in recent years, emerging markets have attracted growing interest from Western

investors, leading us to question whether it is opportune to include emerging markets in international portfolios.

To do this, we defined two investment universes. The first consists solely of indices from developed countries, while the second is formed of indices from both developed and emerging countries, during the period from 01/2006 to 12/2022.

We used Vector AutoRegressive (VAR) modeling to analyze the causal time relationship between economic and financial variables through the usual tests of the Akaike Information Criterion (AIC) and the Schwarz Criterion (SC) (first step), and the Cointegration relationship, both within each group (intra-group integration) and between different groups (inter-group integration) (second step). Based on our econometric results, we highlight the absence of cointegrating relationships for developed markets, at the 5% statistical threshold. In fact, price variations in these markets do not follow a common long-term trend: there would likely be an opportunity for diversification between these developed markets. However, we note the presence of a cointegration relationship between the United States and China, consistent with the situation of trade and payments balances between the two countries. In fact, besides China, we statistically observe a bivariate cointegration between the United States and the United Kingdom, the United States and France, which do not offer, in fact, any diversification possibilities.

In contrast, no cointegration relationship was observed among the emerging markets in the sample. These results suggest that emerging markets represent a significant source of international portfolio diversification. However, one must consider the transmission of volatility shocks following the numerous crises that have shaken financial markets in recent years, including the subprime crisis of 2007-2008. Indeed, movements in developed markets, especially that of the United States, demonstrate marked contagion. Shocks spread rapidly and significantly affect other developed markets and emerging markets. The latter react more strongly to a shock in the American market than to a shock in another emerging market, as indicated by Bekaert et al. (2003). However, crises affecting emerging markets are not transmitted significantly internationally. These crises are characterized by the development of a powerful contagion effect, which negatively affects the potential gains from international diversification.

Finally, this research presents some limitations:

- Firstly, the study period could have been more significant with a longer duration to improve the reliability of cointegration test results.
- Secondly, the restriction of variables to only stock indices and the omission of other relevant variables could introduce biases.
- Thirdly, the non-consideration of the evolution of integration over time.
- Fourthly, the non-inclusion of exchange rate variation, which strongly influences the evolution of stock indices internationally.
- Thus, in order to overcome these limitations, future research using a longer study period and exploring other methods of measuring integration such as models for evaluating international financial assets could provide more robust conclusions to effectively inform the investment allocation decisions of international portfolio managers..

• **APPENDIX 1 :**

• **Literature on Financial Market Integration and its Impact on Gains from International Diversification**

Author	Year	Sample	Methodology	Results
<b>Studies on integration of developed markets</b>				
Mimouni and al.	2016	GCC Gulf Countries	Corrélation conditionnelle	Weak correlation with European markets, greater gains in terms of international diversification.
Miralles-Marcelo and al.	2015	SP500, MSCI 3 for Japan, MSCI for Great Britain	VAR-DCC Model	Strong interdependence among these indices (correlation coefficients around 0.8), reduction in diversification gains.
Heimonen	2002	European and American markets	Johansen and Juselius approach (1990, 1988)	Existence of long-term relationship between capital markets of the United States, the United Kingdom, and Germany, indicating integration among these markets.
Fraser and Oyefeso	2002	Capital markets in Europe, UK, and US	Various approaches	Bilateral convergence in both short and long term among these markets. Perfect correlation between UK and US securities markets in the long term.
Bekaert, Harvey and Ng	2003	European and American markets	Conditional beta asset pricing model	Strong interdependence and substantial influence of US events on European financial market performance.
Aggarwal and Kyaw	2005	NAFTA capital markets (US, Canada, Mexico)	Various approaches	Increased correlation among these markets after the creation of NAFTA in 1993.
Dumas and Solnik	1995	Stock markets in US, Japan, Germany, and UK	GMM (Generalized Method of Moments)	Using multifactorial MEDAFI testing, authors highlighted integration presence among these markets.
Santis and Gerard	1997	Stock markets in Canada, Japan, France, Germany, Italy, Switzerland, UK, and US	MGARCH	MGARCH Applying BEKK method to assess integration level among these eight markets and potential gains from international diversification for US investor, the author observes an estimated gain around 2.11% per year. Notably, this gain remains independent of the degree of integration among these markets.

Author	Year	Sample	Methodology	Results
<b>Studies on Integration of Emerging Markets</b>				
Chiang and al.	2007	Asian Stock Markets	DCC (Dynamic Conditional Correlation) by Engle (2002)	Increasing integration among these markets, leading to the development of contagion effects during financial crises, as observed during the Asian crisis of 1997.
Antoniou and al.	2007	Asian Stock Markets	Conditional and static correlation analysis	Increasing integration among these markets, resulting in reduced benefits associated with international diversification.
Heaney, Hooper and Jaugietis	2002	Latin American Markets	Various approaches	Growing regional integration in these markets during the 1990s.
Forbes and Rigobon	2000	Latin American Markets	MGARCH	Strong interdependence between Latin American markets and other emerging markets.
Barari	2003	Latin American Markets	Various approaches	Strong interdependence within Latin American financial markets, particularly during the 1990s

<b>Piesse and Hearn</b>	2002		Analysis of volatility transmission	Increasing regional integration among these markets, leading to the development of contagion effects during financial crises.
<b>Bekaert, Harvey and Ng</b>	2002	Southeast Asian Markets	Double-index asset pricing model	Significant regional integration among Southeast Asian markets.
<b>Jang and Sul</b>	2002	Southeast Asian Markets	Granger causality test	Significant integration within Southeast Asian markets.

Author	Year	Sample	Methodology	Results
<b>Studies on the Integration of Emerging Markets - Developed Markets</b>				
<b>Gilmore and McManus</b>	2002	American market and three emerging markets in Central Europe (the Czech Republic, Hungary, and Poland).	Johansen cointegration test Granger causality test	Absence of integration, either between these markets or with developed markets. The Granger causality test reveals a causal link between the Hungarian market and the Polish market, but no link with the United States.
<b>DeFusco and al</b>	1996	American market and emerging markets in the Pacific basin, Latin America, and the Mediterranean	Several approaches	Absence of integration between the American market and emerging markets in the Pacific basin, Latin America, and the Mediterranean.
<b>Sappenfield and Speidell</b>	1992	Globally diversified portfolios (18 emerging markets and 18 developed markets)	Several approaches	Increased correlation among developed markets. This increase is attributed to the global impact of events such as the October 1987 crash or the invasion of Kuwait in August 1990.
<b>Divecha, Drak and Stefek</b>	1992	Globally diversified portfolios 23 stock exchanges in developing countries (including Jordan, Malaysia, Nigeria, Pakistan, Turkey...) and 20 developed countries	Several approaches	Weak correlation between developing markets, as well as weak correlation with developed countries, resulting in diversification gains..

## *APPENDIX 2: List of Countries by Region*

INDEX	Country	ISO CODE	Région
TSX Composite Index	CANADA	CA	North America
S&P 500	USA	US	North America
BEL 20.	BELGIUM	BE	Europe & Central Asia
OMX Copenhagen 25	DENMARK	DK	Europe & Central Asia
OMX Helsinki 25	FINLAND	FI	Europe & Central Asia
CAC 40	FRANCE	FR	Europe & Central Asia
DAX	GERMANY	DE	Europe & Central Asia
ISEQ Overall Index	IRELAND	IE	Europe & Central Asia
FTSE MIB	ITALY	IT	Europe & Central Asia
AEX Index	NETHERLANDS	NL	Europe & Central Asia
Oslo Børs All-Share Index (OSEAX)	NORWAY	NO	Europe & Central Asia
PSI 20	PORTUGAL	PT	Europe & Central Asia
IBEX 35	SPAIN	ES	Europe & Central Asia

OMX Stockholm 30 (OMXS30)	SWEDEN	SE	Europe & Central Asia
Swiss Market Index (SMI)	SWITZERLAND	CH	Europe & Central Asia
FTSE 100	UK	GB	Europe & Central Asia
PX Index.	AUSTRALIA	CZ	Europe & Central Asia
Athex Composite Share Price Index (ATG)	HONG KONG	GR	Europe & Central Asia
BUX (Budapest Stock Exchange)	JAPAN	HU	Europe & Central Asia
Warsaw Stock Exchange WIG20	SINGAPORE	PL	Europe & Central Asia
BIST 100	CZECHREPUBLIC	TR	Europe & Central Asia
S&P/ASX 200	GREECE	AU	East Asia & Pacific
Hang Seng Index	HUNGARY	HK	East Asia & Pacific
Nikkei 225	POLAND	JP	East Asia & Pacific
Straits Times Index (STI)	TURKEY	SG	East Asia & Pacific
KOSPI Index	KOREA	KR	East Asia & Pacific
TAIEX (Taiwan Stock Exchange Weighted Index)	TAIWAN	TW	East Asia & Pacific
Shanghai Composite Index (SSE Composite)	CHINA	CN	East Asia & Pacific
IDX Composite (Indonesia Stock Exchange Composite Index)	INDONESIA	ID	East Asia & Pacific
FTSE Bursa Malaysia KLCI	MALAYSIA	MY	East Asia & Pacific
IPSA (Índice de Precio Selectivo de Acciones)	CHILE	CL	Latin America & Caribbean
Bovespa Index (Ibovespa)	BRAZIL	BR	Latin America & Caribbean
COLCAP (Índice de Capitalización de la Bolsa de Valores de Colombia).	COLOMBIA	CO	Latin America & Caribbean
IGBVL (Índice General de la Bolsa de Valores de Lima)	PERU	PE	Latin America & Caribbean
JSE All Share Index	SOUTHAFRICA	ZA	Africa Eastern and Southern

### APPENDIX 3: Descriptive Statistics of Stock Returns in Developed Markets

Country	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability	Sum	Sum Sq. Dev.
CA	0,002	0,0015	0,191	-0,317	0,0592	-1,0212	7,9557	244,2119	0	0,412	0,711
US	0,0057	0,012	0,123	-0,19	0,0446	-0,8111	4,8746	52,2387	0	1,168	0,4034
BE	-0,0016	0,006	0,205	-0,456	0,0697	-1,8306	12,5221	884,6355	0	-0,335	0,986
DK	0,0077	0,0165	0,168	-0,297	0,0595	-1,0167	6,7746	156,249	0	1,561	0,7184
FI	0,0002	0,003	0,214	-0,275	0,0688	-0,5598	4,6417	33,5634	0	0,048	0,9607
FR	0,0015	0,006	0,207	-0,255	0,0626	-0,6014	4,6194	34,5894	0	0,316	0,7967
DE	0,0013	0,0095	0,159	-0,261	0,0668	-0,6839	4,2603	29,4016	0	0,265	0,9047
IE	-0,0036	0,0035	0,176	-0,305	0,0712	-1,0295	5,3905	84,6095	0	-0,731	1,0305
IT	-0,0031	0,0025	0,237	-0,27	0,0749	-0,4486	4,1083	17,2815	0,0002	-0,637	1,1379
NL	0,0036	0,0115	0,144	-0,29	0,0613	-0,8823	5,3856	74,8446	0	0,744	0,7634
NO	0,0002	0,0095	0,187	-0,406	0,0812	-1,181	7,3635	209,2645	0	0,031	1,3384
PT	-0,0028	0,0015	0,135	-0,305	0,0663	-0,7922	4,9002	52,0295	0	-0,571	0,8916
ES	-0,0014	0,009	0,259	-0,295	0,0748	-0,4523	5,0738	43,5097	0	-0,282	1,1351
SE	0,0025	0,003	0,201	-0,311	0,0662	-0,6351	5,6661	74,1336	0	0,51	0,8901
CH	0,0036	0,0105	0,106	-0,131	0,0455	-0,6413	3,5389	16,452	0,0003	0,73	0,4202
GB	-0,0005	0,0065	0,152	-0,213	0,0521	-0,6114	4,81	40,5567	0	-0,102	0,5515
AU	0,0015	0,0075	0,157	-0,296	0,0678	-0,9999	6,1505	118,3638	0	0,314	0,9333
HK	0,003	0,006	0,158	-0,242	0,0596	-0,582	4,8039	39,1747	0	0,603	0,7219
JP	0,0002	0,004	0,118	-0,161	0,0431	-0,522	4,2221	21,9604	0	0,04	0,3764
SG	0,0013	0,0065	0,214	-0,346	0,0648	-0,8805	7,2956	183,2026	0	0,267	0,8522



**APPENDIX 3 : Descriptive Statistics of Stock Returns in Developed Markets (Continued)**

	SE	CH	GB	AU	HK	JP	SG
CA	0,75822	0,68622	0,84907	0,84008	0,72039	0,64842	0,80235
US	0,82538	0,8061	0,84024	0,81318	0,66695	0,72873	0,7534
BE	0,81674	0,76892	0,84303	0,76267	0,69077	0,67866	0,7573
DK	0,83297	0,7755	0,77173	0,71139	0,64975	0,65941	0,68404
FI	0,80235	0,78349	0,78614	0,74728	0,65340	0,66045	0,6773
FR	0,88724	0,84974	0,90763	0,81305	0,71054	0,71997	0,78684
DE	0,88089	0,83937	0,87289	0,80081	0,71530	0,74281	0,79856
IE	0,73224	0,66252	0,76301	0,66639	0,50082	0,61313	0,56433
IT	0,80492	0,77598	0,85274	0,74477	0,64273	0,66909	0,7178
NL	0,88822	0,84183	0,86347	0,78109	0,71441	0,71794	0,7744
NO	0,80977	0,71663	0,868	0,82246	0,71422	0,66729	0,79013
PT	0,70655	0,72815	0,74932	0,70069	0,61191	0,61585	0,6465
ES	0,77159	0,74525	0,82147	0,73641	0,63591	0,65774	0,7132
SE		0,82413	0,85486	0,80192	0,73861	0,69928	0,80757
CH		1,0000	0,8184	0,76669	0,65637	0,69618	0,70317
GB			1,0000	0,84478	0,76852	0,74411	0,81993
AU				1,0000	0,75432	0,68614	0,81179
HK					1,0000	0,63339	0,8474
JP						1,0000	0,69466
SG							1,0000

**APPENDIX 4: Descriptive Statistics of Stock Market Returns in Emerging Markets**

Country	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability	Sum	Sum Sq. Dev.
CZ	-0,001363	0,0035	0,197	-0,349	0,076533	-0,752739	5,890043	90,25994	0	-0,278	1,189027
GR	-0,017299	-0,002	0,268	-0,458	0,118744	-0,834516	4,583071	44,98017	0	-3,529	2,862325
HU	-0,001652	0,001	0,242	-0,569	0,103584	-1,207131	7,682689	235,928	0	-0,337	2,178114
PL	0,000358	-0,0055	0,944	-0,414	0,114588	2,443503	24,92503	4289,012	0	0,073	2,665465
TR	-0,002721	0,004	0,25	-0,421	0,107926	-0,492535	3,888782	14,9625	0,0006	-0,555	2,364527
KR	0,003441	0,005	0,411	-0,303	0,078212	0,422591	7,179162	154,5277	0	0,702	1,241774
TW	0,003838	0,0115	0,161	-0,213	0,062572	-0,388063	3,793531	10,47253	0,0053	0,783	0,794806
CN	0,003858	0,0145	0,177	-0,259	0,07415	-0,608268	4,066878	22,25461	0	0,787	1,116129
ID	0,004789	0,0115	0,267	-0,51	0,083502	-1,392942	11,00689	610,9079	0	0,977	1,415446
MY	-0,002441	0,0045	0,148	-0,682	0,068497	-4,911922	49,09199	18878,32	0	-0,498	0,95244
CL	-0,000309	-0,0035	0,167	-0,297	0,069228	-0,505131	4,237601	21,69444	0	-0,063	0,97287

<b>BR</b>	- 0,00038 2	0,003	0,265	-0,483	0,10082 8	- 0,697999	5,67333	77,31179	0	- 0,078	2,06377
<b>CO</b>	-0,00127	0,01	0,215	-0,537	0,09034 8	- 1,323211	8,90355 1	355,7714	0	- 0,259	1,657022
<b>PE</b>	0,00175	0,007	0,237	-0,559	0,09423 6	- 1,513651	10,3512 1	537,2412	0	0,357	1,80273
<b>ZA</b>	0,00225 5	0,002	0,503	-0,31	0,08229 8	0,541358	9,85263 4	409,1124	0	0,46	1,374917

**APPENDIX 5: Correlation Matrices of Stock Returns for Developed Markets**

	CA	US	BE	DK	FI	FR	DE	IE	IT	NL	NO	PT	ES
<b>C A</b>	1,0000	0,82 997	0,7402 6	0,6937 0	0,6744 8	0,7823 9	0,7693 8	0,6610 7	0,7122 2	0,760 43	0,840 16	0,64 901	0,68458
<b>U S</b>		1,00 00	0,7945 8	0,7334 1	0,7665 6	0,8380 6	0,8424 6	0,7571 2	0,7429 6	0,852 53	0,752 13	0,64 874	0,69654
<b>B E</b>			1,0000	0,7811 4	0,7617 9	0,8492 4	0,8083 8	0,7333 3	0,7790 8	0,871 68	0,802 98	0,73 05	0,77076
<b>D K</b>				1,0000	0,7539 9	0,7849 6	0,7808 2	0,6990 7	0,7327 1	0,832 25	0,764 86	0,71 675	0,69006
<b>F I</b>					1,0000	0,8543 4	0,8411 8	0,6898 5	0,7982 9	0,817 04	0,724 03	0,69 939	0,75433
<b>F R</b>						1,0000	0,9446 7	0,7620 9	0,9345 5	0,923 05	0,821 07	0,80 347	0,90235
<b>D E</b>							1,0000	0,7450 0	0,8860 2	0,896 62	0,784 89	0,75 604	0,84261
<b>I E</b>								1,0000	0,7116 0	0,766 45	0,676 74	0,59 71	0,6443
<b>I T</b>									1,0000	86,12 %	0,758 17	0,78 989	0,91671
<b>N L</b>										1,000 0	0,806 59	0,77 64	0,82715
<b>N O</b>											1,000 0	0,72 578	0,7276
<b>P T</b>												1,00 00	0,80219
<b>E S</b>													1,0000

**APPENDIX 6: Correlation Matrices of Stock Returns for Emerging Markets**

	CZ	GR	HU	PL	TR	KR	TW	CN	ID	MY	CL	BR	CO	PE	ZA
<b>C Z</b>	1,0000	0,6469	0,7382	0,7070	0,5089	0,6611	0,5939	0,5333	0,6479	0,3587	0,5384	0,6489	0,5964	0,4663	0,6719
<b>G R</b>		1,0000	0,6568	0,5798	0,4967	0,5484	0,5162	0,4920	0,4632	0,3459	0,4494	0,5546	0,5300	0,3778	0,4985

HU			1,0000	0,7058	0,5806	0,6491	0,6253	0,6004	0,6193	0,4100	0,5419	0,6207	0,5812	0,4671	0,6278
PL				1,0000	0,5358	0,7775	0,5442	0,5600	0,4940	0,0110	0,4668	0,5794	0,5250	0,1800	0,7843
TR					1,0000	0,5673	0,4440	0,4814	0,5928	0,3424	0,5141	0,6042	0,5637	0,3698	0,6034
KR						1,0000	0,7400	0,7003	0,6090	0,1949	0,5509	0,6274	0,5801	0,3469	0,7629
TW							1,0000	0,7026	0,5949	0,4254	0,5768	0,6025	0,5203	0,5003	0,6171
CN								1,0000	0,5254	0,3335	0,5110	0,5606	0,5169	0,4441	0,6372
ID									1,0000	0,4973	0,5802	0,6200	0,5956	0,5756	0,6131
MY										1,0000	0,4087	0,3719	0,3862	0,6566	0,1316
CL											1,0000	0,6674	0,6207	0,4842	0,6140
BR												1,0000	0,6931	0,5409	0,7269
CO													1,0000	0,5161	0,6475
PE														1,0000	0,3795
ZA															1,0000

### APPENDIX 7: Correlation Matrices of Stock Returns for Developed and Emerging Markets

	CZ	GR	HU	PL	TR	KR	TW	CN	ID	MY	CL	BR	CO	PE	ZA
CA	0,717 3	0,631 8	0,686 3	0,620 8	0,514 3	0,705 0	0,702 4	0,636 9	0,654 9	0,383 2	0,607 7	0,752 5	0,665 3	0,606 8	0,723 2
US	0,655 5	0,640 7	0,673 2	0,609 8	0,475 2	0,685 6	0,690 1	0,577 3	0,603 3	0,404 5	0,501 8	0,578 6	0,545 3	0,459 7	0,632 1
BE	0,683 1	0,629 2	0,698 3	0,625 3	0,565 8	0,681 3	0,680 7	0,597 6	0,639 0	0,397 5	0,574 6	0,595 1	0,571 4	0,492 5	0,658 8
DK	0,659 8	0,602 5	0,688 8	0,598 1	0,471 0	0,624 7	0,619 8	0,573 0	0,574 3	0,424 4	0,460 8	0,503 3	0,461 2	0,403 5	0,574 8
FI	0,698 4	0,651 3	0,696 2	0,628 5	0,530 3	0,672 8	0,639 1	0,577 1	0,558 6	0,387 9	0,451 3	0,539 5	0,480 7	0,387 6	0,603 3
FR	0,776 4	0,744 9	<b>0,797</b> <b>4</b>	0,714 3	0,537 0	0,722 7	0,696 4	0,611 6	0,594 4	0,394 0	0,531 6	0,617 7	0,590 5	0,466 3	0,682 9
DE	0,750 8	0,706 2	0,785 6	0,721 5	0,564 7	0,763 6	0,710 9	0,649 7	0,616 7	0,411 1	0,523 4	0,611 3	0,554 5	0,458 5	0,688 2
IE	0,580 9	0,569 9	0,587 0	0,520 8	0,329 5	0,597 8	0,613 5	0,443 8	0,490 2	<b>0,295</b> <b>8</b>	0,381 8	0,456 0	0,392 8	0,311 9	0,495 3
IT	0,751 8	0,750 1	0,775 3	0,658 1	0,540 2	0,645 4	0,618 7	0,556 4	0,540 5	0,383 8	0,494 7	0,592 8	0,572 5	0,433 4	0,605 3
NL	0,712 9	0,701 0	0,765 7	0,666 2	0,550 8	0,713 6	0,715 5	0,640 4	0,606 6	0,431 8	0,529 0	0,571 4	0,552 0	0,448 6	0,648 4
N	0,714 4	0,631 8	0,711 2	0,635 5	0,527 4	0,697 2	0,713 4	0,643 0	0,633 8	0,407 0	0,613 6	0,724 5	0,634 1	0,534 4	0,700 3
PT	0,664 8	0,667 9	0,687 9	0,582 5	0,471 0	0,601 9	0,566 7	0,566 7	0,524 8	0,415 1	0,542 8	0,568 1	0,605 5	0,459 7	0,587 7
ES	0,773 6	0,744 3	0,755 1	0,671 1	0,558 0	0,636 5	0,594 7	0,558 8	0,571 1	0,390 7	0,494 1	0,594 7	0,578 0	0,439 5	0,604 6
SE	0,691 5	0,637 7	0,745 3	0,685 2	0,529 9	0,731 0	0,733 2	0,662 3	0,622 9	0,431 7	0,550 5	0,591 7	0,550 7	0,464 6	0,668 5
C	0,661 3	0,648 3	0,684 7	0,669 0	0,479 2	0,674 9	0,625 8	0,554 0	0,566 2	0,371 9	0,461 0	0,536 5	0,497 1	0,418 0	0,613 1
H	0,739 4	0,729 6	0,751 3	0,687 1	0,574 9	0,714 1	0,693 7	0,649 3	0,606 1	0,416 9	0,585 2	0,662 3	0,628 5	0,510 1	0,705 0
GB	0,729 7	0,668 3	0,724 0	0,644 8	0,586 4	0,727 4	0,717 1	0,663 7	0,728 0	0,448 5	0,605 3	0,744 4	0,651 7	0,581 4	0,754 7
AU	0,587 0	0,577 9	0,638 9	0,571 9	0,536 9	0,707 7	0,727 6	<b>0,848</b> <b>5</b>	0,612 2	0,445 5	0,596 5	0,625 7	0,585 5	0,496 2	0,661 4
K	0,566 9	0,586 6	0,634 3	0,546 2	0,492 4	0,634 8	0,593 8	0,557 1	0,537 0	0,317 7	0,427 5	0,501 3	0,500 5	0,376 1	0,608 9
JP	0,685 7	0,653 7	0,737 4	0,652 0	0,621 3	0,769 5	0,748 5	0,738 4	0,711 0	0,472 6	0,662 2	0,707 0	0,667 1	0,584 5	0,723 2
SG															

*APPENDIX 8: ADF Test Model 1*

<b>Model 1: No Constant or Trend</b>		
<b>Markets</b>	<b>ADF in Level</b>	<b>ADF in First Difference</b>
CA	-0.100832	-6.156409
US	1.231850	-5.216440
BE	-0.949568	-4.691040
DK	1.251194	-4.861102
FI	-0.731241	-4.581499
FR	-0.231234	-5.588759
DE	-0.389548	-5.689119
IE	-1.752980	-4.234352
IT	-1.399780	-5.103314
NL	0.050416	-4.528580
NO	-0.755038	-6.565346
PT	-1.288041	-4.531523
ES	-0.879965	-5.324037
SE	-0.137182	-5.146182
CH	0.630369	-5.572859
GB	-0.655536	-5.697701
AU	-0.239252	-6.513411
HK	0.117795	-6.501423
JP	-0.281209	-5.873795
SG	-0.339856	-5.807491
CZ	-0.869891	-6.352932
GR	-1.861126	-4.413310
HU	-0.967244	-6.114144
PL	-1.090220	-5.295821
TR	-0.821490	-6.679503
KR	-0.310026	-5.345413
TW	0.216119	-5.493749
CN	-0.293507	-5.931545
ID	-0.038939	-6.440386
MY	-0.304804	-5.546974
CL	-0.493655	-6.654978
BR	-0.780914	-6.634823
CO	-0.570998	-7.253869
PE	-0.236391	-6.163781
ZA	-0.373748	-6.642538
<b>Critical Values</b>	<b>-2.576634</b>	<b>-2.576693</b>
	<b>-1.942431</b>	<b>-1.942439</b>
	<b>-1.615638</b>	<b>-1.615633</b>

*APPENDIX 9: PP Test Model 1*

<b>Model 1: No Constant or Trend</b>		
<b>Markets</b>	<b>PP in Level</b>	<b>PP in First Difference</b>
CA	-0.026054	-13.95439
US	1.710558	-14.14639
BE	-0.901044	-11.82328
DK	1.634598	-12.77248
FI	-0.539069	-11.76047
FR	-0.133728	-13.25052
DE	-0.315847	-12.89995
IE	-1.540505	-11.04437
IT	-1.316012	-12.34261
NL	0.292727	-13.14319
NO	-0.676701	-12.85599

PT	-1.053708	-11.41658
ES	-0.793384	-12.76255
SE	-0.028999	-13.80406
CH	0.770359	-13.75036
GB	-0.585464	-13.14893
AU	-0.228265	-13.26144
HK	0.092371	-14.19703
JP	-0.331939	-12.50257
SG	-0.302154	-13.95761
CZ	-0.906979	-11.73607
GR	-1.893289	-10.91812
HU	-1.033465	-12.38907
PL	-1.080123	-13.58117
TR	-1.147846	-14.24214
KR	-0.283677	-13.04894
TW	0.323585	-12.72937
CN	-0.286699	-13.23342
ID	-0.022476	-12.71910
MY	-0.257709	-13.06646
CL	-0.521192	-14.26521
BR	-0.849065	-12.33420
CO	-0.690882	-13.31315
PE	-0.233375	-14.27359
ZA	-0.491603	-14.91929
<b>Critical Values</b>	<b>-2.576403</b>	<b>-2.576460</b>
	<b>-1.942399</b>	<b>-1.942407</b>
	<b>-1.615659</b>	<b>-1.615654</b>

*APPENDIX 10: ADF Test Model 2*

Model 2: With Constant		
Markets	ADF in Level	ADF in First Difference
CA	-3.334859	-6.155731
US	-0.233964	-5.445901
BE	-2.360512	-4.689393
DK	-0.241220	-5.092328
FI	-2.625696	-4.569010
FR	-2.524124	-5.577353
DE	-3.285362	-5.674884
IE	-2.587076	-4.258581
IT	-2.332084	-5.131978
NL	-1.643464	-4.553186
NO	-3.097131	-6.549074
PT	-1.956967	-4.552194
ES	-2.400426	-5.320736
SE	-2.539689	-5.148141
CH	-1.161585	-5.642933
GB	-2.928073	-5.688774
AU	-3.819885	-6.501536
HK	-2.207077	-6.519164
JP	-1.767163	-5.857245
SG	-3.794741	-5.794244
CZ	-2.169191	-6.341561
GR	-1.728215	-4.472811
HU	-2.788612	-6.098784
PL	-2.212639	-5.300515
TR	-1.812016	-6.654145
KR	-2.625637	-5.339134
TW	-1.261739	-5.537106
CN	-2.963139	-5.929388
ID	-3.006749	-6.462142
MY	-2.054312	-5.534035
CL	-1.718615	-6.637634
BR	-2.389093	-6.618977
CO	-1.412612	-7.233010
PE	-3.308687	-6.171266
ZA	-3.180875	-6.624014
<b>Critical Values</b>	<b>-3.463235</b>	<b>-3.463405</b>



-2.875898	-2.875972
-2.574501	-2.574541

<i>APPENDIX 11: PP Test Model 2</i>			
Model 2: With Constant			
Markets	PP in Level	PP in First Difference	
CA	-2.939478	-13.93355	
US	0.104284	-14.33978	
BE	-1.938922	-11.80343	
DK	-0.016767	-12.93841	
FI	-2.095778	-11.73174	
FR	-2.293897	-13.22368	
DE	-2.892181	-12.86975	
IE	-1.814869	-11.06203	
IT	-1.862359	-12.34154	
NL	-1.263786	-13.14992	
NO	-2.928703	-12.82516	
PT	-1.428858	-11.40657	
ES	-2.101524	-12.73669	
SE	-2.236672	-13.78760	
CH	-1.076113	-13.79280	
GB	-2.478955	-13.11968	
AU	-3.542854	-13.23261	
HK	-2.174269	-14.18408	
JP	-1.745324	-12.47019	
SG	-3.322083	-13.92611	
CZ	-1.912740	-11.71226	
GR	-1.512973	-10.98070	
HU	-2.656437	-12.36365	
PL	-1.904479	-13.56503	
TR	-2.181878	-14.22383	
KR	-2.285600	-13.02337	
TW	-1.114845	-12.74184	
CN	-2.775581	-13.21125	
ID	-2.882792	-12.71292	
MY	-1.957959	-13.03647	
CL	-1.708093	-14.23127	
BR	-2.299494	-12.30535	
CO	-1.416740	-13.28415	
PE	-2.980245	-14.26061	
ZA	-3.275440	-14.88115	
Critical Values	-3.462574	-3.462737	
	-2.875608	-2.875680	
	-2.574346	-2.574385	

<i>APPENDIX 12: ADF Test Model 3</i>		
Model 3: with constant and trend		
Markets	ADF in Level	ADF in First Difference
CA	-3.732291	-6.139491
US	-2.283069	-5.494935
BE	-2.346612	-4.678682
DK	-2.398910	-5.142772
FI	-2.589419	-4.567222
FR	-2.827666	-5.579039
DE	-3.518158	-5.668802
IE	-2.377028	-4.348161
IT	-2.516802	-5.167298
NL	-3.002106	-4.553032
NO	-3.483446	-6.532022
PT	-2.765011	-4.559194
ES	-3.679939	-5.303843
SE	-3.464923	-5.133241
CH	-2.846262	-5.630786
GB	-3.084153	-5.672897
AU	-3.829355	-6.487296
HK	-3.499423	-6.533670
JP	-2.555796	-5.868949
SG	-3.720393	-5.840168
CZ	-3.889646	-6.326222
GR	-2.169161	-4.503907
HU	-2.859842	-6.082923
PL	-3.939357	-5.291225

TR	-3.281646	-6.656840
KR	-3.537718	-5.336479
TW	-2.572705	-5.538523
CN	-3.386156	-5.972953
ID	-3.031096	-6.508800
MY	-2.250213	-5.725886
CL	-2.518183	-6.761851
BR	-3.776841	-6.642815
CO	-1.887328	-7.409460
PE	-3.301800	-6.215359
ZA	-3.147723	-6.644678
Critical Values	<b>-4.004836</b>	<b>-4.005076</b>
	<b>-3.432566</b>	<b>-3.432682</b>
	<b>-3.140059</b>	<b>-3.140127</b>

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