
Time-varying Stock Market Integration and Diversification Opportunities within Developed Markets Using Aggregated Data Approach

Sultan Salahuddin

Benazir Bhutto Shaheed University Lyari, Karachi, Pakistan

Salman Sarwat

Benazir Bhutto Shaheed University Lyari, Karachi, Pakistan

Umair Baig¹

Benazir Bhutto Shaheed University Lyari, Karachi, Pakistan

Mudassir Hussain

Benazir Bhutto Shaheed University Lyari, Karachi, Pakistan

Abstract

This study has examined time-varying features of the developed stock market and diversification opportunities. The study has collected data from 21 developed countries ranging from 2000-2018 from the Pacific Region, Northern Europe, Western Europe, Southern Europe, and G7. The study has developed five panels, and each panel has included one home country and the remaining countries of that panel. We applied panel cointegration and VECM to test the stock market integration and diversification opportunities in the short and long run. Our results indicate few short and long-run diversification opportunities for international investors in the post-crisis period that are more relevant. Canada, Japan, and Italy have long-run opportunities for diversification in the G7, and only Japan has short-run opportunities for diversification. Hong Kong and Japan have short-and long-run opportunities for diversification in the Pacific region.

At the same time, we found short-run diversification options for the UK and Norway in

¹Corresponding Author: Umair Baig; Email: umairbaig@gmail.com

Northern Europe. In the Western European Region, Australia and Switzerland have long-term diversification. There were no long and short-run diversification opportunities in the Southern European Region in the post-crisis period.

Keywords: *Stock market integration, diversification opportunities, developed markets, VECM.*

Introduction

Stock market integration has a time-varying effect in the stock markets of developed countries, which has significantly increased in recent years (Pukthuanthong & Roll, 2009). Given its importance, many researchers have examined this association using different methodologies. For example, Grubel (1968), based on empirical evidence, has validated that international portfolio diversification can minimize portfolio risk through stock markets that have fewer linkages with each other.

Financial integration refers to the financial markets that are closely linked. It includes regional global, neighboring, and global markets (Aboagye & Anong, 2020). Fauziah (2018) asserts that financial integration promotes efficient capital allocation and higher investment and risk-sharing opportunities. It allows greater investment and growth opportunities for the domestic market. The integration motivates domestic firms to become more efficient as they have to compete directly with foreign financial markets. At the same time, financial integration promotes the flow of capital from developed economies to developing economies, stimulating economic growth. Consequently, the capital inflow reduces the capital cost and increases investment opportunities. Financial integration enables poor economies to shift their investment from conventional (agricultural and natural), allowing them to reduce macroeconomic volatility.

Financial integration also has adverse effects. It promotes financial contagion in neighboring and regional economies. It also allows capital outflow from poor capital countries to capital-rich countries. Consequently, it adversely affects countries with poor institutions and policies. Investors' diversification significantly depends on a high level of integration. Investment diversification from one country to another becomes easier when a high level of integration exists between two countries. Yang et al. (2006) assert that globalization, technological advancement, and relaxation in cross-border barriers have made international investment more attractive (Lehkonen, 2015).

Globalization and technology diffusions have linked the stock market, due to which individuals and financial institutions' interest in investing in other countries has increased significantly. Dias, Heliodoro, Teixeira, and Godinho (2020) assert that financial

integration research links the stock markets, provides significant benefits for global diversification and promotes economic stability. The global crisis promotes stock market integration and enhances global investors' challenges. Various studies on stock market integration using developed countries' data found that stock market integration has reached an optimal level, and the integration level is increasing (Shahzad et al., 2016). Yang, Kolari, and Min (2003) and Yang et al. (2006) believe financial crisis stimulates a time-varying degree of stock market integration.

Many past studies have documented that crises do not promote contagion (Al-Dahana, Hasanb & Jedah, 2019), but many researchers, including Rizavi, Naqvi, and Rizvi(2011), have contrary evidence. Despite these results, it will be immature to reject the "correlation breakdown hypothesis" unless researchers support it with more empirical evidence (Rodriguez, 2007; Bekaert et al., 2009). Our study examines the changing pattern of integration over time and the impact of the global financial crisis on developed countries' integration levels. For that reason, we studied the stock market integration within developed countries at three different times: pre, during, and after global crises. This study examines stock market integration using country-level/ aggregated data. It mainly focuses on the international investors who want to invest within developed countries in the short and long run. The results of this study may help international investors find a new combination of international portfolio diversification within developed countries.

The study contributions to the body of knowledge are as follows. First, Only a few studies have examined multiple developed markets in one study. Given this gap, we have contributed to the body of knowledge by using the data set of 21 developed countries belonging to four developed regions and one country group. Secondly, we have used a subsampling approach to test the time-varying feature of integration and the impact of the global financial crisis on developed markets. Third, we have used panel data cointegration and "Vector Error Correction Model (VECM)." This model helps test the integration level between "short and long funds between the country-level assets."

Literature Review

The motivation for keeping a portfolio varies among developed and underdeveloped countries' investors. For example, investors belonging to developed countries tend to keep a diversified portfolio of uncorrelated stocks (Zaimovic, Omanovic & Arnaut-Berilo, 2021). Goetzmann and Komar (2005) assert that the stock market comovement historically varies, and the diversification benefits are not constant over time. On the other side, the emerging market is less integrated than the developed markets, with little potential for diversification (Chambet & Gibson, 2008). Christoffersen et al. (2014)

also concluded that comovement for developed countries has a significant upward trend. We reviewed various studies of developed countries' integration, and their major findings follow.

Morelli (2009) studied on stock market integration of G7 countries, and he found high integration in all seven countries because of increasing trade and economic relationships between these countries. Horvath and Petrovski (2013) examine the stock market comovement between Western Europe and central Europe. Their finding indicates that stock market integration is much higher in Central Europe to Western Europe. Lehkonen (2015) has documented that emerging market integration increased slightly while developed market integration decreased during the crisis.

The literature suggests that the level of integration varies from South Asian Stock market to developed stock market. It is high in the developed markets and low in South Asian Stock Markets (Bowman & Comer, 2000). Thus, we argue that investors in the developed stock market have more opportunities for portfolio diversification. Parma and Wassvik (2018) believe that the interdependence of the stock markets stimulates mutual shock in regional stock markets. Latent literature also suggests that the stock markets globally are now highly integrated. There is a high interrelation between the stock markets of the UK and Asian countries. At the same time, the USA market significantly affects the European and South Asian markets (Shahzad et al., 2016; Bessler & Yang, 2003). The global crisis of 2008-2009 has the enhanced conditional correlation between the stock returns of different regions and countries (i.e., Eastern and Central European emerging markets and developed markets i.e., USA and UK (Syllignakis & Kouretas, 2011; Kim, Moshirian & Wu, 2005).

Claus and Lucey (2012), in a study on stock market integration in the pacific region, found the presence of a relatively higher degree of stock market integration of "Japan, Hong Kong, and New Zealand stock markets." They also found that the New Zealand stock market seems to be more integrated with Japan than Australia. Hence, they concluded that financial market liberalization is necessary but not a condition for the stock market integration. Many researchers have focused on the integration, contagion effect, and diversification during the global financial crisis. Using the Geweke measure of feedback, many researchers found that the foreign investment between Germany and European countries in recent years has increased as the stock markets of European countries are highly linked. Bekaert, et al (2014) and Bekaert and Harvey(1995) found a rising trend between European countries' comovement. The enhancement in stock market comovement can be considered an increase in integration and contagion. Bekaert and Harvey (2003) studied three types of contagion effect, global, the US,

and domestic, and found they have different magnitude. Previous literature suggests magnitudes of stock market integration in developed countries have increased. Further, Dungey and Gajurel (2014) also identified the contagion effect in the US and developed countries. This study tested stock market integration status in developed markets and time-varying stock market integration features during pre, during, and post-crisis.

Data

The study has tested the level of stock market integration based on the data set of 21 developed countries. We included four developed country regions and one group of the country. Pacific Region countries we selected are "Australia, Hong Kong, New Zealand, Singapore, and Japan." From Northern Europe, we selected "UK, Norway, Ireland, Finland, and Denmark," From Western Europe, we targeted "Switzerland, Netherlands. Germany, France, Austria, From Southern Europe, we focused on "Sweden, Spain, Portugal, and Italy," And the G7 Countries we focused on "Canada, France, Germany, Italy, Japan, UK, USA." The study extracted eight years of data (i.e., from 2000 to 2018) from Thompson Stock Indices. We segment the collected data into three eras. The first was the pre-crisis era (from January 2000 to December 2007). The second was the crisis era, and it ranged from "January 2008- to December 2009." And the third was the post-crisis era ranging from "January 2010 to December." Based on price stock indices, we have determined stock market returns.

The study initially used "time series analysis for all these countries" and then transformed the countries into several panels. We applied panel cointegration techniques to test integration in each region (Pedronis, 2019; Cheng, Jahan-Parvar, & Rothman, 2010). We also tested stock market integration using panel cointegration tests (Banerjee & Carrion-i-Silvestre, 2017). We developed a model by including the "panel of the only home country as dependent denoted by (pit) and the panel of other countries as independent (pjt)." We constructed similar panels to test all regions' stock market integration. Finally, we examined short-term and long-term associations between country-level data using VECM.

Method and Techniques

We, in our model, have four regions and one group of developed countries for testing the level of integration in pre, during, and post-crisis periods. In the data set of all four regions and one group of countries, we applied the same six steps for stock market integration

Trend analysis

The study used graphical analysis to find out the trend in the series. It helps to determine the pattern of the series over time. The trend line helps in determining the

return face shock in different period

Descriptive Analysis

Descriptive statistics cover the various aspects of the data like distribution, deviation, central tendency, and the trend in the data. The study used country-level return data series to examine the descriptive statistics.

Correlation Analysis

The investor can get information regarding the degree of association with each country within the region based on the lowest correlation. We used Country-level return data series to explain the pairwise correlation among developed countries within the region.

Panel Data Stationarity Testing

A stationarity test is necessary to apply the panel cointegration test. If two series are non-Stationarity at level (price data) and Stationarity found on the first level (return data), we can apply panel cointegration, discussed above. We provided unit root testing on excluding country panels.

Panel Cointegration Test

The study initially did an “empirical analysis for a typical investor in any one of the nations.” We based the investment portfolio on the “stock market index and market indices,” depicted in equation 1

$$P_{it} = \delta_{1i} + \theta_{1i} P_{jt} + u_{it} \quad \text{Eq 1}$$

Panel VAR/ VECM

We estimated the “short-run relationship between the variables using the panel VECM model.” Equation 2 depicts the derived equation.

$$\Delta P_{it} = \delta_{2i} + \theta_{1i} \sum_{k=1}^n \Delta P_{jt-k} + \delta_{1i} ECT_{it-1} + \varepsilon_{it} \quad \text{Eq 2}$$

Symbolic Δ in the above equations represents the “first differenced form.” The study has represented estimated parameters using “Symbols δ and θ s. The Error Correction Term (ECT)” is one lag of the residual from equation (1). Short-term linkage suggests the “significance of the lag value of return for one country.” At the same time, significantly negative results suggest a “stable long-run relationship between the variables.”

Results and Analysis

Results sections contain five parts that provide evidence on stock market integration and diversification opportunities in all four developed countries, regions, and G7 countries.

Developed Pacific Region

The study selected “Australia, Hong Kong, New Zealand, Singapore, and Japan” to test the country’s stock market integration. Portfolio (A) P_{it} was constructed by adding only Australia in a portfolio. P_{jt} (A) is a portfolio containing all four countries, excluding Australia. The study used P_{it} as a dependent variable in all panel models and P_{jt} as an independent variable. In the case of five countries in the region, we tested five models once for all three periods. Subsequently, we tested the model in three periods, “pre, during, and post-crisis periods,” for more insight.

Developed Pacific Region Trend Analysis

The countries “New Zealand, Australia, Hong Kong, Japan, and Singapore” show normal movement except for a few periods. Returns declined in all developed pacific regions in 2008 due to the global crisis. In normal time monthly returns remained within the limit of negative five to positive five percent. Australian returns declined in 2008 (-.15) and in 2016 (-.11). Japan’s returns declined in 2008-9 (-.28). Singapore’s returns went down in 2008 by almost 25%. Hong Kong returns went down in 2008 (-.21) and 2011 (-.23). New Zealand’s returns declined by 17% in the 2008 crisis. We can analyze the association level within developed counties. Based on these results, investors can manage their portfolios.

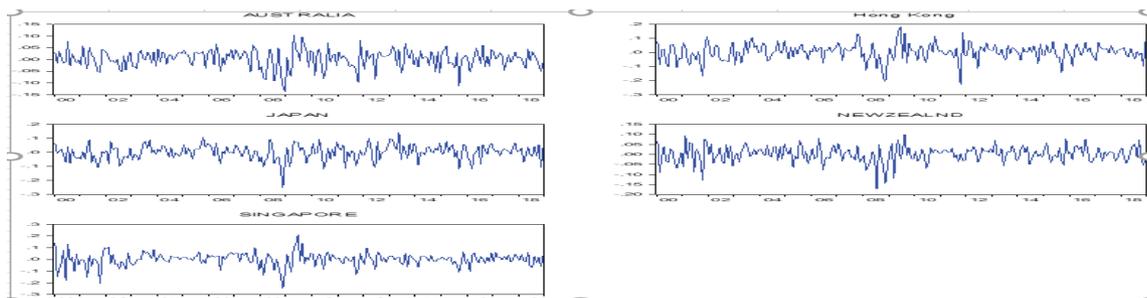


Figure 1: Returns of (Pacific Region)

Developed Pacific Region Descriptive Analysis

We have divided the descriptive analysis into three periods “pre, during, and post-crisis”. Australia’s average returns are the highest in the panel in the pre-crisis, and Japan

has the lowest average monthly returns. In the case of Singapore, we found the lowest returns (ranging from 0.14 to 0.20 in a single period). The results show that all the countries in the panel are negatively Skewed. Singapore had the highest volatility, and Australia had the lowest volatility. Singapore is leptokurtic, new New Zealand shows normal kurtosis, and the rest are platykurtic.

During the crisis period, all the counties have shown negative average returns. Japan led the lowest negative return delivered by Singapore and the highest negative returns. Single-time highest and lowest returns are shown by Singapore .21 and Japan -.25. Singapore has the highest volatility, and New Zealand has the lowest volatility. All the countries in the panel are negatively skewed except Hong Kong. Japan and Singapore are leptokurtic, and the rest are platykurtic. Japan’s highest average monthly returns are in the post-crisis period, and Singapore offers the lowest average monthly returns. At the same time, results suggest Single-time highest and lowest returns demonstrated by Hong Kong .14 and -.22. Japan leads the highest volatility, and New Zealand shows the lowest volatility. All the countries in the panel are skewed negatively except New Zealand. New Zealand is leptokurtic, and the rest are platykurtic. In the pre-crisis period, the average returns of countries are highest .38. In the post-crisis period, it is .33. Returns declined, and the average panel rates were -1.5. These numbers can be helpful for global investors.

Table 1: Descriptive Properties of Developed Pacific Region

Pre-Crisis Pacific	Australia	Hong_Kong	Japan	New Zealand	Singapore
Mean	0.0082	0.0050	0.0003	0.0024	0.0035
Maximum	0.0777	0.1345	0.1073	0.0934	0.1410
Minimum	-0.0546	-0.1673	-0.1085	-0.1292	-0.2058
Std. Dev.	0.0310	0.0563	0.0457	0.0417	0.0607
Skewness	-0.2947	-0.3239	-0.0969	-0.3257	-0.8070
Kurtosis	2.3240	2.9447	2.6001	3.0761	4.6947
During Crisis					
Mean	-0.0126	-0.0137	-0.0250	-0.0180	-0.0100
Maximum	0.1044	0.1824	0.0965	0.0998	0.2125
Minimum	-0.1381	-0.2074	-0.2505	-0.1706	-0.2486
Std. Dev.	0.0665	0.0969	0.0784	0.0661	0.1010
Skewness	-0.0590	0.1067	-0.7014	-0.5564	-0.0721
Kurtosis	2.0094	2.7714	4.0137	3.0119	3.2350
Post Crisis					
Mean	0.0016	0.0043	0.0059	0.0041	0.0007
Maximum	0.0824	0.1427	0.1441	0.0791	0.1003

Minimum	-0.1136	-0.2283	-0.1200	-0.0690	-0.1298
Std. Dev.	0.0369	0.0518	0.0523	0.0308	0.0417
Skewness	-0.5647	-0.9700	-0.4277	0.0550	-0.6397
Kurtosis	3.3494	6.4524	3.2181	2.7419	3.4994

We provide only 1 region’s return graph, descriptive correlation, unit root testing, panel co-integration tables, for rest of four region’s return graphs, descriptive correlation, unit root testing, panel co-integration tables are skipped from draft and only interpretation is provided in each section.

Developed Pacific Region Correlation Analysis

The correlation between Australia and Hong Kong is Moderate in pre & during the crisis period and increased during the post-crisis. The correlation between Australia and Japan is moderate in the pre-crisis period, increasing during the crisis and decreasing in the post-crisis period. The correlation between Australia and New Zealand showed the same pattern as Australia and Japan. The correlation between Hong Kong and Japan is moderate in pre-crisis, enhanced during the crisis, and declined post-crisis. The study found a similar pattern between “Hong Kong and New Zealand.” In “Japan and New Zealand,” the results suggest moderate relation in pre-crisis and increased crisis period but lowest or week in the Post-crisis period.

Table 2: Correlation Pacific Region

Pre Pacific	Australia	Hong Kong	Japan	New Zealand
Australia	1.0000	0.4910	0.5500	0.4739
Hong Kong		1.0000	0.4072	0.3893
Japan			1.0000	0.3640
New Zealand				1.0000
Singapore				
During				
Australia	1.0000	0.6660	0.7220	0.6824
Hong Kong		1.0000	0.7920	0.7004
Japan			1.0000	0.6014
New Zealand				1.0000
Singapore				
Post				
Australia	1.0000	0.6607	0.4555	0.4699
Hong Kong		1.0000	0.4209	0.3235
Japan			1.0000	0.2293
New Zealand				1.0000

Singapore

Developed Pacific Region Stationarity

We tested the Panel Stationarity test, ADF unit test on level (prices of stock indices), and at the first difference (returns). Further, Stationarity tests are important as they are pre-requirements of basic models (Im, et al., 2003; Levin, et al., 2002)

Table 3: Developed Pacific Region Panel Unit Root Test Results

	ADF Statistics Levels	ADF Statistics 1st Difference	IPS Statistics Levels	IPS Statistics 1st Difference	LLC Statistics Levels	LLC Statistics 1st Difference
Australia	11.299	179.234	-1.148	-11.847	-0.143	-2.495
Hong Kong	11.224	241.201	-1.108	-16.239	-0.338	-11.235
Japan	7.851	190.131	-0.356	-12.367	0.004	-2.578
New Zealand	9.466	172.296	-0.617	-11.520	-0.267	-2.304
Singapore	7.810	184.642	-0.351	-121033.000	0.104	-2.136

Developed Pacific Region Panel Co-integration

The cointegration test shows cointegration equations among only the home country and portfolio of excluding the home country portfolio. Results indicate the “presence of more than one long-run co-integrating relationship among the variables.” (Kao 1999)

Table 4: Co-integration Test Results (Developed Pacific Region)

Precrisis	Kao Panel Pedroni Panel Co-integration Statistics					Johansen Panel Co-integration Trace statistics				
	ADF t-Stat.	Panel v	Panel rho	Panel PP	Panel ADF	Group rho	Group PP	Group ADF	None	1
Australia	3.01	-1.16	-0.24	-1.11	-0.11	0.43	-1.36	0.02	13.03	11.98
Hong Kong	1.78	2.38	0.49	1.48	1.13	0.11	1.40	1.10	13.87	11.31
Japan	-0.34	0.60	-0.01	0.00	-0.38	0.83	0.54	0.07	3.65	8.96
New Zealand	0.86	-0.46	0.34	0.31	0.43	1.08	0.89	1.21	11.08	10.98
Singapore	2.57	1.05	-1.15	-1.11	-0.13	-1.34	-1.70	-0.51	16.09	10.65
During Crisis										
Australia	-1.89	1.46	-0.85	-0.69	-0.71	0.15	-0.15	-0.15	15.35	14.42
Hong Kong	-1.46	0.66	0.38	0.53	0.96	0.92	0.64	0.93	17.44	17.89
Japan	-0.60	0.18	1.37	2.15	2.50	2.17	3.37	3.74	6.94	9.09
New Zealand	-2.13	0.27	-0.23	-0.49	-0.48	0.69	0.10	0.21	7.78	18.87
Singapore	-1.08	0.91	0.44	0.70	0.37	0.99	0.98	0.42	11.42	17.51
Post Crisis										

Australia	-0.74	0.20	-1.56	-1.42	-0.82	-2.56	-2.19	-1.41	17.65	10.86
Hong Kong	-1.69	0.72	-1.29	-1.34	-1.30	-1.46	-1.57	-1.62	11.66	97.47
Japan	0.40	-0.17	-0.56	-0.54	-0.03	-1.59	-1.17	-0.54	19.77	7.94
New Zealand	-0.14	-0.63	-0.19	-0.26	-0.09	-0.23	-0.31	-0.08	7.57	8.60
Singapore	-3.16	3.49	-3.35	-2.36	-1.91	-2.07	-2.03	-1.48	9.21	8.34

Developed Pacific Region VECM

Based on the results, we have inferred that apart from Japan, other countries are highly associated with each other in the long run. In post-crisis, other countries have significant long-term linkage apart from Hong Kong and Japan. Also, apart from Japan, a short-term association exists between all other countries. In a crisis, Australia, Japan, and New Zealand were insignificantly associated with the rest of the panel countries, suggesting a short-term relationship. In post-crisis, “we found a short-term association between Hong Kong, Japan, and other panel countries.”

Table 5: VECM Results Pacific Region

Regressors	Pre-Crisis				During Crisis				Post Crisis			
	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept
Australia	-1.242523 (0.11084) [-11.2102]	-0.2977 (0.04088) [-7.28146]	-0.146428 (0.03624) [-4.04080]	-0.001094 (0.00161) [-0.67766]	-0.625714 (0.17744) [-3.52642]	-0.257934 (0.15286) [-1.68738]	0.214631 (0.11706) [-1.83350]	0.002771 (0.00639) [0.43365]	-0.993844 (0.11160) [-8.90536]	-0.286265 (0.06559) [-4.36450]	-0.200122 (0.05063) [-3.95270]	-0.000648 (0.00186) [-0.34797]
Hong Kong	-0.061907 (0.02141) [-2.89126]	0.000129 (3.7E-05) [3.49799]	8.12E-05 (2.6E-05) [3.13255]	-1.65E-06 (1.2E-06) [-1.42507]	-0.599354 (0.22777) [-2.63143]	0.000118 (2.4E-05) [4.86717]	-4.94E-06 (2.5E-05) [-0.19665]	-9.67E-07 (1.8E-06) [-0.52317]	7.88E-05 (0.00181) [0.04360]	5.51E-05 (3.6E-05) [1.53786]	1.31E-06 (2.5E-05) [0.05207]	-1.31E-06 (1.0E-06) [-1.29941]
Japan	-0.071677 (0.03738) [-1.91756]	-0.191726 (0.09774) [-1.96161]	-0.086356 (0.06690) [-1.29077]	-0.000869 (0.00246) [-0.35350]	-0.212831 (0.17974) [-1.18411]	-0.116781 (0.19161) [-0.60947]	-0.049731 (0.14296) [-0.34788]	5.36E-05 (0.00763) [0.00703]	0.010028 (0.01644) [0.61010]	0.192640 (0.14328) [1.34448]	0.031227 (0.09686) [0.32238]	0.000419 (0.00290) [0.14457]
New Zealand	-1.398298 (0.11473) [-12.1873]	-0.187253 (0.05273) [-3.55100]	-0.114782 (0.04963) [-2.31258]	-0.0000592 (0.00212) [-0.02795]	-1.143527 (0.24754) [-4.61964]	-0.080749 (0.13241) [-0.60984]	-0.073163 (0.10600) [-0.69019]	-0.000286 (0.00643) [-0.04452]	-1.08161 (0.08170) [-13.2394]	0.120169 (0.03171) [3.78938]	0.063082 (0.03179) [1.98437]	0.000164 (0.00145) [0.11296]
Singapore	-1.065341 (0.09915) [-10.7447]	-0.275703 (0.09565) [-2.88240]	-0.200447 (0.08545) [-2.34570]	-0.001547 (0.00312) [-0.49659]	-0.438179 (0.20077) [-2.18253]	-0.437321 (0.26561) [-1.64651]	-0.649866 (0.20656) [-3.14610]	0.005572 (0.01009) [0.55205]	-1.183228 (0.09629) [-12.2887]	-0.042047 (0.04892) [-0.85957]	-0.122809 (0.04889) [-2.51211]	-0.000185 (0.00194) [-0.09542]

Developed Northern Europe

UK, Norway, Ireland, Finland, and Denmark are in this region to test the country level’s stock market integration. Portfolio (A) P_{it} is constructed by adding the only UK in a portfolio. P_{jt} (A) is a portfolio containing all four countries, excluding the UK. In all panel models. P_{it} is used as a dependent variable, and P_{jt} is used as the independent variable. In five countries in the region, five models are one-time run-in periods. Further models are run in “pre, during, and post-crisis,” providing important findings.

Northern Europe Descriptive Analysis

Denmark's average returns are the highest in the panel in the pre-crisis period, and Ireland has the lowest average monthly returns. Single time highest and lowest returns shown by Finland .31 and -.34. Finland leads the highest volatility, and the UK shows the lowest volatility. All the countries in the panel are negatively skewed. All countries are leptokurtic. In the crisis period, all the counties have shown negative average returns. The UK led the lowest negative return and the highest negative returns demonstrated by the UK. Finland and Norway show Single-time highest and lowest returns. Norway indicates the highest volatility, and the UK the lowest volatility. All the countries in the panel are negatively skewed except Finland. Finland s leptokurtic, and rest are platykurtic. The highest average monthly returns shown by Denmark and the lowest average monthly returns demonstrated by the UK are in the post-crisis period. Norway and Finland show Single-time highest and lowest returns. Ireland shows the highest volatility, and the UK leads to the lowest volatility. All the countries in the panel are negatively skewed and leptokurtic. In the post-crisis period, average panel returns are .45; in the pre-crisis period, countries' average returns are -.12. The results suggest a decline in returns and an average panel return of -2.5 in crisis countries.

Developed Northern Europe Correlation Analysis

The correlation between Denmark and Finland is moderate in pre, strong in crisis, and again moderate in post-crisis. The correlation between Denmark and Ireland is moderate in all three-time Correlation between Denmark Norway is strong in pre and during and moderate in post. The correlation between Denmark and the UK is strong in pre and during and moderate in post. The correlation between Finland and Ireland Is moderate in pre, high in crisis, and moderate in post. Finland and Norway are moderate in pre and during, and high in post-crisis Finland and the UK are moderate in pre, high in crisis, and moderate in post. Ireland and Norway are moderate in all three times. Ireland and UK are also moderate in all three times. Norway UK is also very strong in all three periods.

Northern Europe VECM

The results in "pre-crisis suggest all countries have a long-term association" with each other. Apart from "Denmark, the rest of the countries have a long-run" association in crisis. Post-crisis results are different than the pre-crisis crisis results. For example, all the countries are significantly associated in the long run. Also, in pre-crisis, apart from Norway, the rest of the countries are significantly associated in the short-run. And apart from Denmark and the UK, other countries are insignificantly associated with the rest panel countries, suggesting a short-term association. The results also suggest an insignificant association between the UK, Norway, and other panel countries post-crisis.

Table 6: VECM Results (Northern European)

Repressors'	Pre-Crisis				During Crisis				Post Crisis			
	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept
DINMARK	-0.327134 (0.08587) [-3.8096]	-0.130159 (0.06456) [-2.01615]	-0.070485 (0.05011) [-1.40665]	-0.001231 (0.00293) [-0.42088]	-0.210892 (0.20925) [-1.0078]	-0.037006 (0.17092) [-0.21651]	-0.118746 (0.11536) [-1.02933]	0.001540 (0.00785) [0.19609]	-0.372579 (0.03863) [-9.64582]	0.452885 (0.05783) [7.83145]	0.134891 (0.04972) [2.71290]	3.45E-05 (0.00224) [0.01542]
FINLAND	-0.9036 (0.08524) [-10.600]	-0.684928 (0.10137) [-6.75639]	-0.560992 (0.10062) [-5.57532]	-0.002293 (0.00553) [-0.41492]	-1.285672 (0.24659) [-5.2137]	-0.782072 (0.16931) [-4.61912]	-0.334215 (0.13704) [-2.43874]	0.004324 (0.01015) [0.42617]	-0.930674 (0.07192) [-12.940]	0.158791 (0.05717) [2.77759]	-0.013019 (0.05606) [-0.23225]	-0.00048 (0.00246) [-0.19541]
IRELAND	-0.864158 (0.07442) [-11.612]	0.101876 (0.03796) [2.68376]	0.158960 (0.03693) [4.30452]	-0.001578 (0.00280) [-0.56292]	-0.51696 (0.22833) [-2.2641]	-0.185666 (0.23444) [-0.79197]	-0.476555 (0.16863) [-2.82596]	0.004702 (0.01182) [0.39788]	-0.004641 (0.00108) [-4.3034]	0.368747 (0.08733) [4.22231]	0.309599 (0.06586) [4.70120]	-0.000672 (0.00265) [-0.25387]
UK	-0.276413 (0.09707) [-2.8475]	-0.04232 (0.04969) [-0.85171]	-0.079556 (0.03791) [-2.09857]	-0.000836 (0.00222) [-0.37662]	-0.546479 (0.24769) [-2.2062]	-0.318664 (0.24320) [-1.31]	-0.221593 (0.17527) [-1.26429]	0.004298 (0.01283) [0.33505]	-1.159817 (0.08289) [-13.991]	-0.007826 (0.04673) [-0.16748]	-0.029781 (0.04628) [-0.64346]	-0.000593 (0.00208) [-0.28562]
NORWAY	-0.136036 (0.06228) [-2.1843]	-0.015377 (0.07498) [-0.20508]	0.044940 (0.05773) [0.77846]	-0.000342 (0.00334) [-0.10241]	-1.4076 (0.32124) [-4.3818]	-0.544304 (0.14497) [-3.75465]	-0.174779 (0.10483) [-1.66728]	0.002515 (0.00695) [0.36198]	-1.363982 (0.09791) [-13.931]	-0.011184 (0.03702) [-0.30210]	-0.019445 (0.03670) [-0.52982]	-0.000305 (0.00169) [-0.18061]

Developed Western Europe

We included Switzerland, Netherlands, Germany, France, and Austria to test the stock market integration at the country level. The study developed Portfolio (A) (P_{it}) by adding all four countries, excluding Switzerland. We included all four countries in portfolio P_{jt} (A) except Switzerland. The study used (P_{it}) as a dependent variable and (P_{jt}) as independent variables in all panel models. We tested the model in “pre, during, and post-crisis.” In the case of five countries in the region, five models were run one-time in the periods.

Western Europe Descriptive Analysis

Austria's average returns are highest in the panel in the pre-crisis period, and Netherland has the lowest average monthly returns. Germany and the Netherlands show Single-time highest and lowest returns. Germany offers the highest volatility, and Switzerland shows the lowest volatility. All the countries in the panel are negatively skewed. Austria has normal kurtosis, and the rest are platykurtic. In the crisis period, all the counties have shown negative average returns. Switzerland offered the lowest negative return and the highest negative returns shown by Austria. Austria shows Single-time highest and lowest returns. Austria indicates the highest volatility, and Switzerland shows the lowest volatility. All the countries in the panel are negatively skewed. Austria is leptokurtic, and the rest are platykurtic. In the post-crisis period, Netherland's the highest average monthly returns and the lowest average monthly returns shown by Austria. Austria offers the highest and lowest returns, shown by Austria's Highest volatility and Switzerland's lowest volatility. All the countries in the panel are negatively

skewed, and all are leptokurtic. In the post-crisis period, average panel returns are .35; in the pre-crisis period, countries' average returns are .30. And returns decline for crisis countries with an average panel returns of -.13

Developed Western Europe Correlation Analysis

Austria and France have a moderate correlation in pre and high both during and post-crisis. Austria, Germany is also moderate, both pre and high during and post-crisis. There is a moderate correlation between Austria and Netherlands in pre, high in, and moderate post-crisis. We discovered a moderate correlation between Austria and Switzerland before the crisis, a strong correlation during the crisis, and a moderate correlation in post-crisis. France and Germany's relationship is moderate in pre-, high correlation during, and moderate post-crisis situations. France and Netherlands are also very strong in all three periods. France and Switzerland are also very strong in all three periods. Germany and Netherlands are also very strong in all three periods. Germany and Switzerland are also very strong in all three periods. Netherlands and Switzerland is also very strong in all three periods.

Table 7: VECM Results (Western European)

Regressors	Pre Crisis		During Crisis		Post Crisis		Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept
	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)									
Austria	-0.49557 (0.0874) [-5.668]	-0.168801 (0.07311) [-2.3087]	-0.01612 (0.0538) [-0.2991]	-0.00075 (0.0024) [-0.300]	0.67605 (0.2457) [2.7507]	0.764804 (0.49571) [1.54283]	-0.58266 (0.3362) [-1.7330]	0.00194 (0.0118) [0.1680]	0.05954 (0.0687) [0.8660]	0.402836 (0.16287) [2.47343]	0.14252 (0.1123) [1.2688]	0.00076 (0.0035) [0.2095]			
Faranc	-0.49592 (0.1476) [-3.358]	-0.364328 (0.11177) [-3.2595]	-0.13711 (0.0835) [-1.6410]	-0.00131 (0.0028) [-0.459]	-1.15432 (0.3476) [-3.320]	-0.428985 (0.21327) [-2.0114]	0.02555 (0.1758) [0.1453]	0.00242 (0.0076) [0.3184]	-1.19222 (0.1745) [-6.831]	-0.61529 (0.10649) [-5.7781]	-0.39457 (0.0774) [-5.0942]	-0.00013 (0.0024) [-0.054]			
Germany	0.12044 (0.1005) [1.1977]	0.021328 (0.15431) [0.13821]	0.26033 (0.1143) [2.2758]	-0.00118 (0.0035) [-0.329]	-1.56859 (0.3527) [-4.447]	-0.428014 (0.23790) [-1.799]	-0.03647 (0.1835) [-0.1987]	0.00317 (0.0088) [0.3574]	-1.47247 (0.1387) [-10.60]	-0.639072 (0.09108) [-7.0163]	-0.34827 (0.0734) [-4.7413]	-0.00062 (0.0025) [-0.244]			
Netherland	-1.28582 (0.1486) [-8.648]	-0.573888 (0.10500) [-5.4658]	-0.46019 (0.0850) [-5.4143]	-0.00122 (0.0029) [-0.408]	-0.87911 (0.3263) [-2.693]	-0.111028 (0.23469) [-0.4730]	-0.01919 (0.1869) [-0.1026]	0.00392 (0.0088) [0.4444]	0.41545 (0.0805) [5.1562]	0.500769 (0.10252) [4.88459]	0.17173 (0.0741) [2.3161]	-0.00043 (0.0023) [-0.1871]			
Switzerland	-0.62615 (0.13342) [-4.6929]	-0.397436 (0.07849) [-5.0633]	-0.27774 (0.05773) [-4.8108]	-0.00073 (0.00230) [-0.3201]	-0.12292 (0.18514) [-0.6639]	0.018217 (0.16337) [0.11150]	-0.18145 (0.12815) [-1.4159]	0.00233 (0.00684) [0.3409]	0.12885 (0.07586) [1.6986]	0.188392 (0.06710) [2.80784]	0.05599 (0.04732) [1.1832]	-0.00028 (0.00181) [-0.1553]			

Western Europe VECM

All the "countries have a long-run association with other countries" in the panel in pre-crisis except Germany. Australia and Switzerland are insignificant as dependent variables during the crisis, whereas the rest have long-run linkages. In pre-crisis, "short-run associations exist between all the countries" in the panel. Only France was significant among other panel countries in that region during the crisis period. The results suggest

an insignificant short-term relationship in those countries. The results suggest a “short-run association between all other panel countries in the post-crisis period. At the same time post-crisis period results “Australia and Switzerland have no significant long-run relationship” with other countries in the region.

Developed Southern Europe

In Portfolio (A) P_{it} , the study incorporated only Sweden. We included “Sweden, Spain, Portugal, and Italy in this region.” We included all four countries in portfolio P_{jt} (A), excluding Sweden. The study used (P_{it}) as a dependent variable and (P_{jt}) as independent variables in all panel models. We tested the model in “pre, during, and post-crisis.” In the case of five countries in the region, five models were run one-time in the periods.

Southern Europe Descriptive Analysis

The pre-crisis period average returns of Spain are highest in the panel, and Sweden shows the lowest average monthly returns. Results suggest that Sweden and Portugal offer the highest and lowest returns, respectively, whereas we few found the highest volatility in the Italian stock exchange. All the countries in the panel are negatively skewed and are leptokurtic. The study also found that all the countries showed negative average returns during the crisis. Sweden showed the lowest negative return, and Italy showed the highest negative returns.

We found single-time highest and lowest returns for Italy and Portugal, respectively. Also, data suggest the highest volatility in Italy and the lowest for Portugal. All the countries in the panel are negatively skewed. Portugal is leptokurtic, and the rest are platykurtic. Sweden’s data shows the highest average monthly returns, and Portugal has the lowest average monthly returns in the post-crisis period. Single-time highest and lowest returns are in Spain and Portugal, respectively. Data related to Italy shows the highest volatility and Sweden’s lowest volatility. All the panel countries are negatively skewed except Spain, Italy’s kurtosis is normal, and the rest are leptokurtic. In the post-crisis period, the average panel return is are -0.11. In the pre-crisis period, the average return of countries is .22. And in crises, countries’ returns declined the average panel return is -1.5.

Developed Southern Europe Correlation Analysis

Italy and Portugal have a moderate correlation in pre-crisis, high during the crisis, and moderate post-crisis. Italy and Spain have a strong correlation in all three periods. At the same time, we found Italy and Sweden are strongly correlated in (i) pre-crisis and (ii) during the crisis. And has a moderate correlation in post-crisis. Portugal and Spain have a moderate correlation in pre-crisis, high during the crisis, and moderate post-

crisis. Portugal and Sweden have a strong correlation in pre-crisis and during the crisis. And moderate in post-crisis. Spain and Sweden have a strong correlation in (i) pre-crisis and (ii) during the crisis, and (iii) moderate in post-crisis.

Southern Europe VECM

Apart from Sweden, other countries in the panel have “a high association in the long run” in pre-crisis. Besides Sweden, the rest of the countries “have a high association” with each other during a crisis. Sweden and Portugal are insignificantly associated with other panel countries’ crises, suggesting an insignificant relationship. In pre-crisis, besides Sweden, the rest of the countries are highly associated in the short run. In post-crisis, we found an insignificant association between Sweden and other countries.

Table 8: VECM Results (Southern European)

Regressors	Pre-Crisis				During Crisis				Post Crisis			
	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept
ITALY	-0.74429 (0.16373) [-4.5459]	-0.306871 (0.10205) [-3.00701]	-0.263285 (0.07204) [-3.65447]	-0.00105 (0.00302) [-0.34820]	-1.089371 (0.35804) [-3.0425]	-0.545715 (0.29965) [-1.82120]	-0.407686 (0.20067) [-2.03162]	0.002240 (0.00886) [0.25277]	-0.790243 (0.07740) [-10.210]	0.271452 (0.07898) [3.43694]	0.038920 (0.07608) [0.51154]	0.000265 (0.00324) [0.08178]
PORTUGAL	-1.05416 (0.14482) [-7.2793]	-0.541206 (0.09204) [-5.87980]	-0.237188 (0.06560) [-3.61541]	-0.000742 (0.00308) [-0.24058]	-0.999959 (0.35765) [-2.7958]	-0.251775 (0.22799) [-1.10433]	-0.217693 (0.15844) [-1.37395]	0.001751 (0.00822) [0.21312]	-0.105025 (0.01890) [-5.5566]	0.374330 (0.08448) [4.43076]	0.270265 (0.06641) [4.06966]	-0.000629 (0.00320) [-0.19667]
SPAIN	-0.938758 (0.18203) [-5.1572]	-0.456388 (0.10770) [-4.23748]	-0.154973 (0.08048) [-1.92562]	-0.001611 (0.00347) [-0.46372]	-0.988439 (0.36081) [-2.7395]	-0.700263 (0.29904) [-2.34172]	-0.386226 (0.20170) [-1.91483]	0.004433 (0.00877) [0.50570]	-0.847005 (0.08107) [-10.447]	0.274242 (0.07290) [3.76167]	0.166338 (0.07034) [2.36466]	6.73E-05 (0.00315) [0.02135]
SWEDEN	0.053654 (0.13628) [0.39370]	-0.068046 (0.20505) [-0.33186]	-0.027742 (0.14006) [-0.19807]	-0.003404 (0.00471) [-0.72277]	0.335111 (0.31707) [1.05690]	0.470285 (0.25334) [1.85637]	-0.233184 (0.16941) [-1.37646]	0.010615 (0.00929) [1.14265]	-1.075148 (0.10076) [-10.670]	0.013915 (0.03648) [0.38144]	0.008760 (0.03601) [0.24324]	-0.000101 (0.00217) [-0.04643]

Developed G7 Countries

The study included “Canada, France, Germany, Italy, Japan, the UK, USA” to test the country-level stock market integration. In Portfolio (A), P_{it} we incorporated only Australia. The portfolio P_{jt} (A) includes all countries besides Canada. We treated P_{it} as a dependent variable P_{jt} as an independent variable. In seven countries in the region, seven models were run one time. Further, we tested the models in “pre, during, and post-crisis.”

G7 Countries Descriptive Analysis

Canada’s average returns are highest in the panel in the pre-crisis period, and the UK has the lowest average monthly returns. Single time highest and lowest returns shown by Germany .17 and -.22. Germany leads the highest volatility, and the UK offers the lowest volatility. All the countries in the panel are negatively skewed. Japan is platykurtic; New Zealand shows normal kurtosis, and the rest are leptokurtic. In the crisis period, all the counties have shown negative average returns. Canada led the lowest negative

return and the highest negative returns shown by Japan. Single-time highest and lowest returns shown by Canada .16 and Japan -.25.

Germany offers the highest volatility, and the UK leads the lowest volatility. All the countries in the panel are negatively skewed. Japan is leptokurtic, and the rest are platykurtic. The USA has the highest average monthly returns, and Italy has the lowest post-crisis. Single-time highest and lowest returns were of Japan and Germany .14 and -.18, respectively. Italy offers the highest volatility, and Canada the lowest volatility. All the countries in the panel are negatively skewed. Italy is platykurtic, and the rest all are leptokurtic. In the post-crisis period, average panel returns are .35; in the pre-crisis period, average returns of countries are .12. In the case of crisis countries, returns decline, showing an average panel return of -1.5.

G7 Countries Correlation Analysis

The correlation between Canada and France is strong in pre-crisis, but it is weak during crisis and post-crisis. The correlations of "Canada with Germany, Italy, Japan, and USA" are weak in all three times period. At the same time the correlations of "France with Germany, Italy, UK, USA" are strong on the three time periods. The correlation between France and Japan is moderate in pre-crisis, high in crisis, and again moderate in the post-crisis period. The correlation between Germany and Italy, the UK and the USA are also very strong in all three periods. Germany and Japan's correlation is moderate in pre-crisis, high in crisis, and moderate in post-crisis. Correlation between Italy Japan has a moderate correlation in pre-crisis, high in crisis, and moderate post-crisis. The correlation between Japan and UK is also very strong in all three periods. The correlation between Japan and the USA is moderate in pre-crisis, high in crisis, and moderate in the post-crisis period.

G7 VECM

Based on VCM, we assessed "short-run and long-run linkages" between all countries of that region. The results suggest "all the countries have a long-run association with other countries in the panel in pre-crisis." In case of a crisis, only Canada and Japan are insignificant as dependent variables; the rest have long-run linkages. In the post-crisis period, Canada, Japan, and Italy have an "insignificant long-run association with other countries" in the region. In pre-crisis, we found "short term associations between all countries" in the region

The results in crisis suggest the USA, Italy, and Japan have an insignificant association "with other panel countries in that region," suggesting an insignificant short-run relationship in those countries. Results during the post-crisis period suggest an "insignificant short-run association" between Japan and other panel countries.

Table 9: VECM Results G7 Countries

Regressors	Pre-Crisis		During Crisis		Post Crisis							
	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept	ECT (-1)	Portfolio ret (-1)	Portfolio ret (-2)	Intercept
CANADA	-0.803	-0.424	-0.169	-0.001	0.138919	-0.540	-0.307	0.003106	-0.073	-0.113	-0.148	0.000
	(0.08459)	(0.05521)	(0.03456)	(0.00187)	(0.19928)	(0.17251)	(0.07879)	(0.00666)	(0.06366)	(0.04356)	(0.02574)	(0.00131)
	[-9.49109]	[-7.67819]	[-4.89077]	[-0.53187]	[0.69712]	[-3.13001]	[-3.89444]	[0.46666]	[-1.15381]	[-2.59321]	[-5.76451]	[-0.30954]
FRANCE	-0.692	-0.391	-0.183	-0.001	-1.253	-0.531	-0.389	0.002631	-1.165	-0.456	-0.265	-0.001
	(0.11536)	(0.10099)	(0.06698)	(0.00228)	(0.26866)	(0.19128)	(0.13090)	(0.00602)	(0.11075)	(0.06769)	(0.05009)	(0.00185)
	[-5.99656]	[-3.87529]	[-2.72975]	[-0.61673]	[-4.66457]	[-2.77653]	[-2.96918]	[0.43693]	[-10.5190]	[-6.73607]	[-5.28409]	[-0.32891]
GERMANY	-0.467	-0.355	-0.057	-0.001	-1.763	-0.733	-0.503	0.003769	-1.297	-0.512	-0.258	-0.001
	(0.09926)	(0.13493)	(0.08859)	(0.00289)	(0.28961)	(0.21948)	(0.14800)	(0.00682)	(0.09563)	(0.06364)	(0.05096)	(0.00195)
	[-4.70685]	[-2.62936]	[-0.64446]	[-0.42078]	[-6.08884]	[-3.33848]	[-3.39853]	[0.55267]	[-13.5629]	[-8.05238]	[-5.05988]	[-0.38022]
ITALY	-0.557	-0.190	-0.079	-0.001	-0.796	-0.393	-0.203	0.002062	0.168922	0.403277	0.014793	0.000
	(0.10093)	(0.08560)	(0.05766)	(0.00213)	(0.23329)	(0.20689)	(0.13895)	(0.00633)	(0.04471)	(0.11116)	(0.07676)	(0.00258)
	[-5.52290]	[-2.22224]	[-1.36625]	[-0.51989]	[-3.41141]	[-1.89733]	[-1.46256]	[0.32588]	[3.77803]	[3.62777]	[0.19273]	[-0.00717]
JAPAN	-0.316	-0.163	-0.056	-0.001	-0.278	-0.068	-0.084	0.000257	-0.054	0.125487	0.090582	0.000493
	(0.05588)	(0.06469)	(0.04418)	(0.00193)	(0.19225)	(0.16840)	(0.11424)	(0.00613)	(0.03020)	(0.08649)	(0.05947)	(0.00232)
	[-5.66222]	[-2.52704]	[-1.26295]	[-0.51453]	[-1.44792]	[-0.40388]	[-0.73679]	[0.04194]	[-1.77611]	[1.45095]	[1.52319]	[0.21297]
UK	-0.316	-0.163	-0.056	-0.001	-1.454	-0.456	-0.421	0.003135	-1.568	-0.182	-0.102	0.000
	(0.05588)	(0.06469)	(0.04418)	(0.00193)	(0.28952)	(0.17124)	(0.11494)	(0.00541)	(0.09691)	(0.03515)	(0.03051)	(0.00138)
	[-5.66222]	[-2.52704]	[-1.26295]	[-0.51453]	[-5.02055]	[-2.66407]	[-3.65847]	[0.57992]	[-16.1810]	[-5.17287]	[-3.35693]	[-0.25455]
USA	-1.057	-0.293	-0.098	-0.001	-0.742	-0.109	-0.179	0.003753	-1.742	0.088396	-0.254	-0.102
	(0.11464)	(0.05617)	(0.04035)	(0.00173)	(0.26628)	(0.22940)	(0.14987)	(0.00671)	(0.09772)	(0.04911)	(0.04117)	(0.03454)
	[-9.22291]	[-5.21008]	[-2.43823]	[-0.37897]	[-2.78662]	[-0.47522]	[-1.19506]	[0.55926]	[-17.8298]	[1.79999]	[-6.17691]	[-2.95064]

Results and Discussion

We tested five different data sets of developed countries (G7, Pacific Region, Northern Europe, Western Europe, and Southern Europe). Pre, during, and post-crisis periods are used to check the crisis effects in diversification and different integration levels at different times. Short-run diversification is available for Sweden only in the pre-crisis period, Portugal and Sweden have short-run diversification during the crisis, and none in the post-crisis. Sweden has long-run diversification opportunities in “pre and during crisis periods” with panel countries in the Southern European Region. There are no diversification opportunities in the post-crisis period. After the crisis, the diversification opportunities decreased for international investors in the Southern European Region. After the crisis, the diversification opportunities decreased for international investors in the Southern European Region.

Germany has “long-run diversification opportunities” in the Western European Region in the “pre-crisis period.” While during and post-crisis, Australia and Switzerland both have long-run diversification opportunities. The study did not find any short-run diversification opportunities in pre and post-crisis. During the crisis period, Austria,

Germany, Netherland, and Switzerland have short-run diversification opportunities. In the Northern Europe region, no long-run diversification opportunity is available pre and post-crisis. And only Denmark has the diversification opportunity during the crisis period. Norway has a Short-run diversification opportunity in pre-crisis. In contrast, Denmark and the UK have no such opportunities during the crisis period. And the UK and Norway in the post-crisis period have diversification opportunities.

A long-run diversification opportunity is available for Japan only during pre and crisis periods in the Pacific region. In pre-crisis, short-run diversification is available in Japan. Hong Kong and Japan both have a long-run diversification opportunity post-crisis period. Australia, Japan, and New Zealand have the chance during the crisis period, while Hong Kong and Japan have no such opportunities in the “post-crisis.” For the G7 panel, no extended run diversification is possible; only Canada and Japan have the opportunity during the crisis, while in the post-crisis period, Canada, Japan, and Italy have the opportunity. There is no short opportunity available in pre-crisis, USA, Italy, and Japan during a crisis while only Japan has in the post-crisis period. These findings can help international investors benefit from short- and long-run diversification within developed regions or countries. Further, it is also helpful to understand the changing pattern of integration and diversification opportunities in the pre, during, and post-crisis periods. Future studies can extend other geographic regions and other asset classes

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