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Chikashi Tsuji

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How Do the Asian and the Asia-Pacific Equity Markets Covariate? The Linkage with Japan

Chikashi Tsuji

Graduate School of Systems and Information Engineering, University of Tsukuba Tsukuba, Japan

Email: mail_sec_low@minos.ocn.ne.jp

Abstract

The objective of this paper is to reveal the situations of time-series changes of the covariations of stock returns between the Japanese markets and other Asian and Asia-pacific markets. In this paper, we first statistically revealed that the connections between stock returns between the Japanese markets and other Asian and Asia-pacific markets recently gradually increased. Second, our empirical examinations also clarified that right after the Lehman Shock in the US, the covariations between stock returns in Japan and other Asian and Asia-pacific markets generally increased.

Keywords: Asia-Pacific Stock Markets, Stock Return Comovements, Welch's Test

Introduction

There exist exciting preceding studies regarding stock return covariations in finance. These researches are, for example, the studies of Stulz (1981); Bekaert and Harvey (1995); Chordia et al. (2000); Dumas et al. (2003); Carrieri et al. (2007); Pukthuanthong and Roll (2009); and Billio et al. (2012). As far as we know, however, there seem to be few studies that examine the stock return covariations by focusing on the relationships between the Japanese markets and other Asian and Asia-pacific markets. Further, we consider that, there may be little study which examines the relations by dividing sample periods into some periods before and after the US Lehman Shock. With these backgrounds and motivations, we aim to clarify how the stock return connections between the Japanese markets and other Asian and Asia-pacific markets have progressed. This is our objective, and to examine these relations, we exploit the indices of the Morgan Stanley Capital International (MSCI) for five Asian and Asia-pacific stock markets with the stock index of Japan.

The followings are our study's contributions. First, we evidenced that the comovements of stock returns between the Japanese markets and other Asian and Asia-pacific markets recently gradually increased in general. Next, we empirically derived that right after the period of the US Lehman Shock, the comovements between stock returns in these markets generally increased. The rest of the paper is organized as follows. First, Section 2 documents the data, Section 3 describes our research design, Section 4 discusses our empirical results, and Section 5 concludes the paper.

Data

We exploit the weekly stock return data derived from the MSCI Indices and derived from the Tokyo Stock Price Index (TOPIX). These data are both supplied through the Nikkei Inc. In this paper, we empirically test the stock return correlation coefficients between the Japanese and other Asian and Asia-pacific markets. More specifically, other than Japan, the focus in our analysis is on five stock markets of Australia, Hong Kong, Israel, New Zealand, and Singapore.

Research Design

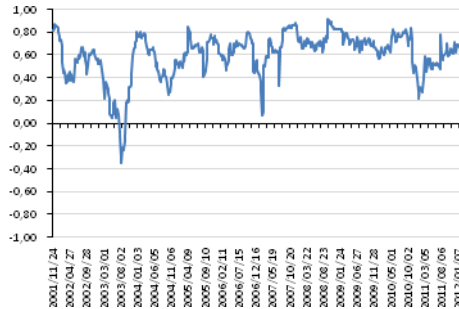
This section explains our research design. First, we set the following four terms: Two 178 week terms before the US Lehman Shock; one 178 week term after the Lehman Shock; one 30 week term after the Lehman Shock. Namely, they are (1) from November 24, 2001 to April 16, 2005 (Hereafter, 'the term 1'); (2) from April 23, 2005 to September 13, 2008 (Hereafter, 'the term 2'); (3) from September 20, 2008 to February 11, 2012 (Hereafter, 'the term 3'); (4) from September 20, 2008 to April 11, 2009 (Hereafter, 'the Lehman term'). Final 30 week period is the short-term right after the US Lehman Shock.

Exploiting the above data and four terms, we perform Welch's tests by comparing the stock return correlation coefficients between the Japanese and other Asian and Asia-pacific markets. The correlation coefficients are for past 20 weeks. Our null hypothesis in the Welch's tests is that the correlation coefficients' mean value of returns in two markets are equal in two compared periods, while the alternative hypothesis is the correlation coefficients' mean value of returns in two markets are different in two compared periods. More concretely, we describe the alternative hypotheses of our five Welch's tests as follows: (1) The correlation coefficients' mean value in 'the term 1' is smaller than the correlation coefficients' mean value in 'the term 2'; (2) The correlation coefficients' mean value in 'the term 1' is smaller than the correlation coefficients' mean value in 'the term 3'; (3) The correlation coefficients' mean value in 'the term 1' is smaller than the mean value in 'the Lehman term'; (4) The correlation coefficients' mean value in 'the term 2' is smaller than the mean value in 'the Lehman term'; (5) The correlation coefficients' mean value in 'the term 3' is smaller than the mean value in 'the Lehman term'. Furthermore, the time-series dynamics of stock return correlation coefficients between the Japanese and other five Asian and Asia-pacific countries are displayed in Panels A to E in Figure 1.

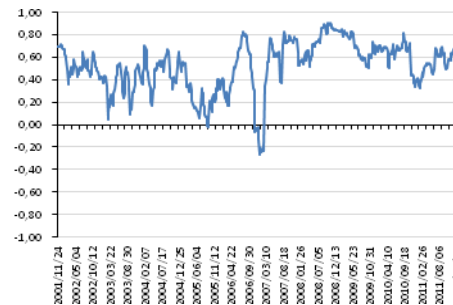
Empirical Results

This section explains our empirical results. (1) First, Panel Bs of Tables 1 and 2 show that the correlation coefficients between stock returns in the Japanese markets and other Asian and Asia-pacific markets increase in 'the term 2' than in 'the term 1' except for the result of Hong Kong. (2) Second, Panel Cs of Tables 1 and 2 indicate that the correlations between the Japanese markets and all other five Asian and Asia-pacific markets are higher in 'the term 3' than in 'the term 1'. (3) Third, Panel Ds of Tables 1 and 2 exhibit that the correlations between the Japanese markets and other Asian and Asia-pacific markets are higher in 'the Lehman term' than in 'the term 1' except for the result of Israel. (4) Fourth, Panel Es of Tables 1 and 2 indicate that the correlations between the Japanese markets and other Asian and Asia-pacific markets are higher in 'the Lehman term' than in 'the term 2' except for the case of Israel. (5) Finally, Panel Fs of Tables 1 and 2 show that the correlations between the Japanese markets and other Asian and Asia-pacific markets are higher in 'the Lehman term' than in 'the term 3' except for the case of Israel, again. To sum up, the stock return

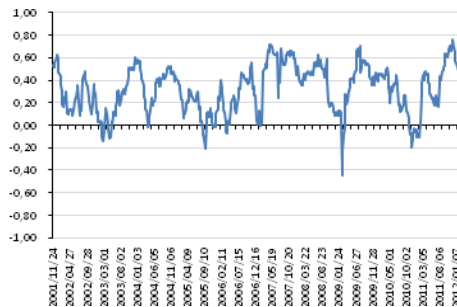
covariations between the Japanese markets and other Asian and Asia-pacific markets recently gradually increased. Further, in the period right after the Lehman Shock, these comovements generally increased although there is one exception of the linkage between Israel and Japan.



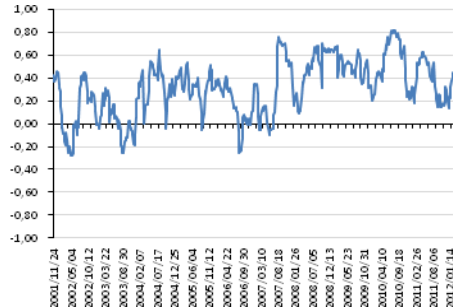
Panel A. Australia and Japan



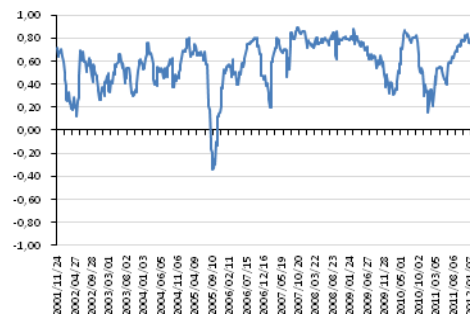
Panel B. Hong Kong and Japan



Panel C. Israel and Japan



Panel D. New Zealand and Japan



Panel E. Singapore and Japan

Figure 1. Correlations with the Japanese Stock Markets

Table 1. The Results of Welch's Tests: The covariations with Australia, Hong Kong, and Israel

Panel A Means and Standard Deviations of Correlation Coefficients of Returns for Four Periods					
Sample Periods	Statistic	Australia	Hong Kong	Israel	
November 24, 2001 to April 16, 2005	Mean	0.4737	0.4584	0.2829	
	SD	0.2471	0.1385	0.1817	
April 23, 2005 to September 13, 2008	Mean	0.6636	0.4615	0.3453	
	SD	0.1265	0.2882	0.2231	
September 20, 2008 to February 11, 2012	Mean	0.6638	0.6467	0.3309	
	SD	0.1352	0.1333	0.2241	
September 20, 2008 to April 11, 2009	Mean	0.8133	0.8419	0.1591	
	SD	0.0543	0.0325	0.2078	
Panel B Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for November 24, 2001 to April 16, 2005 < The Mean Value of the Correlation Coefficients of Returns for April 23, 2005 to September 13, 2008					
<i>t</i> -value for Welch's tests		9.1295***	0.1297	2.8928***	
<i>p</i> -value		0.0000	0.4485	0.0020	
Panel C Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for November 24, 2001 to April 16, 2005 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to February 11, 2012					
<i>t</i> -value for Welch's tests		9.0039***	13.0651***	2.2160**	
<i>p</i> -value		0.0000	0.0000	0.0137	
Panel D Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for November 24, 2001 to April 16, 2005 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to April 11, 2009					
<i>t</i> -value for Welch's tests		16.1693***	32.0595***	-3.0734	
<i>p</i> -value		0.0000	0.0000	-	
Panel E Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for April 23, 2005 to September 13, 2008 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to April 11, 2009					
<i>t</i> -value for Welch's tests		10.9144***	16.9801***	-4.4928	
<i>p</i> -value		0.0000	0.0000	-	
Panel F Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to February 11, 2012 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to April 11, 2009					
<i>t</i> -value for Welch's tests		10.5528***	16.8000***	-4.1408	
<i>p</i> -value		0.0000	0.0000	-	

Notes: In panel A, 'Mean' denotes the mean values of 20 week historical correlation coefficients between stock returns in the Japanese markets and other Asian and Asia-pacific markets. Further, 'SD' means the standard deviations of 20 week historical correlation coefficients between stock

returns in the Japanese markets and other Asian and Asia-pacific markets. In panels B to F, *** denotes the statistical significance at the 1% level, ** denotes the statistical significance at the 5% level, and * denotes the statistical significance at the 10% level, respectively.

Table 2. The Results of Welch's Tests: The covariations with New Zealand and Singapore

Panel A Means and Standard Deviations of Correlation Coefficients of Returns for Four Periods				
Sample Periods	Statistic		New Zealand	Singapore
November 24, 2001 to April 16, 2005	Mean		0.1781	0.5104
	SD		0.2261	0.1462
April 23, 2005 to September 13, 2008	Mean		0.2825	0.6006
	SD		0.2279	0.2587
September 20, 2008 to February 11, 2012	Mean		0.4798	0.6277
	SD		0.1769	0.1748
September 20, 2008 to April 11, 2009	Mean		0.6007	0.7864
	SD		0.0872	0.0498
Panel B Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for November 24, 2001 to April 16, 2005 < The Mean Value of the Correlation Coefficients of Returns for April 23, 2005 to September 13, 2008				
<i>t</i> -value for Welch's tests			4.3387***	4.0471***
<i>p</i> -value			0.0000	0.0000
Panel C Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for November 24, 2001 to April 16, 2005 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to February 11, 2012				
<i>t</i> -value for Welch's tests			14.0190***	6.8692***
<i>p</i> -value			0.0000	0.0000
Panel D Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for November 24, 2001 to April 16, 2005 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to April 11, 2009				
<i>t</i> -value for Welch's tests			18.1770***	19.3857***
<i>p</i> -value			0.0000	0.0000
Panel E Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for April 23, 2005 to September 13, 2008 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to April 11, 2009				
<i>t</i> -value for Welch's tests			13.6284***	8.6787***
<i>p</i> -value			0.0000	0.0000
Panel F Results for Welch's Tests: The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to February 11, 2012 < The Mean Value of the Correlation Coefficients of Returns for September 20, 2008 to April 11, 2009				

Panel A Means and Standard Deviations of Correlation Coefficients of Returns for Four Periods			
Sample Periods	Statistic	New Zealand	Singapore
	<i>t</i> -value for Welch's tests	5.8409***	9.9474***
	<i>p</i> -value	0.0000	0.0000

Notes: In panel A, 'Mean' denotes the mean values of 20 week historical correlation coefficients between stock returns in the Japanese markets and other Asian and Asia-pacific markets. Further, 'SD' means the standard deviations of 20 week historical correlation coefficients between stock returns in the Japanese markets and other Asian and Asia-pacific markets. In panels B to F, *** denotes the statistical significance at the 1% level, ** denotes the statistical significance at the 5% level, and * denotes the statistical significance at the 10% level, respectively.

Conclusions

This paper empirically inspected the covariations of stock returns between the Japanese markets and other five Asian and Asia-pacific markets. In our examinations, we focus on the difference of the correlation coefficients in the periods before and after the US Lehman Shock. Our empirical tests implemented in this paper offered the following novel contributions.

I. First, we statistically revealed that the correlations of stock returns between the Japanese and other Asian and Asia-pacific markets recently gradually increased in general.

II. Second, we empirically demonstrated that in the period right after the US Lehman Shock, comovements between stock returns of the Japanese markets and other Asian and Asia-pacific equity markets generally increased.

As above, our derived facts demonstrated in this research will contribute to the body of academic research in finance. We consider that future related works exploiting our findings and related other data may be also valuable, and these are our future works.

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