Effects of the Japanese Stock Market on Canadian Value Stocks

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Abstract

This paper empirically examines the time-series relationships of value, growth, and standard stock indices in Canadian and Japanese equity markets. More specifically, we investigate the effects of the returns of the Nikkei 225 (the Nikkei), Tokyo stock price index (TOPIX), and Japanese value and growth stock indices on Canadian value, growth, and standard equity index returns. The new evidence from our empirical examinations is as follows. 1) First, our analyses by the exponential generalized autoregressive conditional heteroscedasticity (EGARCH) models find that the returns of the Nikkei and TOPIX most strongly influence value stock index returns in Canada. 2) Second, our examinations by the EGARCH models clarify that the Japanese value and growth equity index return evolution also most strongly affects Canadian value stock returns.

Keywords: EGARCH model, growth stocks, stock market linkage, value stocks

1. Introduction

Many past researches have paid attention to the issues of the international equity market linkage (e.g., Ratanapakorn and Sharma, 2002; Chien et al., 2015) and the value and growth stock performances (e.g., Bauman et al., 1998; Fama and French, 2006; Gharghori et al., 2013; Chung et al., 2016). However, it is considered that these issues have been segmentedly researched; thus, for attempting more advanced contribution to the body of research in finance and economics, this paper newly performs a combined study of these two topics by using value, growth, and standard stock index data from Canadian and Japanese stock markets. Based on the motivation documented above, we analyze four kinds of Japanese stock index returns and three kinds of Canadian equity index returns. More concretely, we empirically test the international effects of returns of the Nikkei 225 (the Nikkei), Tokyo stock price index (TOPIX), and Japanese value and growth stock indices on returns of value, growth, and standard stock indices of Canada. All index data except for the Nikkei and TOPIX are Morgan Stanley Capital International (MSCI) index data.

As a result of our empirical examinations by using the exponential generalized autoregressive conditional heteroscedasticity (EGARCH) models, we derive the following interesting new findings. First, 1) our analyses by the EGARCH models find that the returns of the Nikkei and TOPIX most strongly influence value stock index returns in Canada. Second, 2) our examinations by the EGARCH models further clarify that the Japanese value and growth stock index return evolution also most strongly affects Canadian value stock returns.

We organize the remainder of the paper as follows. First, in Section 2, we review previous studies. In Section 3, we describe our data and then in Section 4, we document our econometric methodology. We then report our empirical results in Section 5 and Section 6 concludes the paper.

2. Literature Review

First, regarding the research of relationships among international stock markets, there are many existing studies with respect to the simple connections among international stock markets. Briefly reviewing recent studies, Tsai (2014) investigated the spillover effects by using standard equity index returns of stock markets in the US, UK, Germany, France, and Japan. Moreover, also by using standard stock index data, Vu (2015) studied the outputs' reactions to the volatility of stock markets for 27 countries. Further, Guidi and Ugur (2014) analyzed South Eastern European stock markets by focusing on the cointegrating relations and portfolio diversification benefits.

Next, as for the researches of growth and value stocks, the value effects have been much more investigated than the growth effects. For example, Liu and Zhang (2008) analyzed the value spreads in the US, and this paper concluded

that in the United States, the value spreads seemed to be much less effective for forecasting stock returns. Further, Baltussen et al. (2012) studied the US stock market and suggested that the value premiums were smaller for such investors as insurance companies and pension funds, especially when they are downside risk averse. Moreover, Fong (2012) reexamined the value effects in the US and suggested that none of the test results in this study supplied robust evidence that business risk could explain the value premiums.

Contrary to the value effects, there is little research that investigated the growth effects. A study by Rytchkov (2010) explored the return predictability regarding US growth and value portfolios. This study suggested that returns of growth and value portfolios in the US were predictable and the predictability was stronger for growth portfolios than for value portfolios. Moreover, Larsen and Munk (2012) tested whether the value/growth tilting strategies are effective in the dynamic asset allocation framework, and their results suggested that the value/growth tilting strategies were rather effective. Further, applying econometric methodology, Tsuji (2007) searched for macroeconomic factors that were priced in the stock market in Japan; and Tsuji (2012) explored the small-size- and value-premia in Japan. However, their studies' focuses were not on the international stock market connections.

Table 1. Descriptive statistics of the daily log percentage returns in terms of equity indices in Canada and Japan

Panel A. Statistics of Japanese equity indices		
	DLNK	DLTPX
Mean	0.0105	0.0042
Median	0.0451	0.0444
Maximum	13.2346	12.8647
Minimum	−12.1110	−10.0071
Standard deviation	1.5613	1.4175
Skewness	−0.4659	−0.3922
Kurtosis	9.5578	9.2869
Observations	3,306	3,306
	DLJG	DLJV
Mean	0.0044	0.0160
Median	0.0278	0.0496
Maximum	13.1060	13.0199
Minimum	−10.8347	−10.2409
Standard deviation	1.5016	1.4328
Skewness	−0.3527	−0.3558
Kurtosis	8.5573	9.4570
Observations	3,306	3,306

Panel B. Statistics of Canadian equity indices			
	DLCA	DLCAG	DLCAV
Mean	0.0290	0.0269	0.0302
Median	0.0630	0.0440	0.0507
Maximum	9.7245	10.3933	10.0484
Minimum	−10.4025	−11.9663	−10.3978
Standard deviation	1.1688	1.3521	1.1234
Skewness	−0.6030	−0.7009	−0.3116
Kurtosis	13.5813	14.0310	13.6538
Observations	3,306	3,306	3,306

Notes: This table presents the descriptive statistics for Japanese and Canadian stock index returns. Our sample period is from 21 June 2001 to 5 December 2014.

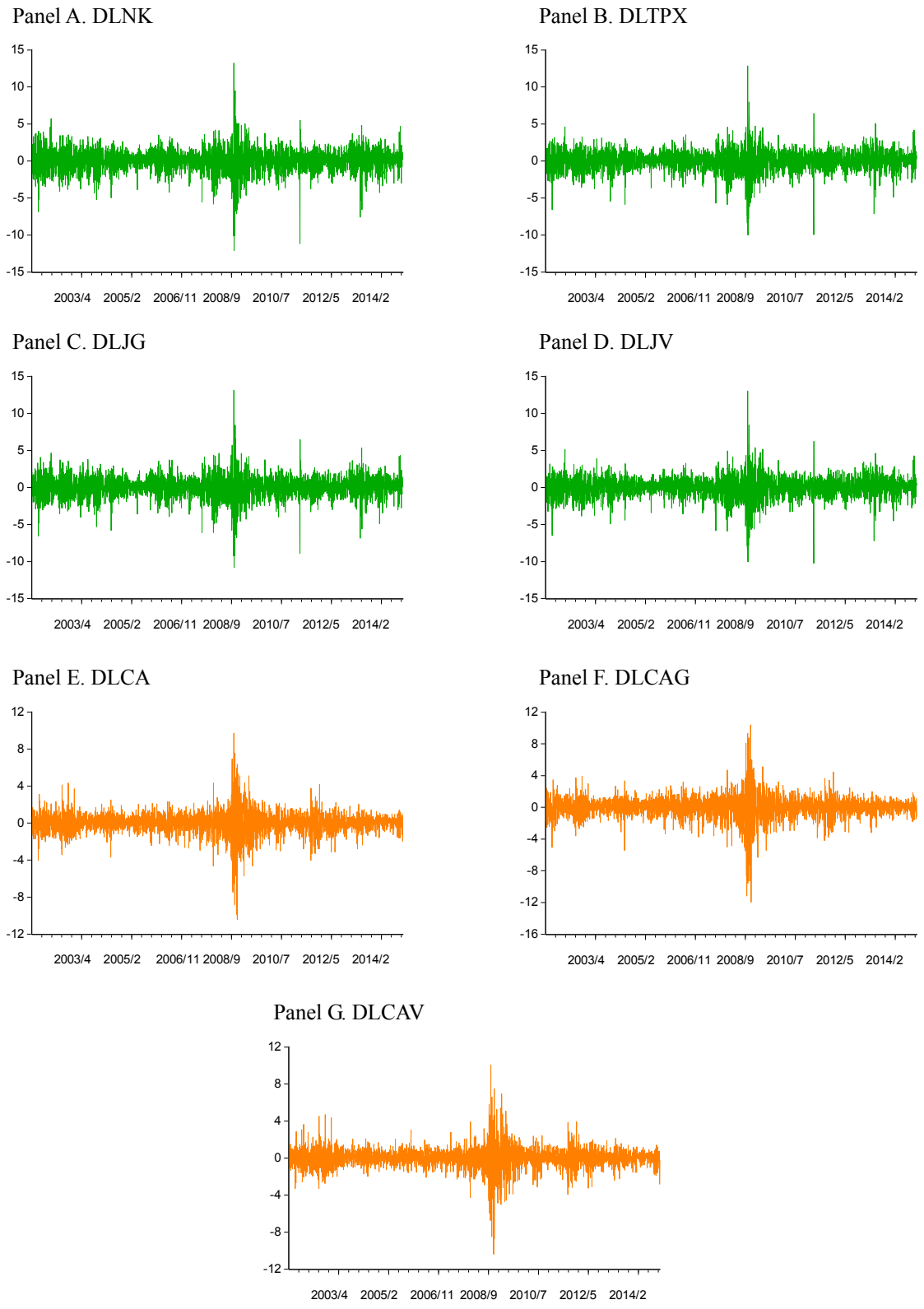

Figure 1. Time-series of daily percentage log returns of Canadian and Japanese equity indices: For the period from 21 June 2001 to 5 December 2014

3. Data

In our research, we use four Japanese and three Canadian equity index data. The full sample period of our daily data is from 21 June 2001 to 5 December 2014. All data investigated in this study are supplied by the QUICK Corp. and the number of our time-series observations of each equity index is 3,306. Specifically, as regards Japan, DLNK means the daily percentage log return as to the Nikkei 225 stock index; DLTPX represents that of TOPIX; DLJG means the daily percentage log return as to the MSCI Japanese growth equity index; and DLJV represents that of the MSCI Japanese value equity index. As for Canadian stock markets, DLCA represents the daily percentage log return as to the MSCI Canadian standard equity index; DLCAG denotes that of the MSCI Canadian growth equity index; and DLCAV is that of the MSCI Canadian value equity index. Analyzing these data, we investigate the international effects of the time-series return evolution of the Japanese growth, value, and standard stock indices on the Canadian value, growth, and standard equity index returns. Figure 1 displays the time-series of the above seven returns. Table 1 displays the descriptive statistics for these seven time-series variables. Documenting some characteristics of the variables, Japanese stock index returns are somewhat more volatile than Canadian stock index returns. Further, Canadian stock index returns exhibit slightly higher kurtosis values than those of Japanese stock index returns.

4. Method

For testing the international effects of Japanese stock index returns on the MSCI Canadian value, growth, and standard stock index returns, we employ a GARCH model, whose mean equation includes autoregressive (AR) terms. Specifically, we employ the following AR(5)-EGARCH model with generalized error distribution (GED) errors to investigate the effects of the four kinds of Japanese equity index returns on the three Canadian stock index returns:

$$\begin{aligned} can_t &= \mu_1 + \mu_2 jp_t + \sum_{p=1}^{5} \phi_p can_{t-p} + \varepsilon_t, \\ \ln(\sigma_t^2) &= \xi_1 + \xi_2 \ln(\sigma_{t-1}^2) + \xi_3 \left| \varepsilon_{t-1} / \sigma_{t-1} \right| + \xi_4 (\varepsilon_{t-1} / \sigma_{t-1}), \end{aligned} \tag{1}$$

where jp_t means one of the Japanese equity index returns and can_t means one of the Canadian equity index returns. Using the above model (1), we empirically examine the effects of returns of the Japanese equity indices such as TOPIX, the Nikkei, MSCI Japanese value, and MSCI Japanese growth stock indices on returns of the MSCI Canadian standard, value, and growth equity indices. It is noted that there is about 14-hour time difference between Tokyo and Toronto; thus, the Japanese equity market is ahead of the Canadian stock market. Hence, we analyze the same day data of Canadian and Japanese equity indices. By this analysis, we can evaluate the time-series effects of the Japanese stock market on the succeeding Canadian stock market.

5. Empirical Results

Empirical results from our investigations are displayed in Tables 2 to 5. First, Table 2 shows the effects of the Nikkei on Canadian stock markets and Table 3 exhibits those of TOPIX on Canadian stock markets. Describing important points concisely, both in Tables 2 and 3, all estimated coefficients of the daily returns as to the Nikkei and TOPIX are statistically significantly positive. These results indicate that the preceding time-series fluctuations of the Nikkei and TOPIX substantially influence the succeeding time-series evolution of not only the value and growth equity returns but also the overall equity market returns in Canada. Moreover, the smallest values of both the Akaike's information criterion (AIC) and the Schwartz (information) criterion (SC) are found in Panel C in Table 2. This suggests that the Nikkei most strongly affects the succeeding time-series evolution of the value stock index in Canada. In addition, in Table 3, we also find the smallest AIC and SC values in Panel C. Hence, these results again suggest that TOPIX changes also have the greatest effect on the succeeding time-series of the value stock index returns in Canada.

Next, Table 4 shows the effects of the returns of the Japanese growth stock index on Canadian stock markets and Table 5 exhibits those of the Japanese value equity index on Canadian stock markets. Specifically, both in Tables 4 and 5, all estimated coefficients of the daily returns as to the Japanese growth and value equity index returns are statistically significantly positive. Thus, these results suggest that the preceding time-series changes of the Japanese growth and value stock index returns strongly affect the following time-series changes of growth, value, and overall equity market indices in Canada. Moreover, in Table 4, the smallest values of AIC and SC are seen in Panel C. This evidence means that the Japanese growth equity index returns most substantially affect the following time-series of the Canadian value index returns. Furthermore, in Table 5, it is found that the smallest values of AIC and SC are seen in Panel C. Hence, the results mean that for Canadian stock markets, the preceding Japanese value stock index returns also have the strongest effect on the value stock index returns.

Table 2. Effects of the Nikkei 225 on Canadian stock markets: Results of the AR(5)-EGARCH models with the GED errors

Panel A. Effects of the Nikkei 225 on the Canadian standard equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0544***	0.0000
DLNK	0.1232***	0.0000
AR(1)	−0.0829***	0.0000
AR(2)	−0.0270	0.1201
AR(3)	−0.0320*	0.0610
AR(4)	−0.0228	0.1841
AR(5)	−0.0212	0.2073
Model statistics		
AIC	2.592624	
SC	2.614806	
Panel B. Effects of the Nikkei 225 on the Canadian growth equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0534***	0.0001
DLNK	0.1222***	0.0000
AR(1)	−0.0585***	0.0012
AR(2)	−0.0191	0.2736
AR(3)	−0.0293*	0.0880
AR(4)	−0.0105	0.5466
AR(5)	−0.0140	0.4120
Model statistics		
AIC	2.887156	
SC	2.909339	
Panel C. Effects of the Nikkei 225 on the Canadian value equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0508***	0.0000
DLNK	0.1157***	0.0000
AR(1)	−0.0804***	0.0000
AR(2)	−0.0220	0.1998
AR(3)	−0.0192	0.2636
AR(4)	−0.0244	0.1511
AR(5)	−0.0297*	0.0776
Model statistics		
AIC	2.481026	
SC	2.503208	

Notes: This table presents the estimation results of the various EGARCH models, which are specified for examining the effects of the Nikkei 225 stock index on the value, growth, and standard stock indices of Canada. In this table, AIC represents the Akaike's information criterion and SC denotes the Schwartz information criterion. Further, ***, **, and * mean the statistical significance of the coefficients at the 1%, 5%, and 10% levels, respectively.

Table 3. Effects of the TOPIX on Canadian stock markets: Results of the AR(5)-EGARCH models with the GED errors

Panel A. Effects of the TOPIX on the Canadian standard equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0538***	0.0000
DLTPX	0.1390***	0.0000
AR(1)	−0.0837***	0.0000
AR(2)	−0.0289*	0.0962
AR(3)	−0.0296*	0.0826
AR(4)	−0.0210	0.2220
AR(5)	−0.0187	0.2663
Model statistics		
AIC	2.591224	
SC	2.613406	
Panel B. Effects of the TOPIX on the Canadian growth equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0526***	0.0001
DLTPX	0.1363***	0.0000
AR(1)	−0.0578***	0.0014
AR(2)	−0.0198	0.2550
AR(3)	−0.0264	0.1232
AR(4)	−0.0077	0.6574
AR(5)	−0.0122	0.4762
Model statistics		
AIC	2.886283	
SC	2.908465	
Panel C. Effects of the TOPIX on the Canadian value equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0508***	0.0000
DLTPX	0.1299***	0.0000
AR(1)	−0.0793***	0.0000
AR(2)	−0.0255	0.1369
AR(3)	−0.0188	0.2738
AR(4)	−0.0224	0.1890
AR(5)	−0.0275	0.1014
Model statistics		
AIC	2.478891	
SC	2.501073	

Notes: This table presents the estimation results of the various EGARCH models, which are specified for examining the effects of the TOPIX on the value, growth, and standard stock indices of Canada. In this table, AIC represents the Akaike's information criterion and SC denotes the Schwartz information criterion. Further, ***, **, and * mean the statistical significance of the coefficients at the 1%, 5%, and 10% levels, respectively.

Table 4. Effects of the Japanese growth equity index on Canadian stock markets: Results of the AR(5)-EGARCH models with the GED errors

Panel A. Effects of the Japanese growth equity index on the Canadian standard equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0535***	0.0000
DLJG	0.1297***	0.0000
AR(1)	−0.0842***	0.0000
AR(2)	−0.0293*	0.0916
AR(3)	−0.0321*	0.0600
AR(4)	−0.0198	0.2485
AR(5)	−0.0193	0.2529
Model statistics		
AIC	2.591292	
SC	2.613474	
Panel B. Effects of the Japanese growth equity index on the Canadian growth equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0517***	0.0001
DLJG	0.1282***	0.0000
AR(1)	−0.0600***	0.0009
AR(2)	−0.0199	0.2524
AR(3)	−0.0293*	0.0879
AR(4)	−0.0082	0.6370
AR(5)	−0.0132	0.4381
Model statistics		
AIC	2.886625	
SC	2.908807	
Panel C. Effects of the Japanese growth equity index on the Canadian value equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0502***	0.0000
DLJG	0.1207***	0.0000
AR(1)	−0.0795***	0.0000
AR(2)	−0.0256	0.1361
AR(3)	−0.0189	0.2702
AR(4)	−0.0222	0.1945
AR(5)	−0.0295*	0.0799
Model statistics		
AIC	2.479737	
SC	2.501919	

Notes: This table presents the estimation results of the various EGARCH models, which are specified for examining the effects of the Japanese growth stock index on the value, growth, and standard stock indices of Canada. In this table, AIC represents the Akaike's information criterion and SC denotes the Schwartz information criterion. Further, ***, **, and * mean the statistical significance of the coefficients at the 1%, 5%, and 10% levels, respectively.

Table 5. Effects of the Japanese value equity index on Canadian stock markets: Results of the AR(5)-EGARCH models with the GED errors

Panel A. Effects of the Japanese value equity index on the Canadian standard equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0518***	0.0000
DLJV	0.1397***	0.0000
AR(1)	−0.0817***	0.0000
AR(2)	−0.0250	0.1481
AR(3)	−0.0283*	0.0960
AR(4)	−0.0190	0.2691
AR(5)	−0.0171	0.3108
Model statistics		
AIC	2.590413	
SC	2.612595	
Panel B. Effects of the Japanese value equity index on the Canadian growth equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0525***	0.0001
DLJV	0.1372***	0.0000
AR(1)	−0.0584***	0.0012
AR(2)	−0.0188	0.2778
AR(3)	−0.0246	0.1490
AR(4)	−0.0080	0.6447
AR(5)	−0.0116	0.4981
Model statistics		
AIC	2.885846	
SC	2.908028	
Panel C. Effects of the Japanese value equity index on the Canadian value equity index		
Mean equation		
Variables	Coefficients	*p*-value
Intercept	0.0496***	0.0000
DLJV	0.1340***	0.0000
AR(1)	−0.0806***	0.0000
AR(2)	−0.0266	0.1224
AR(3)	−0.0178	0.3007
AR(4)	−0.0214	0.2104
AR(5)	−0.0260	0.1214
Model statistics		
AIC	2.477291	
SC	2.499473	

Notes: This table presents the estimation results of the various EGARCH models, which are specified for examining the effects of the Japanese value stock index on the value, growth, and standard stock indices of Canada. In this table, AIC represents the Akaike's information criterion and SC denotes the Schwartz information criterion. Further, ***, **, and * mean the statistical significance of the coefficients at the 1%, 5%, and 10% levels, respectively.

6. Conclusions

This paper empirically examined the time-series relationships of growth, value, and standard stock indices in Canadian and Japanese equity markets. Specifically, we investigated the effects of TOPIX, the Nikkei 225, and Japanese value and growth stock indices on growth, value, and standard equity indices of Canada. The interesting findings we derived from our empirical examinations are as follows. 1) First, our analyses by the EGARCH models found that the Nikkei and TOPIX most strongly influenced the value stock index in Canada. 2) Second, our examinations by the EGARCH models clarified that the Japanese value and growth equity index return evolution also most strongly affected Canadian value stocks.

It is surprising that not the same-type stock indices but the different sorts of equity indices of Canada and Japan demonstrated tighter linkages. The evidence that various Japanese equity index returns analyzed in this paper were strongly connected with Canadian value stock returns was consistent and robust. We also note that our new approach to investigating the different kinds of stock indices in international stock markets shall add additional novel viewpoints not only to the existing body of literature but also to the future research as to the international stock market linkage. Further empirical study by employing other different international equity indices with other analyzing angles shall be also our future work.

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