

# What Drives the Stock Market Comovements between Korea and China, Japan and the US?

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The authors are grateful to Dr. Wook Sohn, Dr. Hwan-Koo Kang and Dr. Hyunjoon Lim at the Bank of Korea, Prof. Sangwon Suh at Chung-Ang University, an anonymous reviewer, and the participants at the interim seminar and BOJ-BOK Research Workshop for their valuable comments and suggestions.

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# What Drives the Stock Market Comovements between Korea and China, Japan and the US?

This paper measures the extent of comovements in stock returns between Korea and three major countries (China, Japan and the US) using the industry-level data for Korea from 2003 to 2016, in the spirit of the international capital asset pricing model. It also examines what drives the comovements between Korea and the three countries.

We find that the comovements of the Korean stock returns with those of the US and Japan became smaller after the global financial crisis. In contrast, the comovement in stock returns between Korea and China became larger after the crisis. After an additional analysis, we conclude that trade linkage is the main driver of the comovements between Korea and the three countries.

Our finding suggests that the concentration of trade with some trading partners can be a destabilizing factor in the domestic financial market if there is a negative shock to trade with those partners. Thus, it is important for Korea to diversify trade with foreign countries to keep its financial market more stable.

**Keywords:** Stock market comovement, Trade linkage, Financial linkage

**JEL Classification Numbers:** F15, F21, G15

## I. Introduction

The Korean stock market has shown a high degree of comovement with major countries' stock markets, which may reflect increasing real linkage as well as more financial integration with those countries. It is also intriguing that the extent of comovement has been changing over time and the degree of change seems to be different for different countries. For example, comparing the period before the global financial crisis with the post-crisis period, the correlations of Korean stock market returns with those of China and the US rose, but the stock market comovement between Korea and Japan decreased.<sup>1)</sup> In this paper, motivated by these observations, we examine what drives the stock market comovements between Korea and three major countries (China, Japan and the US).

To address this issue, we first measure the comovements in stock returns between 24 Korean manufacturing industries and the three countries using a model in the spirit of the international capital asset pricing model (ICAPM), where the expected return of a country's stock market is influenced by global stock market returns. Specifically, we use the market returns of the three major countries as proxies for global stock market returns, and the stock returns for Korean manufacturing industries are related to the market returns of the three countries. In our model, the degrees of the comovements between Korean manufacturing industries and the three countries are measured by slope coefficients (betas) of the three countries for those industries.

Next, we examine the driver(s) of the comovements between Korean manufacturing industries and the three countries. According to conventional financial theory, the price of a security can be modelled as the present value of future cash flows from the security, with the future cash flows being discounted at appropriate discount rates. If this is the case, the degree of commonality between securities may come from two sources: (i)

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1) The correlation coefficients of Korea-China, Korea-Japan and Korea-US stock market returns using weekly data from Datastream were 0.49, 0.59 and 0.47, respectively, for the period of 2003-2007. However, the coefficients changed to 0.69, 0.49 and 0.60, respectively, for the period of 2010-2016.

comovement in cash flows (real linkage) and (ii) comovement in discount rates (financial linkage). In this paper, as proxies for the two sources of comovement, we use the ratio of trade to sales for real linkage and the share of foreign stock investment for financial linkage.

From our analysis, we find that the comovements of the Korean stock market with those of the US and Japan became smaller after the global financial crisis. In contrast, the post-crisis comovement in stock returns between Korea and China is larger than that of the pre-crisis period. With the two proxies for real and financial linkages, we find that the trade to sales ratio is positively related to the degree of comovements in stock returns between Korea and the three countries. On the other hand, we find no evidence that financial linkage proxied by foreign stock investment is related to comovements in stock returns between Korea and the three countries.

There are previous studies such as Forbes and Chinn (2004), Elekdag et al. (2012) and Arslanalp et al. (2016) where a two-stage factor model like ours is employed in order to study the linkage in financial markets across countries. These studies use aggregate and macro-level data for sample countries and thus variations in the linkages and its determinants at the country level. In contrast, our study uses industry-level data for an individual country, i.e. Korea. As there are cross-sectional variations as well as time-series variations across industries, we can use such variations in order to examine the issue for an individual country in more depth with industry-level data. In this regard, we expect that our study at the industry level for an individual country will complement previous studies at the country level for groups of countries.

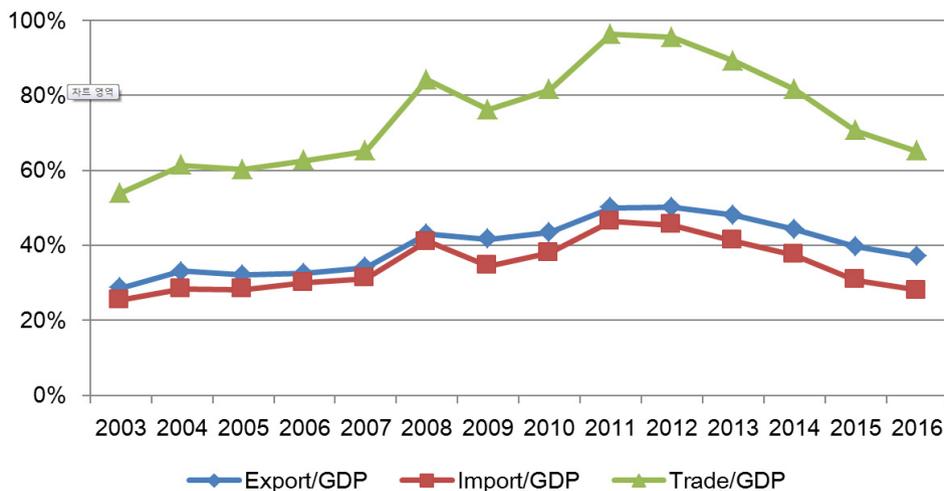
The rest of the paper is organized as follows. In Section II, we explain trade and stock market trends in Korea. We provide a review of the literature in Section III. In Section IV, we describe the data and introduce the methodology for our analysis. We report the empirical results of our analysis in Section V. We conclude in Section VI.

## II. Trade and Stock Market Trends in Korea

Korea's trade (exports plus imports) seems to reflect the overall conditions of the global economy as well as its evolution. Figure 1 shows the shares of exports, imports and trade in Korea's GDP from 2003 to 2016. The trade share continued to rise until 2008, mainly on the back of a favorable global economy. However, it declined sharply in 2009 in the aftermath of the global financial crisis. From 2010, it again increased and recorded 96%, the highest ratio, in 2011. It has been falling since 2012, which may be attributed to sluggish investment due to delayed global economic recovery from the crisis. The share of trade in GDP was 65% as of 2016, similar to the level in 2007.

Both exports and imports show similar trends. In 2016, the share of exports and imports in GDP accounted for 37% and 28%, respectively. As shown in Figure 1, trade surplus (exports – imports) has increased after the crisis, which is mainly due to a decrease in commodity prices and strong exports of Korea's flagship products such as semiconductors and automobiles.

Figure 1. Shares of Exports, Imports and Trade in Korea's GDP



Note: Data are based on nominal amount, goods and Korean won standards.

Source: Bank of Korea (ECOS)

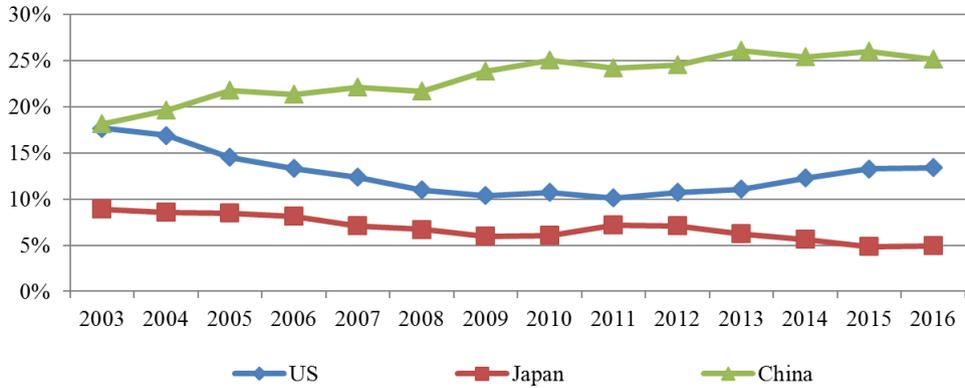
Figure 2 shows the shares of exports, imports and trade with three major trading partners of Korea (the US, Japan and China) for the period from 2003 to 2016. In the case of the US, the shares of exports and imports continued to decline until 2011. The uptrend in recent years is presumably due to the Korea-US FTA, which came into effect on March 15, 2012. For Japan, both the export and import shares showed declining trends throughout the period. As of 2016, the share of imports was 11.7%, whereas the share of exports was 4.9%. In the case of China, in contrast to the US and Japan, the shares of exports and imports have increasing trends. The shares of exports and imports were 25.1% and 21.4% in 2016, which accounted for the largest portion among Korea's trade partners. Consequently, the share of China in Korea's trade is much higher than those of the US and Japan and recorded 23.4% in 2016. This indicates that China may become a more dominant player in Korea's trade dynamics and thus may have a bigger impact on the Korean economy than before, both in real and financial aspects.

The Korean stock market has continued to advance together with the growth of its real economy. Figure 3 represents the ratio of market capitalization to GDP and foreigners' share of stock market capitalization in Korea. The ratio of market capitalization to GDP rose from 48% in 2003 to 101% in 2007. During the crisis, the ratio plunged to 56% in 2008. The ratio then resumed its increase before holding steady at around 90%. On the other hand, foreigners' share of stock market capitalization in Korea reached around 40% in 2003 and 2004, and then declined gradually to 27% in 2008. Afterwards, it increased, reaching 32% in 2016, but it still remains lower than in 2003.

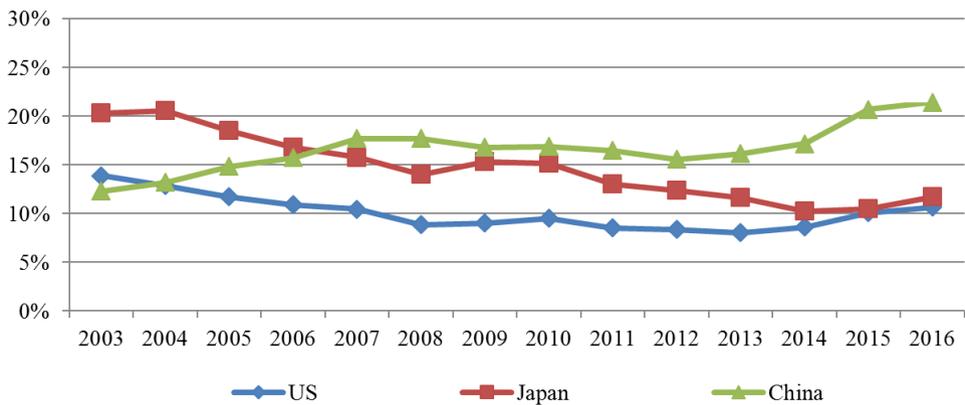
Figure 4 reports the share of foreign investors from the US, Japan and China. As of 2016, the US accounted for 49%, whereas the shares of Japan and China were only 3% and less than 1%, respectively. The US portion has been much larger than those of Japan and China throughout the entire period. This implies that the influence of US investors on Korean stock market may be more evident than those of the other two countries.

Figure 2. Shares of Korea's Exports, Imports and Trade with the US, Japan and China

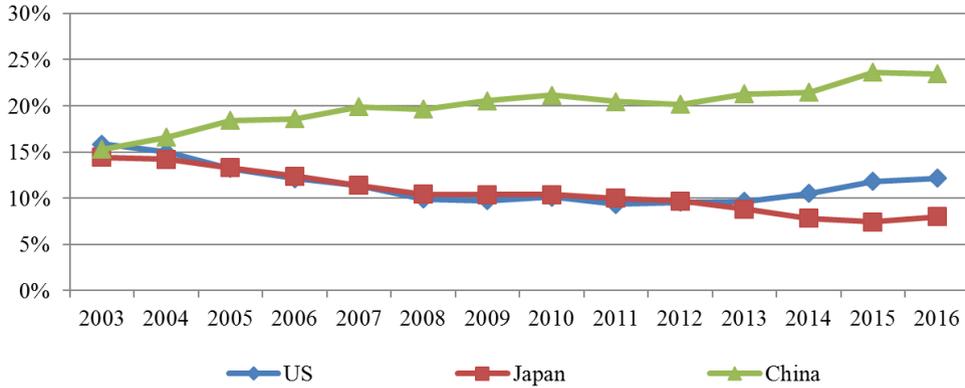
[Panel A: Exports]



[Panel B: Imports]



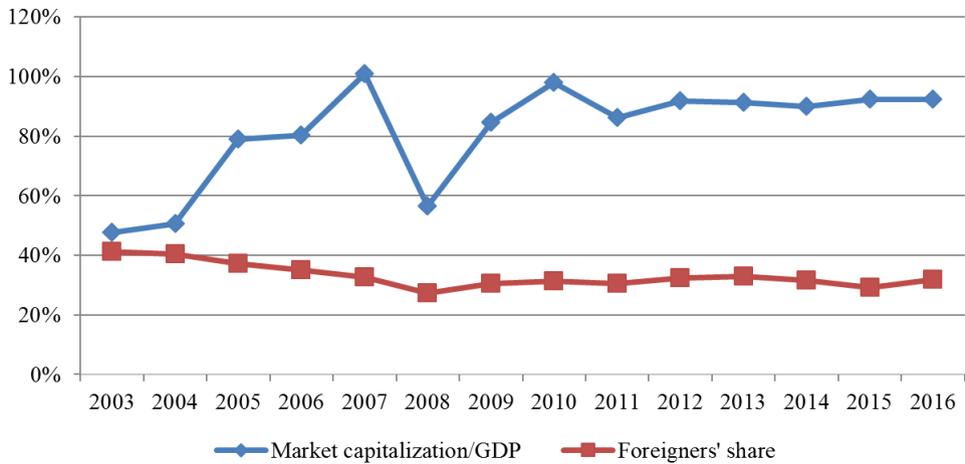
[Panel C: Trade]



Note: Data are based on nominal amount, goods and the US dollar standards.

Sources: Bank of Korea (ECOS)

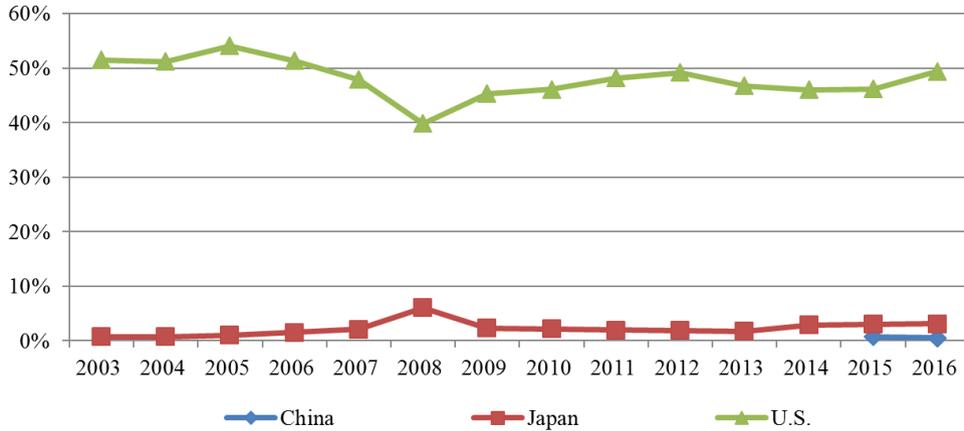
Figure 3. Market Capitalization/GDP and Foreigners' Share in Korean Stock Market



Note: Market capitalization is measured by Kospi plus Kosdak.

Sources: Bank of Korea (ECOS), Koscom and Financial Supervisory Services

Figure 4. Shares of the US, Japan and China in Korean Stock Market



Note: The equity ratio was measured by the stock and investment fund shares.

Source: IMF (Coordinated Portfolio Investment Survey)

### III. Literature Review

Our paper generally follows the methodology used by Forbes and Chinn (2004), Elekdag et al. (2012), and Arslanalp et al. (2016). Forbes and Chinn (2004) investigate how trade and financial linkages between five big countries (France, Germany, Japan, the UK and the US) and 38 sample countries affect comovements in stock and bond market returns from 1986 to 2000. They first estimate the impacts of bilateral, global and sectoral factors on each country's asset returns using a factor model.<sup>2)</sup> In the second stage, the bilateral factor loadings, also known as "betas," are regressed on trade-related and financial variables such as trade flows, trade competition in third markets, bank lending and foreign investment. The authors find that trade linkage variables are more significant than financial ones in explaining the factor loadings.

Elekdag et al. (2012) analyze the evolution of stock market linkages

2) The bilateral factors refer to returns for the five center countries in the asset markets; the global and sectoral factors include world market returns, global interest rates, oil prices, gold prices and commodity prices, and asset returns for 14 sectoral indexes.

between five center countries (France, Germany, Japan, the UK and the US) and 12 Asian countries<sup>3)</sup> during the period of 1992-2011. They document that the Asian countries' financial sensitivities to the center economies increased, and both trade and financial linkages were key determinants of the sensitivities. They also argue that the Asian countries' macroeconomic policies, such as reductions in government debt and increases in foreign reserves, made limited contributions to mitigating these sensitivities.

Arslanalp et al. (2016) explore comovements in stock markets between Asian countries and four center countries (China, Japan, the euro area and the US). They build a two-stage model based on Forbes and Chinn (2004) consisting of four center economies and nine Asian countries<sup>4)</sup> during the period of 2001-2014 (pre-crisis period: 2001-2007, crisis period: 2008-2009 and post-crisis period: 2010-2014). Their empirical results indicate that the spillover effect from China to Asian stock markets has increased since the global financial crisis, although the level of its impact is still lower than those of the US and Japan. They also report that the main driver of spillovers from the two center economies in the region (China and Japan) to other Asian stock markets is trade linkage (trade linkage for China and trade competition in third markets for Japan) rather than financial linkage.

In addition to these studies, there are other studies to examine interdependence in stock market returns between countries. Tavares (2009) examines 40 developed and emerging markets from the 1970s to 1990s and finds that bilateral trade intensity increases the correlation of stock market returns between countries, while real exchange rate volatility, asymmetry in output growth and dissimilarity in exports decrease the correlation. Eiling and Gerard (2015) find that there are significant time trends in cross-country correlations in 32 emerging markets for the period from 1991 to 2009. They argue that official market liberalization, equity

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3) The 12 Asian countries include Australia, China, Hong Kong, India, Indonesia, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan and Thailand.

4) The four center countries include China, Japan, the euro area, and the US, and the nine sample countries are Australia, India, Indonesia, Korea, Malaysia, New Zealand, Philippines, Taiwan and Thailand.

market openness, equity market development and trade openness drive these trends. Paramati et al. (2015, 2016) find that trade intensity drives stock market interdependence between Australia and its trading partners.

The above-mentioned papers use aggregate and macro-level data. In contrast to these studies, our study uses industry-level data for an individual country. As there are cross-sectional variations as well as time-series variations in real and financial linkages across industries for an individual country, we can use such variations in order to examine comovements in stock returns between the individual country and foreign countries in more depth.

The literature on stock return comovements and variations across countries using industry and/or firm level data can be traced back to Roll (1992), Heston and Rouwenhorst (1994), and Griffin and Karolyi (1998).

Roll (1992) documents that industry factors such as difference or similarity of industrial composition is the main factor in explaining stock return correlations across countries. In the analysis, he uses daily stock indexes for 24 countries from April 1988 to March 1991. However, Heston and Rouwenhorst (1994) argue that variation in country stock returns is mainly due to country-specific factors rather than industry ones. Their sample includes 829 firms in 12 European countries for the period from 1978 to 1992. Griffin and Karolyi (1998) find that the industry effect is relatively larger for traded-goods industries than for nontraded-goods industries in explaining the stock return variations for 25 countries for the period from 1992 to 1995.

More recently, Brooks and Del Negro (2006) and Faias and Ferreira (2016) explore international stock market commonality using firm-level data. Brooks and Del Negro (2006) analyze the relationship between international stock market return comovement and the degree of internationalization of firms such as firm's international sales, assets and income as well as sector affiliation (traded versus non-traded). They use firm-level data composed of 1,239 firms in 20 developed and emerging countries for the period from 1985 to 2002. They find that the higher the

degree of globalization of a firm, the higher the sensitivity of stock returns to global shocks, indicating that internationally operating firms have stronger linkages with the global stock market. Faias and Ferreira (2016) find that the stock return variation can be better explained by industry and global factors rather than country factors, using monthly stock return data from 45 countries for the period from 2001 to 2010.

There are also several studies on the stock return comovement of Korean companies using firm-level data. Park (2007) examines the impacts of analysts and foreign investors on the stock return synchronicity of Korean individual firms with the market from 2000 to 2003. The author finds that the synchronicity is greater as the number of financial analysts for a firm increases, while the impact of foreign investors measured by the equity share of foreigners in the firm is not significant. The author argues that foreign investors rely on firm-specific financial information based on the firm's intrinsic value rather than market-wide information, whereas analysts provide investors with more market-related information. Kim et al. (2015) and Cho and Mooney (2015) investigate the comovement of stock returns for firms belonging to business groups (known as chaebol) and its key determinants during the period of 1980-2009 and 2002-2011, respectively. Both papers report that companies affiliated with business groups exhibit more salient comovement in stock returns with other companies in the same business group than with companies not affiliated with the business group.

#### **IV. Data and Methodology**

In the first stage of this paper, we measure comovements in stock returns between Korea and three countries—the US, Japan, and China—using stock returns at the industry level, and in the second stage, we examine what drives the comovements between Korea and the three countries. The three countries are chosen based on the fact that they are major trading partners of Korea. From 2003 to 2016, the Korea's average

proportion of trade with China (20.5%) was the highest, following by the US (11.0%), Japan (10.0%), Saudi Arabia (3.7%), Hong Kong (3.2%), and Taiwan (3.0%).<sup>5)</sup> We choose three countries as major trading partners of Korea as each of their proportions in Korean trade was larger than 5% for the period.

In the first stage, in order to measure the comovements in stock returns between Korea and the three countries at the industry level, we use two alternative specifications, (1) and (2).

$$R_{i,t} = \alpha_i + \beta_{us,i}R_{us,t} + \beta_{Japan,i}R_{Japan,t} + \beta_{China,i}R_{China,t} + \varepsilon_{i,t} \quad (1)$$

$$R_{i,t} = \alpha_i + \beta_{us,i}R_{us,t} + \beta_{Japan,i}R_{Japan,t} + \beta_{China,i}R_{China,t} + \beta_{CRB,i}R_{CRB,t} \\ + \beta_{USTN,i}\Delta Y_{USTN,t} + \beta_{VIX,i}\Delta VIX_t + \beta_{CDS,i}\Delta CDS_t + \varepsilon_{i,t} \quad (2)$$

In (1),  $R_{i,t}$  represents the return of industry  $i$  during the week of  $t$  for Korea.  $R_{us,t}$ ,  $R_{Japan,t}$  and  $R_{China,t}$  denote the market returns during the week of  $t$  for the US, Japan and China, respectively. In the first specification, we follow the spirit of the ICAPM, where the expected return of a country's stock market is influenced by global stock market returns. We use three market returns of major countries as proxies for global stock market returns. In (2), following Arslanalp et al. (2016), we add four control variables to the market returns of the US, Japan and China. The four control variables are the returns computed by  $CRB$  (Commodity Research Bureau) index ( $R_{CRB,t}$ ), changes in the yield of US 2-year Treasury notes ( $\Delta Y_{USTN,t}$ ), changes in the  $VIX$  ( $\Delta VIX_t$ ), and changes in the  $CDS$  premium on Korea's 5-year bonds from the week of  $t-1$  to the week of  $t$ . We collect the  $CRB$  index and  $VIX$  data from Bloomberg, the yield of US 2-year Treasury notes from Federal Reserve Economic Data and the  $CDS$  premium on Korea's 5-year bonds from the Korea Center

5) We compute the proportions of trade with foreign countries for Korea using data from the Bank of Korea (ECOS).

for International Finance. As the *CDS* premium is regularly available from 2003, we begin our sample period from then.

In our sample, we include Korean manufacturing companies for which stocks were traded for the period from 2003 to 2016. We compute weekly stock returns (Wednesday to Wednesday) for each of the stocks using their stock prices adjusted for any distribution to stockholders such as stock splits and dividend payments. The adjusted stock prices are provided by DataGuide. We compute weekly value-weighted stock returns for each industry using all the stock returns of individual companies included in the industry. We use the market capitalization of each stock in order to compute the value-weighted stock returns for the industry. The information on the industry to which each company belongs and the market capitalization of the company are also provided by DataGuide. For the classification of industries for Korea, we use the Korean Standard Industrial Classification (KSIC, revision 9) provided by the Korea National Statistical Office.<sup>6)</sup> There are 24 divisions (industries) for manufacturing in the KSIC (revision 9). Table 1 reports the codes and names for the 24 divisions (industries). For the US, Japan and China, we compute stock market returns using the stock market return index provided by Datastream. The stock market returns are also computed weekly (Wednesday to Wednesday) for the period from 2003 to 2016. All the returns are computed in terms of local currencies.

In both (1) and (2), we run a regression for each year in our sample period and estimate the coefficients yearly in order to measure the comovements of stock returns for industry  $i$  with respect to the US, Japan and China for the year.

In the second stage, in order to examine what determines the

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6) The KSIC was first introduced in 1963 and is based on the UN's International Standard Industrial Classification (ISIC). There have been 10 revisions since its introduction. The 10<sup>th</sup> revision went into effect in July 2017. The 9<sup>th</sup> revision, which became effective in 2008, was the latest revision in our sample period. The KSIC has a hierarchical five-digit system. The KSIC (revision 9) was divided into 21 sections, and each section is broken down into divisions (denoted by 2 digits). The divisions are further broken down into groups (3 digits), into classes (4 digits) and then into subclasses (5 digits). There were 76 divisions, 228 groups, 487 classes and 1,145 subclasses for the KSIC (revision 9). (source: <https://unstats.un.org/unsd/cr/ctryreg>)

comovements in stock returns between Korea and the three countries at the industry level, we use three main explanatory variables: (i) the ratio of trade to sales as a proxy for trade linkage (ii) the proportion of foreign stock investment as a proxy for financial linkage and (iii) export competition in third markets. In addition, we add a dummy variable for the period of the global financial crisis (2008-2009) following Arslanalp et al. (2016) as the stock returns between Korea and the three countries may

**Table 1. Korean Standard Industrial Classification (revision 9) for Manufacturing**

Division Code	Name of Division
10	Food products
11	Beverages
12	Tobacco products
13	Textiles, except apparel
14	Wearing apparel, clothing accessories and fur articles
15	Tanning and dressing of leather, manufacture of luggage and footwear
16	Wood and of products of wood and cork, except furniture
17	Pulp, paper and paper products
18	Printing and reproduction of recorded media
19	Coke, hard-coal and lignite fuel briquettes and refined petroleum products
20	Chemicals and chemical products, except pharmaceuticals and medicinal chemicals
21	Pharmaceuticals, medical chemicals and botanical products
22	Rubber and plastic products
23	Other non-metallic mineral products
24	Basic metal products
25	Fabricated metal products, except machinery and equipment
26	Electronic components, computer, radio, television and communication equipment and apparatuses
27	Medical, precision and optical instruments, watches and clocks
28	Electrical equipment
29	Other machinery and equipment
30	Motor vehicles, trailers and semi-trailers
31	Other transport equipment
32	Furniture
33	Other manufacturing

Source: Korea National Statistical Office (Korean Standard Industrial Classification, 2008)

comove more or less during the crisis. We also consider industry effects for Korea using 23 industry dummies. The ratio of trade to sales and export competition in third markets are computed yearly for each division (industry) of Korean manufacturing for each of the three countries (the US, Japan and China). The proportion of foreign stock investment is computed for each division (industry) of Korean manufacturing for a given year. In the regression, we use the natural log of (1 + trade to sales ratio x 100) and the natural log of (1 + proportion of foreign stock investment x 100). The specification without the dummy variables for the second stage can be shown as follows:

$$\beta_{us,i} = \delta_{us,i} + \delta_{us,trade} Trade_{us,i} + \delta_{us,finance} Finance_i + \delta_{us,xc} ExportCompetition_{us,i} + \varepsilon_{us,i} \quad (3-1)$$

$$\beta_{Japan,i} = \delta_{Japan,i} + \delta_{Japan,trade} Trade_{Japan,i} + \delta_{Japan,finance} Finance_i + \delta_{Japan,xc} ExportCompetition_{Japan,i} + \varepsilon_{Japan,i} \quad (3-2)$$

$$\beta_{China,i} = \delta_{China,i} + \delta_{China,trade} Trade_{China,i} + \delta_{China,finance} Finance_i + \delta_{China,xc} ExportCompetition_{China,i} + \varepsilon_{China,i} \quad (3-3)$$

Specifically, the ratio of trade to sales for industry  $i$  for a certain year for each of the three countries ( $Trade_{us,i}$ ,  $Trade_{Japan,i}$ , and  $Trade_{China,i}$ ) is computed as follows. We collect the annual exports and imports between Korea and each of the three countries in US dollars from UN Comtrade database at the level of HS 6-digit codes under HS 1996. Next, we convert HS 6-digit codes under HS 1996 to HS 6-digit codes under HS 2002 using a correspondence table provided by the UN Statistics Division.<sup>7)</sup> Then, we use two correspondence tables for 2010 Input-Output Statistics of Korea.<sup>8)</sup> The first one is a correspondence table between HS 6-digit codes

7) <https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp>

under HS 2002 and I-O commodity codes for 2010 Input-Output Statistics of Korea. The second one is a correspondence table between I-O commodity codes and KSIC (revision 9) codes. By combining the two correspondence tables, we convert HS 6-digit codes under HS 2002 to KSIC (revision 9) codes. Next, we sum up the annual trade for all the HS 6-digit codes in each industry so that we can compute the annual trade for the industry. For the sales of each industry, we collect the annual sales in Korean won for each company within the industry from DataGuide, and compute the annual sales in Korean won for the industry by adding up the annual sales for all the companies in the industry.<sup>9)</sup> Then, we divide the annual sales for the industry in Korean won by the average exchange rate between the Korean won and US dollar for the year<sup>10)</sup> and thus compute the annual sales for the industry in US dollars. Lastly, we compute the ratio of trade to sales using the annual trade and sales in US dollars for the industry.

For the proportion of foreign stock investment each year in a Korean industry, we collect the proportion of foreign stock investment for each company in the industry at the end of each month during the sample period from DataGuide and compute the value-weighted mean of the proportions for all the companies in the industry at the end of the month. Then, we calculate the annual average of monthly proportions for the industry. Following Arslanalp et al. (2016), we compute export competition in third markets for industry  $i$  each year for each of the three countries ( $ExportCompetition_{us,i}$ ,  $ExportCompetition_{japan,i}$ , and  $ExportCompetition_{china,i}$ ) as the minimum between the share of industry  $i$  in total exports for Korea and that for each of the three countries.

Table 2 reports the averages of the trade to sales ratio, proportion of foreign stock investment and export competition for 24 Korean

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8) The Bank of Korea (2014)

9) It is possible that sales data underestimate the actual amount of each industry to some degree because DataGuide does not include non-listed companies.

10) We collect the annual average exchange rate between the Korean won and US dollar from the Bank of Korea (ECOS).

manufacturing divisions before the global financial crisis (2003-2007), during the global financial crisis (2008-2009), and after the global financial crisis (2010-2016). The average of the trade to sales ratio for the US decreased from 39.7% before the crisis to 26.4% after the crisis. The average of the trade to sales ratio for Japan also decreased from 45.7% before the crisis to 27.9% after the crisis. On the other hand, the average of the trade to sales ratio for China increased from 53.4% before the crisis to 72.1% after the crisis. For the average proportion of foreign stock investment, it was 20.3% before the crisis and changed to 19.8% after the crisis. For export competition, the three countries have similar levels of competition with Korea and show little change over time.

Table 2. Trade to Sales Ratio, Proportion of Foreign Stock Investment and Export Competition for Korea  
(Average for 24 Manufacturing Divisions)

Category	Country	2003–2007 (A, %)	2008–2009 (B, %)	2010–2016 (C, %)	(C–A, %p)
Trade to Sales	US	39.7	28.2	26.4	–13.3
	Japan	45.7	34.7	27.9	–17.9
	China	53.4	68.0	72.1	18.7
Foreign Stock Investment	All countries	20.3	17.7	19.8	–0.5
Export Competition	US	2.8	2.7	2.7	–0.1
	Japan	2.9	2.9	2.9	0.0
	China	2.8	2.8	2.8	0.0

## V. Empirical Results

Table 3 reports the estimates of betas from specification (1), such as regression without control variables, in Section IV. Panel A of Table 3 provides the estimates of betas for 24 Korean manufacturing divisions (industries) with respect to the US and their averages for three sub-periods: before the global financial crisis (2003-2007), during the global financial crisis (2008-2009), and after the global financial crisis (2010-2016). For the US, the average betas before and after the global financial crisis are estimated to be 0.270 and 0.218, respectively. Also, the beta after the crisis is smaller than that before the crisis for 18 out of 24 divisions. Thus, we conclude that the comovement between the Korean and US stock markets becomes smaller over time. Interestingly, the average beta during the crisis was -0.163, and the beta was negative for 22 out of 24 divisions. This suggests that the Korean and US stock markets might have moved in opposite directions during the crisis when we control for the effects from the other two major markets, Japan and China.

Panel B of Table 3 provides the estimates of betas for 24 Korean manufacturing divisions (industries) with respect to Japan and their averages for three sub-periods. For Japan, the average betas before and after the global financial crisis are estimated to be 0.365 and 0.114, respectively. In addition, the beta after the crisis is smaller than that before the crisis for 23 out of 24 divisions. Thus, the comovement between the Korean and Japanese stock markets also becomes smaller over time. The average beta during the crisis was 0.494, which suggests that the Korean and Japanese stock markets might have moved further in the same direction during the crisis.

Panel C of Table 3 provides the estimates of betas for 24 Korean manufacturing divisions (industries) with respect to China and their averages for three sub-periods. For China, the average betas before and after the global financial crisis are estimated to be 0.129 and 0.229, respectively. Furthermore, the beta after the crisis is larger than that

before the crisis for 20 out of 24 divisions. Thus, we conclude that the comovement between Korean and Chinese stock markets becomes larger over time. The average beta during the crisis was 0.249. This suggests that the Korean and Chinese stock markets might have moved further in the same direction during the crisis.

Table 3. Estimates of Betas for Korean Manufacturing Industry with respect to US, Japanese and Chinese Stock Market Returns (without Control Variables)

[Panel A: US]

Industry	2003–2007 (A)	2008–2009 (B)	2010–2016 (C)	(C–A)
10	0.228	-0.143	0.025	-0.203
11	0.192	-0.168	0.100	-0.092
12	0.294	-0.081	0.153	-0.140
13	0.061	-0.151	0.278	0.217
14	0.310	-0.114	0.119	-0.191
15	-0.006	-0.316	0.543	0.549
16	0.397	-0.030	0.225	-0.171
17	0.259	-0.233	0.194	-0.065
18	0.666	0.040	0.232	-0.434
19	0.273	-0.029	0.257	-0.016
20	0.402	-0.087	0.259	-0.143
21	0.226	-0.220	-0.061	-0.288
22	0.217	-0.155	0.286	0.070
23	0.213	-0.287	0.214	0.002
24	0.334	0.265	0.289	-0.046
25	0.164	-0.440	0.412	0.248
26	0.265	-0.011	0.202	-0.063
27	0.462	-0.336	0.230	-0.231
28	0.400	-0.135	0.231	-0.169
29	0.375	-0.350	0.337	-0.038
30	0.166	-0.173	0.104	-0.062
31	0.147	-0.225	0.381	0.234
32	0.326	-0.080	0.122	-0.204
33	0.110	-0.446	0.089	-0.021
Average	0.270	-0.163	0.218	-0.052

Table 3. Estimates of Betas for Korean Manufacturing Industry with respect to US, Japanese and Chinese Stock Market Returns (without Control Variables, cont'd)

[Panel B: Japan]

Industry	2003–2007 (A)	2008–2009 (B)	2010–2016 (C)	(C–A)
10	0.322	0.306	0.133	–0.189
11	0.329	0.116	0.116	–0.213
12	0.039	0.168	0.012	–0.026
13	0.323	0.403	0.158	–0.165
14	0.303	0.284	0.226	–0.077
15	0.278	0.199	0.059	–0.218
16	0.271	1.037	0.153	–0.118
17	0.134	0.483	0.058	–0.075
18	0.172	0.556	0.073	–0.099
19	0.170	0.296	–0.080	–0.249
20	0.388	0.517	0.053	–0.335
21	0.269	0.440	0.272	0.003
22	0.405	0.580	0.118	–0.287
23	0.426	0.636	0.115	–0.311
24	0.711	0.454	0.030	–0.681
25	0.414	0.744	0.126	–0.288
26	0.614	0.487	0.277	–0.338
27	0.391	0.655	0.104	–0.287
28	0.354	0.604	0.103	–0.251
29	0.569	0.788	0.184	–0.385
30	0.715	0.437	–0.015	–0.729
31	0.545	0.722	0.195	–0.350
32	0.198	0.201	0.061	–0.136
33	0.424	0.754	0.197	–0.227
Average	0.365	0.494	0.114	–0.251

Table 3. Estimates of Betas for Korean Manufacturing Industry with respect to US, Japanese and Chinese Stock Market Returns (without Control Variables, cont'd)

[Panel C: China]

Industry	2003–2007 (A)	2008–2009 (B)	2010–2016 (C)	(C–A)
10	0.102	0.205	0.053	–0.049
11	0.138	0.207	0.060	–0.078
12	–0.042	0.021	–0.003	0.039
13	0.162	0.215	0.130	–0.032
14	0.061	0.280	0.060	–0.001
15	0.043	0.512	0.120	0.077
16	0.030	0.286	0.201	0.171
17	0.038	0.224	0.179	0.141
18	0.105	–0.129	0.210	0.105
19	0.239	0.251	0.578	0.339
20	0.255	0.222	0.392	0.138
21	0.113	0.244	0.117	0.004
22	0.129	0.181	0.170	0.041
23	0.145	0.312	0.213	0.069
24	0.226	0.421	0.440	0.214
25	0.130	0.387	0.240	0.110
26	0.191	0.066	0.330	0.138
27	0.111	0.363	0.264	0.154
28	0.137	0.067	0.278	0.141
29	0.166	0.466	0.304	0.138
30	0.183	0.224	0.348	0.165
31	0.267	0.556	0.419	0.152
32	0.109	0.154	0.139	0.029
33	0.062	0.232	0.247	0.185
Average	0.129	0.249	0.229	0.100

Table 4 reports the estimates of betas from specification (2), such as regression with control variables, in Section IV. Panel A of Table 4 provides the estimates of betas for 24 Korean manufacturing divisions (industries) with respect to the US and their averages for three sub-periods. For the US, the average betas before and after the global financial crisis are estimated to be 0.479 and 0.006, respectively. Also, the beta after the crisis is smaller than that before the crisis for 21 out of 24 divisions. Panel B of Table 4 provides the estimates of betas for 24 Korean manufacturing divisions (industries) with respect to Japan and their averages for three sub-periods. For Japan, the average betas before and after the global financial crisis are estimated to be 0.304 and 0.124, respectively. Moreover, the beta after the crisis is smaller than that before the crisis for 20 out of 24 divisions. Panel C of Table 4 provides the estimates of betas for 24 Korean manufacturing divisions (industries) with respect to China and their averages for three sub-periods. For China, the average betas before and after the global financial crisis are estimated to be 0.112 and 0.192, respectively. In addition, the beta after the crisis is larger than that before the crisis for 19 out of 24 divisions. By industry, the increase in the value of beta was especially significant in divisions 19 (0.270), 24 (0.231) and 30 (0.182).

When we look at the post-crisis period (2010-2016) in terms of specific Korean industries, the estimated beta with regard to China was the highest in division 19 (0.533), followed by divisions 24 (0.396), 30 (0.344), 20 (0.338), 31 (0.331) and 26 (0.320). The betas in divisions 19 (0.410), 31 (0.406), 22 (0.255) and 30 (0.254) were the highest with respect to the US. In the case of Japan, the betas in divisions 21 (0.327), 26 (0.255) and 31 (0.232) were the highest.

Thus, together with the results from Table 3 and Table 4, we conclude that the comovements in stock returns between Korea and the US and between Korea and Japan become smaller over time. In contrast, the comovement in stock returns between Korea and China becomes larger over time.

Table 4. Estimates of Betas for Korean Manufacturing Industry with respect to US, Japanese and Chinese Stock Market Returns (with Control Variables)

[Panel A: US]

Industry	2003–2007 (A)	2008–2009 (B)	2010–2016 (C)	(C–A)
10	0.300	–0.301	–0.204	–0.504
11	0.087	–0.401	–0.161	–0.248
12	0.300	–0.217	0.071	–0.229
13	0.378	–0.084	–0.144	–0.522
14	0.460	0.004	–0.136	–0.596
15	0.272	0.177	0.201	–0.071
16	0.711	–0.056	–0.352	–1.063
17	0.429	–0.086	–0.044	–0.474
18	1.662	0.310	–0.112	–1.774
19	0.265	–0.141	0.410	0.145
20	0.581	0.108	0.169	–0.412
21	0.389	–0.085	–0.249	–0.638
22	0.283	0.110	0.255	–0.029
23	0.167	–0.274	0.031	–0.136
24	0.775	0.453	–0.040	–0.815
25	0.466	–0.310	0.030	–0.436
26	0.584	0.349	0.134	–0.450
27	1.036	–0.104	–0.214	–1.250
28	0.620	0.179	0.026	–0.594
29	0.743	0.110	0.179	–0.564
30	0.078	0.762	0.254	0.176
31	0.091	0.260	0.406	0.315
32	0.410	–0.151	–0.160	–0.570
33	0.407	–0.539	–0.197	–0.604
Average	0.479	0.003	0.006	–0.473

Table 4. Estimates of Betas for Korean Manufacturing Industry with respect to US, Japanese and Chinese Stock Market Returns (with Control Variables, cont'd)

[Panel B: Japan]

Industry	2003–2007 (A)	2008–2009 (B)	2010–2016 (C)	(C–A)
10	0.265	0.169	0.140	–0.125
11	0.247	0.051	0.171	–0.076
12	0.057	0.184	0.060	0.003
13	0.295	0.227	0.150	–0.145
14	0.163	0.088	0.192	0.029
15	0.299	–0.087	0.036	–0.263
16	0.223	0.689	0.198	–0.025
17	0.059	0.361	0.082	0.023
18	0.130	0.519	0.060	–0.070
19	0.116	0.134	–0.051	–0.167
20	0.276	0.313	0.081	–0.195
21	0.202	0.457	0.327	0.125
22	0.367	0.312	0.121	–0.246
23	0.379	0.476	0.123	–0.256
24	0.578	0.149	0.080	–0.499
25	0.321	0.398	0.145	–0.176
26	0.587	0.317	0.255	–0.332
27	0.362	0.491	0.070	–0.291
28	0.282	0.434	0.100	–0.183
29	0.500	0.512	0.183	–0.317
30	0.656	0.040	–0.028	–0.684
31	0.420	0.309	0.232	–0.188
32	0.182	0.185	0.058	–0.124
33	0.336	0.545	0.189	–0.148
Average	0.304	0.303	0.124	–0.180

Table 4. Estimates of Betas for Korean Manufacturing Industry with respect to US, Japanese and Chinese Stock Market Returns (with Control Variables, cont'd)

[Panel C: China]

Industry	2003–2007 (A)	2008–2009 (B)	2010–2016 (C)	(C–A)
10	0.083	0.096	0.041	–0.043
11	0.130	0.163	0.016	–0.114
12	–0.033	–0.032	–0.001	0.032
13	0.169	0.065	0.107	–0.061
14	0.033	0.125	–0.023	–0.055
15	0.042	0.396	0.058	0.016
16	–0.017	0.101	0.147	0.164
17	0.008	0.150	0.141	0.133
18	0.097	–0.155	0.140	0.043
19	0.263	0.149	0.533	0.270
20	0.209	0.142	0.338	0.129
21	0.126	0.174	0.110	–0.016
22	0.112	0.035	0.157	0.045
23	0.106	0.191	0.166	0.060
24	0.165	0.348	0.396	0.231
25	0.112	0.235	0.188	0.076
26	0.186	–0.007	0.320	0.135
27	0.081	0.228	0.231	0.150
28	0.107	0.000	0.278	0.171
29	0.131	0.380	0.270	0.139
30	0.162	0.173	0.344	0.182
31	0.272	0.411	0.331	0.059
32	0.086	0.142	0.114	0.029
33	0.048	0.055	0.212	0.163
Average	0.112	0.149	0.192	0.081

Table 5 reports the results of a regression analysis where we examine the drivers of comovements in stock returns between Korea and the three countries. In Panel A of Table 5, we use the betas for 24 Korean manufacturing divisions (industries) with respect to the US from specifications (1) and (2) in Section IV, such as regression without and with control variables, as dependent variables. When we use the beta from specification (1), i.e. without control variables, as a dependent variable, and variables on trade flows, foreign stock investment and export competition in third markets as independent variables, the variable of trade is positive and significant at the 5% level, but the variables of foreign stock investment and export competition are not significant at any conventional level. When we add a dummy variable for the global financial crisis, none of the three variables is significant. When we use the beta from specification (2), i.e. with control variables, as a dependent variable, the variable of trade is positive and significant at the 5% level, but the variables of foreign stock investment and export competition are not statistically significant. When we add a dummy variable for the global financial crisis, the variable of trade is still positive and significant at the 5% level. However, the variables of foreign stock investment and export competition are not significant. Thus, in the case of the US, we conclude that the variable of trade has a positive relationship with beta, but the variables of foreign stock investment and export competition have no relationship with beta.

In Panel B of Table 5, we use the betas for 24 Korean manufacturing divisions (industries) with respect to Japan from specifications (1) and (2) as dependent variables. When we use the beta from specification (1) as a dependent variable, the variable of trade is positive and significant at the 1% level, but the variables of foreign stock investment and export competition are not significant. When we add a dummy variable for the global financial crisis, the variable of trade is still positive and significant at the 1% level, but the variables of foreign stock investment and export competition are not significant. When we use the beta from specification

(2) as a dependent variable and variables on trade and foreign stock investment as independent variables, the variable of trade is still positive and significant at the 5% level, but the variables of foreign stock investment and export competition are not significant. When we add a dummy variable for the global financial crisis, the variable of trade is still positive and significant at the 5% level. However, the variable of foreign stock investment and export competition are not significant. Thus, in the case of Japan, we conclude that the variable of trade has a positive relationship with beta, but the variables of foreign stock investment and export competition have no relationship with beta.

In Panel C of Table 5, we use the betas for 24 Korean manufacturing divisions (industries) with respect to China from specifications (1) and (2) as dependent variables. When we use the beta from specification (1) as a dependent variable, the variable of trade is positive and significant at the 1% level, but the variables of foreign stock investment and export competition are not statistically significant. When we add a dummy variable for the global financial crisis, the variable of trade is still positive and significant at the 1% level, but the variables of foreign stock investment and export competition are not significant. When we use the beta from specification (2) as a dependent variable, the variable of trade is still positive and significant at the 10% level, but the variables of foreign stock investment and export competition are not significant. When we add a dummy variable for the global financial crisis, the variable of trade is still positive and significant at the 10% level. However, the variables of foreign stock investment and export competition are not significant. Therefore, in the case of China, we conclude that the variable of trade has a positive relationship with beta, but the variables of foreign stock investment and export competition have no relationship with beta.

Together with the results for the US, Japan and China, we conclude that trade linkage is the main driver of comovements in stock returns between Korea and the three major countries. We find no evidence that either financial linkage proxied by foreign stock investment or export

competition is related to comovements in stock returns between Korea and the three countries. We also admit that the proxy used for measuring bilateral financial linkage between Korea and the three countries in our paper has some limitations to explain the interconnection.

Table 5. Regression of Beta on Trade, Foreign Stock Investment and Export Competition for Korean Manufacturing Industry

[Panel A: US]

Independent Variables	Dependent Variable			
	Beta of Korean Manufacturing Industry			
	Without Control Variables		With Control Variables	
Trade	0.161** (2.11)	0.082 (1.12)	0.335** (2.44)	0.301** (2.20)
Finance	0.007 (0.09)	-0.031 (-0.45)	-0.068 (-0.63)	-0.084 (-0.78)
ExportCompetition	-0.009 (-0.34)	-0.006 (-0.24)	-0.008 (-0.18)	-0.006 (-0.15)
Crisis Dummy		-0.395*** (-7.55)		-0.169** (-2.17)
Industry Effect	Yes	Yes	Yes	Yes
N	336	336	336	336
R <sup>2</sup>	0.054	0.166	0.079	0.087

Notes: 1) Numbers in parentheses are heteroscedasticity-robust t-statistics.

2) \*\*\*, \*\*, and \* denote statistical significance at the level of 1%, 5% and 10%, respectively.

Table 5. Regression of Beta on Trade, Foreign Stock Investment and Export Competition for Korean Manufacturing Industry (cont'd)

## [Panel B: Japan]

Independent Variables	Dependent Variable			
	Beta of Korean Manufacturing Industry			
	Without Control Variables		With Control Variables	
Trade	0.225 <sup>***</sup> (3.70)	0.230 <sup>***</sup> (4.02)	0.123 <sup>**</sup> (2.10)	0.128 <sup>**</sup> (2.17)
Finance	0.057 (0.95)	0.074 (1.35)	0.022 (0.41)	0.029 (0.55)
ExportCompetition	-0.012 (-0.72)	-0.010 (-0.63)	0.005 (0.28)	0.006 (0.33)
Crisis Dummy		0.279 <sup>***</sup> (7.10)		0.105 <sup>***</sup> (2.73)
Industry Effect	Yes	Yes	Yes	Yes
N	336	336	336	336
R <sup>2</sup>	0.143	0.240	0.102	0.118

Notes: 1) Numbers in parentheses are heteroscedasticity-robust t-statistics.

2) <sup>\*\*\*</sup>, <sup>\*\*</sup>, and <sup>\*</sup> denote statistical significance at the level of 1%, 5% and 10%, respectively.

Table 5. Regression of Beta on Trade, Foreign Stock Investment and Export Competition for Korean Manufacturing Industry (cont'd)

[Panel C: China]

Independent Variables	Dependent Variable			
	Beta of Korean Manufacturing Industry			
	Without Control Variables		With Control Variables	
Trade	0.134 <sup>***</sup> (3.11)	0.132 <sup>***</sup> (2.98)	0.087 <sup>*</sup> (1.95)	0.087 <sup>*</sup> (1.96)
Finance	0.019 (0.70)	0.022 (0.83)	0.023 (0.77)	0.022 (0.75)
ExportCompetition	-0.014 (-1.06)	-0.013 (-1.03)	-0.004 (-0.32)	-0.005 (-0.33)
Crisis Dummy		0.060 (1.69)		-0.011 (-0.33)
Industry Effect	Yes	Yes	Yes	Yes
N	336	336	336	336
R <sup>2</sup>	0.239	0.248	0.212	0.212

Notes: 1) Numbers in parentheses are heteroscedasticity-robust t-statistics.

2) <sup>\*\*\*</sup>, <sup>\*\*</sup>, and <sup>\*</sup> denote statistical significance at the level of 1%, 5% and 10%, respectively.

## VI. Conclusion

This paper measures the extent of comovements in stock returns between Korea and three major countries (China, Japan and the US) using the industry-level data for Korea from 2003 to 2016, in the spirit of the ICAPM. It also examines what drives the comovements between Korea and the three countries.

From our analysis, we find that the comovements of the Korean stock market with those of the US and Japan became smaller after the global financial crisis. In contrast, the post-crisis comovement in stock returns

between Korea and China is larger than that of the pre-crisis period.

Next, we examine the drivers of comovements in stock returns between Korea and the three countries. Specifically, we use betas for 24 Korean manufacturing divisions (industries) with respect to the US, Japan and China as dependent variables, and variables on trade and foreign stock investment as independent variables, so that we can examine whether either trade or financial linkage between Korea and the three countries may explain the degrees of comovements in stock returns between Korea and the three countries. From our analysis, we find that trade linkage is the main driver of comovements in stock returns between Korea and the three countries. On the other hand, we find no evidence that financial linkage proxied by foreign stock investment is related to comovements in stock returns between Korea and the three countries.

Our finding that trade linkage with foreign countries has an effect on the domestic financial market suggests that the concentration of trade with some trading partners may become a destabilizing factor in the domestic financial market, if there is a negative shock in trade with those partners. Thus, it is important for Korea to diversify trade with foreign countries to keep its financial market more stable. In this regard, it will be also useful to further study the effects of trade diversification on the real economy and financial markets.

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<Abstract in Korean>

## 한국과 중국, 일본, 미국 간 주식시장 동조성 결정요인은 무엇인가?

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본고는 국제자본자산가격 모형(ICAPM: International Capital Asset Pricing Model)에 기반을 두고 2003-2016년 중 한국의 산업 데이터를 이용하여 한국과 중국, 일본, 미국 간 주식시장 동조성의 정도를 측정하고 이를 결정하는 주요한 요인이 무엇인지 분석하였다.

실증분석 결과, 한국-미국과 한국-일본의 경우 글로벌 금융위기 이후 주식수익률의 동조성이 작아졌으나 한국-중국은 오히려 커진 것으로 나타났다. 또한 무역연계성이 한국과 이들 3개국과의 동조성을 결정하는 주요인이었다.

이러한 결과는 일부 국가와의 무역집중은 이들 국가와의 무역에서 발생하는 부정적인 충격이 국내 금융시장의 불안정 요인으로 작용할 수 있음을 시사한다. 이러한 점에 비추어 볼 때, 우리나라의 금융시장을 안정적으로 유지하기 위해서는 외국과의 무역다변화 필요성도 제기된다.

핵심 주제어: 주식시장 동조성, 무역연계성, 금융연계성

JEL Classification: F15, F21, G15

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## BOK 경제연구 발간목록

한국은행 경제연구원에서는 Working Paper인 『BOK 경제연구』를 수시로 발간하고 있습니다. 『BOK 경제연구』는 주요 경제 현상 및 정책 효과에 대한 직관적 설명 뿐 아니라 깊이 있는 이론 또는 실증 분석을 제공함으로써 엄밀한 논증에 초점을 두는 학술논문 형태의 연구이며 한국은행 직원 및 한국은행 연구용역사업의 연구 결과물이 수록되고 있습니다. 『BOK 경제연구』는 한국은행 경제연구원 홈페이지(<http://imer.bok.or.kr>)에서 다운로드하여 보실 수 있습니다.

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3	경제충격 효과의 산업간 공행성 분석	황선웅 · 민성환 · 신동현 · 김기호
4	서비스업 발전을 통한 내외수 균형성장: 기대효과 및 리스크	김승원 · 황광명
5	Cross-country-heterogeneous and Time-varying Effects of Unconventional Monetary Policies in AEs on Portfolio Inflows to EMEs	Kyoungsoo Yoon · Christophe Hurlin
6	인터넷뱅킹, 결제성예금 및 은행 수익성과의 관계 분석	이동규 · 전봉걸
7	Dissecting Foreign Bank Lending Behavior During the 2008-2009 Crisis	Moon Jung Choi · Eva Gutierrez · Maria Soledad Martinez Peria
8	The Impact of Foreign Banks on Monetary Policy Transmission during the Global Financial Crisis of 2008-2009: Evidence from Korea	Bang Nam Jeon · Hosung Lim · Ji Wu
9	Welfare Cost of Business Cycles in Economies with Individual Consumption Risk	Martin Ellison · Thomas J. Sargent
10	Investor Trading Behavior Around the Time of Geopolitical Risk Events: Evidence from South Korea	Young Han Kim · Hosung Jung
11	Imported-Inputs Channel of Exchange Rate Pass-Through: Evidence from Korean Firm-Level Pricing Survey	Jae Bin Ahn · Chang-Gui Park

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제2015-1	글로벌 금융위기 이후 주요국 통화정책 운영체계의 변화	김병기 · 김인수
2	미국 장기시장금리 변동이 우리나라 금리기간구조에 미치는 영향 분석 및 정책적 시사점	강규호 · 오형석
3	직간접 무역연계성을 통한 해외충격의 우리나라 수출입 파급효과 분석	최문정 · 김근영
4	통화정책 효과의 지역적 차이	김기호
5	수입중간재의 비용효과를 고려한 환율변동과 수출가격 간의 관계	김경민
6	중앙은행의 정책금리 발표가 주식시장 유동성에 미치는 영향	이지은
7	은행 건전성지표의 변동요인과 거시건전성 규제의 영향	강종구
8	Price Discovery and Foreign Participation in The Republic of Korea's Government Bond Futures and Cash Markets	Jaehun Choi · Hosung Lim · Rogelio Jr. Mercado · Cyn-Young Park
9	규제가 노동생산성에 미치는 영향: 한국의 산업패널 자료를 이용한 실증분석	이동렬 · 최종일 · 이종한
10	인구 고령화와 정년연장 연구 (세대 간 중첩모형(OLG)을 이용한 정량 분석)	홍재화 · 강태수
11	예측조합 및 밀도함수에 의한 소비자물가 상승률 전망	김현학
12	인플레이션 동학과 통화정책	우준명
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14	Global Liquidity and Commodity Prices	Hyunju Kang · Bok-Keun Yu · Jongmin Yu
15	Foreign Ownership, Legal System and Stock Market Liquidity	Jieun Lee · Kee H. Chung

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제2015-16	바젤Ⅲ 은행 경기대응완충자본 규제의 기준지표에 대한 연구	서현덕 · 이정연
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18	북한 인구구조의 변화 추이와 시사점	최지영
19	Entry of Non-financial Firms and Competition in the Retail Payments Market	Jooyong Jun
20	Monetary Policy Regime Change and Regional Inflation Dynamics: Looking through the Lens of Sector-Level Data for Korea	Chi-Young Choi · Joo Yong Lee · Roisin O'Sullivan
21	Costs of Foreign Capital Flows in Emerging Market Economies: Unexpected Economic Growth and Increased Financial Market Volatility	Kyoungsoo Yoon · Jayoung Kim
22	글로벌 금리 정상화와 통화정책 과제: 2015년 한국은행 국제컨퍼런스 결과보고서	한국은행 경제연구원
23	The Effects of Global Liquidity on Global Imbalances	Marie-Louise DJIGBENOU-KRE · Hail Park
24	실물경기를 고려한 내재 유동성 측정	우준명 · 이지은
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26	Macroeconomic Shocks and Dynamics of Labor Markets in Korea	Tae Bong Kim · Hangyu Lee
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28	Energy Efficiency and Firm Growth	Bongseok Choi · Wooyoung Park · Bok-Keun Yu
29	An Analysis of Trade Patterns in East Asia and the Effects of the Real Exchange Rate Movements	Moon Jung Choi · Geun-Young Kim · Joo Yong Lee
30	Forecasting Financial Stress Indices in Korea: A Factor Model Approach	Hyeongwoo Kim · Hyun Hak Kim · Wen Shi

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제2016-1	The Spillover Effects of U.S. Monetary Policy on Emerging Market Economies: Breaks, Asymmetries and Fundamentals	Geun-Young Kim · Hail Park · Peter Tillmann
2	Pass-Through of Imported Input Prices to Domestic Producer Prices: Evidence from Sector-Level Data	JaeBin Ahn · Chang-Gui Park · Chanho Park
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4	Stock Returns and Mutual Fund Flows in the Korean Financial Market: A System Approach	Jaebeom Kim · Jung-Min Kim
5	정책금리 변동이 성별·세대별 고용률에 미치는 영향	정성엽
6	From Firm-level Imports to Aggregate Productivity: Evidence from Korean Manufacturing Firms Data	JaeBin Ahn · Moon Jung Choi
7	자유무역협정(FTA)이 한국 기업의 기업내 무역에 미친 효과	전봉걸 · 김은숙 · 이주용
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9	조세피난처 투자자가 투자 기업 및 주식 시장에 미치는 영향	정호성 · 김순호
10	주택실거래 자료를 이용한 주택부문 거시 건전성 정책 효과 분석	정호성 · 이지은
11	Does Intra-Regional Trade Matter in Regional Stock Markets?: New Evidence from Asia-Pacific Region	Sei-Wan Kim · Moon Jung Choi
12	Liability, Information, and Anti-fraud Investment in a Layered Retail Payment Structure	Kyoung-Soo Yoon · Jooyong Jun
13	Testing the Labor Market Dualism in Korea	Sungyup Chung · Sunyoung Jung
14	북한 이중경제 사회계정행렬 추정을 통한 비공식부문 분석	최지영

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제2016 –15	Divergent EME Responses to Global and Domestic Monetary Policy Shocks	Woon Gyu Choi · Byongju Lee · Taesu Kang · Geun-Young Kim
16	Loan Rate Differences across Financial Sectors: A Mechanism Design Approach	Byoung-Ki Kim · Jun Gyu Min
17	근로자의 고용형태가 임금 및 소득 분포에 미치는 영향	최충 · 정성엽
18	Endogeneity of Inflation Target	Soyoung Kim · Geunhyung Yim
19	Who Are the First Users of a Newly-Emerging International Currency? A Demand-Side Study of Chinese Renminbi Internationalization	Hyoung-kyu Chey · Geun-Young Kim · Dong Hyun Lee
20	기업 취약성 지수 개발 및 기업 부실화에 대한 영향 분석	최영준
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제2017 –1	가계부채가 소비와 경제성장에 미치는 영향 – 유량효과와 저장효과 분석 –	강종구
2	Which Monetary Shocks Matter in Small Open Economies? Evidence from SVARs	Jongrim Ha · Inhwan So
3	FTA의 물가 안정화 효과 분석	곽노선 · 임호성
4	The Effect of Labor Market Polarization on the College Students' Employment	Sungyup Chung
5	국내 자영업의 폐업률 결정요인 분석	남윤미
6	차주별 패널자료를 이용한 주택담보대출의 연체요인에 대한 연구	정호성
7	국면전환 확산과정모형을 이용한 콜금리 행태 분석	최승문 · 김병국

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제2017-8	Behavioral Aspects of Household Portfolio Choice: Effects of Loss Aversion on Life Insurance Uptake and Savings	In Do Hwang
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10	유가가 손익분기인플레이션에 미치는 영향	김진용 · 김준철 · 임형준
11	인구구조변화가 인플레이션의 장기 추세에 미치는 영향	강환구
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13	Crowding out in a Dual Currency Regime? Digital versus Fiat Currency	KiHoon Hong · Kyoungsoon Park · Jongmin Yu
14	Improving Forecast Accuracy of Financial Vulnerability: Partial Least Squares Factor Model Approach	Hyeongwoo Kim · Kyunghwan Ko
15	Which Type of Trust Matters?: Interpersonal vs. Institutional vs. Political Trust	In Do Hwang
16	기업특성에 따른 연령별 고용행태 분석	이상욱 · 권철우 · 남윤미
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18	The Effect of Market Volatility on Liquidity and Stock Returns in the Korean Stock Market	Jieun Lee · KeeH.Chung
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20	패스트트랙 기업회생절차가 법정관리 기업의 이자보상비율에 미친 영향	최영준
21	인구고령화가 경제성장에 미치는 영향	안병권 · 김기호 · 육승환
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제2017 -23	인구구조변화와 경상수지	김경근 · 김소영
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25	인구고령화가 주택시장에 미치는 영향	오강현 · 김솔 · 윤재준 · 안상기 · 권동휘
26	고령화가 대외투자에 미치는 영향	임진수 · 김영래
27	인구고령화가 가계의 자산 및 부채에 미치는 영향	조세형 · 이용민 · 김정훈
28	인구고령화에 따른 우리나라 산업구조 변화	강종구
29	인구구조 변화와 재정	송호신 · 허준영
30	인구고령화가 노동수급에 미치는 영향	이철희 · 이지은
31	인구 고령화가 금융산업에 미치는 영향	윤경수 · 차재훈 · 박소희 · 강선영
32	금리와 은행 수익성 간의 관계 분석	한재준 · 소인환
33	Bank Globalization and Monetary Policy Transmission in Small Open Economies	Inhwan So
34	기존 경영자 관리인(DIP) 제도의 회생기업 경영성과에 대한 영향	최영준
35	Transmission of Monetary Policy in Times of High Household Debt	Youngju Kim · Hyunjoon Lim
제2018 -1	4차 산업혁명과 한국의 혁신역량: 특허자료를 이용한 국가·기술별 비교 분석, 1976-2015	이지홍 · 임현경 · 정대영
2	What Drives the Stock Market Comovements between Korea and China, Japan and the US?	Jinsoo Lee · Bok-Keun Yu

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