I estimate the impact of China’s GDP on Korean exports to the world and Korean exports to China based on the VAR model. It is found that the responses of Korean exports to shocks in China’s GDP are very different by export type (exports of raw materials, capital goods, and consumption goods). Reflecting the trend that the proportion of capital goods in Korean exports is increasing, Korean exports of capital goods respond most sensitively to these shocks among the three export types. Another finding is that Korean exports of raw materials do not respond very sensitively relative to the other export types. These findings are almost same as those for Korean exports to China in terms of response to GDP shocks. In addition, Korean exports to the world and Korean exports to China are more responsive to China’s GDP growth shocks over time.

Keywords: Korea, China, Exports, Raw Materials, Capital Goods, Consumption Goods
JEL Classification: F10, F14, F41, F51

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본 연구는 중국의 GDP 변화가 한국의 세계에 대한 수출 및 한국의 대중국 수출에 미치는 효과를 VAR 모형을 통해서 분석한다. 분석결과에 따르면, 중국의 GDP 충격에 대한 한국의 대세계 수출 반응은 수출품 유형(원자재, 자본재, 소비재)에 따라 다르게 나타났다. 한국의 수출에서 자본재 비중이 확대되는 것을 반영하듯, 중국의 GDP 충격에 대해 세 가지 수출 유형 중 자본재가 가장 큰 반응을 나타냈다. 반면 같은 충격에 대해 원자재는 다른 유형의 수출에 비해 상대적으로 반응이 미약하지 않은 것으로 나타났다. 이러한 분석결과는 중국의 GDP 충격에 대한 한국의 대중국 수출에서도 마찬가지이다. 한편 중국의 GDP 충격에 대한 한국의 대세계 및 대중국 수출은 시간이 경과함에 따라 더욱 확대되고 있는 것으로 분석되었다.

핵심용어: 한국, 중국, 수출, 원자재, 자본재, 소비재
JEL 분류: F10, F14, F41, F51
I. Introduction

China’s economy has been growing rapidly at an annual average growth rate of over 8% for the last 20 years. As a result, China’s economic changes are affecting other economies, especially other Asian economies such as those of Korea and Southeast Asia, which are closely linked with China through trade. Currently, changes in China’s macroeconomic variables, such as economic growth rate, exchange rates, and prices, are very important factors for these economies to monitor and respond to accordingly.

Economists and economic agents such as firms and governments have great interest in the effect of China’s economy on their economies. Many economists have studied the effect of the Chinese economy on other countries’ exports or economic growth rates. Abeysinghe and Forbes (2001), Abeysinghe and Lu (2003), and Girardin (2005) show how China’s economic growth has affected other economies’ growth. According to Abeysinghe and Forbes (2001), one unit of positive shock in China made cumulative (through the fourth quarter) impacts of 0.09, 0.52, 0.38, and 1.08 percentage points for the Japanese, Malaysian, Thai, and Korean growth rates, respectively. Yang and Vines (2000), Eichengreen et al. (2004), and Greenaway et al. (2008) investigated the impact of Chinese exports on other economies’ exports. Eichengreen et al. (2004)’s analysis showed that in third-market countries, such as the United States and Japan, China’s exports crowded out other Asian countries’ exports. On the other hand, for several Asian countries, such as Korea, Japan, and Singapore, which export capital and intermediate goods to China, exports to China offset their losses in the third markets. However, Greenaway et al. (2008) argue that although the increase in China’s imports from Asian countries partly offsets their losses in the third markets, the loss is larger than the offsetting gain. In conclusion, China’s exports negatively affect other Asian countries’ exports. However, previous studies did not give much attention to the relationship between China’s economic growth and other countries’ exports growth. The relationship matters in that changes in China’s economic growth can be
transmitted to other economies through their trade with China.

I consider two channels through which China’s economic growth can affect other countries’ trade, for example, Korean trade. First, China’s economic growth directly increases its imports from other countries. This means, for example, that Korea’s exports to China increase in response to China’s economic growth. Second, China’s economic growth increases other countries’ exports to China (for example, Southeast Asian countries’ exports to China), which increases their growth rates. Therefore, Korean exports increase to other countries (for example, Southeast Asian countries) as well as to China.

In this paper, I estimate the effect of China’s growth on Korean exports to the world and Korean exports to China while considering the above two channels. The impact depends on China’s weight in the world economy and Korean exports. In the analysis, I also check whether the impact might be sensitive to the production phase (raw materials, capital goods, and consumption goods) over time. This is because Korea and China have a close relationship in production fragmentation, and the relationship has changed over time. In effect, the impacts of China’s economic growth on Korean exports may vary by production phase and over time.

This paper consists of four sections. In the second section, the position of China in the Korean economy, the structural changes in Korean exports, and Korean export dependence on China are investigated. In the third section, models for empirical analysis are shown and analysis results are presented. In the final section, a summary and conclusion are provided.

II. Economic Relations between Korea and China

1. Importance of China in the Korean Economy

The influence of China on the Korean economy has grown over the last 20
years. The portion of Korean exports going to China increased from 6.0% in 1993 to 21.4% in 2008. The portion of Korean imports from China also dramatically increased from 4.5% to 17.7% during the same period. China became Korea’s largest trading partner in 2004. Further, China is the largest host country for Korean foreign direct investment. As Korea and China edge closer together economically, changes in the Chinese economy have more influence on the Korean economy than before. According to Abeysinghe et al. (2003), a one-percentage-point increase in the Chinese economy gives rise to a 0.82-percentage-point growth in the Korean economy over five years.

Changes in Chinese economic growth affect the Korean economy through many paths, such as trade, prices, and exchange rates. Trade is one of the major paths. As mentioned in the introduction, there are two channels through which China’s growth affects Korea’s exports. Figure 1 shows the trend in the growth rate of Chinese real GDP and Korea’s exports to China. In general, it looks like a stable relationship exists between the two variables in the long run. Figure 2 also shows a similar relationship between growth rate of Chinese real GDP and Korea’s total exports. However, since 2005, the stable relationship

Figure 1. Growth rate of Chinese real GDP and Korean exports to China

Note: CH_GDP and KR_CH_X represent the growth rates of Chinese real GDP and Korean exports to China, respectively.
Source: IMF, International Financial Statistics database.
between Chinese GDP and Korean exports seems to have disappeared. The gradual appreciation of the Chinese yuan seems to be related to the deviation of Korean exports from the trend of Chinese GDP. This is because the Chinese government changed the exchange rate regime from a pegged system to a managed floating system in July 2005. From 2005 to 2008, the exchange rate of the yuan to the U.S. dollar fell by about 16%. Closer examination of the relationship between the two variables is made based on econometrical tools in section 3.

Figure 2. Growth rate of Chinese real GDP and Korean total exports

Note: CH_GDP and KR_X represent the growth rates of Chinese real GDP and Korean total exports, respectively.
Source: IMF, International Financial Statistics database.

2. Structural Changes in Korean Exports and China’s Role

There were major changes in the structure of Korean exports over the last 20 years. Until the early 1990s, Korea’s major trading partners were the developed countries, such as the United States, the European Union, and Japan. As a result, Korea’s major exporting goods were consumption goods (see Figure 3). Since 1992, when formal diplomatic relations between Korea and China were established, Korean exports to China have increased dramatically. China became the largest export partner of Korea in 2004. Raw materials and capital goods
exports to China, Korea’s main exports to China, increased at a very high rate. This is because many Korean firms gained entry into China, and these export-oriented firms imported these goods from their home country; Chinese local firms’ demand for these goods from Korea also rapidly increased. As a result, after the mid-1990s, raw materials and capital goods made up more of Korea’s total exports than consumption goods. This change in Korea’s trade structure by production phase is closely related to the rise of China. Korea’s trade is very dependent on the Chinese economy regardless of the type of traded goods (see Figures 4 through 6).1) Even for consumption goods, China has been Korea’s largest export partner since the late 2000s.

Figure 3. Weights of raw materials, capital goods, and consumption goods among Korean exports

Note: RM, KG, and FG indicate raw materials, capital goods, and consumption goods, respectively.
Source: Korean International Trade Association, Trade Statistics database.

1) The trade classification used in this study follows the MTI classification (Korean trade classification). It is slightly different from the UN BEC classification. Raw materials in the MTI classification include raw materials and semi-finished goods in the UN BEC classification. Capital goods in the MTI classification include capital goods and parts and portions in the UN BEC classification.
Figure 4. Weights of main export partners for Korean exports: raw materials

Note: RM_CH, RM_US, RM_JP, RM_EU8, and RM_ASEAN indicate the weights of China, the United States, Japan, the EU8, and ASEAN6 in Korean total exports of raw materials, respectively.

Source: The Korean International Trade Association, Trade Statistics database.

Figure 5. Weights of main exporting partners for Korean exports: capital goods

Note: KG_CH, KG_US, KG_JP, KG_EU8, and KG_ASEAN indicate the weights of China, the United States, Japan, the EU8, and ASEAN6 in Korean total exports for capital goods, respectively.

Source: Korean International Trade Association, Trade Statistics database.
3. Changes in Korea’s Dependence on China for Exports

China’s weight in Korean exports of raw materials, capital goods, and consumption goods increased from 8.1%, 4.0%, and 3.2%, respectively, in the fourth quarter of 1994 to 27.6%, 20.2%, and 16.4%, respectively, in the first quarter of 2009 (see Figure 7). It is also found that the weight of capital and consumption goods is increasing while the weight of raw materials is decreasing in terms of Korea’s exports to China. It is noted that capital goods have been exported more than raw materials since 2003 (see Figure 8).

Korea’s dependence on China for exports indicates that Korea’s exports are very sensitive to changes in China’s macroeconomic variables, such as economic growth and exchange rates. Considering the changes in export dependence on China, the impact of China’s economic growth on Korean exports is also greater than in previous years. In this paper, taking into account
the change in the dependence on China, I estimate the impact of China’s GDP on Korean exports.

**Figure 7. China’s share of Korean exports by production phase**

![Graph showing China’s share of Korean exports by production phase](image)

Note: RM, KG, FG, and TEX indicate raw materials, capital goods, consumption goods, and total exports, respectively.
Source: Korean International Trade Association, Trade Statistics database.

**Figure 8. Weights of raw materials, capital goods, and consumption goods among Korean exports to China**

![Graph showing weights of raw materials, capital goods, and consumption goods among Korean exports to China](image)

Note: RM_KC, KG_KC, and FG_KC indicate weights of raw materials, capital, and consumption goods among Korean exports to China, respectively.
Source: Korean International Trade Association, Trade Statistics database.
III. Empirical Analysis

1. Model Specification and Data

Equation (1) represents a country’s export function as derived by O’Neill and Ross (1991) and Sato (1967). It consists of world income ($WGDP$), export country’s relative prices to other countries’ prices ($P^D/P^O$; $P^D$ indicates domestic price and $P^O$ indicates other countries’ prices), and production capacity ($PRD$). Relative prices can be interpreted as exchange rates. In this empirical study, I replace the relative prices with real effective exchange rates ($REEX$). Equation (2) is the first difference of equation (1). Equation (2) shows that a country’s export growth depends on the changes in exchange rates, world GDP, and production capacity (production index is used as a proxy of production capacity in this study).

\[
\ln(EX_t) = c_0 + c_1 \ln(P^D_t / P^O_t) + c_2 \ln(WGDP_t) + c_3 \ln(PRD_t) + \varepsilon_t, \tag{1}
\]

\[
d \ln(EX_t) = c_1 d \ln(P^D_t / P^O_t) + c_2 d \ln(WGDP_t) + c_3 d \ln(PRD_t) + d\varepsilon_t. \tag{2}
\]

Equation (2) can be re-written as equations (3) and (4) (Kim 2009) by decomposing world economic growth rate into each country’s economic growth rate with its weight in the world GDP.

\[
d \ln(EX_t) = c_1 d \ln(P^D_t / P^O_t) + c_2 \sum_{j=1}^{N} s^j_t \left[ d \ln(GDP^j_t) \right] + c_3 d \ln(PRD_t) + d\varepsilon_t, \tag{3}
\]

\[
d \ln(EX_t) = c_1 d \ln(P^D_t / P^O_t) + c_2 \cdot s^j_t \cdot d \ln(GDP^j_t) + c_2 \cdot s^O_t d \ln(WGDP^O_t)
+ c_3 d \ln(PRD_t) + d\varepsilon_t, \tag{4}
\]
where $s_j^t$ indicates the weight of country $j$ (for example, China in this study) in the world GDP. According to equation (3), the export elasticity of a country (for example, Korea) based on another country’s GDP growth (for example, China) is $c_2 s_j^t$ in time $t$. For the purpose of this study, world economic growth rate is separated into the growth rate of a country (China) and the rest of the world without China. In equation (4), $WGDP_t^o$ and $s_t^o$ refer to the GDP of the world except for country $j$ and its weight of world GDP, respectively.

Based on equation (4), I set up the VAR model to reflect the endogeneity problem of relative prices and the GDP term in the equation [see equation (5)]. The endogeneity of the GDP term should be considered because in this study, Korean exports and China’s growth rate can be affected by common factors such as world GDP, as in Eichengreen (2004). Unlike the general VAR model, two exogenous variables, $PRD$ and $DM$ consisting of vector $X$, are included in the model. The reason why $PRD$ is included in the VAR model is to reflect the supply side of exports, based on the export equation [equation (3)]. A dummy variable ($DM$) is included to reflect the structural change in the export and exchange rate equations during the Asian financial crisis. Further, a constant term for each equation is included in the model. It is represented as vector $K$ in equation (5).

$$B_p Y_t = K + B_1 Y_{t-1} + B_2 Y_{t-2} + \cdots + B_p Y_{t-p} + C_1 X_{t-1} + \cdots + C_p X_{t-p}, \quad (5)$$

$$K = (K_1, K_2, K_3, K_4)',$$

$$Y_t = (WGDP_t^o, CHGD_t, REEX_t, EX_t)',$$

$$X_t = (PRD, DM)',$$

$$B_p = \begin{bmatrix} b_{p1} & b_{p2} & b_{p3} & b_{p4} \\ b_{p5} & b_{p6} & b_{p7} & b_{p8} \\ b_{p9} & b_{p10} & b_{p11} & b_{p12} \\ b_{p13} & b_{p14} & b_{p15} & b_{p16} \end{bmatrix}, \quad C_p = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & c_{p1} \\ 0 & c_{p2} & c_{p3} \end{bmatrix}.$$
However, as shown in equation (3), the coefficients of the fourth equation (Korean export equation: $EX_t$) are time-varying. This means that the coefficients of $WGDP_t$ (GDP of the world except for China) and $CHGDP_t$ (GDP of China) are dependent on the ratios of GDP of the world except for China and GDP of China in the world GDP. Further, there are other time-varying coefficients in the VAR model as follows. In the first equation ($WGDP_t$: world GDP), the coefficient of China’s GDP depends on the ratio of China’s GDP to the world GDP. In the second equation ($CHGDP_t$: Chinese GDP), the coefficient of world GDP is dependent on the ratio of world GDP (excluding China’s GDP) to world GDP. As in Abeysinghe et al. (2003), taking time-dependent coefficients into account, the VAR model should be changed as in equation (6), where the matrix $W$ represents the ratios mentioned above. Matrix $B$ can be estimated as follows. After estimating matrix $A$ based on $Y^*$ [see equation (7)], the parameter matrix $B_p (=A_pW_p)$ is obtained because the ratio $W_p$ is known. Obtaining the estimated matrix $B$, I can now calculate the impulse response function following the usual processes.

$$A_0W_0Y_t = K + A_1W_1Y_{t-1} + A_2W_2Y_{t-2} + \cdots + A_pW_pY_{t-p} + C_1X_{t-1} + \cdots + C_pX_{t-p},$$  \hspace{1cm} (6)

$$A_0Y^*_t = K + A_1Y^*_{t-1} + A_2Y^*_{t-2} + \cdots + A_pY^*_{t-p} + C_1X_{t-1} + \cdots + C_pX_{t-p},$$  \hspace{1cm} (7)

where $A_0 = \begin{pmatrix} 1 & 0 & 0 & 0 \\ a_1 & 1 & 0 & 0 \\ a_2 & a_3 & 1 & 0 \\ a_4 & a_5 & a_6 & 1 \end{pmatrix}$ and $Y^*_p = WP_{t-p}$, where

$$Y^* = \begin{pmatrix} 1 \\ w_{2p} \\ 1 \\ w_{3p} \\ 1 \\ w_{4p} \\ 1 \\ w_{5p} \end{pmatrix}$$

To estimate the unique impulse response function (IRF), restrictions on the contemporaneous matrix ($B_0$) are needed. While all variables are allowed to affect each other, in the contemporaneous period, world GDP is not affected by
China’s GDP, Korea’s real effective exchange rates, and Korean exports. Second, during this period, China’s GDP is not affected by Korea’s real effective exchange rates and Korean exports. The first and second assumptions are not so restrictive because Korea has a relatively small economy compared to China. Third, in the contemporaneous period, Korea’s real exchange rates are not affected by Korean exports. As is well known, while the trend of exchange rates is definitely affected by the changes in the current account in the long run, it is not so sensitive to the current account in the short run. This is because exchange rates in the short run fluctuate mainly as a result of financial factors such as interest rates and stock prices rather than the real factor current account.

Further, the payment for exports is not made at the time of purchase. Consider that the data used in this paper are quarterly data. Taking these factors into account, this assumption is not so restrictive. Based on the LR and Schwartz Criterion, one lag [VAR(1)] and four lags [VAR(4)] are chosen for the VAR model, respectively. Considering that the data used in the study are quarterly, I used four lags in the estimation. In the case of real effective exchange rates, a possibility of unit root exists in the level value. However, in this study, in order to estimate how the Chinese GDP growth rate affects the Korean export growth rate, the first differenced data are used. Therefore, all variables used in the model are probably stable. In the unit root test for the first differenced data, the null hypothesis of unit root is rejected (see Table 1).

The data for Korean exports are extracted from the Trade Statistics database of the Korean International Trade Association (KITA). This database provides trade data by production process: raw materials, capital goods, and consumption goods. The data for GDP growth rate and industrial production index are extracted from the Global Insight database (historical data). The real effective exchange rates are obtained from the Bank of Settlement homepage. The data

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2) Korea’s share of Chinese exports is 4-5% over the period considered.
3) In the Korean exchange market, which dealers control, it is known that dealers do not consider macro variables in the short run forecasting of exchange rates.
coverage in the analysis is from 1995.Q1 to 2008.Q2.

Table 1. Result of unit root test

| WGD | CHGDP | KR_PI | REEX | EX_RM | EX_KG | EX_CG |
|-----|-------|-------|------|-------|-------|-------|
| constant, linear trend | constant | constant | constant | constant | constant | constant |
| -4.48*** | -3.21* | -4.39*** | -2.74* | -2.87* | -3.38** | -3.08** |

Note: 1) The figures are Augmented Dickey-Fuller (ADF) statistics. The second rows represent the exogenous variables included in the models. KR.PI, EX.RM, EX.KG, and EX.CG represent Korea’s production index, the exports of raw material, capital goods, and consumption goods, respectively.

2) *p<0.10, **p<0.05, ***p<0.01.

2. Estimation Results

(1) Impact of Chinese GDP growth on Korean exports to the world

Table 2 shows the impulse response functions of Korean exports to shocks to China’s GDP growth for total exports, raw materials, capital goods, and consumption goods exports, respectively. As shown in Table 2, capital goods exports are the most sensitive to China’s GDP growth in the first period after a shock. Korean capital exports increase by around three percentage points in the first period after one standard deviation shock to China’s GDP growth. The export responses for raw materials are smaller than for capital goods and consumption goods. Korean raw materials exports increase by around one percentage point in the first period after the same shock. For Korean total exports to the world, the response in the first period after the same shock is around 2.5 percentage points. The paths of response of Korean exports to a shock to China’s GDP growth are as follows: (1) China’s GDP growth directly increases Korean exports to China and (2) China’s GDP growth affects other countries’ exports to China, their GDP growth, and as a result, Korea’s exports to these countries. The paths are incorporated in the VAR model specification because as endogenous variables, world GDP (except China) and Chinese GDP
are included in the model. The second path is understood by considering the fact that China’s growth increases other countries’ growth in the first equation of the VAR model, and in turn, other countries’ growth increases Korean exports to them in the fourth equation. This is one of the reasons why the second-period response of exports to a Chinese growth shock can be larger than

Table 2. Impulse response functions of Korea’s exports to the world to the shock of China’s GDP growth

|       | Total95 |        | Total08 |        | Raw95 |        | Raw08 |        |
|-------|---------|--------|---------|--------|-------|--------|-------|--------|
|       | IRF     | 2*S.D. | IRF     | 2*S.D. | IRF   | 2*S.D. | IRF   | 2*S.D. |
| 1     | 2.460   | 0.006  | 2.460   | 0.007  | 1.220 | 0.004  | 1.230 | 0.005  |
| 2     | 2.000   | 0.010  | 2.830   | 0.012  | 1.600 | 0.008  | 1.970 | 0.010  |
| 3     | 2.030   | 0.090  | 3.400   | 0.212  | 1.800 | 0.075  | 2.460 | 0.124  |
| 4     | -0.609  | 0.208  | -0.499  | 0.514  | -1.050| 0.178  | -0.801| 0.308  |
| 5     | -1.580  | 0.193  | -0.529  | 0.482  | -1.070| 0.177  | -0.585| 0.312  |
| 6     | -0.490  | 0.266  | 0.604   | 0.452  | 0.006 | 0.202  | 0.305 | 0.304  |
| 7     | -0.276  | 0.274  | 0.246   | 0.436  | 0.234 | 0.208  | 0.333 | 0.306  |
| 8     | -1.110  | 0.270  | -0.802  | 0.434  | -0.308| 0.218  | -0.253| 0.272  |
| 9     | -1.400  | 0.264  | -0.337  | 0.380  | -0.512| 0.194  | 0.088 | 0.189  |
| 10    | -1.320  | 0.246  | -0.449  | 0.350  | -0.425| 0.186  | 0.019 | 0.170  |

|       | Capital95 |        | Capital08 |        | Cons95 |        | Cons08 |        |
|-------|-----------|--------|-----------|--------|--------|--------|--------|--------|
|       | IRF       | 2*S.D. | IRF       | 2*S.D. | IRF    | 2*S.D. | IRF    | 2*S.D. |
| 1     | 3.210     | 0.004  | 3.210     | 0.005  | 2.080  | 0.007  | 2.080  | 0.007  |
| 2     | 2.530     | 0.007  | 4.030     | 0.009  | 1.700  | 0.013  | 2.620  | 0.013  |
| 3     | 2.630     | 0.078  | 5.100     | 0.284  | 2.150  | 0.102  | 3.390  | 0.208  |
| 4     | -0.266    | 0.180  | -0.120    | 0.644  | -0.143 | 0.216  | -0.715 | 0.440  |
| 5     | -2.570    | 0.171  | -0.762    | 0.588  | -1.280 | 0.212  | -0.793 | 0.432  |
| 6     | -1.690    | 0.228  | 1.400     | 0.538  | -0.548 | 0.294  | 0.160  | 0.430  |
| 7     | -1.050    | 0.310  | 1.190     | 0.552  | -0.070 | 0.334  | -0.355 | 0.428  |
| 8     | -1.830    | 0.290  | -0.358    | 0.674  | -0.810 | 0.294  | -2.010 | 0.324  |
| 9     | -3.070    | 0.254  | -0.356    | 0.606  | -2.090 | 0.238  | -3.100 | 0.282  |
| 10    | -4.160    | 0.288  | -0.873    | 0.628  | -3.340 | 0.336  | -4.740 | 0.264  |

Note: 1) Raw95 (Raw08) represents the responses of Korean exports to China’s GDP growth shock when the weight of raw materials out of Korean trade is the same as in 1995 (2008).

2) Total08, Raw08, Capital08, and Cons08 represent total exports, exports of raw materials, capital goods, consumption goods in 2008, respectively.
the first-period response.

On the other hand, it can be found from the results that regardless of the type of export, China’s impact on Korean exports is increasing over time, reflecting the change in China’s economic share in the world (see Table 2). In particular, for exports of capital goods, the impact of China’s GDP growth on Korean exports is increasing rapidly over time (see Capital95 and Capital08 in Table 2). This reflects the fact that the proportion of capital goods in Korea’s exports to the world is increasing over time. In this paper, I compare the size of the impact based on the trade weights of 1995 and 2008.

(2) Impact of China’s GDP growth on Korea’s exports to China

The responses of Korea’s exports to China to shocks to China’s GDP growth are shown in the Table 3. The results tell us that the impacts of China’s GDP growth on Korea’s exports to China are very different depending on the type of exported goods. When I take into account the trade weight of 2008, export responses for raw materials are 0.1 and 2.9 percentage points in the first and second periods, respectively, after one standard deviation shock to China’s GDP growth. The responses are not so great relative to capital and consumption goods. Further, as shown in Table 3, the differences in responses between 1995 and 2008 are not so great for raw materials.

On the other hand, the export response for capital goods to the same shock is more sensitive than for raw materials and consumption goods, where the responses in the first and second periods are 5.0 and 3.3 percentage points, respectively. Further, the responses in 2008 were larger than in 1995. This means that the impact of China’s GDP growth on Korea’s exports to China is increasing over time, especially for capital goods. As shown above, the case is the same for the impact of China’s GDP growth on Korea’s exports to the world. For consumption goods, the export responses in 2008 were 2.98 and 2.53 percentage points in the first and second periods after the shock,

4) Another reason why the second- or third-period response can be larger than the first-period response is that time lags exist in the interaction among endogenous variables.
Table 3. Impulse response functions of Korea’s exports to China to the shock of China’s GDP growth respectively.

Total exports to China increase by 1.66 and 3.43 percentage points in the first and second periods after the shock when the trade weight of 2008 is applied in the estimation. When comparing the responses in 1995 and 2008, it can be said that the response size is getting larger. That is, Korea’s exports to China are becoming more responsive to China’s GDP growth over time.

An interesting result found in the analysis is that out of the three types of export goods, the export response to a shock to China’s GDP growth for raw
materials is the smallest in the first period after the shock. This difference from final goods, such as capital and consumption goods, can be understood in that the demand for raw materials depends on the demand for final goods.

I compare the relative importance of explanatory variables in explaining the changes in Korea’s exports to China based on variance decomposition of its forecasting error (see Table 4). According to the variance decomposition analysis, for Korean exports of capital and consumption goods, out of the four explanatory variables, China’s GDP growth rate provides a better explanation for the variance in the forecasts for Korea’s exports to China. In contrast to the capital and consumption goods, for Korea’s exports of raw materials to China, the exchange rate variable is more important in the explanation of the variance in the forecasts. It is also found that regardless of the type of export goods, China’s GDP growth provides a more important explanation for the variance of Korean exports to China over time (see TEX95 and TEX08 in Table 4).

Table 4. Variance decomposition of Korea’s exports to China

|        | 1-period-ahead | 4-periods-ahead |
|--------|---------------|-----------------|
|        | WGD | CHGD | REEX | EX  | WGD | CHGD | REEX | EX  |
| TEX95  | 2.30 | 4.28 | 23.0  | 70.4 | 13.9 | 9.3  | 27.9  | 48.9 |
| TEX08  | 1.50 | 5.33 | 29.3  | 63.9 | 11.9 | 15.0 | 32.4  | 40.8 |
| RM95   | 0.33 | 0.04 | 37.9  | 61.7 | 35.2 | 7.79 | 29.6  | 27.4 |
| RM08   | 0.15 | 0.04 | 40.7  | 59.1 | 29.4 | 11.2 | 32.7  | 26.7 |
| KG95   | 6.41 | 11.4 | 10.4  | 71.8 | 8.47 | 12.1 | 14.3  | 65.1 |
| KG08   | 5.79 | 14.1 | 13.5  | 66.6 | 6.89 | 17.6 | 17.2  | 58.3 |
| FG95   | 2.54 | 20.2 | 19.7  | 57.6 | 5.41 | 21.0 | 24.8  | 48.8 |
| FG08   | 2.58 | 21.6 | 21.1  | 54.7 | 5.08 | 24.6 | 25.6  | 44.7 |

Note: For example, in the case of TEX95 (based on the trade weigh of 1995), WGD, CHGD, REEX, and EX represent the variances of 1-period-ahead Korean exports to China forecasts by 2.3%, 4.28%, 23.0%, and 70.4%, respectively.
IV. Summary and Conclusion

In this paper, I estimate the impacts of China’s GDP on Korean exports to the world and Korea’s exports to China based on the VAR model. Taking a different approach from previous studies, based on trade weights, I incorporate two channels through which China’s GDP growth affects Korean exports by including China’s GDP and world GDP (excluding China) in the VAR model. Analyzing the impacts based on the VAR model, I allow the possibility of endogeneity of GDP and exchange rates. Further, I check heterogeneity of export responses to shocks to China’s GDP by type of exports. In addition, changes in the responses to the same shocks are analyzed over time.

According to the analysis, Korean exports are more responsive to shocks to China’s GDP growth over time. Further, it is found that the responses vary greatly by the type of export. Reflecting the trend that the proportion of capital goods in Korean exports is increasing, Korean exports of capital goods respond the most to shocks among the three export types. Another finding is that Korean raw materials exports do not respond sensitively relative to the other export types. This can be understood by considering the fact that the demand for raw materials depends on the demand for final goods, such as capital and consumption goods. These findings are almost the same as those for Korea’s exports to China.

To see the relative importance of explanatory variables in explaining the change in Korean exports, a variance decomposition of Korea’s exports to China was performed. According to the analysis, compared to other variables, China’s GDP provides a better explanation for the variance of forecasts for Korean exports to China for capital and consumption goods. However, for raw materials exports, the exchange rates give a better explanation for the variance than China’s GDP.
References

Abeysinghe, Tilak, and Ding Lu. 2003. “China as an economic powerhouse: Implications on its neighbors.” *China Economic Review*, 14, pp. 164-185.

Abeysinghe, Tilak, and Kristin J. Forbes. 2001. “Trade Linkages and Output-Multiplier Effects: A Structural VAR Approach with a Focus on Asia.” MIT Sloan School of Management, Working Paper 4242-01.

Eichengreen, Barry, Yeongseop Rhee, and Hui Tong. 2004. “The Impact of China on the Exports of Other Asian Countries.” NBER Working Paper 10768.

Girardin, Eric. 2005. “The transition of Chinese growth to East Asia.” paper presented at the KIEP-Seoul conference on Rising China.

Greenaway, David, Aruneema Mahabir and Chris Milner. 2008. “Has China displaced other Asian countries’ exports?” *China Economic Review*, 19, pp. 152-169.

Kim, W. 2009. “Comparative Analysis of United States’ and China’s Influence on East Asian Countries’ Exports.” *The Journal of Northeast Asian Economic Studies*, 21(2), pp. 33-62. (Korean)

Korean International Trade Association(KITA). Trade Statistics DB(www.kita.net).

O’neil, H.M, and W. Ross. 1991. “Exchange rates and South Korean exports to OECD countries.” *Applied Economics*, 23, pp. 1227-1236.

Sato, Kazuo. 1967. “The Demand Function for Industrial Exports: A Cross-Country Analysis.” *The Review of Economics and Statistics*, 60, pp. 456-464.

Yang, T. & Vines, D. 2000. “The Fallacy of Composition and Terms of Trade of Newly Industrializing Economies.” Mimeo. Australian National University. (November)
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김완중(金完仲)

현재 동아대학교 국제무역학과 조교수로 재직 중이다. 미국 뉴욕주립대학교(State University of New York at Albany)에서 경제학 박사학위를 취득하고, 2004년부터 2009년까지 SK경영경제연구소에서 경제연구실 팀장을 역임하였다. 주요 연구분야는 동아시아 지역연구와 국제경제 등이다. 주요 논문으로 「중국수출의 한국과 일본수출에 대한 파급효과」("한중사회과학연구", 2009), 「중국 위안화 환율 변화가 한국의 대중 수출에서 미치는 효과 분석」("중국학연구", 2010), 「동북아와 동남아의 경제적 상호연계 분석: 지역간무역을 중심으로」("동북아경제연구", 2010), 「동아시아 국가의 역내 수출구조와 경쟁력 변화 분석-한중일 수입시장을 중심으로-」("동북아경제연구", 2011) 등 다수가 있다.