

Does Export-led Growth Still Work for the South Korean Economy? Before and After the 1997/98 Asian Crisis

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Abstract The export-led growth hypothesis has been examined for South Korea, which has long been regarded as a typical export-oriented economy. In particular, the expansion of exports in South Korea is reinforced by the imports of raw materials and intermediate goods from overseas, and the exports of manufactured final goods increase at a greater rate than the import growth. In this case, net exports rise. One striking result we have found is that for the earlier sample period of 1972-1996 prior to the 1997/98 Asian crisis, changes in net exports had a significant impact on economic growth; but the growth effect of net exports has been mitigated and insignificant for the recent years of 1999-2017. The two contrasting results we have found reflect the structural changes experienced by the South Korean economy after the 1997/98 economic crisis.

Keywords: Export-led Growth, Net Exports, Disaggregated Imports, Structural Change, South Korean Economy

JEL Classifications: F4, O5, C2

Received 6 May 2024, Revised 5 July 2024, Accepted 26 July 2024

I. Introduction

One of the most intensively discussed in the literature is the export-led growth hypothesis, in which export expansion has a significant impact on economic growth (Bhagwati, 1978; Krueger, 1978, among others). More specifically, if an economy is open to world trade, foreign technologies will be introduced to the domestic economy through international trade (Helpman and Krugman, 1985; Lucas, Jr., 1988, 1993; Grossman and Helpman, 1991; Young 1991, among others).¹⁾ The enriched domestic technology, in turn, makes production processes more efficient and therefore reduces the cost of production. In this case, domestically-produced goods are relatively inexpensive and, in general, better in quality, so that domestic goods will be more

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Conflict of Interest: The author declares that he has no conflict of interest.

Ethical Approval: This article does not contain any studies with human participants performed by the author.

Acknowledgement: This paper was benefited from seminar participants at the Midwest Economic Association Annual Meeting, Hong Kong Conference on Recent Advances in International Trade, and George Mason University Korea Seminar Series. The author thanks Lester Kurtz, David Ahlstrom, Eden Yu, and Anita Kaul for invaluable comments and suggestions on the first draft. The author also thanks Olivia Jin for excellent research assistance. All remaining errors are mine.

competitive in international markets. Accordingly, exports will rise. The resulting gains from trade, in turn, raise national income. This suggests that the causal direction runs from export expansion to GDP growth.

The causal relationship has been empirically investigated in the literature using several different measures of exports. Most often used was total exports, in which all types of exports of goods and services were aggregated (Balassa, 1978, among others). Several others employed the measurement of disaggregated exports of manufacturing goods (e.g. Marin, 1992; Pomponio, 1996, among others), while the exports of agricultural products, as well as non-oil exports were further used in the literature (Arnade and Vasavada, 1995; Subasat, 2002, respectively). Similarly, the growth-enhancing effect of exports was found to vary depending on export composition: agricultural exports vs. manufactured exports (Bbaale and Mutenyo, 2011). The export share of GNP or GDP was also utilized as an indicator of trade dependency across countries (e.g. Michaely, 1977; Islam, 1998), while export-led growth was further examined for provincial economies (Park and Prime, 1997; Jin, 2002).

In addition, the growth rate of imports, together with export growth, was used as an additional variable to explain economic growth (Serletis, 1992; Shan and Sun, 1998a, 1998b; Raghutla and Chittedi, 2020; Malefane, 2021). More recently, the income elasticity of exports was found to decrease in China over time (Felipe and Lanzafame, 2020), while the growth effect of merchandise exports was examined for countries with abundant natural resources (Kalaitzi and Chamberlain, 2021, among others). A survey of the literature prior to the 2000s is available in Giles and Williams (2000a, 2000b), and further evidence afterwards has been discussed in Kalaitzi and Chamberlain (2021). Although many studies employed several different measures of exports, the findings in the literature were mixed and often contradictory.

This paper thus aims to introduce an alternative measure of exports—net exports—to examine the validity of the export-led growth hypothesis for the South Korean economy. In particular, the expansion of South Korean exports was heavily dependent on the imports of raw materials and intermediate goods from overseas. That is, exports and imports were close complements in production ($r = 0.99$). If the imports of raw materials and intermediate goods rise in South Korea, the exports of manufactured final goods increase even at a greater rate than the import growth. Indeed, average annual growth in exports and imports over time stood at 8.7% and 7.8%, respectively (Korea International Trade Association, 2019). In this case, net exports rise. The role of net exports is then expected to be significant for the South Korean economy.

In order to test the export-led growth hypothesis, an empirical model has been specified

1) To enhance domestic technology further, the government as well as business firms also increase spending for research and development (R&D), which help domestic firms be more competitive in international markets (Oliner and Sichel, 2000; Jorgenson, 2001). In addition, the inflow of foreign direct investment (FDI) has a spillover effect that improves domestic technology as well (Naseem, 2003; Freckleton et al., 2012; Ciesielska and Koftuniak, 2017; Ahmad, et al., 2018).

based on the Cobb-Douglas production function in which net exports are used as a proxy for total factor productivity, assuming that domestic technology is improved through international trade. Using the time-series data for the earlier subsample period 1972-1996 prior to the 1997/98 Asian financial crisis, changes in net exports were found to have a significant impact on the growth of the South Korean economy.

However, business and socio-economic environments have been changed substantially in South Korea since the 1997/98 financial crisis. For example, the pattern of government-led economic development in the 1970s and 1980s gradually diminished, and instead, the economic crisis in 1997/98 served as an opportunity to switch to an economic model led by private business firms (Hart-Landsberg and Burkett, 2001; Eichengreen and Chung, 2004; Eichengreen et al., 2012). The domestic capital market was also forced to open more to foreign investors, so that foreign direct investment (FDI) inflow has been sharply increased right after the crisis (Lim and Hahm, 2006; Eichengreen et al., 2012). More specifically, total amount of FDI inflow dramatically increased and reached a peak in 1999, which was well over 4 times higher than before the crisis (KOSIS, 2024). In addition, to compete with overseas technology, domestic business firms as well as the government spent much more money on research and development (R&D). Accordingly, the South Korean economy has been relied more on high-tech industries, with less weight on labor-intensive manufactured goods (Jung, 2011; Eichengreen et al., 2012). At the same time, this study finds that the impact of net exports on economic growth has eased and appeared no longer significant in recent decades. The difference we have found here is largely attributed to the structural changes that South Korea has experienced since the economic crisis in 1997/98, which is our major contribution to the literature.

The rest of this paper is organized as follows. Section 2 discusses the transmission mechanism of net exports. Section 3 specifies an empirical model and describes the dataset used. Section 4 discusses baseline regression results: the growth effect of net exports is significant for earlier decades, while the growth effect shrinks and becomes insignificant for recent two decades. For the robustness of the results, Section 5 employs an alternative model that includes an interaction effect between exports and imports. Section 6 disaggregates the imports by commodity types. Using the disaggregated imports, Section 7 examines the endogeneity of exports. The two-stage least squares (2SLS) estimation reaffirms the insignificant role of exports for recent decades. In contrast, for earlier decades, the export-led growth has been re-confirmed in Section 8. Section 9 concludes with policy implications.

II. Transmission Mechanism of Net Exports

As noted earlier, several different measures of exports were used in the literature to test

for the export-led growth hypothesis. To date, few papers have explicitly used net exports to test for the validity of the hypothesis. One exception is Mo (2010) in which 'the ratio of net exports to output' was used as one of several control variables in the growth model, and the net exports measure was found to have a non-trivial impact on economic growth. However, no studies so far have discussed the transmission mechanisms through which imports are closely associated with exports, in which the exports of manufactured final goods grow faster than the imports of raw materials and intermediate goods. Therefore, net exports increase, triggering the growth of the economy. We fully discuss such transmission channels below. This is one of our major contributions to the literature.

A. The effect of imports on net exports

For less developed countries (LDCs) that are topographically short of natural resources, the expansion of exports is typically reinforced by the imports of raw materials and intermediate goods from overseas. In particular, producing exportable final goods has an 'increasing-returns-to-scale' with respect to imported intermediate goods (Amiti and Konings, 2007). This peculiar relationship suggests that exports and imports are close complements in production ($\rho = 0.99$). Raw materials and intermediate goods are imported from overseas to increase the exports of manufactured final goods; the export growth (8.7% on average over time) indeed increases even faster than the import growth (7.8% on average over time). In this case, net exports rise.

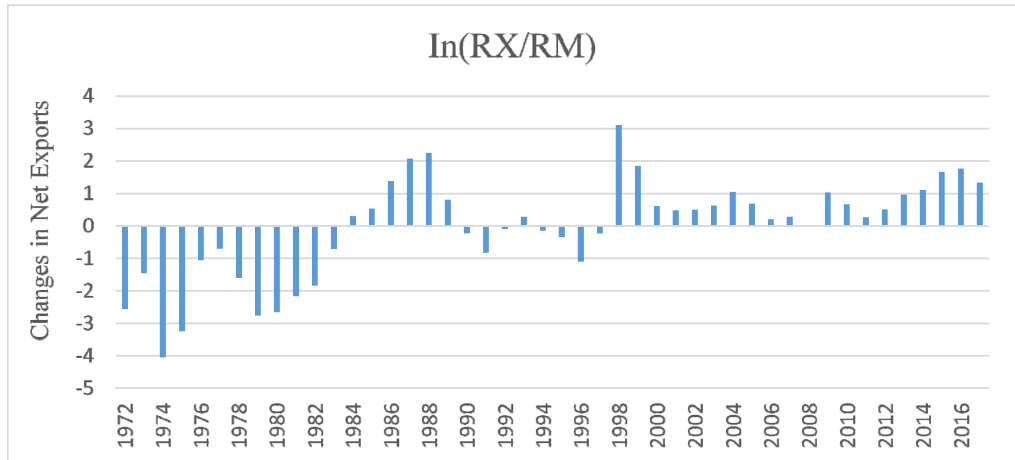
More specifically, the expansion of South Korean exports in earlier decades was heavily dependent on the imports of raw materials and intermediate goods from overseas. Because of excessive imports, the South Korean economy once suffered from trade deficits in the 1970s and early 1980s (see Figure 1). Since then, the exports of manufactured final goods have dominated and continued to maintain a trade surplus. Another exception was the early 1990s in which the imports of final goods, rather than raw materials and intermediate goods, accelerated trade deficits again. This was one of many reasons for the 1997/98 economic crisis in South Korea. Other than that, the imports of raw materials and intermediate goods were approximately 90% of total imports over time (Korea International Trade Association, 2019).

The heavy dependency on the imports of raw materials and intermediate goods reflects one distinct characteristic of the South Korea economy. That is, the sustained growth of exports of manufactured final goods was largely accompanied by the imports of raw materials and intermediate goods overseas, and hence the import growth in South Korea used to be a signal that new investment would rise domestically. The export expansion of manufactured final goods was indeed greater than the import growth of raw materials and intermediate goods.²⁾ Therefore, an

2) As indicated earlier, the average annual growth rates of exports and imports over the sample period were 8.7%

increase in imports strengthens export expansion in South Korea, which, in turn, raises net exports.

Figure 1. Trade surplus (Deficit) in Korea: 1972-2017



(Sources) International Financial Statistics (produced by IMF). The nominal values were converted to real values using GDP deflator (2010=100).

B. The effect of net exports on economic growth

The increase in net exports will cause an economy to grow. The potential growth effect of net exports prudently suggests that the imports of raw materials and intermediate goods are particularly important for economic growth because import expansion conveys 'economies of scale' (Amiti and Konings, 2007). The economies of scale is the property whereby long-run average total cost falls as the quantity of output increases. For example, the import of raw materials from overseas is cheaper than using raw materials produced domestically, and hence the average total cost of using foreign materials is even lower than the average total cost of using domestic materials only. In this case, domestically-produced exportable goods that are using raw materials from overseas will be more competitive in international markets, and thus the imports of raw materials and intermediate goods will strengthen export activities. In this case, net exports will rise, and the economy will grow in the long run.

In addition, such import expansion potentially raises 'total factor productivity', since domestic firms use high quality inputs from overseas and have more choices to select quality materials due to the input varieties available in foreign countries (Amiti and Konings, 2007); domestic firms also import foreign products and learn foreign technologies embedded in imported products (Grossman and Helpman, 1991; Young, 1991). Such an increase in domestic technology will

make the production process more efficient, and hence the domestically produced goods and services will be more competitive in international markets. Therefore, an increase in net exports, which is largely attributed to the exports of manufactured final goods, will raise GDP growth in the long run.

III. Model Specification and Data

Our empirical model that aims to test the export-led growth hypothesis is based on the Cobb-Douglas production function (e.g. Bosworth and Collins, 2003):

$$Y = AK^\alpha(LE)^{1-\alpha}. \quad (1)$$

Output (Y) depends on total factor productivity (A), capital (K), and labor (L). Labor L is now adjusted for improvements in educational attainment E , and hence LE represents an 'educated' labor force. The skilled labor's income share is assumed to be $1-\alpha$. With this assumption, along with capital's income share α , the output Y shows the constant returns to scale.

For estimation purposes, we take the natural logs of Eq (1):

$$\ln Y = \ln A + \alpha \ln K + (1-\alpha) \ln LE. \quad (2)$$

We also presume that non-stationary time series in levels becomes stationary if differenced. In practice, most macro variables are found to be integrated with one unit root (Nelson and Plosser, 1982), and thus we take first differences of logarithm (i.e., log differences) for both sides:

$$\Delta \ln Y = \Delta \ln A + \alpha \Delta \ln K + (1-\alpha) \Delta \ln LE. \quad (3)$$

With this framework, output growth is decomposed of the growths of three factors: total factor productivity, physical capital, and skilled labor. For skilled workers, educational attainment E is achieved by the number of years of schooling (e.g. Barro, 1991; Barro and Lee, 2015, among others). Secondary education is used here as a proxy for the workers' capability to assimilate the overseas technologies introduced through international trade.

For total factor productivity (TFP), a proxy variable is used. That is, foreign technologies will be introduced to the domestic economy if an economy increases exports and imports with less trade barriers (Grossman and Helpman, 1991). In particular, if imports increase, domestic

firms learn foreign technologies imbedded in foreign products (e.g. Young, 1991), and export promotion policies also enhance domestic technology through R&D expenditures (Jorgenson, 2001, among others). In this case, both imports and exports are close complements in production. For example, the import of raw materials and intermediate goods strengthen export expansion, in which the export of manufactured final goods would be greater than the amount of imports. In this case, net exports rise. We thus include net exports as a proxy for such a technological enhancement. Accordingly, our empirical model is specified as:

$$\ln \text{RGDP}_t = \beta_1 + \beta_2 \ln \text{RK}_t + \beta_3 \ln \text{LE}_t + \beta_4 \ln (\text{RX}/\text{RM})_t + \varepsilon_t, \quad (4)$$

where $\ln \text{RGDP}_t$ is the growth rate of real GDP deflated by the price level (2010=100); $\ln \text{RK}_t$ is the growth rate of real fixed capital formation deflated by the price level (2010=100); $\ln \text{LE}_t$ is the growth rate of educated labor force; and $\ln (\text{RX}/\text{RM})_t$, a difference between logs of real exports and real imports, is included as a proxy for technological improvement, where nominal values of exports and imports are deflated by the price level (2010=100).³⁾

In Eq (4), residuals ε_t are treated as the estimates of additional total factor productivity, which are best interpreted as further gains in efficiency when more factor inputs are used. If all other relevant factors are included, our model will clearly suffer from the degrees of freedom problem. Rather than controlling for all possible determinants of economic growth, we merely focus on one important aspect of the transmission mechanism in which domestic technology can be improved through international trade.

All data, except for quality labor force (LE), are obtained from *International Financial Statistics* (produced by IMF). The data for the number of employed workers (L) are obtained from *Korean Statistical Information Service* (KOSIS, produced by Statistics Korea), and secondary school enrollment rates (E) are taken from *World Development Indicators* (WDI, produced by World Bank). Because of limited data for LE, the sample period begins in 1971 and ends in 2017.

Table 1 shows descriptive statistics for model variables. The average annual growth rate of GDP is 6.60% over the entire sample period from 1972-2017. While the GDP growth rate

3) Using the Korean TFP data obtained from Productivity Research Data Portal (produced by the Korea Productivity Center, 2024), TFP was regressed on net exports with one-year lag:

$$\text{TFP}_t = -0.28 + 8.44 \ln(\text{RX}/\text{RM})_{t-1} \\ (0.49) \quad (4.32)^\dagger$$

$$R^2 = 0.16 \quad \text{SE} = 1.68 \quad N = 22 \text{ obs. (1997-2018)}$$

As expected, the past value of net exports has a positive effect on TFP, and its parameter estimate appears to be significant at the 10% level. The correlation coefficient between the two variables also appears to be non-trivial ($r = 0.40$). Thus, net exports can be used as a good proxy for TFP in Eq. (4). The author thanks an anonymous referee for suggesting a TFP data source.

(8.81% on average) is even higher in the earlier subsample period (1972-1996), the average growth rate has been substantially reduced to 4.38% in the recent two decades (1999-2017). The average growth rates of capital and labor have also fallen by more than half during the recent decades. The negative mean value of net exports depicts that the South Korean economy suffered from trade deficits in the earlier decades, whereas the recent two decades showed a trade surplus. The comparison of two subsample periods roughly suggests that the South Korean economy has undergone structural changes since the 1997/98 economic crisis.

Table 1. Summary Statistics for Each Sample Period

1972-2017	dlnRGDP	dlnRk	dlnLE	lnRX/RM
Mean	6.60	7.22	4.17	-0.03
Median	6.93	6.49	2.98	0.29
Kurtosis	0.87	2.14	0.90	0.24
Skewness	-0.64	-0.25	0.32	-0.62
Minimum	-5.63	-20.72	-8.36	-4.04
Maximum	13.82	26.43	13.88	3.11
Observations	46	46	46	46
1972-1996	dlnRGDP	dlnRk	dlnLE	lnRX/RM
Mean	8.81	10.75	6.76	-0.80
Median	9.04	10.27	6.14	-0.71
Kurtosis	5.04	0.00	-1.03	-0.34
Skewness	-1.51	-0.16	0.39	-0.01
Minimum	-1.72	-6.47	1.40	-4.04
Maximum	13.82	26.43	13.88	2.26
Observations	25	25	25	25
1999-2017	dlnRGDP	dlnRk	dlnLE	lnRX/RM
Mean	4.38	4.40	1.64	0.82
Median	3.62	4.15	0.99	0.67
Kurtosis	1.57	2.95	-1.43	-0.50
Skewness	1.22	1.30	0.45	0.59
Minimum	0.71	0.01	0.23	0.00
Maximum	10.71	13.37	3.89	1.86
Observations	19	19	19	19

(Sources) All data, except for quality labor force (LE), are obtained from *International Financial Statistics* (produced by IMF). The data for the number of employed workers (L) are obtained from *Korean Statistical Information Service* (KOSIS, produced by Statistics Korea), and secondary school enrollment rates (E) are taken from *World Development Indicators* (the World Bank database).

Note. All variables are measured in log differences. RGDP represents real GDP, RK stands for real capital, LE represents educated labor force, RX is real exports, and RM is real imports.

It often is useful to examine whether a given time series approximates the normal distribution. For all series, the mean and median values were nearly identical. The closeness of these two measures

approximately indicates that distributions would not be seriously skewed to the right or left tail. The kurtosis statistic that provides a measure of the thickness of the tails of a distribution was also found in most cases to be less than 3.0. The skewness statistic that is useful to check with the symmetry of a probability distribution was also close to zero. Therefore, the results are, in general, consistent with the OLS assumption that all series should be normally distributed.

IV. Baseline Regression Results

Our regression model employs net exports to examine empirically the validity of the export-led growth hypothesis for the South Korean economy. Least squares are used for estimation, assuming ε_i be serially uncorrelated white noise residuals. The OLS regression results are presented in Table 2. Model (1) shows the estimation result for the whole sample period of 1972-2017. Both capital and labor inputs have positive and significant impacts on economic growth. The results are robust across sample periods.⁴⁾

Table 2. *Baseline Regression Results*

Dependent Variable: \ln RGDP			
Independent Variables	(1) 1972-2017	(2) 1972-1996	(3) 1999-2017
Constant	3.64 (0.58)	6.21 (0.73)	1.61 (1.29)
\ln RK	0.25** (0.04)	0.16** (0.03)	0.46** (0.15)
\ln LE	0.33** (0.11)	0.23** (0.09)	0.33 (0.39)
\ln (RX/RM)	0.38 (0.28)	0.60** (0.23)	0.31 (0.86)
DUM _{GDP}	-3.95** (1.41)	-7.37** (1.69)	-1.67 (2.13)
Adj. R ²	0.73	0.76	0.35
D-W	1.10	2.03	1.35
S.E	2.02	1.46	1.93
N	46	25	19

Note. For variable definitions, see Table 1. DUM_{GDP} stands for the GDP dummy variable. The values in parenthesis are standard errors. ** indicates significant at the 1% level, * at the 5% level, and † at the 10% level.

4) Although our empirical model was specified based on the Cobb-Douglas production function that assumed constant returns to scale, the sum of two parameter estimates (RK and LE) appears to be less than one. The seemingly inconsistent result is due to the transformation of model variables to log differences (i.e. growth rates) rather than log levels. In other words, the sum of parameter estimates in log differences (i.e. percentage point change) differs from the sum of parameter estimates in log levels (i.e. percentage change).

In addition, a dummy variable, DUM_{GDP} , is included in the model to isolate the negative side of the GDP growth. In particular, three economic downturns were observed in South Korea. One occurred in the year of 1980. Almost all domestic firms stopped working for several months because of a military coup after the assassination of President Park (October 1979). Consequently, the real GDP growth rate at the time turned out to be negative (-1.7%), which was the first negative growth in the Korean economic history after the reconstruction period of the 1960s. The second oil shock in 1979/1980 must have been another important reason for the observed negative growth of the South Korean economy at the time. The second economic downturn in South Korea was experienced in 1998 due to the financial crisis in December 1997, after which the growth rate of real GDP dramatically dropped (-5.6%). The negative impact was so serious that it provided an opportunity to change business environments and culture, as well as an unhealthy economic structure. The third economic downturn was the 2008 global financial crisis that originated from the U.S. property market. The real GDP growth rate slowed down in 2008 and eventually dropped to 0.7% in the following year, which was a lot lower than the potential growth rate of the South Korean economy at the time. The negative and significant effect of a dummy variable in Table 2 well reflects such three economic downturns.

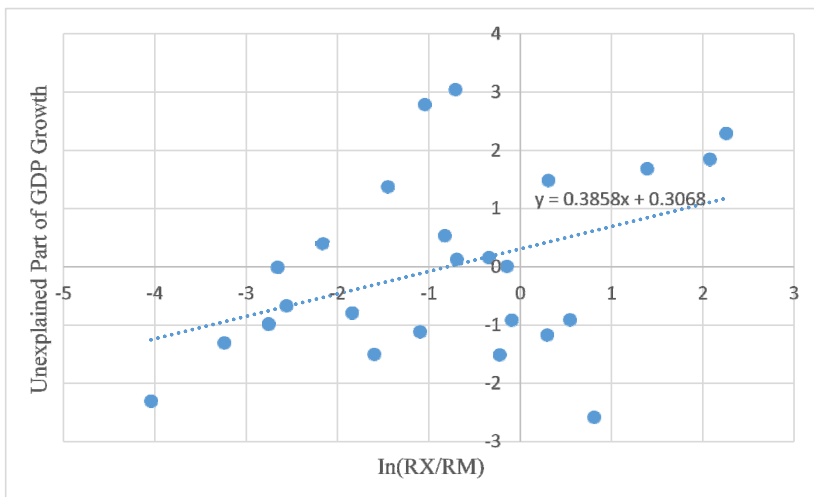
After all these variables are controlled for economic growth, Model (1) shows that changes in net exports have a positive and insignificant effect on real GDP growth over the whole sample period (1972-2017). The insignificant growth effect appears to be at odds with the export-led growth hypothesis. The parameter estimate of net exports is positive but not strong enough to support the hypothesis. The insignificant growth effect of net exports largely attributes to South Korea's development strategies that shifted several times in the past. For instance, import substitution in the 1960s was the first stage of economic development in South Korea, and the second stage was the active export-promotion strategies in the 1970s through the 1990s. Since then, the South Korean economy has reached in the 2000s and 2010s the 'technological maturity' and 'high mass consumption' stages (Rostow, 1960). Correspondingly, the insignificant growth effect of net exports for the entire sample period suggests that the export-led growth from the 1970s to the 1990s could have been alleviated in the recent decades of the 2000s and 2010s.

To convince the proposition, Models (2) and (3) further estimate the same model for an earlier subsample period of 1972-1996 and the recent years of 1999-2017, respectively, and compare the two estimation results. For the earlier subsample period, it is not surprising to find that the positive growth effect of net exports is significant even at the 1% level. The parameter estimates of 0.60 indicate that, holding capital and labor inputs constant, a 100 % increase in net exports is associated with a 0.60 % point increase in economic growth. The export-led growth hypothesis is well supported by the data for this earlier subsample period. The result is, in general, consistent with the findings in Riezman et al. (1996) and Islam (1998)

for the South Korean economy although their export measures differ from ours.

In order to capture the independent growth effect of net exports graphically, the GDP growth rates predicted by all independent variables, except for net exports, were subtracted from actual GDP growth rates. That is, the unexplained portion of GDP growth rates—residuals—is then plotted against net exports. Figure 2 shows the positive association of net exports, holding capital and labor inputs constant. This graphical analysis re-confirms the positive and significant growth effect of net exports for the earlier subsample period.

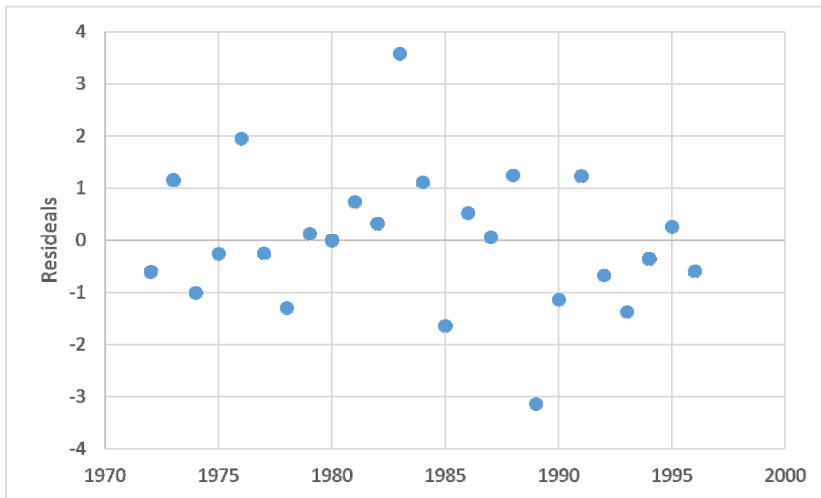
Figure 2. Partial association of net exports with unexplained part of GDP growth



Note. The unexplained portion of GDP growth was obtained from the model in which the GDP growth rates predicted by all independent variables, except for net exports, were subtracted from actual GDP growth rates.

For the cogency of the baseline regression result, residuals are plotted over time to examine any symptoms of serial correlation that often arise in time series. Figure 3 plots residuals which fluctuate approximately randomly around mean zero, and no systematic patterns are observed. The Durbin-Watson statistic ($D-W = 2.03$) reaffirms that the null of no serial correlation cannot be rejected. Figure 4 further plots residuals against each independent variable to check with a symptom of heteroscedasticity, where the growth rate of real GDP can vary increasingly or decreasingly along the size of capital, labor, and net exports. For each explanatory variable, residuals are found to be scattered around mean zero and no systematic patterns are observed. Therefore, we conclude that OLS assumptions are not seriously violated in our model specification.

Figure 3. Residuals over time



Note. Residuals were obtained from Model (2) in Table 2.

Figure 4. Residuals against explanatory variables

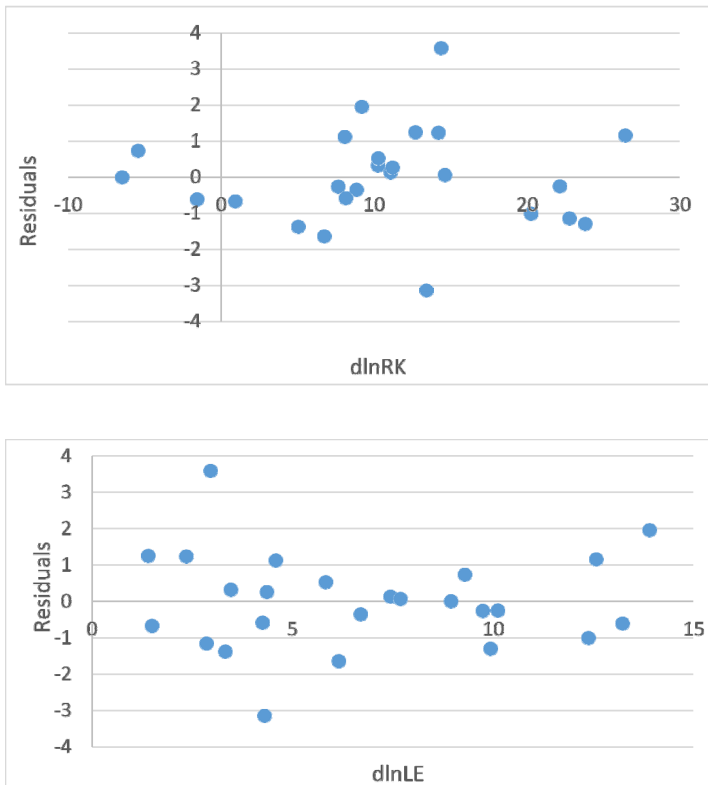
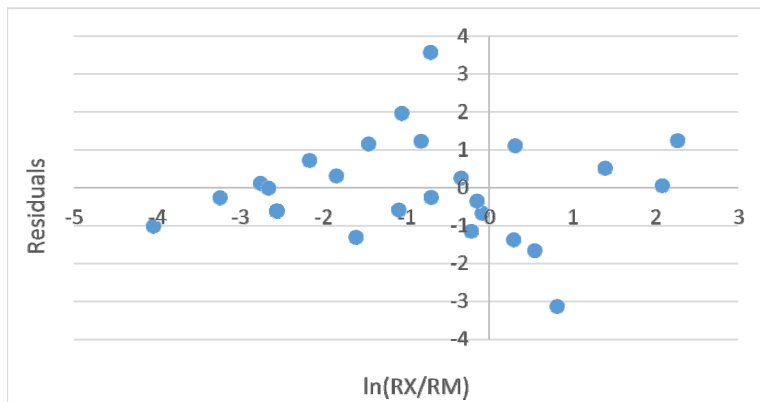


Figure 4. Continued



Note. Residuals were obtained from Model (2) in Table 2.

Model (3) further estimates the same regression model for recent years of 1999-2017, after the 1997/98 crisis. The negative but insignificant effect of the GDP dummy variable suggests that, unlike the direct impact of the 1997/98 Korean economic crisis, the impact of the 2008 global recession originated from the U.S. property market was relatively weak on the South Korean economy. To check with any potential problem of multicollinearity, correlation coefficients among explanatory variables are also computed. The association of net exports with capital and labor inputs are found to be relatively small ($r = 0.07$ and -0.19 , respectively), and hence the multicollinearity problem may not be serious in this model specification.

One striking result we have found is that, unlike in the earlier decades, the growth effect of net exports over the last two decades appears to be insignificant at the conventional significance levels. The insignificant growth effect of net exports is consistent with our earlier proposition that the important role of the export sector gradually reduced in recent decades. In other words, the export-led growth in the 1970s, 80s, and until mid-90s is no longer valid for the recent development of the South Korean economy.⁵⁾ This difference is largely due to the structural changes that often occur in newly developed industrialized countries such as South Korea. The results are, in general, consistent with the structural changes found early in Japan (Balcilar and Ozdemir, 2013) and more recently in China (Felipe and Lanzafame, 2020).

5) Alternatively, our empirical model has been estimated, deflating model variables by RK (i.e., $d\ln(RGDP/RK)$ and $d\ln(LE/RK)$ as dependent and independent variables, respectively), but the key findings remain intact. The growth effect of net exports is significant for the earlier subsample period, while the growth effect shrinks substantially and becomes insignificant for the recent two decades. The estimation results are not reported here but available upon request.

V. Interaction Effect between Exports and Imports

So far, we have found that the export-led growth hypothesis was supported for the subsample period prior to the economic crisis, but afterwards, the growth effect of net exports mitigated and appeared to be insignificant. In this case, the positive and significant growth effect of net exports for the earlier subsample period (1972-1996) was based on our presumption that a rise in imports strengthens export expansion particularly in South Korea. To examine this peculiar inter-relationship between exports and imports, we employ another growth regression in which exports and imports are included separately in each model, so that both variables are allowed to have an independent effect on economic growth. Implicit in this model is the assumption that exports and imports are not interactive, and hence changes in exports are exogenously determined regardless of import growth. In the real world, such an assumption may be untenable. Especially in the South Korean economy, there must be an interaction between exports and imports, and thus their effects on economic growth may not be independent but interrelated.

Table 3 reports the estimation results by adding explanatory variables one by one. Model (1) shows that the capital input has a significant impact on economic growth, while the growth effect of labor is insignificant. The significant growth effect of capital is robust across model specifications. Model (2) includes the growth rate of exports, which is found to have a positive and significant effect on GDP growth. The parameter estimate of export growth suggests that, holding capital and labor inputs constant, changes in export growth are, on average, positively and significantly associated with economic growth over the period 1972-1996. Model (3), however, shows that the growth effect of imports alone is found to be small and insignificant. Model (4) includes both exports and imports together in the same model and finds that the growth effect of export expansion is positive and significant even with the inclusion of imports.⁶⁾ To convince the inter-relationship between exports and imports, Model (5) further includes an interaction term. The parameter estimate of the interaction term appears to be positive and significant at the 10% level. The result is consistent with our earlier presumption that both exports and imports in South Korea are complements in production.⁷⁾

6) A multicollinearity problem might be suspicious in this case because both exports and imports were correlated in nature ($r = 0.45$). But it appears that parameter estimates had a correct sign: the positive growth effect of exports and the negative growth effect of imports. Thus, the multicollinearity problem may not be serious in this model. The significant growth effect of exports we have found here appears to be at odds with the findings in the literature, where the growth effect of Korean exports was insignificant when imports were included in the same model (e.g. Shan and Sun, 1998b).

7) The model could not include exports and imports together with an interaction term since a multicollinearity problem appeared to be serious in this model. Both exports and imports were directly related to the interaction term.

Table 3. Regression with Interaction Effect of Exports with Imports: 1972-1996

Dependent Variable: \ln RGDP					
Independent variables	(1)	(2)	(3)	(4)	(5)
Constant	6.59 (0.80)	6.60 (0.61)	6.64 (0.84)	6.39 (0.61)	6.98 (0.81)
\ln RK	0.17** (0.04)	0.17** (0.03)	0.16** (0.05)	0.21** (0.04)	0.14** (0.04)
\ln LE	0.09 (0.08)	-0.07 (0.07)	0.08 (0.09)	-0.06 (0.07)	0.05 (0.09)
\ln RX		0.09** (0.02)		0.11** (0.02)	
\ln RM			0.01 (0.04)	-0.05 (0.03)	
\ln RX * \ln RM					0.15† (0.09)
DUM _{GDP}	-8.03** (1.88)	-8.20** (1.42)	-8.28** (2.11)	-7.21** (1.53)	-8.67** (1.85)
Adj. R ²	0.70	0.83	0.69	0.84	0.72
D-W	1.94	1.46	1.87	1.82	1.73
S.E	1.65	1.24	1.68	1.21	1.59
N	25	25	25	25	25

Note. See Table 1 for variable definitions. DUM_{GDP} stands for the GDP dummy variable. The values in parenthesis are standard errors. ** indicates significant at the 1% level, * at the 5% level, and † at the 10% level.

VI. Disaggregated Imports by Commodity Types

The results found in Table 3 above presumed that export expansion policies in South Korea heavily relied on the imports of raw materials and intermediate goods from overseas. But in practice, final goods can also be imported substantially if domestic prices are higher than international prices. This often happens in the course of economic development, where per capita income rises above a certain level. Particularly when South Korea decided to liberalize its economy in the early 1990s and thus joined the WTO in 1995 and the OECD in 1996, domestic consumers in South Korea preferred to buy quality products from overseas. Consequently, the South Korean economy suffered from a trade deficit for most of the 1990s (see Figure 1).⁸⁾ Exports were, indeed, reduced and domestic investment shrank, and thus economic growth was gradually mitigated. In this regards, the growth effect of exports found in Table 3 might have been biased upward.

8) It was unusual for an export-oriented economy like South Korea to have such a trade deficit continuously for several years. This was considered to be one of the many causes of South Korea's 1997/98 economic crisis (Eichengreen et al., 2012).

We address this issue using the imports disaggregated by commodity types. Total imports are disaggregated into five commodity types over the period 1988-2017: raw materials, intermediate goods, capital goods, final goods for consumption, and other miscellaneous goods (Korea International Trade Association, 2019).⁹⁾ The first three types are imported for the purpose of manufacturing exportable final goods, and the last two types are imported for domestic consumption.

Table 4 shows descriptive statistics for five types of disaggregated imports. While the average import of raw materials was about 23% of total imports over time, the average import of intermediate goods was about 51%. The import of capital goods to be used in the production process of exportable goods was, on average, about 15%, whereas the import of final goods for domestic consumption was about 8%. The import of other miscellaneous goods was even smaller (about 2%) and close to zero in recent years. This suggests that approximately 90% of total imports was used for the manufacturing of exportable final goods.

Table 4. *Disaggregated Imports by Commodity Types: 1988-2017, percent (%)*

	<i>M_raw</i>	<i>M_interm</i>	<i>M_capital</i>	<i>M_cons</i>	<i>M_others</i>	<i>M_total</i>
Mean	23.53	51.33	15.21	7.59	2.34	100.00
Median	22.97	51.11	14.81	8.03	0.21	100.00
Kurtosis	0.04	-0.24	-0.55	0.65	-0.74	1.12
Skewness	0.70	0.47	0.27	0.67	1.13	0.76
Minimum	17.65	45.49	10.94	2.72	0.06	100.00
Maximum	31.76	59.79	21.28	14.72	9.08	100.00

(Source) Korea International Trade Association (2019).

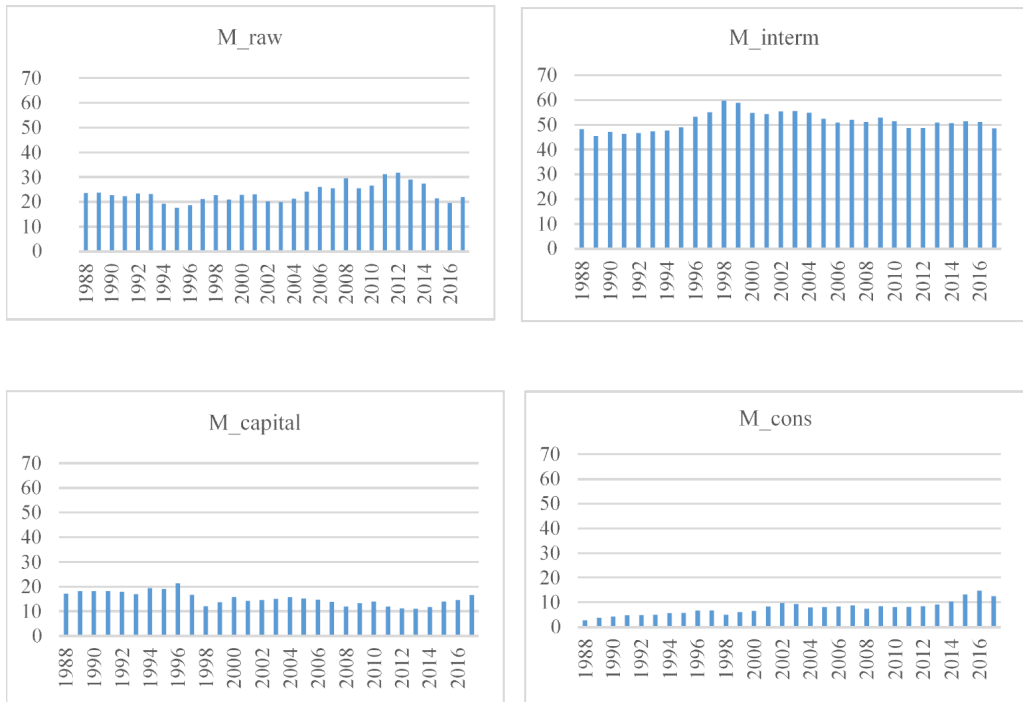
Note. The values are the proportions (%) of total imports. *M_raw* stands for the imports of raw materials, *M_interm* represents the imports of intermediate goods, *M_capital* is the imports of capital goods, *M_cons* is the imports of final goods for domestic consumption, and *M_others* is the imports of other miscellaneous goods.

Figure 5 further depicts how the disaggregated imports evolved over time. The imports of raw materials were found to fall in the late 1980s until the mid-1990s, while the imports of intermediate goods rose during the same period. Since the South Korean economy began to open in the early 1990s, the import of final goods for domestic consumption was gradually rising and reached a peak right before the economic crisis in 1997. After the economic crisis, the imports of raw materials had a tendency to rise, while the imports of intermediate goods remained almost constant. The imports of capital goods suddenly dropped and remained more or less constant over time, while the imports of final goods continued to rise. It should however be noted that, unlike in the United States and other developed countries in Europe, the import of final goods was relatively small in South Korea, whereas the imports of raw materials and

9) The sample period is relatively short because the classification criteria was changed in 1988 (Korea International Trade Association, 2019).

intermediate goods were the major portion of total imports over time. This re-confirms the importance of importing raw materials and intermediate goods from overseas, and it signals an expansion of new investment in the manufacturing sector for the growth of exports.

Figure 5. Disaggregated imports by commodity types: 1988-2017, percent (%)



(Sources) Korea International Trade Association (2019). For variable names, see Table 4.

Table 5 shows the correlation coefficients of exports with five types of disaggregated imports (see the bottom row). The imports of raw materials and intermediate goods are highly correlated with an increase in exports ($r = 0.64$ and 0.66 , respectively), while the import of final goods has a negative association with export expansion ($r = -0.31$). That is, the imports of raw materials and intermediate goods, which comprise about 90% of total imports, do function to increase the manufacturing of exportable final goods in South Korea, while the imports of final goods from overseas make it difficult for domestic producers.

Table 5. Correlation Coefficients of Exports with Disaggregated Imports

	<i>dlnRM_ Raw</i>	<i>dlnRM_ Interm</i>	<i>dlnRM_ Cap</i>	<i>dlnRM_ Cons</i>	<i>dlnRM_ Others</i>	<i>dlnRX</i>
<i>dlnRM_Raw</i>	1					
<i>dlnRM_Interm</i>	0.80	1				
<i>dlnRM_Cap</i>	0.40	0.56	1			
<i>dlnRM_Cons</i>	0.21	0.39	0.65	1		
<i>dlnRM_Other</i>	-0.08	-0.17	-0.16	-0.33	1	
<i>dlnRX</i>	0.64	0.66	-0.05	-0.31	0.09	1

(Source) Korea International Trade Association (2019).

Note. For variable definitions, see Table 4. All variables are measured as the growth rates (log differences) of real term (in 2010 prices). The sample period used is from 1988-2017.

VII. The Endogeneity of Exports

The imports of raw materials and intermediate goods have been found to play a major role in enhancing the exports of manufactured final goods in South Korea, so that one complication of convincing export-led growth for the South Korean economy would be the possibility of inconsistent parameter estimates due to an endogeneity problem of exports. In other words, changes in exports are not random but endogenously determined by changes in imports, as well as by other relevant variables. To accommodate this potential problem, we estimate a model using two-stage least squares (2SLS) in which changes in imports of raw materials and intermediate goods are used here as an instrument for export growth. Namely, changes in imports affect GDP growth only through changes in exports (Wooldridge, 2002). Therefore, the 2SLS estimation first allows exports to be influenced by the imports of raw materials and intermediate goods, and second, it permits the predicted export growth obtained from the first stage to be used as an explanatory variable in the growth model.

For the 2SLS estimation, the growth rate of real exports (RX) is first regressed on two instrumental variables: the sum of raw materials and intermediate goods (RM_raw&int), as well as real exchange rates (RE):

$$\ln RX_t = \alpha_1 + \alpha_2 \ln RM_raw\&int_t + \alpha_3 \ln RE_t + u_t, \quad (5)$$

where the subscript t represents the time period used. Since most imports in South Korea consist of raw materials and intermediate goods overseas, the sum of the two import types is expected to be associated positively with export growth (Amiti and Konings, 2007). Real exchange rates (RE) are also used here as an explanatory variable, since RE is a key determinant of real exports (Mankiw, 2013). For example, devaluation of the domestic currency will make domestically produced goods and services

cheaper in price, increasing their competitiveness in international markets. This will increase exports.

The left panel in Table 6 shows the estimation result of the export equation (Eq. (5)) for recent two decades (1999-2017).¹⁰⁾ Both explanatory variables have positive and significant impacts on export growth. The positive effect of the sum of raw materials and intermediate goods on the growth of exports is consistent with our earlier proposition that exports and imports are close complements in production. Real exchange rates also have a positive and significant effect on export expansion. The nominal exchange rate was defined here as Korean won per US dollar, so that an increase in exchange rates (i.e. depreciation of the Korean won) promoted export growth over the sample period.¹¹⁾

Table 6. Two-Stage Least Squares for Recent Two Decades: 1999 - 2017

<i>First Stage</i>		<i>Second Stage</i>	
Dependent Variable: dln RX		Dependent Variable: dln GDP	
Constant	2.11(1.06)	Constant	1.80(0.99)
dln RM_raw&int	0.61(0.07)**	dln RK	0.49(0.16)**
dln RE	0.27(0.13)*	dln LE	0.24(0.39)
		dln \widehat{RX}	0.02(0.08)
		DUM _{GDP}	-2.78(3.04)
Adj. R ²	0.79	Adj. R ²	0.37
F-value	35.54	F-value	3.70
S.E	4.39	S.E	1.90
N	19	N	19

Note. All variables are measured in log differences. RX stands for real exports, RM_raw&int represents real imports of raw materials and intermediate goods, RE is real exchange rates, RK is real capital, LE is educated labor force, and DUM_{GDP} stands for a GDP dummy. The values in parenthesis are standard errors. ** indicates significant at the 1% level, * at the 5% level, and † at the 10% level.

Using the predicted export growth obtained in Eq. (5), the two-stage least squares (2SLS) estimator is computed as follows:

$$dln\ RGDP_t = \beta_1 + \beta_2\ dln\ RK_t + \beta_3\ dln\ LE_t + \beta_4\ d\widehat{ln}\ RX_t + \beta_5\ DUM_{GDP_t} + v_t, \tag{6}$$

where $d\widehat{ln}\ RX$ is the predicted growth rate of real exports obtained from Eq. (5). Other than that, Eq. (6) is identical to the baseline regression model.

10) Although it is desirable to have a similar estimation for the earlier sample period 1972-1996, it has not been applied because consistent data for disaggregated imports prior to 1988 are not available to the public (Korea International Trade Association, 2019).

11) To check with a potential causality backwards from GDP to exports, the size of the economy (ln RGDP) has also been included in the export equation (5). If an economy size is bigger, domestic products will be more competitive in international markets, and hence exports are expected to rise. However, the parameter estimates of GDP appeared to be negative and insignificant in our model, and thus the reverse causality from GDP to exports may not be the reason for the case of South Korea. The result was not reported here but available upon request.

The right panel in Table 6 shows the estimation result for recent two decades (1999-2017). While capital is found to be significant, the growth effects of other explanatory variables appear to be small and insignificant. In particular, the variation of export growth does not show a significant effect on GDP growth. Although export growth has been allowed to enhance through the imports of raw materials and intermediate goods, its impact on economic growth appears to be insignificant for recent two decades. The insignificant growth effect of exports is consistent with our earlier findings in that the economic role of net exports was mitigated and insignificant for recent two decades. The results stand in sharp contrast to the findings of export-led growth in the 1970s, 80s, and until mid-90s. The two contrasting results we have found largely reflect the structural changes experienced by the South Korean economy after the 1997/98 economic crisis.

VIII. Re-confirmation of Export-led Growth for Earlier Decades

Finally, Table 7 reaffirms export-led growth for earlier decades 1972-1996, using two-stage least squares, as shown in Table 6. Since the consistent data for the imports of raw materials and intermediate goods (RM_raw&int) prior to 1988 are not available to the public (Korea International Trade Association, 2024), it has been replaced by total imports (RM) that includes final goods. Although the imports of final goods are negatively related to export growth ($r = -0.31$), Table 7 re-confirms our earlier findings that total imports are highly related to export growth which, in turn, drives economic growth. In other words, imports and exports are compliments in production, and the predicted value of export growth causes the growth of an economy for earlier decades. The results are, in general, consistent with the export-led growth, which had long been convinced before South Korea's 1997/98 economic crisis.

Table 7. Two-Stage Least Squares for Earlier Decades: 1972 - 1996

<i>First Stage</i>		<i>Second Stage</i>	
Dependent Variable: $\ln RX$		Dependent Variable: $\ln GDP$	
Constant	10.27(2.91)	Constant	6.06(0.76)
$\ln RM$	0.60(0.21)**	$\ln RK$	0.16(0.04)**
$\ln RE$	0.29(0.27)	$\ln LE$	0.05(0.08)
DUM_{exp}	-15.33(4.44)**	$\ln \widehat{RX}$	0.08(0.03)**
		DUM_{GDP}	-9.12(1.77)**
Adj. R^2	0.45	Adj. R^2	0.75
F-value	7.62	F-value	19.63
S.E	9.39	S.E	1.50
N	25	N	25

Note. See Table 6 for variable definitions. For earlier decades, the data for RM_raw&int was not available to the public and thus it was replaced by RM (real imports of all goods and services).

IX. Concluding Remarks

South Korea has long been regarded as an export-oriented economy, but the robust evidence of export-led growth is difficult to find especially for recent time periods. Several measures of exports have been used in the literature to test for the export-led growth hypothesis. Traditionally in South Korea, the expansion of exports has been reinforced by the imports of raw materials and intermediate goods from overseas, and the exports of manufactured final goods are found to grow faster than import growth. In this case, net exports will rise, which in turn causes the economy to grow. To test the export-led growth hypothesis, net exports are used here as an alternative measure of exports. One salient feature we have found is that structural changes have been observed since the 1997/98 economic crisis. For the earlier subsample period 1972-1996, the export-led growth hypothesis was well supported; but for the recent 1999-2017, the growth effect of net exports was no longer significant.

For the robustness of the results, we estimated a model that includes exports and imports separately. The positive growth effect of exports was significant only for the earlier subsample period. The interaction effect of exports and imports was also found to be positive and significant, which suggests that the significant growth effect of exports was reinforced by import expansion in South Korea. That is, the imports of raw materials and intermediate goods from overseas were positively associated with export expansion which, in turn, had a significant effect on economic growth. Our findings are, in general, consistent with the export-led growth hypothesis for the earlier subsample period, in which the genuine growth effect of export expansion is reinforced by import growth.

However, the important role of export growth has diminished gradually over time and becomes insignificant for recent two decades. In particular, export growth, strengthened by the imports of raw materials and intermediate goods, has not had a significant effect on GDP growth for recent decades. The insignificant growth effect of exports is consistent with our proposition that the important role of exports in the 1970s, 1980s, and until mid-1990s gradually eased in the 2000s and 2010s. The two contrasting results we have found reflect the structural changes experienced by the South Korean economy after the 1997/98 economic crisis.

Our empirical results have two policy implications. First, we have found that export expansion notably promoted economic growth in early decades, but the export-led growth was no longer valid for recent economic development. That is, the export sector has been of greatly diminished importance in the modern South Korean economy, and hence the impact of exports on economic growth will be weakened progressively in the future. It is thus suggested that the South Korean economy gradually reduce its heavy dependency on the exports of a labor-intensive manufacturing sector; instead, South Korea needs a further shift to an economy of more advanced technologies such as artificial intelligence, robot technology, biotechnology, internet-based marketing, and

so forth. Accordingly, policy makers in South Korea should carefully deliberate what economic policies can facilitate economic growth for future generations.

Second, the South Korean experience of the export-led growth in earlier decades can be used as a development strategy for less developed countries (LDCs) in which natural resources are scarce. The shortcoming of natural resources can overcome by importing raw materials and intermediate goods from abroad. Then, domestically produced final goods will be a better quality with lower costs, so that the domestic products will be more competitive in international markets. As long as people are highly educated, it will be relatively easy for skilled labor force to learn foreign technologies that are introduced through international trade. For example, home appliances such as rice cookers and refrigerators can be imported from overseas, whereupon the foreign technologies imbedded in such imported products can easily be learned by educated and skilled labor force. However, more advanced technologies are limited to import from industrialized countries and difficult to learn through international trade only. Such high technologies should be developed domestically by increasing R&D spending; sending domestic scientists and students abroad to learn foreign technologies would be another advantageous step in the long run.

Although our regression results show the short-run effect of net exports on economic growth, vector autoregressive (VAR) techniques such as variance decompositions and impulse responses can identify the dynamic growth effects of net exports over longer horizons. But the annual data used here are restricted to use such time series techniques that quickly deplete the degrees of freedom. Complementing these limitations has been left for further study.

References

- Ahmad, F., Draz, M. U., & Yang, S. (2018). Causality nexus of exports, FDI and economic growth of the ASEAN5 economies: Evidence from panel data analysis. *Journal of International Trade & Economic Development*, 27(6), 685-700.
- Amiti, M., & Konings, J. (2007). Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia. *American Economic Review*, 97(5), 1611-1638.
- Arnade, C., & Vasavada, U. (1995). Causality between productivity and exports in agriculture: evidence from Asia and Latin America. *Journal of Agricultural Economics*, 46(2), 174-186.
- Balassa, B. (1978). Exports and economic growth: further evidence. *Journal of Development Economics*, 5(2), 181-189.
- Balcilar, M., & Ozdemir, Z. A. (2013). The export-output growth nexus in Japan: a bootstrap rolling window approach. *Empirical Economics*, 44(2), 639-660.
- Barro, R. J. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics*, 106(2), 407-443.

- Barro, R. J., & Lee, J. W. (2015). *Education Matters: Global Schooling Gains from the 19th to the 21st Century*. Oxford, U.K.: Oxford University Press.
- Bbaale, E., & Mutenyo, J. (2011). Export composition and economic growth in Sub-Saharan Africa: A panel analysis. *Consilience: The Journal of Sustainable Economy*, 6(1), 1-19.
- Bhagwati, J. (1978). *Anatomy and Consequences of Exchange Control Regimes: Liberalization Attempts and Consequences*. Cambridge, MA: Ballinger.
- Bosworth, B., & Collins, S. M. (2003). The empirics of growth: An update. *Brookings Papers on Economic Activity*, 1(2), 113-206.
- Ciesielska, D., & Kołtuniak, M. (2017). Outward foreign direct investments and home country's economic growth. *Physica A: Statistical Mechanics and its Applications*, 482, 127-146.
- Eichengreen, B., & Chung, D-K. (2004). Introduction. In *The Korean Economy: Beyond the Crisis* (pp. 1-24). Aldershot, U.K.: Edward Elgar.
- Eichengreen, B., Perkins, D. H., & Shin, K-H. (2012). *From Miracle to Maturity: The Growth of the Korean Economy*. Cambridge, MA: Harvard University Asia Center.
- Felipe, J., & Lanzafame, M. (2020). The PRC's long-run growth through the lens of the export-led growth model. *Journal of Comparative Economics*, 48(1), 163-181.
- Freckleton, M., Wright, A., & Craigwell, R. (2012). Economic growth, foreign direct investment and corruption in developed and developing countries. *Journal of Economic Studies*, 39(6), 639-652.
- Giles, J. A., & Williams, C. L. (2000a). Export-led growth: a survey of the empirical literature and some non-causality results. *Part 1. Journal of International Trade and Economic Development*, 9(3), 261-337.
- Giles, J. A., & Williams, C.L. (2000b). Export-led growth: a survey of the empirical literature and some non-causality results. *Part 2. Journal of International Trade and Economic Development*, 9(4), 445-470.
- Grossman, G. M., & Helpman, E. (1991). *Innovation and Growth in the Global Economy*. Cambridge, MA: MIT Press.
- Hart-Landsberg, M., & Burkett, P. (2001). Economic crisis and restructuring in South Korea: Beyond the free market-statist debate. *Critical Asian Studies*, 33(3), 403-430.
- Helpman, E., & Krugman, P. (1985). *Market Structure and International Trade*. Cambridge, MA: The MIT Press.
- International Monetary Fund. (2019). International Financial Statistics. Retrieved from <http://data.imf.org/?s=k=388DFA60-1D26-4ADE-B505-A05A558D9A42>
- Islam, M. N. (1998). Export expansion and economic growth: testing for cointegration and causality. *Applied Economics*, 30(3), 415-425.
- Jin, J. C. (2002). Exports and growth: Is the export-led growth hypothesis valid for provincial economies? *Applied Economics*, 34(1), 63-76.
- Jorgenson, D. W. (2001). Information technology and the U.S. economy (Presidential address to the American Economic Association). *American Economic Review*, 91(1), 1-32.
- Jung, S-H. (2011). The Korean development strategy: Trajectories of the Korean economic development, 1961-2010. *Journal of the Economic Geographical Society of Korea*, 14(4), 453-466.
- Kalaitzi, A. S., & Chamberlain, T. W. (2021). The validity of the export-led growth hypothesis: some

- evidence from the GCC. *Journal of International Trade and Economic Development*, 30(2), 224-245.
- Korea International Trade Association. (2019 & 2024). K-Stat. Retrieved from <http://stat.kita.net/stat/kts/user/BecList.screen>
- Korea Productivity Center. (2024), Productivity Research Data Portal. Retrieved from <https://stat.kpc.or.kr/eng/index>
- Krueger, A. O. (1978). *Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences*. Cambridge, MA: Ballinger.
- Lim, W., & Hahn, J-H. (2006). Turning a crisis into an opportunity: The political economy of Korea's financial sector reform. In *From Crisis to Opportunity: Financial Globalization & East Asian Capitalism* (pp. 85-121). Stanford, CA: Walter I. Shorenstein Asia-Pacific Research Center.
- Lucas, R. Jr. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3-42.
- Lucas, R. Jr. (1993). Making a miracle. *Econometrica*, 61(2), 251-272.
- Malefane, M. R. (2021). Export-led growth hypothesis: Empirical evidence from the Southern African Customs Union countries. *Entrepreneurial Business and Economics Review*, 9(2), 55-69.
- Mankiw, N. G. (2013). *Macroeconomics*. Basingstoke, England: Macmillan.
- Marin, D. (1992). Is the export-led growth hypothesis valid for industrialized countries? *Review of Economics and Statistics*, 74(4), 678-688.
- Michaely, M. (1977). Exports and growth: An empirical investigation. *Journal of Development Economics*, 4(1), 49-53.
- Mo, P. H. (2010). Trade intensity, net export, and economic growth. *Review of Development Economics*, 14(3), 563-576.
- Naseem, S. M. (2003). Rethinking the East Asian miracle. *Journal of Economic Studies*, 30(6), 636-644.
- Nelson, C. R., & Plosser, C. R. (1982). Trends and random walks in macroeconomic time series: Some evidence and implications. *Journal of Monetary Economics*, 10(2), 139-162.
- Oliner, S. D., & Sichel, D. E. (2000). The resurgence of growth in the late 1990s: Is information technology the story? *Journal of Economic Perspectives*, 14(4), 3-22.
- Park, J. H., & Prime, P. B. (1997). Export performance and growth in China: cross-provincial analysis. *Applied Economics*, 29(10), 1353-1363.
- Pomponio, X. Z. (1996). A causality analysis of growth and export performance. *Atlantic Economic Journal*, 24(2), 168-176.
- Raghuwala C., Chittedi, K. R. (2020). Is there an export- or import-led growth in emerging countries? A case of BRICS countries. *Journal of Public Affairs*, 20, e2074.
- Riezman, R. G., Whiteman, C. H., & Summers, P. M. (1996). The engine of growth or its handmaiden? A time series assessment of export-led growth. *Empirical Economics*, 21(1), 77-110.
- Rostow, W. W. (1960). The five stages of growth - A summary. In *The Stages of Economic Growth: A Non-Communist Manifesto* (pp. 4-16). Cambridge, MA: Cambridge University Press.
- Serletis, A. (1992). Export growth and Canadian economic development. *Journal of Development Economics*, 38(1), 133-145
- Shan, J., & Sun, F. (1998a). On the export-led growth hypothesis: the econometric evidence from China.

Applied Economics, 30(8), 1055-1065.

Shan, J., & Sun, F. (1998b). On the export-led growth hypothesis for the little dragons: An empirical reinvestigation. *Atlantic Economic Journal*, 26(4), 353-371.

Statistics Korea. (2019). Korean Statistical Information Service (KOSIS). Retrieved from http://kosis.kr/eng/statisticsList/statisticsListIndex.do?menuId=M_01_01&vwcd=MT_ETITLE&parmTabId=M_01_01&statId=1962002&themaId=#B11.4

Subasat, T. (2002). Does export promotion increase economic growth? *Some cross-section evidence. Developing Policy Review*, 20(3), 333-349.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press.

World Bank. (2019). World Development Indicators. Retrieved from <http://data.worldbank.org/data-catalog/world-development-indicators>

Young, A. (1991). Learning by doing and the dynamic effects of international trade. *Quarterly Journal of Economics*, 106(2), 369-405.