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The Quantitative Growth in North Korea's Trade : Is it Enough?*

Kyoochul Kim, Fellow at KDI

"Despite international sanctions, North Korea's trade has exhibited quantitative growth. However, the sanctions have also limited North Korea's trade partners to China. The surging demand for anthracite in China has skewed North Korea's trade structure, leaving it vulnerable to external shocks and possibly distorting the allocation of resources and diminishing the capital investment in other industries. In response, the South Korean government must make efforts to seek new measures for economic cooperation to encourage North Korea to foster other industries that have comparative advantage. In addition, assistance must be made available to enable North Korea to establish a balanced trade structure by diversifying its trade partners and trade portfolio."

I . Introduction

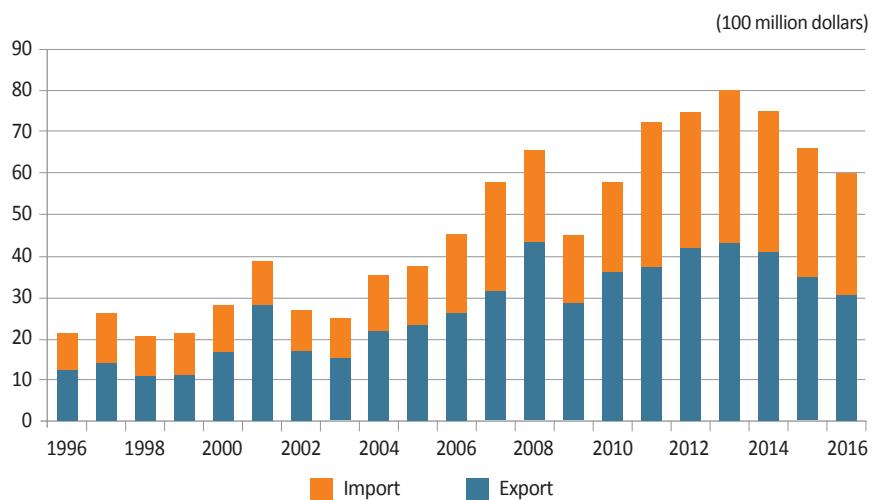
Marking just \$2.15 billion in 1996, North Korea's trade volume¹⁾ soared to \$6.06 billion in 2016 after peaking at \$8.01 billion in 2013. The pace of growth has been consistent despite a slight retreat due to the recent impact of international sanctions.

North Korea's trade has grown in quantity since the 2000s.

Generally, a correlation exists between a country's overseas trade and economic growth. That is, a growth in trade leads to a growth in the economy. However, the opposite is true for North Korea as trade growth has been quantitative but not qualitative. Accordingly,

* Based on Kim, Kyoochul, "A Study of Structural Breaks in the North Korean Economy: Focusing on a Trend Analysis of Sectoral Data," in Suk Lee, ed., *Analysis of North Korea's Economic Changes and Inter-Korean Economic Integration*, Research Monograph, Korea Development Institute (forthcoming) (in Korean).

1) The trade volume in this study is the current value and excludes inter-Korean trade. Such trade is unique as it is conducted between the same ethnic group and is therefore not included in the scope of research.

[Figure 1] North Korea's Total Trade Volume

Source: UN Comtrade

North Korea's economic growth was unable to catch up with the growth in trade due to the qualitative decline.

this study empirically analyzes the long-term qualitative changes in North Korea's trade. Specifically, the impact of the distortions in the allocation of resources caused by the recent changes in North Korea's trade structure on the investments in human and physical capital is examined and South Korea's policy response discussed.

II. Changes in North Korea's Trade Structure

North Korea's trade has been heavily dependent on China from the mid-2000s.

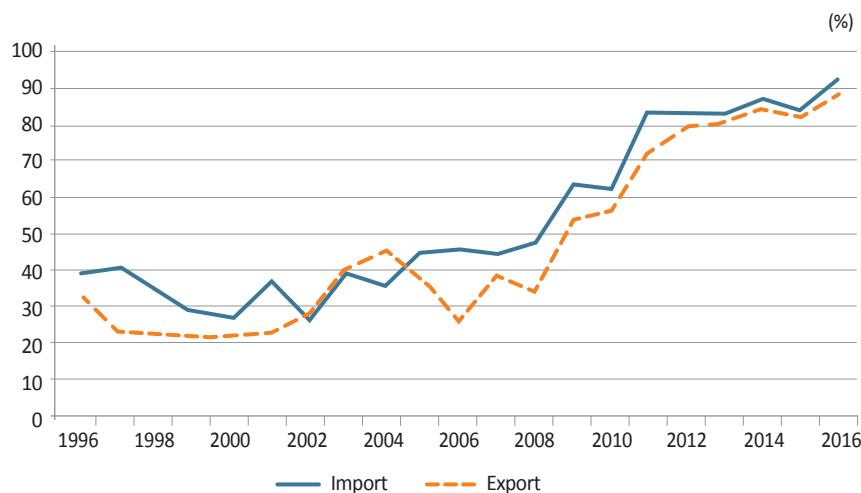
To understand the trade structure, an analysis was conducted on North Korea's biggest trade partners and most exported items by year.²⁾ Based on trade volume, Japan ranked top from 1996 to 2001 and China from 2002 onwards. As for imports, China maintained the number one position throughout with the exception of 2001 (Japan).

[Figure 2] shows the share of the top country in terms of North Korea's total exports and imports which marked a steady 30-40% from 1996 and rapidly escalated from 2009 to post 90% in 2016. Indeed, China established itself as the primary trade partner from the early 2000s. Subsequently, North Korea's trade dependency has continued to intensify, with China now having absolute advantage in North Korea's overseas trade. Since the late 2000s, international relations and politics including economic sanctions have also become drivers of the skewed trade relations between the two border-sharing countries.

In regards to the most traded products (yearly), imports mainly consisted of grains (corn, rice), integrated circuits and iron ore until the early 2000s and crude or refined oil from 2002 to 2016. In the meantime, exports were diverse during the earlier period and included mineral products (gold, zinc, radio, TV parts, seafood, etc. But, from 2008 to

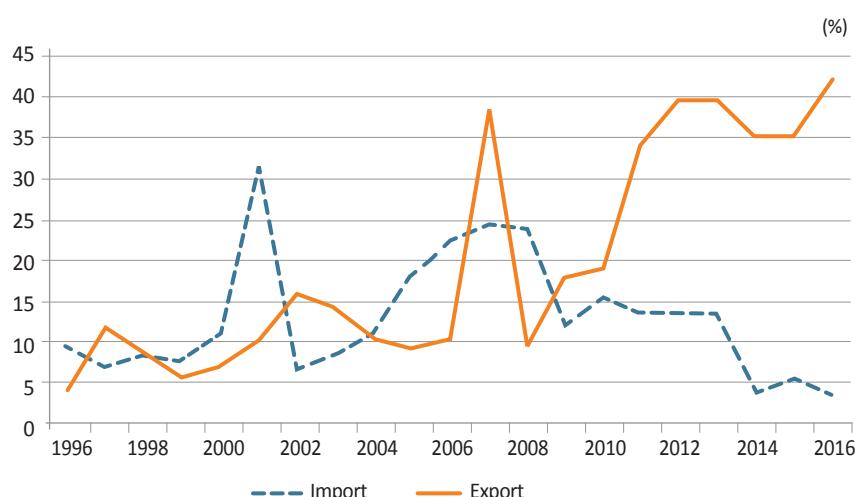
2) This study used UN Comtrade which provides trade data by country, item (HS 6-digit) and year. The analysis period is limited to 1996 onwards as the data on North Korea's trade with China was compiled from 1992 and that with Russia from 1996.

[Figure 2] Share of the Top Ranking Country in Terms of North Korea's Trade Volume



Source: Ibid.

[Figure 3] Share of the Top Ranking Product in Terms of North Korea's Trade Volume



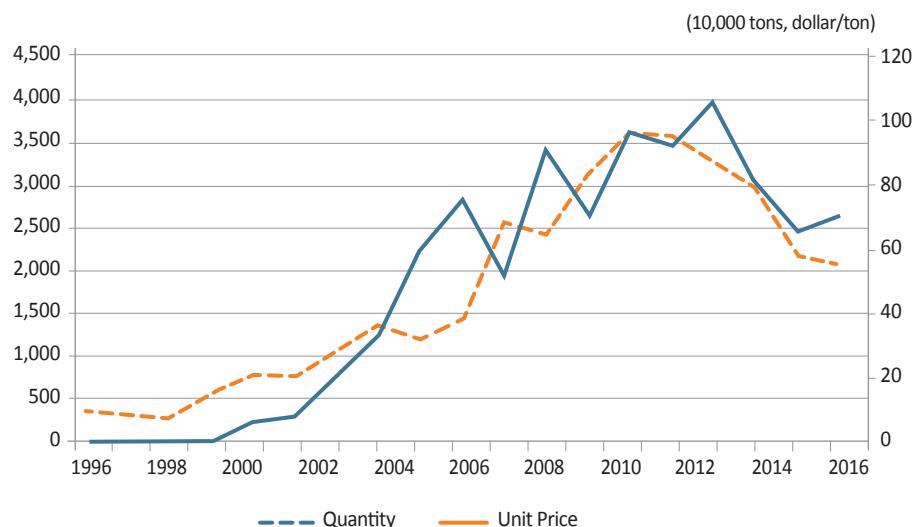
Source: Ibid.

2016, anthracite took the lead as the most exported item. [Figure 3] shows the share of the most traded items for the respective years. Notably, the share of anthracite exports surged from 2008 while that of petroleum imports declined. Specifically, the share of anthracite, the primary export product in 2016, accounted for 40% of total exports as that of petroleum, the biggest import item, fell below 5%. This indicates that although petroleum remains an important resource, its share has declined due to North Korea's diversification of its import portfolio.

The rapid increase in North Korea's export of anthracite could be due to the following demand- and supply-side factors. First, anthracite prices skyrocketed on the sharp increase in the demand for fossil fuel resulting from China's fast economic growth. As in [Figure 4],

From 2008, North Korea's top export item has been anthracite and its export volume has expanded sharply.

[Figure 4] Quantity and Unit Price of China's Anthracite Imports



Source: Korea International Trade Association (KITA) website (<http://stat.kita.net/>)

The spike in North Korea's anthracite exports from the late 2000s was driven by demand factors including an increase in the demand for fossil fuels on China's economic development and also supply factors including the difficulties in earning foreign currency.

both the amount and price of China's anthracite import shot up from the mid-2000s as the increase in demand and prices propelled the production and export of anthracite in North Korea.³⁾ Second, international sanctions intensified following the first nuclear test in 2006. And in 2010, South Korea imposed the 'May 24 Measure,' halting all North-South trade with the exception of Kaesong Industrial Zone, and deadlocking the inflow of foreign currency to North Korea. As a solution, North Korea strategically expanded its anthracite export to China.

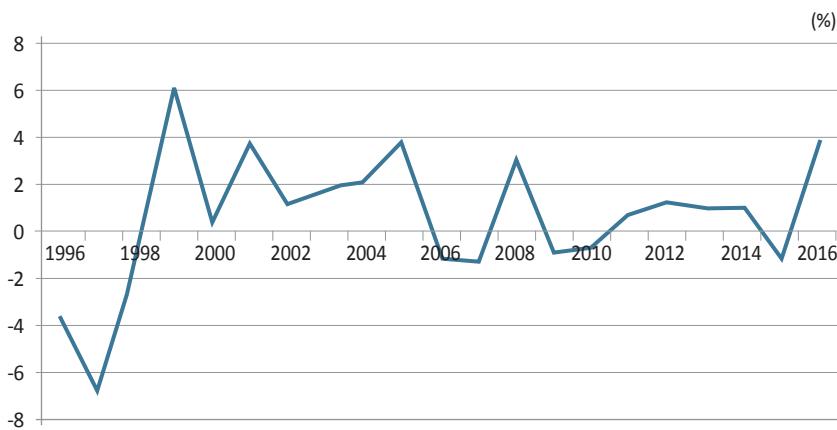
III. Analysis of North Korea's Trade Quality

Literature on North Korea's trade hitherto have mainly centered on the quantitative aspects. Based on research stating that the increase in North Korea's trade can explain its economic growth,⁴⁾ North Korea's economic growth rate should have consistently shown a positive value in line with the continued growth in trade volume from the late 2000s. However, as shown in [Figure 5], North Korea's economic growth rate has not increased but rather, recorded negative figures since the late 2000s to the present. As such, North Korea's trade, which has undergone quantitative growth, cannot explain the economic slump. Hausmann *et al.* (2007) showed that in addition to quantitative indicators such as trade volume, a qualitative level of trade including which products are being exported is also needed to determine a country's income level and long-term economic growth. That is, for long-term sustainable economic growth, products that can be steadily exported are needed and not a temporary increase in trade volume.

3) Lee (2015).

4) Lee (2004).

[Figure 5] North Korea's Economic Growth Rate



Source: Bank of Korea (BOK)

Researchers have recently begun to analyze North Korea's trade quality by examining the industrial structure through data on traded goods.⁵⁾ This study placed focus on the qualitative aspects and quantified the changes by period to examine, compare and verify the changes in North Korea's trade.

Based on the understanding that 'export items are vital factors in economic growth,' Shirotori *et al.* (2010) categorized resources into physical capital,⁶⁾ human capital⁷⁾ and natural capital⁸⁾ in line with the idea that countries that are richly endowed with certain resources (comparative advantage) are most likely to export products related to them. In addition, the study quantified the factor intensity level of each resource for products classified under the Harmonized System (HS) 6-digit system—one of the most detailed international classification system for trade items. The methodology helps to calculate how much physical and human capital are required to produce a certain good. This study applied the above revealed factor intensity indices to North Korea's export data to calculate the input level of physical and human capital in accordance with the export share of the respective items. The formula below was used for the calculation.

$$\text{input} = \frac{\sum_j (EX_j \cdot RFI_j)}{\sum_j EX_j}$$

EX_j denotes the export amount of product 'j' exported by North Korea and RFI_j the revealed factor intensity index of 'j' estimated using the methodology by Shirotori *et al.* (2010).

The trends in North Korea's physical and human capital investment helps to evaluate the quality of its export and to project the sustainability of its long-term economic growth.

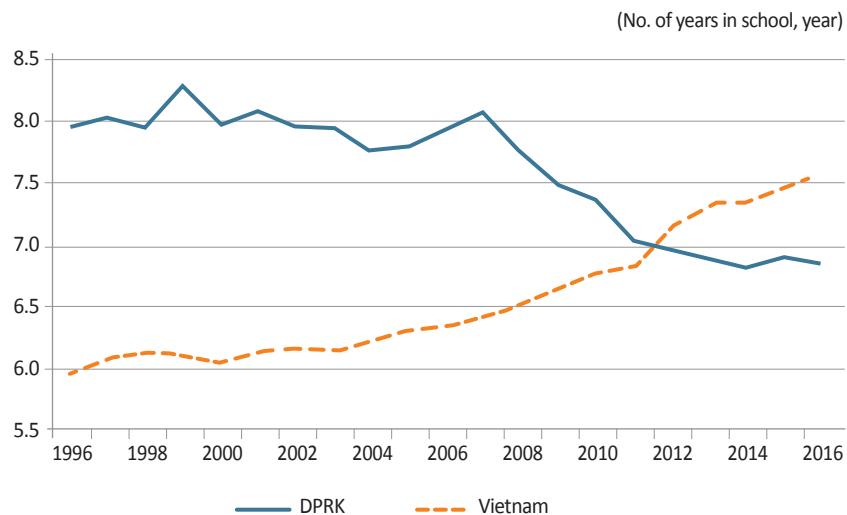
5) Kim (2013) examined the structure of North Korea-China trade using the OECD's industrial classification system which is based on technology intensity and Choi *et al.* (2017) studied how the composition of North Korea's trade items is related to industrial policy.

6) National net capital stock per worker calculated using the Penn World Trade for 1971-2003 (136 countries).

7) Average years in school was calculated based on Barro and Lee (2001) and the UNESCO Census and Survey.

8) Arable land from the World Bank Data (World Development Indicators) was used. The international prices of buried resources, agricultural area, meadows, forest and etc. for pertinent years were used to calculate the per capita resource stock.

[Figure 6] Human Capital Input Factors in Export: North Korea vs. Vietnam



In other words, the sum of the export volume for each item multiplied by the revealed factor intensity indices divided by North Korea's total export volume equals the physical and human capital input factors. The yearly figures can be understood as the quantified average physical and human capital input that North Korea used to produce items exported during the pertinent year. The accumulation of physical and human capital is a significant factor for economic growth and has been proven both theoretically and empirically. Thus, the average trend in physical and human capital input used for export items reveals not only the quality of North Korea's exports but also the sustainability of its economic growth.

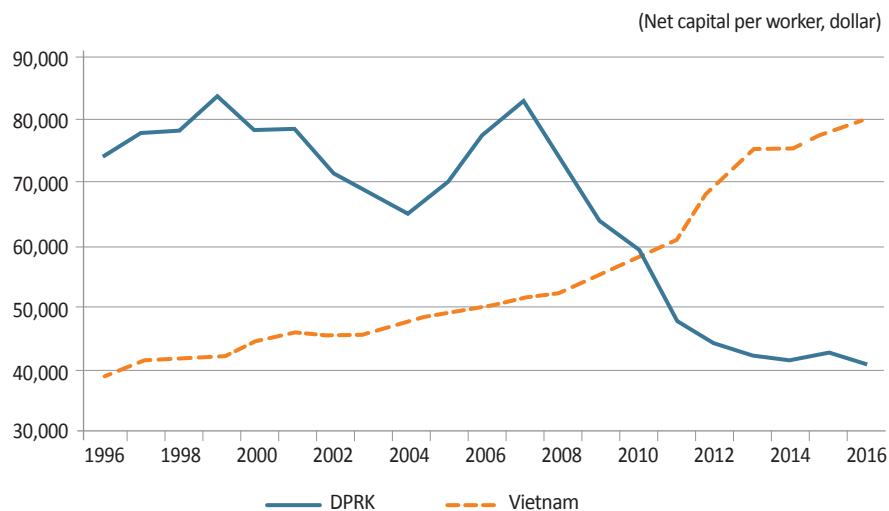
As shown in [Figure 6], physical and human capital input for North Korea's export items have been on a constant decline since the late 2000s, mostly due to the continued increase in the share of anthracite exports during this period.⁹⁾ The physical and human capital input for anthracite were analyzed to be \$0.26 million and 6.53 years, respectively, accounting for 7.6% and 15.7% of the bottom tier among 5,035 items at the HS 6-digit level. This means that anthracite is a low-level product requiring little input.

China became North Korea's fastest-growing trade partner from the mid-2000s following the international sanctions imposed against the latter. North Korea ramped up its export of anthracite to meet the surging demand resulting from China's rapid economic development, and overall trade grew as the change in trade structure increased export volume and expanded import capacity. However, the biased trade structure is inevitably sensitive to the fluctuations in China's economy. Additionally, a structure that is centered on anthracite is vulnerable to the frequent changes in

An anthracite-dependent export structure would reduce the investment in physical and human capital, possibly leading to long-term economic stagnation.

9) Generally, capital is a stock variable and export a flow variable. The input level for the human and physical capital in [Figure 6] and [Figure 7] were revealed through the export items for the pertinent year and as such, are closer to being a flow variable. Thus, the continued decline in this figure since the late 2000s implies the accumulation of North Korea's human and physical capital (stock) also declined. However, if this continues in the long-term, it will most probably reduce investment and weaken long-term capital accumulation.

[Figure 7] Physical Capital Input Factors in Export: North Korea vs. Vietnam



international prices which will likely damage economic stability.

On the export boom in North Korea's anthracite to China, mining companies are recruiting laborers and technicians from state-owned companies in other industries. And on a national level, mining has priority not only in terms of labor but also essential intermediary goods including food, electricity and petroleum, etc.¹⁰⁾ That is, due to North Korea's anthracite exports to China, resources including human and physical capital have been reallocated, centering around the coal industry.

At the initial stages of economic growth in underdeveloped countries such as North Korea, it is common to expand the export of natural resources in order to increase capital investment. However, if the export structure becomes bound to the export of minerals, this will most likely distort the allocation of resources and deal a blow to the economy. Accordingly, if the anthracite-based export structure becomes a long-term condition, it could diminish the competitiveness of other industries that are in need of both human and physical capital. This type of export structure is reminiscent of the 'Dutch disease,' which was coined after the Netherlands discovered natural gas deposits and the export boom led to an overall decline in industrial investment and ultimately, long-term economic recession.

For an international comparison of the trends in physical and human capital input for North Korea's export items, this study extracted Vietnam's input values using the aforementioned methodology. Vietnam, like North Korea, is a socialist country but transformed successfully into a market-oriented economy (both countries are often compared to each other). Vietnam too achieved quantitative growth in trade after the 1990s and more than tripled its export volume from \$6.9 billion in 1996 to \$21.9 billion in 2016. However, Vietnam's growth differs from North Korea as its trade quality also improved.

Vietnam's physical and human capital input for export items have moved in the opposite

Vietnam's exports have grown in both quantity and quality, since consistently expanding its export of high-tech products, contrary to North Korea whose trade quality has weakened.

10) Joung (2016).

direction to North Korea's. Both continued to rise from 1996 to 2016 but Vietnam surpassed North Korea during the 2010s. Vietnam mainly exported primary agricultural commodities such as rice and coffee in the 1990s, apparels in the 2000s and electronic parts from 2010 onwards. On the other hand, North Korea, long known as an industrial country, mostly exported electronic products in the 1990s and anthracite from the mid-2000s. Accordingly, the countries' export structures have changed differently, causing different impacts to their economic growth trajectory.

Vietnam has shown consistent growth, recording an economic growth rate of over 5% since 1996. At the same time, however, North Korea's economy has remained stagnant, marking negative figures ([Figure 5]). In the post-Doi Moi era, Vietnam's economic structure underwent reform, and adopted an open stance in terms of investment and trade towards the international community. As such, the trade structure shifted towards manufacturing. In comparison, due to its closed and negative attitude to the outside world, North Korea's trade has become overly dependent on its anthracite exports to China, which has, in turn, restricted economic growth.

IV. Conclusion and Policy Implications

North Korea's China- and anthracite-dependent trade structure is vulnerable to external shocks as well as reducing human and physical capital investment, diminishing long-term growth.

From the 2000s, North Korea's trade has expanded sharply, especially in terms of quantity. A closer look into the expansion, however, reveals a decline in quality. The sanctions imposed by the international community intensified North Korea's dependency on its trade with China. Indeed, in response to China's escalating need for fossil fuels, North Korea boosted its anthracite export which does not require much input of physical and human capital. And, owing to the changing trade environment, North Korea's exports as well as imports grew rapidly. Economic growth was also spurred by the increased investment in the anthracite industry at the early stages of economic development. However, if North Korea is unable to shift away from its anthracite exports and biased trade structure, it will reduce the capital investment needed to foster other industries and diminish economic development in the long-term. In other words, North Korea's heavily dependent export structure (China and anthracite) is highly atypical and would inevitably have a negative impact not only on economic stability but also on long-term economic growth.

The South Korean government needs to act as a bridge between North Korea and the world, helping North Korea discard the existing trade structure and transform itself into a normal member of the global economy.

The South Korean government needs to elaborate on the long-term measures for economic cooperation which could bolster the North Korean economy. For instance, when the sanctions are lifted, South Korea should work to encourage North Korea to broaden its trade partners by collaborating with such international organizations as the IMF and World Bank to connect North Korea to the rest of the world. Furthermore, measures must be examined to induce North Korea to reduce its share of exports of low value-added products like anthracite, and instead, foster other exporting industries such as apparels, electronics and software using high-tech equipment in which North Korea has a comparative advantage.

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