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Decline in the DPRK's Anthracite Export to China: Causes and Implications*

Jong-Kyu Lee, Fellow at KDI

"North Korea's anthracite export to China, which represents more than 40% of its total exports, is experiencing fall outs from a downturn in export unit prices, China's dwindling steel industry, the Chinese government's restructuring plans for the steel industry, and strengthened environmental regulations. The time has come for North Korea to reshape its external trade structure which has persevered since the May 24 measures. In recognition of this, the South Korean government now needs to consider flexible North Korea policies which will provide incentives for the North Korean economy."

Ⅰ. Issue

With North Korea lacking export competitiveness in most areas, its anthracite export to China has become particularly important for the economy as a source of hard currency. Following the May 24 sanctions, anthracite export to China marked 40.4% of North Korea's total exports in 2011, rising to 41.3% in 2012, and 42.7% in 2013. The US$1.37 billion posted in 2013 outperformed not only all other export items i.e. iron ore, clothing, fishery

* This is a summary excerpt from Lee, Jong-Kyu, "What Determines DPRK's Anthracite Exports to China?: Implications for the DPRK's Economy", *KDI Journal of Economic Policy 2015*, 37(2): 19-43.

products, etc. but also outstripped the mobile phone sector, Gaeseong Industrial Complex project, labor export, tourism, and other means of foreign currency.

North Korea's anthracite export to China has greatly contributed to the stabilization of the North Korean economy.

The hard currency earned has ensured a stable supply of materials to the North Korean economy; which is structured so that it is not dependent on the external world for living necessities, capital goods, strategic materials, and so on. Given this, it can be assessed that North Korea's anthracite export to China has contributed to the positive growth of the North Korean economy for three consecutive years and downward stabilization of prices and exchange rates.

North Korea's economic journal the *Economic Research* highlights the significance of anthracite export to North Korea. North Korean economist Kang Kyung-hui asserted, "Only when we strike a balance between import and export can we import the necessary materials in a timely manner without falling into debt to other countries " (2012, p.55). Kim Hyang-suk claimed, "Increased import of foreign currency is not the goal itself, but aimed at supporting the necessary spending of foreign currency" (2010, p.40). In line with this, exports of globally competitive items have become the focal point. Choi Young Ock stated, "Gathering, processing, and exporting resources is expected to be significant to the development of the national economy and the improvement of people's lives," emphasizing the earning of hard currency through exports of natural resources (2013, p.34).

Analysis into the determinants of North Korea's anthracite export to China will offer foresight into the changes in the North Korean economy albeit indirectly.

Despite the gravity, there has been little study on the actual determinants of North Korea's anthracite export to China; the only recognition is that the export is influenced by China's markets. Such studies will assist policy makers in South Korea understand North Korea's internal circumstances and changes in economic policies, which are normally unaccessible, albeit indirectly and establish North Korea policies based on the results. In this context, this paper will analyze the factors causing the recent drops in North Korea's anthracite export to China and examine their effects on and meanings to the North Korean economy.

Ⅱ. Status of North Korea's Anthracite Export to China

North Korea's exports reached a new high in 2013 despite hurdles at home and abroad, wholly owing to the increased trade with China. According to the Korea Trade-Investment Promotion Agency (KOTRA), North Korea's dependence on China for exports stood at 89.1% in 2013.[1] However, in 2014, a sudden fall in North Korea's export to China reduced

1) Dependence reaches 84.1% by UN standards and 73.8% by IMF standards. See "Analysis of North Korea's Trade Structure and Its Implication for Inter-Korean Trade (Koh, Ildong et al., Research Paper 2008-05, KDI, 2008) for difference between each data

<Table 1> North Korea's Major Export Items to China

(US$100 million, %)

	HS	Name of Item	2013		2014	
			Amount	Growth Rate	Amount	Growth Rate
1	2701	Coal	13.8	15.1	11.4	-17.7
2	2601	Iron Ore	3.0	20.1	2.2	-25.7
3	6201	Men's Overcoat	1.3	42.6	1.6	24.2
4	6203	Women's Overcoat	1.2	28.4	1.5	25.1
5	6202	Women's Jacket	1.2	32.3	1.4	17.6
North Korea's Total Exports to China			29.1	17.2	28.4	-2.4

Note: Year-on-year growth.
Source: China's General Administration of Customs and Korea International Trade Association(http://www.kita.net/), date of search: May 4, 2015.

<Table 2> Amount, Volume, and Unit Price of North Korea's Anthracite Export to China

(US$10,000, 10,000 tons, US$/ton)

	Amount	Volume	Unit Price
2001	171	9	19.8
2002	734	41	18.2
2003	1,543	75	20.7
2004	4,909	157	31.2
2005	10,827	280	38.6
2006	9,653	248	38.9
2007	16,261	374	43.5
2008	20,126	254	79.3
2009	25,378	360	70.5
2010	38,619	460	83.9
2011	112,685	1,105	102.0
2012	118,979	1,181	100.8
2013	137,371	1,649	83.3
2014	113,218	1,543	73.4

Note: Corrected data were used for 2009. See page 6 for further discussion on data correction.
Source: China's General Administration of Customs and Korea International Trade Association(http://www.kita.net/), date of search: May 4, 2015.

its overall export from the previous year. The North's total trade with China shrank 2.8% year-on-year to US$6.36 billion in 2014 with exports dipping 2.4% to US$2.84 billion and imports, 3.0% to US$3.52 billion. Considering North Korea's basic economic structure in which food, crude oil, living necessities, etc. are imported from China while natural resources are exported to support the imports, the contraction in trade with China in 2014 may have put a burden on the North Korean authorities. The problem is exacerbated by the fact that the fall was apparent not only in imports (-3.0%), where statistics showed no import of crude oil, but also in exports (-2.4%).

Drop in North Korea's anthracite export to China in 2014 caused a fall in its overall trade with the country.

Among others, the export of coal (mostly anthracite) and iron ore, the main export items, fell sharply (see Table 1); export of coal plunged by approximately 17.7%, playing a critical role in the contraction of the overall export to China. The unit export price of anthracite tumbled from US$83.3 per ton in 2013 to US$73.4 per ton in 2014, lowering the total amount of export and presenting a 'price effect.' A 'quantity effect' also materialized with the export volume shrinking from 16.49 million tons in 2013 from 15.43 million tons in 2014. As a result, North Korea saw the price, total amount and volume of its anthracite export simultaneously decline for the first time since it began exporting natural resources to China in earnest from 2000 (see Table 2). To the North Korean authorities, the reduction in volume was more serious as the surge in its anthracite export to China from 2000 was 82% attributable to the quantity effect arising from the sharp increase in Chinese domestic demand and only 18% attributable to the price effect.[2)]

2) "Study on Inter-Korean Economic Integration: Strategies for North Korea's Economic Reform and Transition" (Lee, Suk [Ed.], Research Paper 2013-05, KDI, 2012) separated the price effect and the quantity effect in its analysis of the causes of growth in North Korea-China trade. This approach was adopted for this study.

Steel makers and ceramic manufacturers and Shandong Province, Liaoning Province, Hebei Province, and Jiangsu Province have been the main consumers of North Korean anthracite.

Despite being the world's largest coal producer, generating approximately 3.65 billion tons of coal as of 2012, China's import of coal has exceeded export since 2005 with the demand for imported coal surging from the early 2000s. Increased domestic demand, reduced production of anthracite, weakening price competitiveness, etc. have been cited as the causes. Since 2000, China has imported anthracite mostly from Vietnam and North Korea. In 2013 and 2014, North Korea was China's largest source of anthracite.

Nevertheless, this does not imply that North Korean anthracite is a substitute for Vietnamese anthracite. It is reported that the main consumers of North Korean anthracite, which is considered high quality, are steel and ceramics manufacturers while provincial power plants are the main consumers of Vietnamese anthracite which is considered lower in quality. Moreover, due to high transportation costs, trade of anthracite is concentrated in areas in close proximity to the deposits, reflecting the characteristics of regional industries. As such, North Korean anthracite is mainly used in the eastern region of China, including Shandong Province, Liaoning Province, Hebei Province, Jiangsu Province, etc. while, transactions of Vietnamese anthracite mainly occur in the southern area, which includes Guangdong Province, Zhuang Autonomous Region of Guangxi, Hainan Province, Hunan Province, etc. Therefore, it is necessary to analyze the export patterns of North Korean anthracite by each region of China to understand the determinants of anthracite trade between the two countries.

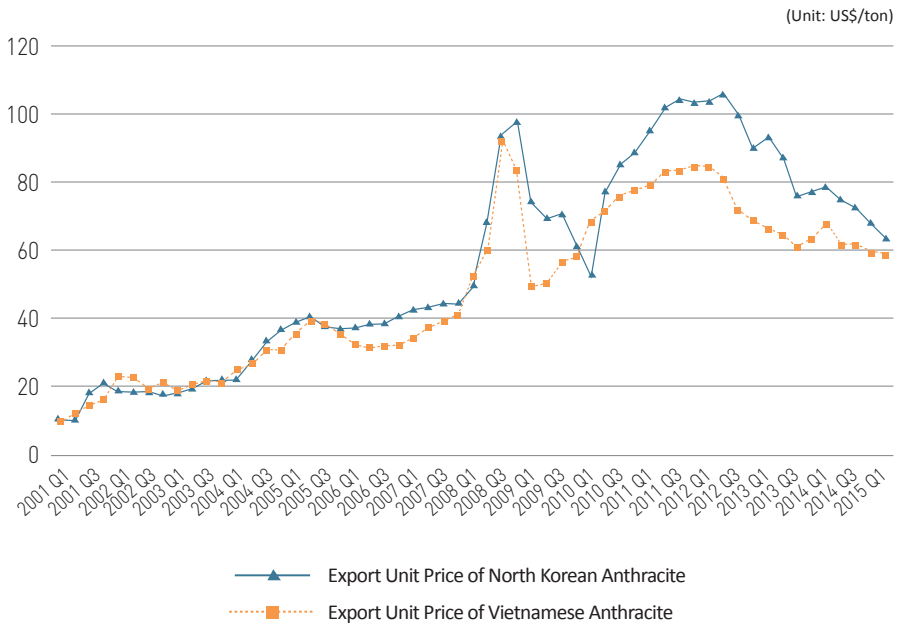
Price of North Korean anthracite fell to US$73.4 per ton in 2014 from US$102 in 2011, mainly influenced by the slump in the world's steel industry and a sluggish Chinese economy.

Ⅲ. Determinants for the Decline in North Korea's Anthracite Export to China

1. Price: Fall in Export Unit Price

As shown above, the export unit price of North Korean anthracite has steadily fallen since 2012 after peaking at US$102 in 2011. At end-2013, Jang Song Thaek was executed for the "act of treachery to his country by selling off the nation's valuable natural resources at a cheap price." The fall in price, however, continued through 2014, recording US$73.4 per ton and then into 2015, reaching US$62.4 per ton in March. The fall in price is not limited to North Korean anthracite. The price of Vietnamese anthracite imported to China slid to US$62.5 per ton after peaking at US$82.7 per ton in 2011. International prices of anthracite have also steadily dropped since posting record breaking figures in 2011. Accordingly, recent falls in the export price of North Korean anthracite to China probably lies in economic circumstances such as a stagnation in the worldwide coal industry and China's economic slowdown, rather than in political factors including soured relations between the two countries.

[Figure 1] Falls in Export Unit Price of North Korean Anthracite



Note: Revised data were used for 2009. See page 5 for further discussion on data revision.
Source: China's General Administration of Customs and Korea International Trade Association(http://www.kita.net/), date of search: May 4, 2015.

Fall in unit price was a common factor of reduced export scale for major destinations.

Upon closer examination of the four major destinations of North Korean anthracite in China; in Shandong Province, the biggest importer of North Korean anthracite, price falls (-12.6%) had a direct impact on the total amount of North Korea's anthracite export which decreased 14.1% in 2014 from the previous year. Steel makers in Rizhao City, ceramics manufacturers and nickel refineries in Linyi City, and ceramic manufacturers in Zibo City were the main consumers of North Korean anthracite. Falling prices also had an impact on the total amount of North Korea's anthracite export to Jiangsu Province, where the price cuts (-8.3%) pushed down the total amount (-2.8%) despite an increase in volume (6.0%). In the meantime, a more drastic contraction in export volume reduced the total amount of exports in Liaoning and Hebei Provinces. Known main consumers of North Korean anthracite are steel makers in Tangshan City and Tianjin City in Hebei Province, and smaller steel makers and ceramics manufacturers in Liaoning Province.[3)]

2. Demand: China's Withering Steel Industry

Before conducting a demand analysis, data revision was carried out as there was a statistical break (from August to November) in the 2009 data on North Korea-China

3) These were confirmed through field research of people in China who are involved in trade with North Korea, interview with Bang Kyeong-zin in charge of inter-Korean resources cooperation at Korea Resources Corporation, etc.

The monthly statistical sums of the export of the 'North Korea' category and the 'Other unspecified Asian countries' category of China's General Administration of Customs generally correlate with those of the UN's annual trade statistics.

<Table 3> Amount, Volume, and Unit Export Price by Major Destination (as of 2014)

	Stake in North Korean Anthracite Exported to China (%)	Amount (US$ million)	Volume (1,000 tons)	Unit Price (US$/ton)
Shandong Province	44.6	504.7 (-14.1)	7,149 (-1.7)	70.6 (-12.6)
Hebei Province	20.5	232.0 (-25.9)	3,217 (-16.3)	72.1 (-11.4)
Jinagsu Province	17.6	199.6 (-2.8)	2,545 (6.0)	78.4 (-8.3)
Liaoning Province	12.7	143.8 (-36.6)	1,842 (-27.5)	78.1 (-12.6)

Note: Figures in parenthesis are year-on-year growth.
Source: China's General Administration of Customs and Korea International Trade Association(http://www.kita.net/), date of search: May 4, 2015.

<Table 4> Revision of North Korea-China Trade Statistics (2009)

(US$10,000, 10,000 tons)

Month	Statistics of China's General Administration of Customs						UN Comtrade	
	North Korea		Other Asian Countries		North Korea + Other Asian Countries			
	Amount	Volume	Amount	Volume	Amount	Volume	Amount	Volume
1	1,459	19	-	-	1,459	19		
2	1,626	21	-	-	1,626	21		
3	2,397	33	-	-	2,397	33		
4	3,374	50	-	-	3,374	50		
5	3,312	48	-	-	3,312	48		
6	4,544	65	-	-	4,544	65		
7	4,032	59	-	-	4,032	59		
8	-	-	3,420	47	3,420	47		
9	-	-	1,018	14	1,018	14		
10	-	-	49	0.7	49	0.7		
11	-	-	29	0.4	29	0.4		
12	119	2	-	-	119	2		
Total	20,863	297	4,515	63	25,378	360	25,619	360

Source: China's General Administration of Customs, UN Comtrade, and Korea International Trade Association(http://www.kita.net/), date of search: May 4, 2015.

trade.[4] Without such a revision, the recent trend in North Korea's external trade may be misinterpreted. For instance, North Korea conducted the second nuclear test in May 2009, which was followed by UN sanctions. Concluding that there was no trade between North Korea and China in that period may induce a misinterpretation that China was the most active in imposing sanctions.

There is no existing literature on how the data should be corrected in this case. The 2009 statistics of China's General Administration of Customs has a new category entitled, 'Other unspecified Asian countries,' which covers data on coal, crude oil, oil products, grains, and so on. This alludes the possibility that China classified its trade with North Korea into this new category. The sums of the monthly amount and volume of export of the 'North Korea' category and the 'Other unspecified Asian countries' category generally correlate with those of the UN's annual trade statistics.[5]

Regression analysis showed that local steel production in China has the biggest impact on North Korea's anthracite export.

Following the data revision, a regression analysis was conducted on the panel data by province and quarter.[6] Anthracite export to each province was taken as a dependent variable; and the final demand for anthracite (electricity output and steel production), business cycle, price, distance, and sanctions were applied as independent variables. Meaningful variables of these would be the determining factor of North Korea's anthracite export.

4) For further discussions, see chapter 7 (External Trade, Lee, Jong-Kyu) of "Issue Analysis of North Korea's Economic Sectors and Implications for North Korea Policies" (Lee, Suk [Ed.], Research Paper 2014-07, KDI, 2014).
5) This is true for all such items as iron ore, crude oil, oil product, and automobiles. The sum of monthly data of the two categories is almost identical to UN's annual statistics across the board.
6) Data from total 30 regions (22 provinces, four municipalities, and four autonomous regions, excluding Tibet) and 64 quarters from the first quarter of 1998 to the fourth quarter of 2013 were used. The number of data used for actual observation was much lower since export of North Korean anthracite was concentrated in regions near the border and anthracite was not exported to 13 regions at all.

<Table 5> Regression Analysis: Determining Factors of North Korea's Anthracite Export to China

		Basic Data (No. of Data for Observation is 325)	Revised Data (No. of Data for Observation is 327)
Demand	Electricity Output	-1.06 (0.73)	-1.06 (0.72)
	Steel Production	1.71*** (0.36)	1.70*** (0.36)
Price	Unit Export Price	-1.28*** (0.45)	-1.24*** (0.45)
Business Cycle	Local Economic Growth	-0.42 (0.59)	-0.40 (0.59)
Sanction	UN Resolutions	1.13 (1.01)	1.15 (0.09)

Note: 1. Figures in parenthesis represent standard error. *** p<0.01, **p<0.05, *p<0.1
2. Log analysis included constants and time dummy, which were not reported.
3. Fixed effects were used in the Hausman test, thereby excluding the distance factor.
Source: CEIC, Globefeed, China's General Administration of Customs, and Korea International Trade Association(http://www.kita.net/), date of search: May 4, 2015.

According to Table 5, the analysis revealed that local steel production in China has a strong impact on North Korea's anthracite export while electricity output does not. This is in accordance with the results from field research showing that China's local steel makers are the biggest importers of North Korean anthracite. It is presumed that a 10% rise in steel production in a region raises the region's import of North Korean anthracite by about 17%. This indicates the recent slump in China's steel industry may have reduced the import of North Korean anthracite. The unit price of anthracite also had an effect on export; a rise in price caused a fall in volume.[7] The remaining electricity output, local business cycle, and UN Security Council resolutions had little significance.[8]

The Chinese government's policy plans imply more unfavorable environments for North Korea's anthracite export.

3. Policy: Strengthening Environmental Regulations, Restructuring the Steel Industry

Factors affecting North Korea's anthracite export exist not only in price and demand but a look at the Chinese government's policy plans for the future reveals that there are other unfavorable factors. These factors may negatively effect North Korea's export environments at present as well as in the future.

Above all, the Chinese government's plan to strengthen its environmental regulations will be a detriment to North Korea's anthracite export. According to the Chinese government's air pollution action plan, individual provinces are obligated to meet targets to reduce coal consumption from 2012 to 2017. The target rate is 5% for Shandong Province, 13% for Hebei Province, and 19% for Tianjin City. The action plan is expected to be implemented aggressivly in regions which import anthracite from North Korea. In addition, the temporary measure for anthracite quality management, announced by the Chinese government in September 2014, took effect in January 2015. The measure is

7) An alternative was used for unit export price. Significance varies depending on mix of variables.
8) According to an additional analysis with import of Vietnamese anthracite by province of China taken as the dependent variable, the significance of each variable varied depending on formula, mix of variables, data revision, etc. Therefore, it is not appropriate to analyze the determining factors of export of Vietnamese anthracite using the same model.

aimed at banning companies that import and use anthracite from distributing low-quality anthracite containing pollutants. Notably, the measure stipulates that shipments carrying anthracite with ash, sulfur, mercury, arsenic and/or phosphorus contents that exceed the standard will be turned away. For instance, a North Korean ship carrying the resource was refused at a port in Rizhao City in February 2015 due to an excessive mercury content.[9)]

Another obstacle is the Chinese government's restructuring plan for the steel industry. Chinese steel makers have suffered from steady declines in the export unit price of steel due to oversupply, which led to a drastic fall in profit in 2014. Also, the central government's determination over restructuring seems stronger than ever following its failure to restructure the industry due to resistance from local governments in 2005. Local small and medium sized steel makers with idle facilities are likely to be the main target. The Chinese government is determined to push ahead with the plan; it "announced plans to shut down 100 million tons of uncompetitive facilities by 2017 in the National People's Congress in March 2014 and impose punitive regulations (i.e. electricity charge penalty, limit on bank loans, cut in local subsidy, etc.) on local governments."[10)] These moves are highly likely to have a negative impact on North Korea's export of anthracite.

North Korea is expected to diversify its external trade relations. Thus, the South Korean government needs to prepare more flexible North Korea policies.

Ⅳ. Assessment and Policy Implications

For the past three years since the inauguration of Kim Jong-un, indicators in certain sectors of the North Korean economy have been reasonable; three consecutive years of positive growth, stabilization of prices and exchange rates, and relatively stable food supply. Specifically, the volatility of prices and exchange rates reached the lowest point ever since the 2009 currency reform. These were achieved despite harsh conditions, including international sanctions thanks to the foreign currency earned from the sharp growth in export of natural resources. The North's structure wherein foreign currency is spent to import consumer and capital goods and strategic materials from China has been maintained for the past five years since the May 24 measures. In this regard, the current reduction in North Korea's anthracite export seems a notable change with implications not only for the North's external trade structure but for the overall economy.

The problem is that there is little room for North Korea to expand its anthracite export to China. First, the price of North Korean anthracite exported to China has generally moved in line with international prices, which are likely to continue to fall in the future. Second, China's demand for anthracite is unlikely to increase. This study showed China's steel industry has had the biggest impact on North Korea's anthracite export, and the outlook

9) "China rejects another imports of N. Korean anthracite coal: report" (Yonhap News Agency, April 4, 2014).
10) "Review on Seven Major Issues of the Steel Industry" (Korea Investors Service, 2014)

for the industry is not bright. Thus, without proper solutions such as discovering other industries, the current situation for North Korea is likely to continue. The Chinese central government's environmental regulations and restructuring plan will probably further exacerbate the diminishment of North Korea's anthracite export environment.

Thus far, North Korea has responded to changing external environments by modifying its trade structure. In the past, the North's biggest trading partner was Japan. As economic sanctions in the 2000s blocked the trade with Japan North Korea immediately increased trade with China and South Korea and made up for the deficit in trade with the former with surplus in trade with the latter. North Korea will probably again attempt to secure a stable channel to earn foreign currency by implementing a partial or overall revision to its trade structure. Its recent attempts to diversify external trade relations seem part of this effort.

However, it will be hard for North Korea to normalize its unbalanced trade structure which is heavily dependent on specific countries and items in the short-term. For instance, its trade with China surpassed US$6 billion in 2013 while that with Russia (the second largest trade partner, excluding South Korea) barely exceeded US$100 million. North Korea and Russia agreed to raise the bilateral trade to US$1 billion by 2020. That figure, however, is dwarfed by the volume of trade between North Korea and China and remains nothing more than a goal. In this sense, the North Korean authorities should recognize that South Korea is the best partner for trade to relieve its overdependence on China as well as a critical economic partner to diversify its external trade relations and export items, and attract foreign investments, the goals pursued after the inauguration of Kim Jong-un.

As for the South Korean government, it must understand that North Korea policies and unification discussions which are rigid and centered around the supply side may retard changes in North Korea and worsen the heterogeneity of the North Korean economy, thereby making it more difficult to achieve an economic integration in the future. Therefore, as the first step to resolving the current stalemate in inter-Korean relations, the South Korean government must consider flexible North Korea policies[11)] which provide practical incentives for the North Korean economy under the recognition that inducements for the North Korean authorities to attempt to alter its trade structure exist. ■

11) At this point, plausible options would include promotion of economic exchanges led by local autonomous bodies, facilitation of cultural exchanges led by the private sector, and internal consensus building on the concept of and criteria for humanitarian assistance for North Korea.