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Research Report

Macroeconomic Trends in the Kim Jong-un Era: Continuation or Break?

Dialogue on the North Korea Economy, No. December 2019

Provided in Cooperation with:

Korea Development Institute (KDI), Sejong

Suggested Citation: Kim, Kyoochul; Lee, Suk (2019) : Macroeconomic Trends in the Kim Jong-un Era: Continuation or Break?, Dialogue on the North Korea Economy, No. December 2019, Korea Development Institute (KDI), Sejong

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Dialogue on the North Korea Economy

December 2019



Macroeconomic Trends in the Kim Jong-un Era:
Continuation or Break?

Dialogue on the North Korea Economy

Macroeconomic Trends in the Kim Jong-un Era: Continuation or Break?

Many agree that the economy of North Korea has changed under the Kim Jong-un regime, but there are often different interpretations as to whether these changes are in line with the continued transformation from the 1990s or they should be seen as a completely separate trend. And the way of understanding the shift varies on which side you stand.

In this context, the *KDI Review of the North Korean Economy* September edition chose “Macroeconomic Trends in the Kim Jong-un Era: Continuation or Break” as the first theme of its new section, ‘Dialogue.’ The section covers expert interviews devoted to exploring fundamental and diverse research questions about the North Korean economy in the aspects of economics. We hope that readers find this article interesting and informative.

Dialogue on the North Korea Economy

Time and Venue

CEO Suite, Friday July 12, 2019

Interviewer

Lee, Suk (Senior Fellow at KDI)

—

Interviewee

Kim, Kyoochul (Associate Fellow at KDI)

—

Editor

Kim, Soyoung
(Reporter at the Farmers Newspaper)



LEE. Suk Q.

Please introduce yourself.

KIM. Kyoochul

Hello, my name is Kyoochul Kim, and I do research on the North Korean economy at Korea Development Institute (KDI). I obtained a Ph. D. in economics, but had not been engaged in the study of North Korea during the degree course. Since joining KDI, I have been doing research on the subject for more than three years. At first, I felt unfamiliar with the topic because it was quite different from what I had studied during my study at the Ph. D. program. But now, I enjoy working on the topic very much.

Are there any methods to find out whether there was continuation or break in the macroeconomic trends of North Korea after Kim Jong-un rose to power? If so, please introduce them.

Many argue that the North Korean economy has gone through significant changes since 2012-2013, the initial period of the Kim Jong-un regime. However, it is hard to find substantial discussions on what the changes are or if the changes are real. It seems that most of them tend to argue with their own personal experiences or based on media reports. They often lack strong objective grounds although clear evidences and concrete facts are critical to such arguments.

Economists use Chow test to verify a structural change of an economy. Please see Figure 1 below and imagine that the thick solid lines do not exist. Then, the remaining dots would appear to present similar upward patterns. The patterns, however, are quite different from each other when compared before and after the thin solid line rising from T (time). If one does not pay enough attention, s/he may easily think that the trends of dots follow the dashed line that crosses the chart. This observation will lead to a wrong conclusion on the relationship between axes x and y. Therefore, it is critical to verify the difference in the trends before and after T if the value of T is available. Here comes the Chow test, which is a statistical method used to verify the difference in the gradient and intercept of a trend before and after T.

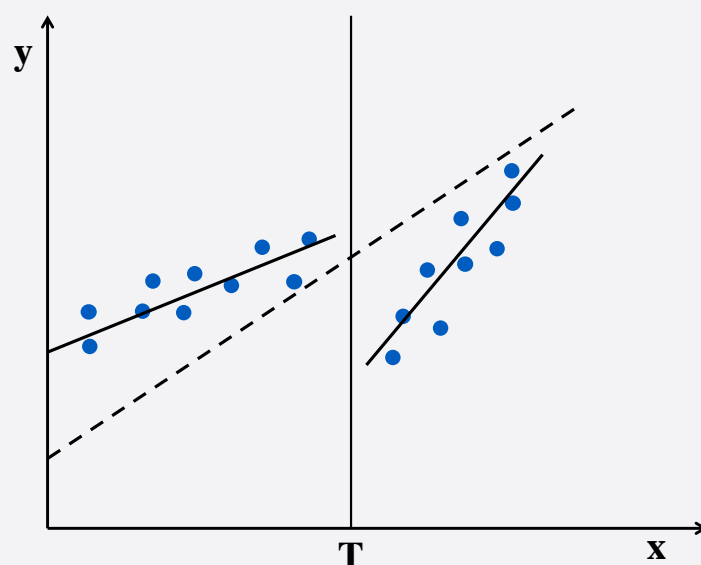
Everyone agrees that the structure of the South Korea economy has changed in many aspects including employment stability and corporate accounting practices, since 1997 IMF financial crisis. Before the



crisis, the concept of a 'life-long employment' had been held; but employment stability has deteriorated and corporate accounting practices have greatly improved since the crisis. Data also confirm that there was a break in the trends of many economic variables before and after the crisis. The break is not only observed intuitively in charts but can also be verified through statistical analysis.

Likewise, it is possible to determine if there has been a break in the trends of North Korean economy before and after the inauguration of Kim Jong-un in 2012 by first intuitively interpreting graphs and then confirming through a statistical verification.

| Figure 1 | Structural Break of A Linear Regression Model



I would like to take this interview as an opportunity to explain the results of statistical verification of any change that arose in the trends of the North Korean economy under the Kim Jong-un regime based on data of various sectors that comprise the economy.

You are saying that it is possible to objectively determine whether an economy has experienced a structural change using classic quantitative methods such as the Chow test, and this applies to the North Korean economy under the Kim Jong-un regime. Then, how does that work? For example, what data do you use for Chow test? Is there one or multiple data to use? Please tell us about it in detail.

People who argue that the North Kore-

an economy has experienced changes often cite the photos or videos of the streets of Pyongyang. Sometimes they do so based on what they heard from visitors to North Korea. For instance, they say, “A lot of things have changed since I was there last time.” or “Many buildings have been built after Kim Jong-un seized power.” These narratives are useful as information but limited as an indication to the general status of the North Korean economy.

If one judges the general situation of North Korea only from the aspects of Pyongyang s/he may believe that the North Korean economy has made more progress than expected. According to visitors, Pyongyang has a number of skyscrapers and stores that sell luxury goods not easily affordable even for South Koreans. However, according to the World Food Programme reports, one out of five North



Korean children are malnourished and 40% of all North Korean people suffer from poor nutrition. If this is true, North Korea is still one of the poorest countries in the world.

The contradiction raises a question, ‘What life is really like in North Korea?’ I believe both sides reveal a bit of truth. From the perspective of observers on North Korea, especially researchers, information about North Korea seems partial as it usually derives from personal experience like mentioned above. Also, when they choose information on North Korea, bias sometimes plays in depending on their political orientation. The contradiction seems to incur unnecessary costs such as the so-called South-South conflicts when establishing policies on North Korea. What I would like to emphasize here is that the assessment of the North Korean economy should be based on objective data and

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*the assessment of
 the North Korean
 economy should be
 based on objective
 data and hard facts*
 ”

hard facts while excluding fragmented information and bias as much as possible.

Some assess the North Korean economy based on their own personal experiences because, they say, statistics on the economy are hard to obtain, and, if any, they are unreliable. Recently, however, the reliability and the availability of data on the North Korean economy have gradually improved as international organizations provide reliable statistics on North Korea, and new kinds of data become available. Of course, it is too early to say that statistics on North Korea are equally diverse, reliable, and of high quality as those on such advanced countries as South Korea and the US. Still, analyzing indicators that are considered reliable should come first when we understand the North Korean economy.

There are many components that form an economy, and the North Korea economy also consists of diverse sectors. Trade data tells us much about the economy, but they are not enough to represent the whole. Likewise, *jangmadang* is essential part of the economy, but it would be ridiculous to try to explain the economy in general only using the data of *jangmadang*. The reality of the North Korean economy would become comprehensible only after reaching a general conclusion based on the analysis of various components.

In this sense, I would like to review four types of economic indicators of the North Korean economy for this interview. First, I reviewed aggregate economic indices such as gross domestic product(GDP) and eco-

nomical growth rates. Second, North Korea's foreign trades including the scale, trends, the structure of trades and export items as well as trade partners were reviewed. Moreover, I researched what impacts export items would have on the economy in the long term, in other words, how the quality of North Korea's trades transformed over time.

Then, I examined informal sectors of the economy, i.e. *jangmadang* or markets. Specifically, currency-related factors including the market prices of rice and market exchange rates between North Korean won and US dollar were examined. Finally, public health and welfare indicators including life expectancy, neonatal mortality rate, infant mortality rate, under-five mortality rate, and immunization rates were analyzed. The comprehensive analysis of the four indicators provided a basis to understand changes the North Korean economy has experienced and whether the economy has become any different from the past under the Kim Jong-un regime. The kinds of statistics mentioned above have been recognized for their verified reliability thus used by most researchers who study North Korea. The producers of those statistics include the South Korean government agencies such as Bank of Korea, Statistics Korea; international organizations such as the Food and Agriculture Organization, the United Nations International Children's Emergency Fund; and customs offices of other countries that trade with North Korea.



What you explained would be like the following. There are diverse methods to verify the characteristics of the trends of the North Korean economy under the Kim Jong-un regime, and Chow test is one of the most common quantitative methods. To conduct the test, objective statistical data should be available. Although still controversial, it is true that the quantity and quality of statistical data on the North Korean economy have been improving. Thus, it is possible now to thoroughly examine and verify diverse economic indicators such as GDP, growth rates, and those for trades, markets, agriculture, public health and welfare to reach a conclusion on whether there is a break in the trends of the North Korean economy. This sounds very interesting and scholarly. I wonder what the outcome of that process

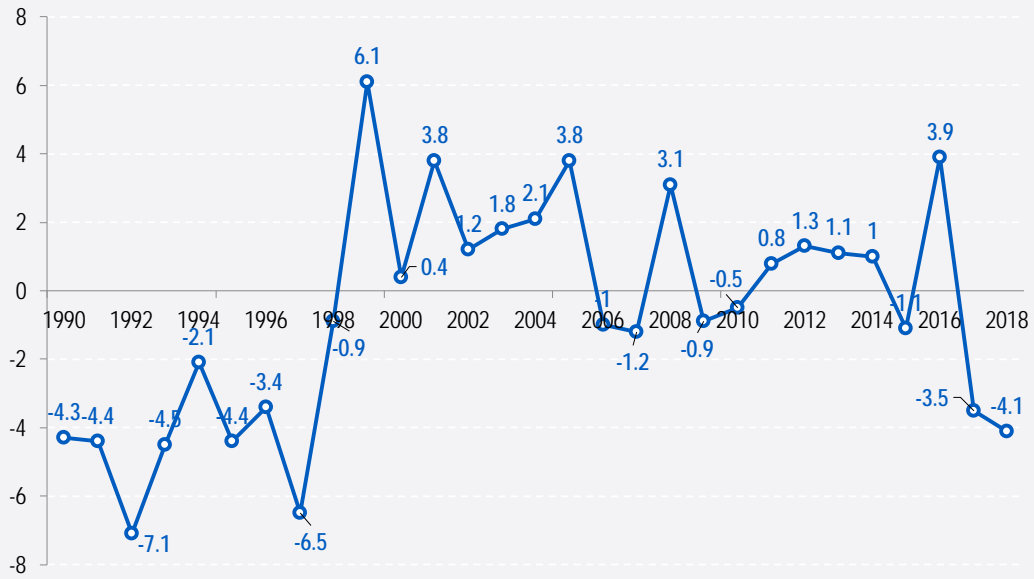
are. Please tell us about the outcome of the statistical verification of GDP and economic growth rates, the two most representative macroeconomic indicators.

An economic growth rate is a representative indicator that shows a country's economic development and growth. As North Korean authorities do not release economic growth rates, the estimates provided by the Bank of Korea are used most widely. The estimates are virtually the only data on the North Korean economy available since the United Nations also cites the BOK data for its reports on the economy.

Figure 2 shows the economic growth rates of North Korea from 1990 to 2018 based on BOK's data. During the period, North Korea recorded negative growth rates from 1990 to 1998, an exceptional phenomenon for a normal economy—meaning that the North Korean economy contracted for a long period of time. Then, the rates shifted to the positive territory in 1999 and remained there before beginning to alternate between the negative and positive territories from the mid-2000s. The alternation means that the North Korean economy has experienced stagnation or a slow growth since then. Because the growth rates show no particular moves right after 2013 when Kim Jong-un seized power, it is hard to argue intuitively that the economy improved significantly under the Kim Jong-un regime. Recently, the growth rates have fluctuated from 3.9% in 2016 to -3.5% in 2017 and then to -4.1% in 2018. Given these, an answer to the question, “Has the North Korean economy changed since the

Figure 2 | Economic Growth Rates of North Korea

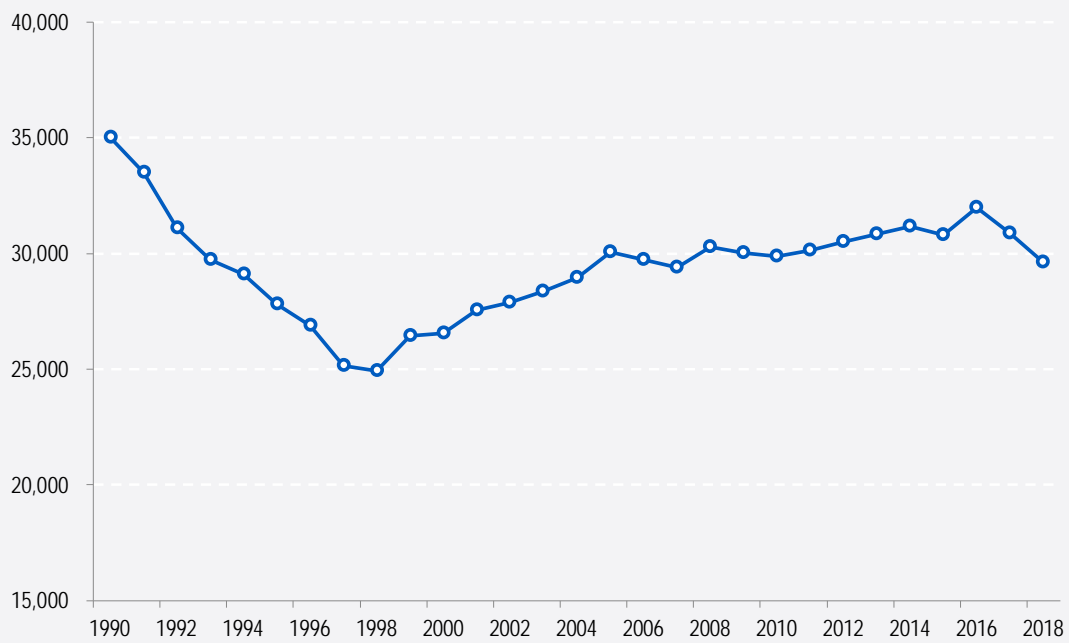
(Unit: %)



Source: Economic Statistics System of Bank of Korea (<http://ecos.bok.or.kr/>).

Figure 3 | Real GDP of North Korea

(Unit: Billion won)



Source: Economic Statistics System of Bank of Korea (<http://ecos.bok.or.kr/>).

inauguration of Kim Jong-un?” would be, “No, it has not.”

Economic growth rates are represented by changes in real GDP that are shown in Figure 3 below. As the growth rates of North Korea fell sharply until 1998, real GDP declined until it reached the lowest point and rose afterwards. Since the late-1990s, the real GDP of North Korea has been growing quite steadily. Thus, the answer to the question, “Has the slope of the real GDP of North Korea become steeper in the Kim Jong-un era?” cannot be “Yes.”

An intuitive observation shows that the aggregate size of the North Korean economy under the Kim Jong-un regime is not much different from before. In addition, the outcome of the statistical verification also indicates that there is no particular difference in the trends of the North Korean economy before and after 2013.

Throughout the entire period covered in Figures 2 and 3, a break appeared in 1999 when the growth rates shifted dramatically from negative to positive. It is thus fair to say that the North Korean economy had experienced a much bigger structural change in 1999 than it did with the inauguration of Kim Jong-un. In other words, in terms of the aggregate size of the economy—e.g. economic growth rates and real GDP—the period under the Kim Jong-un regime can be characterized by continuation rather than a break.

As I understand, “During the period from

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the North Korean economy had experienced a much bigger structural change in 1999 than it did with the inauguration of Kim Jong-un

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the 1990s to the present, the North Korea economy shows a clear break in 1999 as economic growth rates turned from negative to positive and gross domestic product began to grow gradually. Yet, such a break does not appear around 2012 and 2013. This outcome is supported not only by intuitive observation but also by a statistical verification using the Chow test.”
Am I right?

Yes, what I would like to emphasize is doing the research based on data. If someone asks, “What is your grounds for arguing that (the economy of) North Korea has not changed while others say it has,” I will answer, “My argument is purely based

on the results of statistical analysis of data, especially those of BOK, and that led to the conclusion (that the North Korean economy has not changed much under the Kim Jong-un regime).” And that is also a reason why I comprehensively review various kinds of statistics in addition to the aggregate economic indicators

Many argue that the North Korean economy has made a major progress since the inauguration of Kim Jong-un while others say that it is still struggling. You are suggesting that GDP, economic growth rates, and other statistics indicate that the North Korean economy has not shown extensive nor notable changes after Kim’s seizure of power.

GDP or economic growth rates compactly explain an economy with just one indicator. They do not describe specific conditions that exist within an economy such as economic inequality. The BOK statistics show us how much the North Korean economy has grown—or shrank—on ‘average’, but do not provide a detailed description of situation within North Korea, as is often delivered by visitors to North Korea saying, “People were dying of hunger in rural areas of North Korea.”

Most travelers to North Korea visit Pyongyang and witness the evidence of economic progress in the streets. Then they cast a question over a possibility of underestimation of the North Korean economy. In the meantime, it is hard to find media reports that show the reality in rural ar-

reas of North Korea. According to international organizations, it seems that economic conditions have not as much improved in rural areas as they have in Pyongyang. This gap in perception occurs because the growth rates of North Korea reflect not only the economic status of Pyongyang but also that of the remaining parts of the country. In South Korea, too, when the general economic growth rate stands at 2-3%, some areas can grow much faster while others recede.

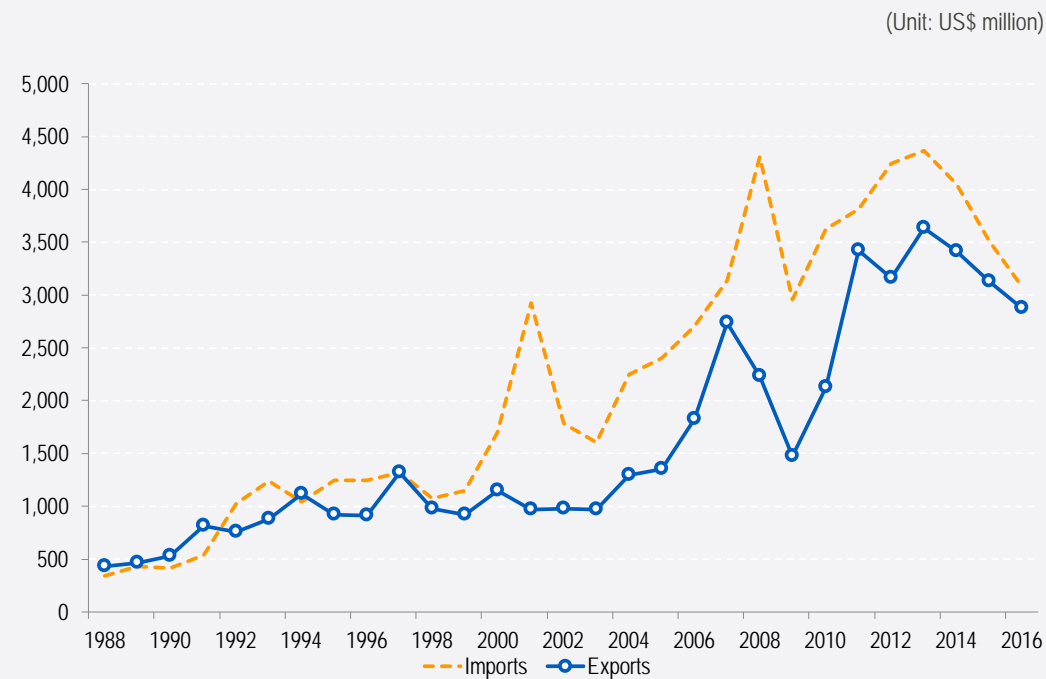
Inequality is a topic that should be dealt with a further study. More research should be done to understand the economic gap among different areas, industries, and social classes of North Korea.

As you mentioned, last year, South Korea recorded a mid-2% growth with the semiconductor sector faring well, but others falling into a slump. I guess this kind of gap may exist in North Korea, too. Let us turn to the next topic: trade. You said there are many indicators of trades such as scale, structure and trade partners. What did you find out from those indicators?

The availability and the reliability of trade statistics are relatively higher than other statistics by the nature of trade that there is a partner country. A country’s imports from North Korea can be turned into North Korea’s exports; and its exports to North Korea as North Korea’s imports.

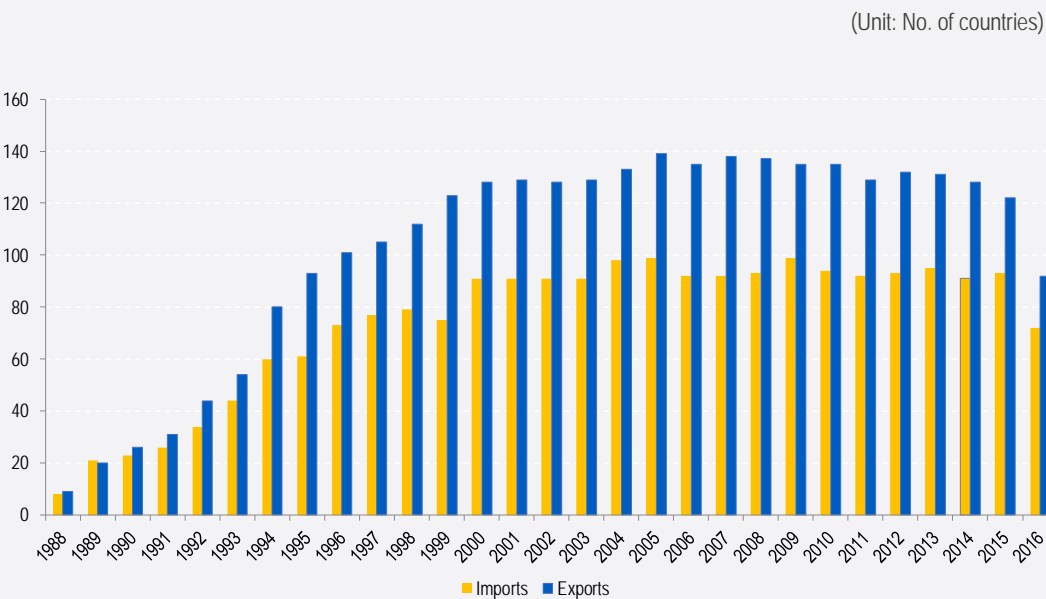
One of the major indicators regarding North Korea’s foreign trades is its scale.

Figure 4 | Size of Trade of North Korea



Source: UN Comtrade.

Figure 5 | Number of Trade Partners of North Korea



Source: UN Comtrade.

Figure 4 shows the scale of North Korea’s trades that grew only slightly from 1988 to the late-1990s. But imports and exports began soaring in 2000 and 2004, respectively. The distinctive feature we observed since 2000 is North Korea’s chronic trade deficits. Since 2014, both imports and exports have shrunk slightly from their peaks pre-

sumably owing to international sanctions

The volume of imports and exports do not tell us about the structure of North Korea’s trades. Figure 5 shows the number of trade partners of North Korea over time. After rising steadily from 1998, the number began to decrease from around

| Table 1 | Biggest Trade Partner of North Korea by Amount

Year	Exports	Imports
	Biggest trade partner	Biggest trade partner
1988	Japan	Japan
1989		
1990		
1991	Mexico	China
1992	Japan	
1993	China	
1994	Japan	
1995		
1996		
1997		
1998		
1999		
2000		
2001		
2002	China	China
2003		
2004		
2005		
2006	India	
2007	Angola	
2008	China	
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		

Souce: UN Comtrade.

2014 when North Korea's exports and imports began shrinking. The number peaked in 2005 when North Korea exported to 130 countries and imported from 99 countries. The number of export destinations of North Korea accounts for about two thirds of the number of the U.N. member states (193), an indication that North Korea is more inclined to an open economy rather than a closed one.

Which country would be the biggest trade partner of North Korea? Table 1 shows that Japan was the biggest export market for North Korea before being replaced by China in 2002. When it comes to imports, the same replacement occurred in around 1992. These shifts mean that the share of China in North Korea's trades has sharply increased from the early-2000s. Please note that data used in Table 1 exclude statistics of inter-Korean trade.

I suspect there are some errors in the export data. In 2007, the biggest trade partner of North Korea was reported as Angola and it was India in 2006. Previously in 1991, it was Mexico. This does not make sense to me. I suspect India, Angola, and Mexico reported wrong data to UN Comtrade by misunderstanding its trade with South Korea as that with North Korea, and the UN agency released such data without any correction.

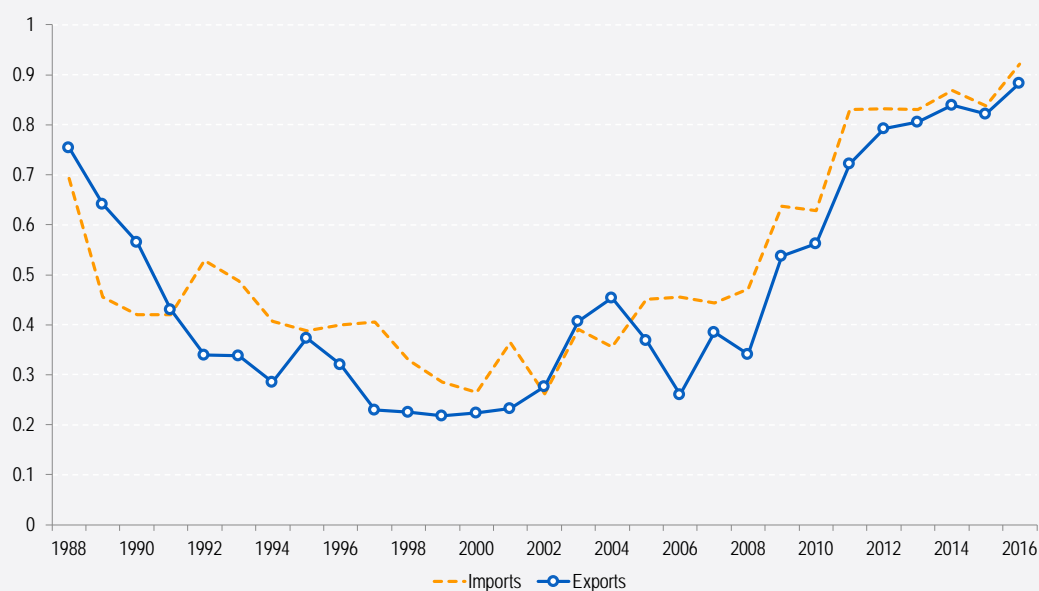
I agree. Although I performed all verification processes available, I am reserved when it comes to if it is appropriate to publish the results. Personally, I believe the

biggest trade partner of North Korea in 2006 and 2007 might be China, not India nor Angola.

Depending on the purpose of analysis, the UN Comtrade data may be often replaced by those from the Korea Trade-Investment Promotion Agency (KOTRA). This is because KOTRA is known to perform its own verification processes. If KOTRA data were adopted for the table, the outcome would have been more acceptable.

Still, KOTRA's data have their own limitations in that data are available only for the major trade partners of North Korea. This puts a restriction on a comprehensive understanding of the overall trade structure of North Korea. Also, KOTRA data



Figure 6 | The Share of the Biggest Trade Partner in Exports and Imports

Source: UN Comtrade.

are not available for all trade items. Thus, despite the reliability issue, UN Comtrade data are much more useful when trying to understand the overall trade structure of North Korea.

As I understand, you used the UN Comtrade data because they show North Korea's trades in a more comprehensive manner although they are less precise than the KOTRA data. The lower level of precision of the UN data should be considered when one interprets the table above, and the KOTRA data may serve as a good complement to the UN data when analyzing the trade structure of North Korea. Having said that, it is crystal clear that North Korea heavily depends on Japan and China for its trades.

Although it is important to know which country is the biggest trading partner, it is equally important to figure out how much North Korea depends on that country by looking at its share out of total. As shown in Figure 6, the shares of the biggest export and import partners consistently declined from 1988 to the late 1990s when Japan was the biggest trading partner of North Korea.

However, since the early 2000s when China became the biggest trading partner of North Korea, its share has dramatically risen in terms of both exports and imports reaching 90% of total in 2016. This implies that the influence of China on North Korea's trades has steadily increased from the early 2000s.

That sounds significant. North Korea's dependence on the biggest trading partner gradually slid throughout the period when Japan was the biggest trade partner indicating North Korea diversified its trade structure. However, at some point, China took over Japan, and since then its share has continuously risen. This means, from the 2000s, export dependence on China has only deepened and the concentration of North Korea's trade structure has intensified. Correct?

Yes, correct. When Japan was the most important trade partner, North Korea traded with a large number of countries as well, thereby lowering Japan's share in its total trade. However, after China overtook Japan, the share of China has grown in both exports and imports. It can be said that there is no need to look at other countries but China to understand the trade of North Korea after the 2000s.

Now, let us look at trade items. Please refer to Figure 7 below. The number of trade items of North Korea classified under the 6-digit HS coding system had risen until the early- and mid-2000s and then began falling, but only slightly, not dramatically.

What is interesting is the fact that import items outnumber export items. This suggests that North Korea imports a variety of goods and exports a limited variety of goods. As is shown in Figure 5 above, the number of export markets of North Korea exceeds that of import sources. As for trade items, however, the opposite holds true. To sum up, the trade of North Korea

is characterized by the export of a limited variety of goods to a number of markets and the import of a variety of goods from a limited number of sources.

In the meantime, the items that dominate the trade of North Korea have changed over time as is shown in Table 2. Before 2002, the biggest import items were grains such as flour, corn, and rice; but oil-related items such as crude oil and refined oil took the position from 2002. As

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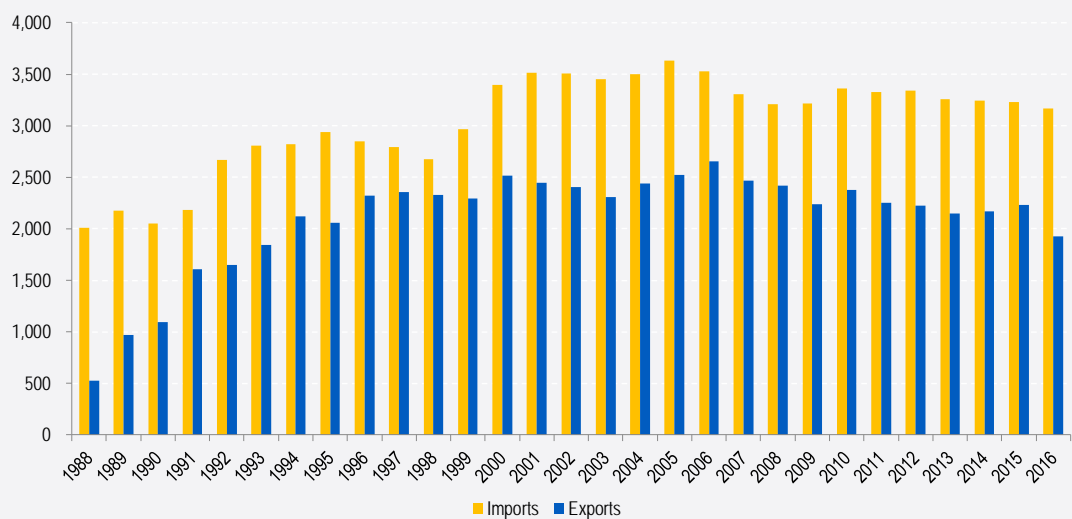
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Table 2 | The Biggest Trade Item of North Korea by Amount

Year	Exports	Imports
	Biggest trade item	Biggest trade item
1988	Gold	Flour
1989	Zinc	Plywood
1990		Flour
1991		
1992	Fishing boat	Crude oil
1993	Rolled steel sheet of iron or non-alloy steel	
1994	Radio, TV radar	
1995		
1996	Sea foods	
1997	Gold	Corn
1998	Freight vessel	Integrated circuit
1999	Sea foods	Iron ore
2000	Refined oil	Crude oil
2001	Sea foods	Rice
2002		Refined oil
2003		Crude oil
2004		
2005		
2006	Radio, TV receiver	Refined oil
2007	Machinery parts	
2008	Anthracite	Crude oil
2009		Refined oil
2010		Crude oil
2011		
2012		
2013		Refined oil
2014		
2015		
2016		

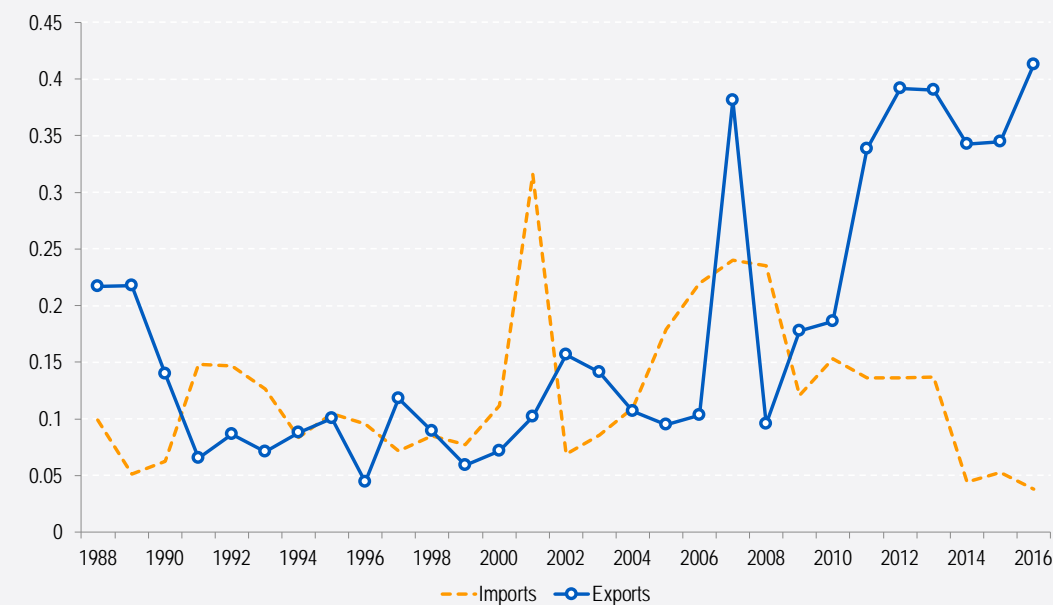
Source: UN Comtrade.

Figure 7 | Number of Trade Items of North Korea



Source: UN Comtrade.

Figure 8 | Share of the Biggest Trade Item



Source: UN Comtrade.

for exports, radio, television parts, marine products, minerals, etc. were the best selling items until the mid-2000s, but since 2008, anthracite has been the undisputed best seller.

Figure 8 shows the share of items North Korea bought and sold the most each year. What is notable in the chart is a steep escalation of the share of anthracite, the biggest export item of North Korea from the late-2000s. When read together with Table 2, Figure 8 indicates, before 2008, the biggest export item of North Korea was gold, sea foods, radio, etc., and in 2008 they were replaced by anthracite and its share only grew thereafter. In contrast, the share of oils, the biggest import item of North Korea, tumbled: in 2016, the share of anthracite in total exports reached 40%, but that of oils slid below 5%. Although oil is still a major import item, its share has fallen gradually probably due to the diversification of import structure of North Korea. The growth in the share of anthracite in North Korea's exports seems attributable to a growing demand for fossil fuels from China in the wake of its economic expansion in the mid-2000s and the suspension of inter-Korean trade after South Korea took the so-called May 24 measures

When considering the size of trade, the number of trade partners, the share of the biggest trade partners, the number and variety of trade items, and the share of the biggest export/import items, have there been any break in the trends of the North Korean trades since Kim Jong-un's

inauguration? I assume, as was the case with the aggregate size of the economy shown in GDP, etc, there would be a break in the trends of foreign trades in 1998-1999 as a turning point.

A structural break is not observed in the trends of foreign trade around 2012-2013 when Kim Jong-un came into office. The timing of the break can be interpreted depending on which index you are looking at. It was early to mid-2000s when the share of the biggest trading partner started to increase after its downward trend. In case of the share of the biggest trade item and the number of trade items, a shift becomes evident in the late 1990s and early to mid 2000s. In case of the share of export items, especially anthracite started to expand in the late 2000s.

Therefore, it is hard to define the changes in the foreign trades of North Korea in a one-size-fits-all manner. In other words, it cannot be said "The entire foreign trade of North Korea experienced changes in the late-1990s and the early to mid 2000s or in the late 2000s." Yet, as far as anthracite is concerned, it is safe to say that a relatively evident structural break appeared in exports rather than in imports in the late-2000s.

You explained that although it is hard to tell when a structural break appeared in the trends of North Korea's trades, exports rather than imports suffered a structural change in relative terms, and specifically, the export of anthracite exhibited a

distinctive break in the late-2000s. What is this inferring?

Regarding the trade of North Korea, exports, especially the export of anthracite, are noteworthy. Because anthracite is the biggest export item of North Korea, the international community imposed a ceiling first and then later a total ban on its exports of anthracite as a part of the economic sanctions. More recently, some speculate the possibility of a temporary suspension of the ban. These demonstrate the significance of anthracite in North Korea's exports. Thus, it is meaningful to explore how the growing share of anthracite has altered the internal structure of the North Korean economy.

A country's economic growth is more closely related with the production of export goods than with the production of goods for domestic consumption as export goods should be competitive in for-

ign markets. In other words, what products a country exports affects how much the economy can grow.

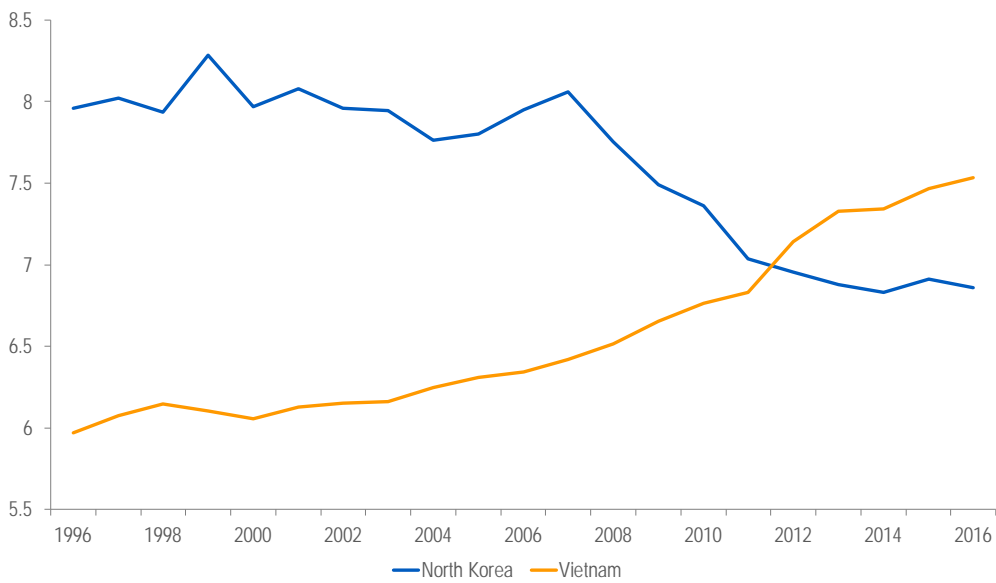
We can turn the average human and physical capital input required to produce an export into numerical figures. For example, in order to produce semiconductors that require an abundant input of human and physical capital, skilled human resources with up to a Ph.D. should be employed. In contrary, the production of anthracite does not require an input of highly-educated human resources. We can calculate the level of education attainment required for persons involved in the production of a unit product and the extent of physical capital investment required. Since we have the data on the levels of human and physical capital investments required to produce a unit product, we can also estimate the quality aspect of export (the level of the input of human and physical capital) based on the data by country



Figure 9 | Trends of Input of Human and Physical Capital Calculated Based on Exports of North Korea (Comparison with Vietnam)

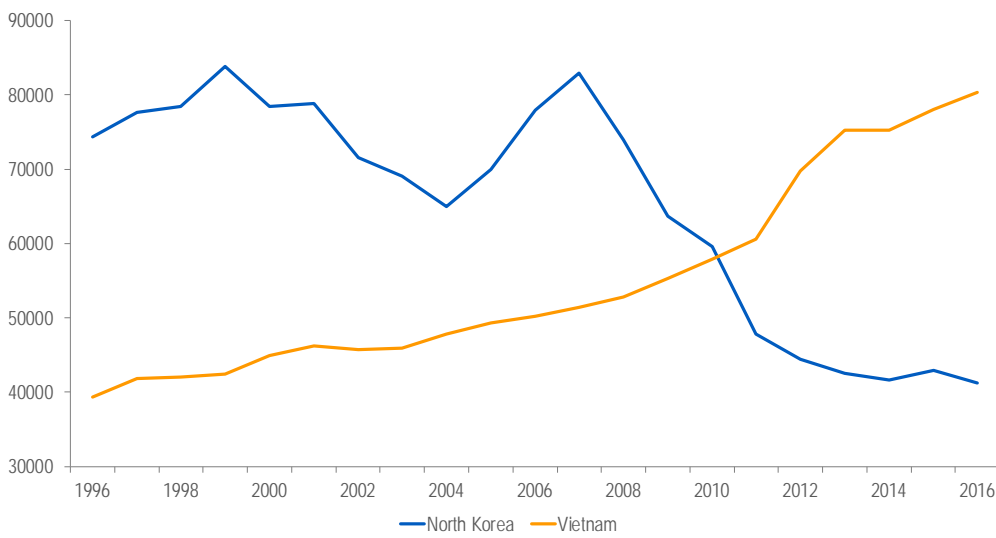
(1) Human Capital

(Unit: No. of years of education attainment)



(2) Physical Capital

(Unit: Real capital stock per employee, US\$)



Source: Calculated by the author based on the UN Comtrade data.

or by time.

See Figure 9 below that compares the North Korean economy with the Vietnamese economy. In the first chart, the solid line represents the average level of input of human capital by North Korea for exports and the dotted line, that by Vietnam. The second chart shows the same comparison between the two countries in terms of the input of physical capital.

The average input of human capital by North Korea was about eight years until 2007, meaning that middle school-educated people were employed for the production of export goods. Yet, the number of years of education attainment has declined since the late-2000s when the share of anthracite in exports began to rise.

Although the average input of human capital in Vietnam lagged far behind that in North Korea in the past, it has been steadily rising since the 2000s. Today, the average quality of Vietnamese exports excels that of North Korean exports. In addition, the input of physical capital by Vietnam has been steadily increasing as well while that by North Korea has been shrinking since the 2000s.

The main culprit for the deterioration in the quality of North Korean exports is the growing share of anthracite, a low value-added product that does not require a significant input of human and physical capital. In contrast, Vietnam has shifted its major export items from rice and coffee in the 1990s to clothing in the 2000s

and to electronics in the 2010s, adding value to their exports in the process. Vietnam implemented the Doi Moi policy in 1980 to reform its economy and opened its door to the international markets to reshape its export structure to a manufacturing-oriented one.

Exports of North Korea are concentrated on China in terms of market, and on anthracite in terms of an item. Given that exports affect the economic growth of a country, the structural degradation of exports of North Korea is highly likely to have negative effects on the country's economic development in the long run. Since

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anthracite has become a major export item, the North Korean regime cannot but concentrate its investments on anthracite-related sectors limiting investments in other sectors. This would persuade the government officials and the people of North Korea into believing that doing a mining job would earn them more money than attaining a higher education to expand their human capital or doing research and development to produce higher quality products. Of course, the remnants of a centrally planned economy may weaken the effects of the said incentive mechanism, thereby limiting potential shocks to the North Korean economy in the immediate future. However, the current structure of exports concentrated on anthracite cannot but affect the incentive mechanism of the North Korean people in the long run. Also, if the government continues to pour its resources into anthracite-related sectors with a short-sighted view, it becomes questionable whether the positive effects the export of anthracite have on the economy at present will continue over the long run.

In a way, the concentration is not something chosen by North Korea, but something imposed on it. In 2010, South Korea ceased the May 24 Measures to prohibit any trade with North Korea except that related with the Kaesong Industrial Complex, thereby restraining the inflows of foreign currency into North Korea. Moreover, an economic growth of China and the resultant boom in its demand for fossil fuels that began in the late-2000s pushed up the prices of anthracite. These external conditions seem to have prompted North Korea

to believe that the export of anthracite can be a lucrative business and choose to sell the mineral to China to seize that opportunity.

So far, the statistical verification of indicators on the foreign trades of North Korea showed that a structural break appeared in the trends of exports, the number of trading partners, the share of export items, etc. from the late-2000s to the early-2010s. However, there was no meaningful break in the trends of indicators associated with imports. This means that the export of North Korea experienced

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a structural break appeared in the trends of exports, the number of trading partners, the share of export items, etc. from the late-2000s to the early-2010s

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changes during the abovementioned period. In other words, changes in the export of North Korea had already been occurring under the influence of external factors (China factor) even before the inauguration of Kim Jong-un until international sanctions took effect.

In the past, North Korea was an industrialized economy while Vietnam was an agricultural economy. However, a growing amount of foreign investments into Vietnam facilitated the industrialization of the Vietnamese economy prompting the advancement of the manufacturing sector as well as even some state-of-the-art industries, which, in turn, facilitated a rapid expansion of human and physical capital. In the meantime, the North Korean economy tends to have retreated. It is interesting to know that North Korea that had experienced industrialization in the past was completely overtaken by Vietnam at least in the area of export goods in 2012 as a turning point.

To sum up what we have discussed so far, it seems that a structural break is hardly observed in the trends of trade in the Kim Jong-un era. Having said that, one of the most notable changes in the North Korean economy under the Kim Jong-un regime appeared in the variables of market prices. Some argue that the stabilization of market prices and exchange rates has had positive effects on the livelihoods of the ordinary people of North Korea. Please tell us about the informal sector of the North Korean economy or markets based on statistical

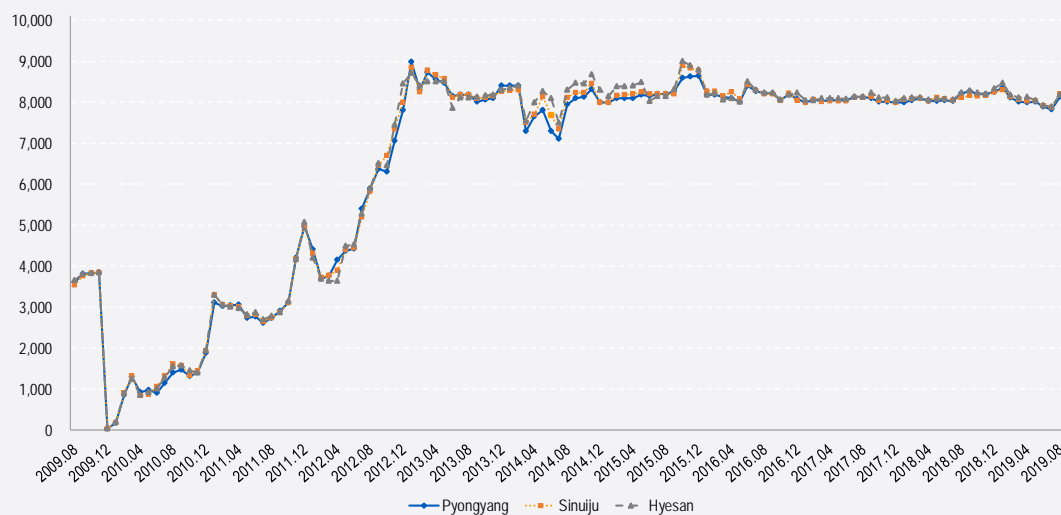
data.

The informal sector of the North Korean economy called *jangmadang* has become an essential part that must be dealt to understand the North Korean economy. Going through an economic crisis known as the Arduous March in the 1990s, the North Korean people abandoned the state rationing system and accustomed themselves to making a living for themselves. The share of the informal sector out of the aggregate economy of North Korea ranges from 30% at minimum to 80% at maximum depending on the research selected. Yet, almost all researchers agree on the significance of the informal sector in the North Korean economy. To find out whether the informal sector has expanded or not, one should examine a variety of factors including the share of the informal sector measured by the rate of the people engaged in market activities; market prices that, if stabilized, would predict an expansion of commercial activities; and the advancement of laws and an institutional framework in relation to the facilitation of markets.

Among data that have been collected over a long period of time based on the same criteria are rice prices in *jangmadang* and market exchange rates. After collapsing in the wake of the currency reform in November 2009, rice prices in *jangmadang* began rising sharply in 2010 before finally stabilizing at the end of 2012 (see Figure 10). Although rice prices in *jangmadang* have shown seasonal fluctuations from time to time thereafter, they

Figure 10 | Rice Prices in North Korean Markets

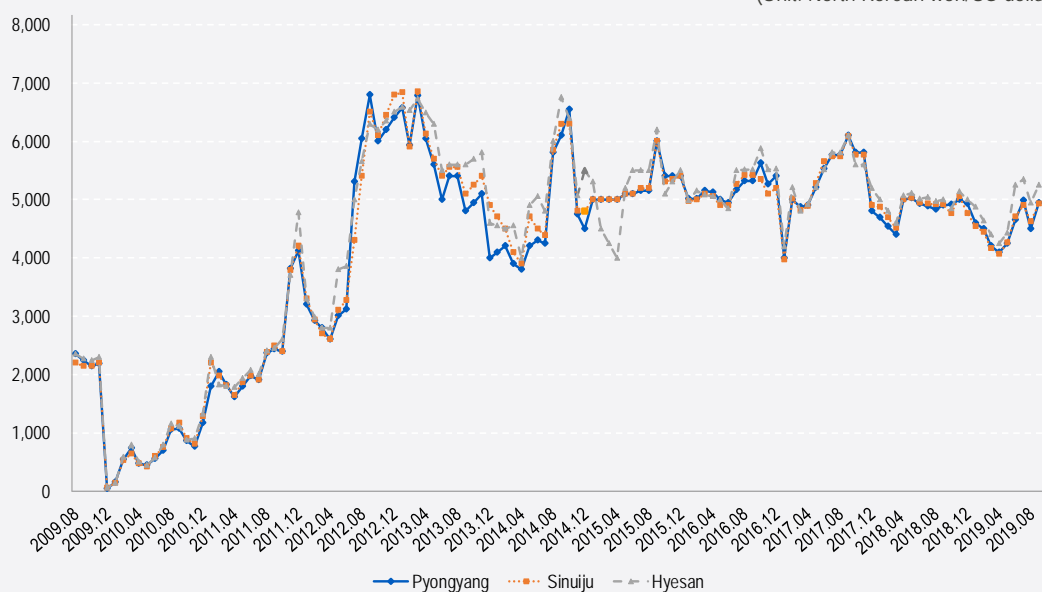
(Unit: North Korean won/kg)



Source: Monthly data converted by the author from the DailyNK data.

Figure 11 | Exchange Rates in North Korea

(Unit: North Korean won/US dollar)



Source: Monthly data converted by the author from the DailyNK data.

are said to have generally stabilized in relatively terms at around 5,000 North Korean won per one kilogram of rice.

The trend of market exchange rates of North Korean won to US dollar are in accordance with that of rice prices (see Figure 11). The market exchange rates of North Korean won to US dollar skyrocketed right after plunging briefly in the wake of the currency reform at the end of 2009. Then, the rates have stabilized at around 8,000 North Korean won to 1 US dollar since 2013. The rates have stabilized thanks to the dollarization—the widespread use of foreign currencies in markets. Owing to the currency reform of 2009, the North Korean people became less confident in the North Korean won, pushing down the value of the currency even further. Researchers have created a hypothesis on the market prices of North Korea: Since North Korean people refuse to use the North Ko-

rean won due to skyrocketing prices following the currency reform, the North Korean government gave its control of the currency at the invisible hands of market forces after failing to receive earnings from the issuance of currency. The decision, in fact, helped the North Korean people regain their confidence in the local currency, and as a result, the North Korean won is now circulated together with the US dollar and the Chinese yuan in the market. The North Korean government seems to have learned a lesson after failing every currency reforms it tried. Under the Kim Jong-un regime, North Korea seems to believe that stabilizing market prices rather than pursuing seigniorage (i.e. profit made by issuing currency) is not only useful for the welfare of the people but also at its best interest.

In addition, the expansion of the informal sector of North Korea is also con-



firmed by institutional changes. The North Korean government no longer cracks down on activities in *jangmadang*; it attempts to turn it into the formal sector through various measures including the introduction of market tax. The Institute for Peace and Unification Studies at Seoul National University conducted a survey to the North Korean defectors in South Korea. According to the survey, in 2011 and 2012, the respondents pointed at a lack of capital as their biggest problem in doing business in the informal sector of North Korea. Since 2013, a crackdown by the law enforcement agency or its bribery have become the biggest error. The results confirm that *jangmadang* is no longer illegal in North Korea but a target of regulation and taxation by the authorities.

Do you mean that there were breaks in the trend of rice prices and exchange rates in markets at the end of 2012 and the beginning of 2013?

Yes, I do. The statistical verification of market exchange rates and rice prices proved an occurrence of structural break at the end of 2012 and the beginning of 2013. Unlike the economic growth rates or foreign trades of North Korea, a structural break became apparent under the Kim Jong-un regime. The growth and the stabilization of the informal sector are certainly in accordance with a view that the North Korean economy has gone through changes recently.

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The statistical verification of market exchange rates and rice prices proved an occurrence of structural break at the end of 2012 and the beginning of 2013

A structural break became apparent under the Kim Jong-un regime

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You explained that there was a noticeable change in the informal sector and the markets of North Korea after Kim Jong-un seized power. The change in market prices was in accordance with a change in institutionalization where the North Korean government and people both started to

actively participate. For instance, although the North Korean government has pursued seigniorage with its monetary policy, it now seems to believe that achieving price stability through market activities is more beneficial. This shift in policy approach is a distinctive phenomenon of the Kim Jong-un era. It seems fair to say that at least the informal sector has shown a structural change in the Kim Jong-un era. It is significant that we talked about what has really changed in the informal sector of North Korea, not just delving into the reasons why a phenomenon has occurred.

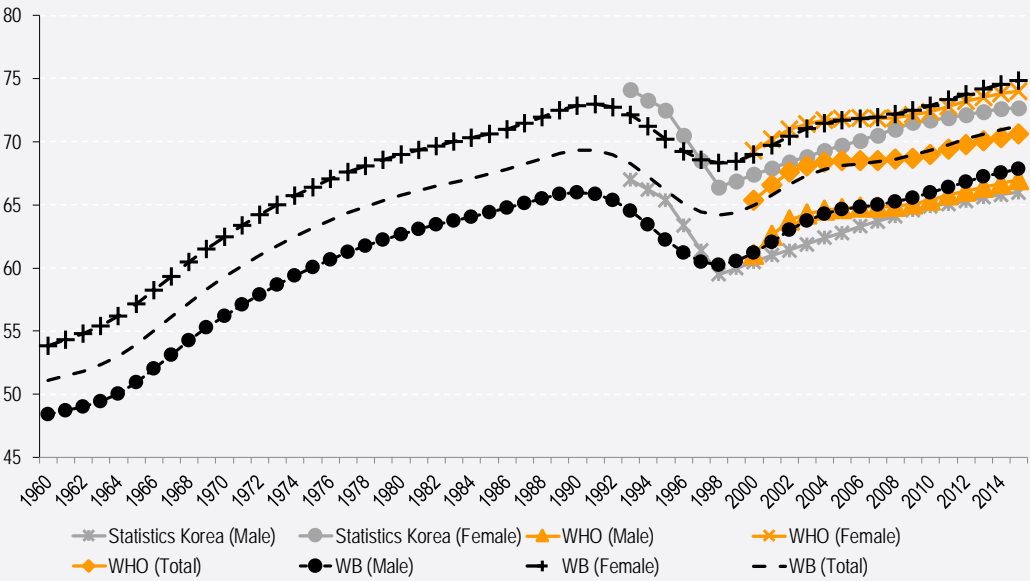
So far, we have reviewed three major economic indices: first, growth rates in the macroeconomic aspect; trade in the industrial aspect; and markets that reflect the domestic economy of North

Korea. These are all direct indicators of an economy. Then, now let us talk about public health and welfare, which are not economic indicators, but highly related to the overall economic trends.

As you mentioned, public health is closely related to the economic strength of a country. Thus, public health and welfare are often used as proxy indicators of an economic progress of underdeveloped countries where reliable statistical data are scarce. While the general status of an economy can be explained by growth rates, public health and welfare are represented by life expectancy. Life expectancy, which is affected not only by the nutritional conditions of individuals but also by health policies, can comprehensively explain the health conditions of the people.

| Figure 12 | Life Expectancy of the North Korean People

(Unit: Years old)



Source: Statistics Korea, WHO, and World Bank.

Figure 12 describes the life expectancy of the North Korean people. Life expectancy tends to extend as the economy develops. The life expectancy in North Korea is projected by Statistics Korea, the World Health Organization (WHO), and the World Bank. The World Bank data are available from 1960 while those from the former two institutions are available from 1993 and 2000, respectively.

According to the World Bank, the life expectancy of the North Korean people steadily increased from 48.4 for men and 53.9 for women in 1960 to 66 and 72.8 in 1990 respectively before sliding to 60.2 for men and 68.3 for women in 1998. The life expectancy estimated by Statistics Korea also began tumbling in 1993 to reach the lows in 1998. Since 1999, it has continuously increased until now.

If life expectancy is assumed to proportionately correspond to the status of an

economy, it can be said that, after growing until 1990, the North Korean economy had rapidly contracted in the 1990s before recovering into the 2000s.

As for the question if the North Korean economy rebounded to the pre-crisis level, different institutions provide different answers. The World Bank estimates the life expectancy of the North Korean people at 68.3 for men and 75.3 for women in 2017, up from 64.5 and 72.1 each reported at the time of the Arduous March. In the meantime, Statistics Korea assesses that North Korea's overall economic situation has continued to remain below the pre-crisis level, estimating the life expectancy at 66.5 for men and 73.3 for women in 2018, down from 67 and 74.1, respectively at the time of the crisis.

Moreover, according to surveys on the health conditions of North Korean children conducted by the United Nations



Children's Fund (UNICEF) and the World Food Programme (WFP), the nutritional status of the children has improved in accordance with the expansion of life expectancy in North Korea. International organizations also release their estimates on the maternal mortality rate and child/infant mortality rate of North Korea. The trends of the estimates replicate a deterioration in the public health and welfare indicators in the 1990s and a subsequent recovery in the 2000s.

A statistical verification of the life expectancy and the child/infant mortality rate of North Korea which have annualized data are available demonstrates the existence of structural breaks in the trends of public health and welfare of the North Korean people in 1992 and in 1999. Public health indicators deteriorated in 1992 and then started to recover in 1999. Thus, according to the health and welfare indicators, it can be said that the public health and welfare status of North Korean people have continuously improved since 2000 with no dramatic changes seen after Kim Jong-un came into office. In a nutshell, the trend of public health and welfare conditions have shown continuation not a break.

To sum up what you have explained so far, “In the trends of economic growth rates, trade, markets, and public health and welfare of North Korea, a distinctive break appeared in 1999. Although there seems to be a slight improvement in the economy of North Korea, no noticeable change is observed under the Kim Jong-un regime—

except for markets or price variables that do exhibit a clear break.” What is your general conclusion of the research? What implications do you think the outcome of the research have on the study of the North Korean economy under the Kim Jong-un regime?

A variety of data were used to examine the status and structural change of the North Korean economy. According to the BOK data on economic growth rates and GDP, the economic recovery of North Korea began in 1999 whereas trade data

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suggest that North Korea experienced a significant change in exports from the late-2000s to the early-2010s. Market prices and exchange rates began stabilizing since end-2012 or early-2013 and the trend has continued thereafter. After worsening in the early-1990s, public health indicators such as life expectancy recovered in the late-1990s and the trend has continued until today.

In general, the economic status of North Korea aggravated with an economic crisis setting in the early-1990s; a recovery began in the late-1990s and the trend has been continuing until today. The growing dependence of North Korea's exports on China and anthracite that appeared in the late-2000s creates a concern that the entire economy might suffer from side effects. After going through the Arduous March, the informal sector started to expand, and the North Korean government took several suppressive measures including currency reform, which only ended in failures. From the end of 2012 and early-2013, market prices and exchange rates stabilized. This seems to have been possible as the North Korean government attempted to integrate the informal sector into the formal sector by ceasing its oppressive measures on markets, recognizing the importance of the markets and collecting market tax, all of which measures were also accepted by the people.

To sum up, a recovery of the North Korean economy that began in the late-1990s has continued until today without any particular change under the Kim Jong-un regime. Still, the market and price sta-

bilization measures that the North Korean government took in 2012-13 were a noticeable change in the Kim Jong-un era. The price stabilization facilitated the macro economy of North Korea, which seems to have played a significant role in invigorating the economy after Kim came into power.

In this perspective, from now on, North Korea research should focus more on the currency-related phenomenon. More research studies should be done to under-

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stand the reason why rice prices have stabilized since after 2013. At present, most research on the North Korean economy are focused on dollarization and seigniorage, and various hypotheses and research that verify those hypotheses are needed. Also, we should ask ourselves if it is appropriate to use rice price to assess the market. If we have more access to usable data, we will be able to establish the composite price index of North Korea using other products besides rice.

The fact that market prices and exchange rates have finally stabilized reflects the expectation the North Korean people have on the regime as to the way it operates the economy. In other words, the people became confident that the government would not take any currency reforms as it had done in the past. In this sense, it would be meaningful to conduct a research on the attempt of the North Korean government to institutionalize/legalize the informal sector of the economy.

You have provided an in-depth analysis on the question whether the North Korean economy has changed under the Kim Jong-un regime based on a variety of macroeconomic data. We must be aware of two things: first, the data we dealt with today cover the period before the sanctions, not the period thereafter; thus we should not expect the trends to continue until today. You also proved that it is not impossible to track the trends of the North Korean economy using available data and it is even possible to draw meaningful

results. I hope many experts on North Korea, particularly the younger generation, do research further on a variety of topics. Do you have anything to add or comment?

My topic today focused on verifying any break in the time-series data on the North Korean economy. Thus, it lacks in-depth analysis and discussion on the reason why changes occurred. It would be interesting to look at how North Korea has changed so far focusing on its economic policy or changing external environments.

In the study of North Korea, qualitative and quantitative methods should be used in a complementary manner. Researchers tend to use a methodology that they are familiar with because they have been trained with and become skillful with the methodology. North Korea researchers may not be that different. The limitation of case studies in terms of representation can be overcome with quantitative research based on data; the limitation of a quantitative study in terms of drawing an insight or explaining the reality can be overcome with a qualitative research. In order to advance the study on North Korea, researchers using different methodologies should create a network and come together in a forum to communicate and build a consensus.

Although what I have explained today seems to have resulted from a purely statistical approach based on data, I had to rely on diverse interpretations of the North Korean economy that have been accumulated so far. As economics has advanced

through an interplay between theories and empirical studies, I expect a complementary relationship between quantitative studies and qualitative analyses to be established in the study of North Korea.



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