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How High is North Korea's Real Employment and Income?

Suk Lee, Fellow at KDI

“According to North Korea’s 2008 census, about 88% of the population aged 20-59 are officially employed in socialist sectors. However, the actual share of the employed population who can afford a decent living is estimated at 31%-62%. As for North Korea’s PPP-based per capita income-calculated using energy usage patterns-it is well in the range of the Bank of Korea’s estimates on the North’s per capita GNI for 2008, at \$948-\$1,361. On the contrary, Pyongyang has marked the official share of the employed population aged 20-59 at 85% and per capital income at a maximum of \$2,715, implying that the capital is more affluent than the rest of the country.”

I. Introduction

More than often, figures on the North Korean economy are subject to dispute as the authenticity and reliability of the data and compilation process are called into question. As such, one of the most difficult, and perhaps the most awkward, task for researchers studying the North Korean economy is resolving the skepticism over the data that was used. This has become particularly true for data on income and the employment

* This paper was written based on Lee Suk, *Household Economic Activity in North Korea: Size, Structure and Trend*, Policy Study 2015-11, Korea Development Institute, 2015 (in Korean).

(and unemployment) rate in recent years; existing figures for the former have become controversial and there is almost no data for the latter, although it is the key to resolving much of the controversy.

Indeed, numerous questions have been raised during the past several years over Korea's statistical estimations on the North, including the Bank of Korea's (BOK) GNI estimates. Specifically, there are doubts that the statistics have accurately reflected North Korea's rapidly expanding market. To that end, in order to rationally respond to the prevailing skepticism, an examination must be conducted into the 'actual employment and unemployment rate' of official North Korean sectors. This is because the North Korean market is dependent on the activities of the 'industrial reserve,' which is formed of collapsed official sectors. However, the lack of available data on the North's real employment and unemployment rates is making it impossible to gain an accurate understanding of market conditions and pertinent income changes. As such, the doubts over statistics and estimates are left unanswered.

Nevertheless, bringing some relief to researchers for the stark lack of accurate figures, is the census conducted by the North Korean authorities in 2008 with assistance from the outside. The 2008 North Korea Census contains various data that researchers can use to ascertain income and unemployment figures. Accordingly, using the data, this study attempts to draw upon meaningful implications with regards to the actual income and employment and unemployment rates of North Korea with the intention of preventing the 'troubled' feelings of researchers from turning into 'panic.'

II . Officially Employed Persons, Unofficial Household Economic Activity and Real Employment and Unemployment Rates

1. Officially Employed Persons

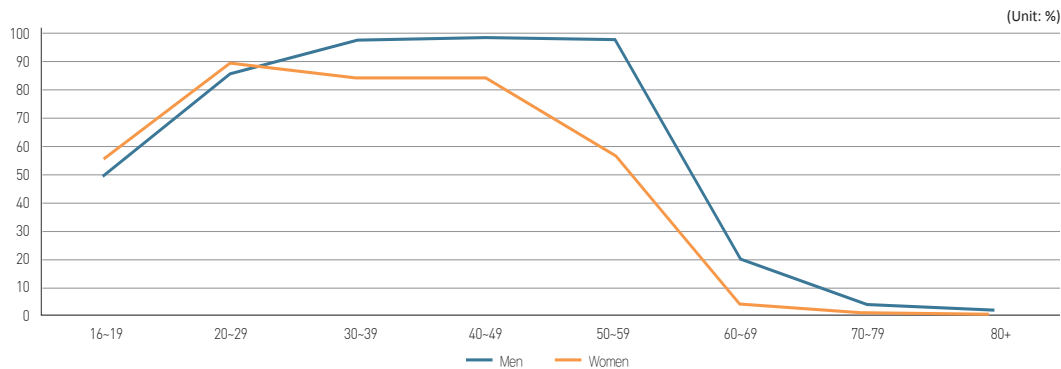
[Figure 1] offers a look into the real employment and unemployment rates and shows the share of employed persons by age and gender from the 2008 North Korea Census. It is shown that the share of employed persons aged 16-plus accounts for over 70% of the total population. In particular, the share of those aged 20-59—real working age in North Korea—accounts for 88%. Further still, the share surpasses 95% among the male population and nears 80% among female, implying that, at least according to official statistics, almost all able-bodied and -minded North Koreans are employed.

This can be also confirmed via the employment share by age. For instance, North Korean men usually start their military service or higher education at the age of around 19. However, the employed share of this population marks 52% of the total. And, of those who have just started to work after the mandated 10-year military service or university

Drawing on the data from the 2008 North Korea Census directly conducted on North Korean people, this study seeks certain implications on the real employment (unemployment) rate in official socialist sectors and the real income level.

Officially, the share of those employed in socialist economic sectors is marked at 88% for those aged 20-59 and 97% for men aged 30-59.

[Figure 1] North Korea's 2008 Official Employment-share Ratio by Age and Gender



Source: DPRK Central Bureau of Statistics, *DPR Korea 2008 Population Census National Report*, Pyongyang, DPR Korea, 2009 (hereinafter '2008 North Korea Census').

education, the share of those aged 20-29 rose to 86%, while that for those aged 30-59 peaked at 97-98%. Considering that North Korean men are ordered to either serve or study, these figures imply that almost all North Korean men are employed from their late teens. Of course, the share of the employed population aged 60-plus dropped to below the 20%-range, which is natural given the retirement age. A similar pattern can be observed among North Korean women; the differences are a relatively lesser burden of military service, lower employment of those aged 30-plus due to marriage and household management and a much lower employment of those aged 50-plus due to their 5-year earlier retirement than men.

According to official records, North Korea exhibits total employment, meaning all able-bodied and minded North Koreans are employed.

2. Unofficial Household Economic Activity

The aforementioned statistics imply that North Korea has almost a 'zero' rate of unemployment, which stands in vast contrast to the actual economic conditions. Indeed, the majority of companies and workplaces in North Korea are already at a standstill, following the economic crisis in the 1990s, and the workers are "employed" on paper only, i.e. they are de facto unemployed, according to outside observers. Then, how many people are categorized as such—officially employed but actually unemployed?

With respect to this inquiry, the 2008 census provides a very interesting figure, termed 'household economic activity,' which represents the population engaged in unofficial economic activities. Household economic activity is different from market activity in the general sense, as it is based on self-consumption and not on market trade, and hence it is mostly related to food (vegetables, fruit, poultry and livestock, etc.). To put it another way, such characteristic differences can help estimate the size of the actual unemployed population in North Korea's official sectors.

Above all, food is rationed via the workplace, meaning that people have to go to work to obtain food. As such, if an employed person is in a position wherein he/she needs to

The 2008 census however shows that a large number of North Koreans are regularly engaged in household economic activities such as food production for self-consumption.

<Table 1> General Household Economic Activities of North Koreans Aged 16-plus in 2008: Six-month Period

(Unit: No. of persons)

		Total	Men	Women
Total population		17,366,769	8,001,786	9,364,983
Household economic activities by type	Vegetable·fruit cultivation	9,763,174	3,945,792	5,817,382
	Poultry·livestock·fish farming	8,067,878	3,102,531	4,965,347
	Firewood gathering	6,532,524	3,543,728	2,988,796
	Water hauling	3,875,347	1,221,185	2,654,162
	Others	2,773,933	1,097,788	1,676,145

Source: 2008 North Korea Census.

It is doubtful that those engaged in household economic activity actually work in socialist sectors, because the socialist system provides people with food and other consumables and extra economic activities are unnecessary.

Based on these findings, this study compares North Korea's official data on the employed population with the population engaged in household economic activity in order to estimate the real employment or unemployment rates in North Korea's official socialist sectors.

additionally work to acquire/produce food, only two explanations are possible. One is that the employer, i.e. the company or workplace, is in fact out of operation, and the other is that the person may not actually work there. Obviously, these two explanations assume that the person is de facto unemployed. The situation becomes more complicated, however, if a person is engaged in such activities very sporadically. On the other hand, if such activities are concentrated in a certain time frame, this could be a great indicator in gauging the de facto unemployment conditions in North Korea's official sectors.

Based on such reasoning, this study estimates the de facto unemployment rate in official sectors, using the data on household economic activities offered in the 2008 North Korea Census. To elaborate, the study extracts the size of the population aged 20-59 'routinely engaged in household economic activities related to acquiring/producing food such as vegetable and fruit cultivation and poultry, livestock and fish farming for the past six months.' Then, it deducts the extracted estimate from the aforementioned number of officially employed persons to obtain the share of the de facto unemployed population and size of the real employed population. The reason for using the population aged 20-59 is to exclude the influence of factors affecting employment in North Korea such as military service, study or retirement, as much as possible.

There are, however, certain technical problems. For example, how many of those engaged in household economic activities are included in the official statistics for the employed population? This can be answered simply; first calculate the maximum (or minimum) de facto unemployed population (or real employment), assuming that the population engaged in household economic activities is included in the officially employed population. At the same time, calculate the minimum (or maximum), assuming the former is not included in the latter. The real figures will be those between the minimum and maximum.

3. Estimations on the Real Employed and Unemployed Populations

<Table 2> compares the above estimations on the share of the real employed population aged 20-59 and the official records provided in the 2008 North Korea Census. Deducting

<Table 2> Estimated Share of the Employed Population Among Those Aged 20-59: Official vs. Real

(Unit: %)

Province		Share of real employed population		
		Min.	Max.	Mean
Yanggang	88.86	17.57	36.78	27.18
North Hamgyong	87.75	36.90	78.78	57.84
South Hamgyong	88.31	21.19	53.05	37.12
Kangwon	86.96	25.42	57.04	41.23
Chagang	89.39	21.08	48.85	34.96
North Pyongan	89.80	32.92	63.91	48.42
South Pyongan	86.79	30.93	58.96	44.95
North Hwanghae	86.58	16.29	48.29	32.29
South Hwanghae	90.76	22.53	60.22	41.38
Pyongyang (municipality)	84.78	61.09	84.78	72.93
Total	87.73	87.73	62.38	46.86

Source: Data on officially employed persons are from the 2008 North Korea Census, and those on real employed persons are estimations from this study.

the former from the latter would naturally produce the share of the population who are officially employed but actually unemployed i.e. those who are employed on paper only and have to participate in household economic activities to make a living. However, the table also reveals two exciting and even shocking observations.

First, of the total North Korean population, the share of the officially employed population aged 20-59 accounts for 88%. Of that, the share of the real employed population accounts for a minimum of 31% and maximum of 62%. Accordingly, the de facto unemployed population accounts for a minimum of 25% and maximum of 56%. This implies that of the total population aged 20-59, more than half may only be employed on paper.

Second, the huge disparity between the official and real figures can be commonly observed in almost all regions, except Pyongyang, the capital of North Korea. Its official share of the employed population is registered at 85% while the real share is actually 61-85%; difference between the official and real figures is statistically insignificant.

What these findings imply are quite clear. At present, North Korea's socialist economic system is so ruptured that a maximum of half of the officially employed persons are de facto unemployed, albeit Pyongyang. Of course, the disparity between the official and real figures in this study does not represent the unemployment rate in the general sense. That is, it is impossible to apply the market method used to calculate unemployment and employment rates to a socialist economy such as North Korea. Nevertheless, the figures in this study can at least serve as an appropriate guide to gauge the North's general employment and unemployment rates.

The results show that while the official share of the employed population aged 20-59 is 88%, the share of the real employed population is a minimum of 31% and maximum of 62%.

Pyongyang is the exception as the real employment rate is well in the range of the official rate (85%), at 61-85%.

<Table 3> Share of Cooking Energy Sources Used in North Korean Households

(Unit: %)

	Total	Urban	Rural
Electricity	1.34	1.84	0.57
Gas	2.84	4.39	0.44
Oil	1.75	2.54	0.53
Coal	46.11	63.45	19.21
Wood	46.85	27.50	76.87
Others	1.10	0.28	2.38
Total	100	100	100

Source: 2008 North Korea Census.

III . Energy Use and Real Income Level

1. Current Energy Usage Patterns and Implications

According to the 2008 census, North Korean's income and consumption are at a very low level.

This study has, thus far, shown that a considerable share of North Koreans are de facto unemployed and hence, have to engage in additional economic activities to make a living. This indicates that North Korea's real consumption and income levels are considerably low. The sluggishness is indeed detected via numerous indicators in the 2008 North Korea Census. The most notable is the figure on current energy usage patterns.

Energy usage patterns are closely related to income in underdeveloped countries.

For instance, as of 2008, households who use firewood to cook account for 47% of the total and coal-using households account for 46%—93% in total. This means that almost all North Koreans are given no access to modern energy sources such as electricity, gas and oil.

And the high use of firewood (50%) implies that conditions are extremely primitive.

These figures are an indicator of North Korea's poor consumption and also serve as good evidential data in estimating real income. This is because in underdeveloped countries like North Korea, the type of cooking energy used is closely linked to the public's income level. For instance, households with very low income and poor living environment use traditional cooking fuels, such as firewood, wood pellets or dried animal dung. With better income and living conditions, people depend more on solid mineral fuels such as coal. And only when income rises enough, can the choice of energy source switch to modern fuels such as petroleum, gas and electricity. Notably, traditional energy sources are all solid fuels while modern forms are not. And estimating the share of solid fuel used in cooking is considered a relatively significant method in gauging the real income in underdeveloped countries with little statistical infrastructure.

This study applied North Korea's use of energy sources to estimate the income level.

2. Estimation of Real Income Level

This study attempts to estimate the income level of North Korean households based on the above data with regards to the use of cooking energy. To be more specific, an

<Table 4> Panel Regression Analysis Results on PPP-based per Capita GDP in Underdeveloped Countries

	Pooled OLS		Random Effect		Fixed Effect	
	Coefficient	SD	Coefficient	SD	Coefficient	SD
Constant term	9.138***	0.102	9.152***	0.128	9.897***	0.702
Proportion of solid fuel use	-0.021***	0.001	-0.021***	0.002	-0.032***	0.011
R ²	0.724		0.724		0.967	
Total samples	87					

Note: *** denote the significance at the 99% level.

<Table 5> North Korea's PPP-based per Capita GDP Estimates

(Unit: dollar)

Province	Estimate 1 (R.E)	Estimate 2 (F.E)	Range	
			Min.	Max.
Yanggang	1,262	842	842	1,262
North Hamgyong	1,223	802	802	1,223
South Hamgyong	1,221	799	799	1,221
Kangwon	1,222	800	800	1,222
Chagang	1,244	823	823	1,244
North Pyongan	1,216	794	794	1,216
South Pyongan	1,222	800	800	1,222
North Hwanghae	1,216	794	794	1,216
South Hwanghae	1,213	791	791	1,213
Pyongyang (municipality)	2,658	2,715	2,658	2,715
Total	1,361	948	948	1,361

Source: Estimated by author.

examination is conducted of the relationship between the share of solid fuel used in cooking and the income level of underdeveloped countries.

To that end, the study used panel data compiled by the World Health Organization (WHO) on the share of solid fuel used in cooking in 36 countries for the past several years and IMF data on the per capita GDP in terms of PPP (purchasing power parity) of the respective countries. A panel regression analysis was then conducted to deduce the linear relationship. Lastly, the derived share of solid fuel used in North Korea, as of 2008, was applied to the linear relationship and North Korea's per capital GDP, in terms of PPP, in 2008 was estimated. The reason for using PPP-based rather than market exchange rate-based GDP is that underdeveloped countries generally have weak exchange rates and financial markets. Therefore, it is believed that using GDP based on the latter lacks accuracy in reflecting the real income level.

<Table 4> and <Table 5> present the analysis estimates. It is of course impossible to ensure that these estimates are an exact reflection of the reality in North Korea. Nevertheless, it should be noted that the data on solid fuel used in this analysis was obtained from the 2008 North Korea Census, which was actually conducted on North

The results show that, as of 2008, North Korea's PPP-based per capita GDP is estimated to be a minimum of \$948 and maximum of \$1,361.

However, Pyongyang's per capita GDP is a minimum of \$2,658 and maximum of \$2,715, much higher than the rest.

Koreans. This means that, of all of the data that was used to estimate North Korea's GDP, surely this is the most high quality. In turn, this implies that the results presented in this study are more than adequate to derive significant implications from the reality of North Korea.

The findings from the data are as interesting as and even more shocking than the estimates for the real employment rate. As of 2008, North Korea's PPP-based per capita GDP marks \$948-\$1,361, implying that North Korea is one of the poorest countries in the world (as of 2008), given that in underdeveloped countries, per capita GDP on a market exchange basis is usually much lower.

However, Pyongyang's per capita GDP is very high at \$2,658-\$2,715. This is three times (maximum) than that of the rest of the country given South Hwanghae earned \$791-\$1,213 during the same time frame. This indicates extreme income polarization between the capital and the remaining regions. As of 2008, North Korea has been one of the poorest countries with a per capita GDP of only \$1,000 (PPP basis), but its capital is situated at a very 'special' position with three times more earnings (maximum).

3. Comparison with Existing Estimates by the BOK

These estimates of North Korea's real income are found to be very similar to the Bank of Korea's estimates of North Korea's per capita GNI (in won terms).

Lastly, this study translated the above dollar estimates into Korean won terms in accordance to the 2008 won/dollar exchange rate. The comparison of this with the BOK's GNI estimates for North Korea is shown in <Table 6>. The BOK releases its own estimates on North Korea's GNI—income level estimated from a ROK economic perspective—by applying South Korea's prices and value-added ratio to the North's output. These estimates are totally different from the PPP- or market exchange-based GDP in concept. Hence, even if the above estimates on North Korea's PPP-based GDP are converted in the won, it would not be appropriate to compare it with the BOK's GNI estimations.

Despite these limitations, what <Table 6> shows is still interesting as it can be seen that the BOK estimates North Korea's per capita GNI at 1.14 million won while the estimates in this study of North Korea's PPP-based per capita GDP is at a minimum of 1.05 million won and maximum of 1.50 million won. This means that, despite the conceptual difference, the BOK's estimates on North Korea's GNI well complements the PPP-based GDP estimate (based on data from the 2008 North Korea Census). In this regard, it may be fair to say that, at least in the general sense, the BOK's data on North Korea's GNI is not deserving of the accusations of being totally unrealistic.

However, Pyongyang's real income is estimated to be far above the Bank of Korea's estimate of North Korea's per capital GNI.

However, this is far from the situation in Pyongyang, where PPP-based income is above 2.90 million won, almost three times that estimated by the BOK; which could be the reason behind the controversy over the BOK's estimates. Indeed, Pyongyang is the most popular target for outside observers to gain some insight on the North, and accordingly,

<Table 6> BOK's Estimation on North Korea's GNI vs. PPP-based GDP Estimate

(Unit: 10,000 won)

Category	BOK's estimate for North Korea's per capita GNI estimate	North Korea's PPP-based per capita GDP estimate	
		Nationwide	Pyongyang
	114	Min. 104 – Max. 150	Min. 293 – Max. 299

Source: 2008 North Korea Census.

their observations would deviate far from the BOK's estimates.

IV. Conclusion

This paper estimated North Korea's real employment and unemployment rates and income level using the 2008 North Korea Census, and its findings convey some interesting facts. According to North Korea's official data, of those aged 20-59, 88% are employed, which represents almost zero unemployment. However, when these figures are reinterpreted in terms of the scale of unofficial household economic activity, the share of those actually working in official sectors is only at a minimum of 31% and a maximum of 62%. This implies that of the officially employed population, a minimum of 25% and maximum of 57% are de facto unemployed. The opposite is true for Pyongyang where the share of the officially employed population is at 85%, with little difference to that of the real employed population (61-85%). Meanwhile, North Korea's PPP-based per capita income is estimated to be \$948-\$1,361 according to the data on households' use of cooking energy, which is similar to the BOK's estimate on North Korea's GNI; although Pyongyang's per capita GDP is estimated to be \$2,658-\$2,715, almost three times (maximum) larger than the rest of the country. Accordingly, these findings imply that, in terms of income as well as real employment, Pyongyang holds a very special position in North Korea.

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