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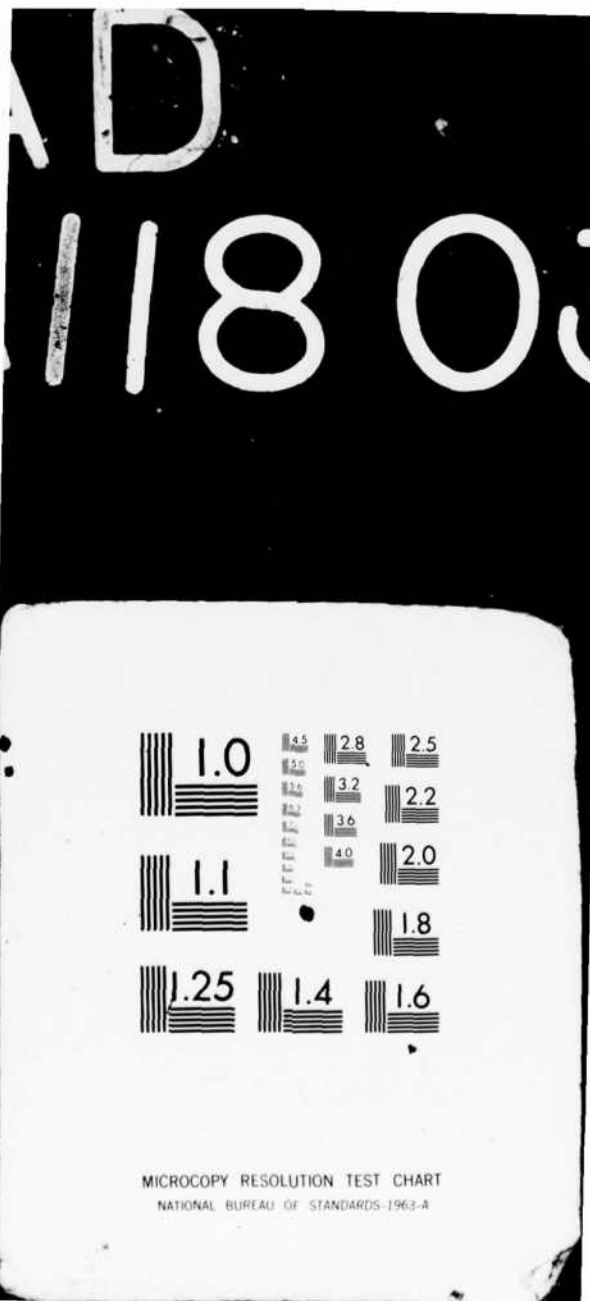
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DIFFERENCES IN ESTIMATES OF NORTH KOREA'S GNP

Kyong-Mann Jeon

March 1982

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PREFACE

This paper was written by Mr. Kyong-Mann Jeon, a graduate student in The Rand Graduate Institute, as part of his applied on-the-job training in the Institute. Mr. Jeon's survey of published estimates of North Korea's gross national product has contributed to a collaborative study, between The Rand Corporation and the Korea Institute for Defense Analyses, of the ability of North Korea to sustain a high level of military effort over the next decade.



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SUMMARY

Estimates of North Korea's gross national product have been made by a number of agencies in South Korea and in the United States. These estimates vary widely, by as much as a factor of two. Moreover, most of the sources do not fully explain the methods used. However, the principal causes of the differences seem to fall into two categories: differing concepts of national income and the products on which estimates are based, and different values used in measuring population, foreign exchange rate, economic growth rate, and price indexes.

Comparative analyses among several of the sources are shown for various components of GNP, including agricultural and industrial production, and foreign trade. The component estimates vary by factors ranging from 140 percent to over 230.

In general, estimates by American agencies tend to be high, based primarily on the official figures published by the North Korean government, while South Korean agencies tend toward lower estimates using data derived from private sources or personal judgments.

In evaluating North Korea's economic ability to sustain a high level of military effort over the next decade, these differences and their causes should be taken carefully into account.

INTRODUCTION

Estimates of North Korea's gross national product have been made by several institutions. The various estimated values are widely divergent, and most of the estimates do not explain the methods used. This brief review explores the principal sources of the divergencies, but the limited information available precludes a complete explanation.

Table 1 presents estimates of North Korea's GNP prepared by various institutions. Both dollar figures and growth rates vary dramatically. For example, for 1975 the estimates range from a high of \$9975 million (U.S. Arms Control and Disarmament Agency (ACDA)) to a low of \$4425 million (Vantage Point); for 1976, estimates from the same two sources range from \$10471 million down to \$4822 million. The disparity ratios are 225 percent and 217 percent for the range of each year, and the mean values are \$6635 million and \$7573 million for the respective years. As for growth rates, the reader will note, for example, that the Korea Institute for Defense Analyses' (KIDA) estimate is more than double that of the Korea Development Institute (KDI) in 1972. Likewise, ACDA's estimated growth rate in 1976 is relatively quite low (5 percent), while the Korea Central Intelligence Agency's (KCIA) estimate for the same year is more than twice as high. Such startling differences may be due to personal judgments based on scanty external quantitative data, rather than to realistic analyses of the North Korean economy's domestic conditions or production.

Table 2 reveals another interesting example: a disagreement over what was the first year when South Korea outperformed the North in per capita GNP. The CIA shows 1976, while the KDI estimate goes back as far as 1969. And the income differential in same years between the two estimates is almost twofold. The cause of this gap

Table 1

ESTIMATES OF NORTH KOREA'S GNP

In \$ Million; Growth Rate
in Parentheses

Year	CIA ^a	Vantage ^b Point	KDI ^c	KIDA ^d	World Bank ^e	ACDA ^f	KCIA ^g
1961				1700			
1962				1877 (8.2)			
1963				2042 (8.8)		2300	
1964				2297 (12.5)		2500 (8.7)	
1965	4580			2506 (9.1)		2500 (0.0)	1983
1966				2611 (4.2)		2900 (16.0)	2067 (4.2)
1967			2100	2940 (12.6)		3000 (3.4)	2328 (12.6)
1968			2600 (23.8)	3263 (11.0)		3500 (16.7)	2584 (11.0)
1969			2700 (3.8)	3345 (2.5)		4000 (14.3)	2649 (2.5)
1970			3200 (18.5)	3696 (10.2)		4500 (12.5)	2998 (13.2)
1971			3500 (9.3)	3807 (3.3)		4900 (8.9)	3221 (7.4)
1972			3800 (8.6)	4517 (18.6)		5300 (8.2)	3853 (19.6)
1973			4500 (18.4)	5626 (24.6)			4953 (28.5)
1974		3961	4800 (6.7)	6449 (14.6)	6300	8595	5459 (10.2)
1975		4425 (11.7)	5200 (8.3)	7131 (10.6)	7100 (12.7)	9975 (16.1)	5977 (9.5)
1976	10000	4822 (9.0)	5600 (7.7)	7926 (11.1)	7600 (7.2)	10471 (5.0)	6594 (10.3)
1977			6100 (8.9)			10781 (3.0)	

^a CIA, Korea: The Economic Race Between the North and the South, January 1978; U.S. base of 1975 \$U.S.

^b Choi Joo-Whan, "Estimate of North Korea's GNP," in Vantage Point, October 1979 (Korea); foreign exchange rate used: \$1 to W3.03.

^c KDI, Economic Comparison Between South and North Korea, 1975 (Korea).

^d KIDA, Analysis of Military Expenditures of North Korea, February 1980 (Korea).

^e MNU, Economic Statistics of North Korea, 1977, p. 208 (Korea).

^f ACDA, World Military Expenditures and Arms Transfers (1967-1976), U.S. Government Printing Office, 1978.

^g KCIA, Evaluation of North Korean Economic Power, 1978, derived from the data of KIDA's report.

Table 2
COMPARISON OF PER CAPITA GNP
(In \$ U.S.)

Year	South Korea	North Korea
CIA Estimates		
1965	245	375
1970	365	425
1976	605	590
KDI Estimates		
1967	143	162
1968	168	194
1969	208	200
1970	242	208
1971	275	241

SOURCES: CIA, op. cit., p. 2;
KDI, op. cit., p. 20.

may be examined in two aspects. One is the differences in concept between National Income (NI), Gross National Product (GNP), Gross Social Product (GSP), or social utility between capitalist and Communist economies, especially North Korea; the other may be differences in interpretation of official North Korean statistical data, such as data on population, price level, and exchange rate. Most attempts to estimate the North's national income have been obliged to depend on questionable but widely publicized data contained in Kim Il Sung's speech before the first Supreme People's Assembly in December 1967. In that speech he announced that per capita national income in 1966 was 500 Won, as large as 1.2 times of that in 1962, and that the estimate predicted for 1968 was 580 Won--nine times the figure for 1946. The North Korean Government has not published official figures on the growth rate of per capita national income since 1967.

The following sections deal with sources of the differences in estimation, using for comparison estimates made by three out of the seven sources mentioned above: CIA, Vantage Point, and KDI, and presenting some factors to be taken into account when calculating communism's national product.

CAUSES OF THE DIFFERENCES IN ESTIMATES

The causes on the whole fall into two categories: differing concepts of national income and product on which estimates are based, and disparities in values of the units used in measuring population, foreign exchange rate, economic growth rate, and price indexes.

GROSS NATIONAL PRODUCT VS. GROSS SOCIAL PRODUCT

Total or per capita GNP, which is a common measure of economic aggregates in capitalist countries, is quite different from Gross Social

Product (GSP), employed in Communist countries. The latter is the total value of all "material"* units produced by the economy and includes the values of all intermediate input units transferred from other sectors, which can give rise to varying degrees of multiple-counting of intermediate input. Although the failure to account for invisible positive or negative social utility is a weakness of measuring GNP, it seems reasonable to include only tangible material products into the GNP concept for comparing economies. Another major difference between GNP and GSP arises from the exclusion of the value of certain tertiary sector activities in the calculation of GSP. As a result, the method formally adopted in communist countries for estimation of GSP is accounting in terms of production rather than distribution or spending. Table 3 lists productive sectors that are included, as well as "nonproductive" sectors that are generally excluded, in estimating GSP.

Table 3
SECTORS INCLUDED AND EXCLUDED IN GSP

included sectors	excluded sectors
Industry	Public administration and justice
Construction	Education, science, and culture
Agriculture	Health, social welfare, and sports
Transport	Finance and insurance
Trade	Local government and housing administration
Other material production	Defense
	Political, social, and religious activities
	Other services

* Due to the development of tertiary industries and industrial deepening, it gets harder and less meaningful to classify national products into material and non-material, or productive and unproductive. See Abraham S. Becker, "National Income Accounting in the USSR," in Soviet Economic Statistics, ed. by Vladimir G. Treml and John P. Hardt, Duke Univ. Press, North Carolina, 1971.

In general, North Korea's national income concept and its measuring methods have been similar to those of the Soviet Union, since the North has followed the Soviet pattern of economic policy. North Korea has published indices of growth only in two sectors: industry for the entire period from 1946 to the present, and agriculture for the period from 1946 to 1960 and for the year 1963. Table 4 compares the component percentages of GSP with those in GNP estimates. The industrial sector in GSP tends to be overestimated and the agricultural sector to be underestimated from the viewpoint of GNP, because of multiple counting in industry and no turnover tax in agriculture. Added values from service sectors are too ambiguous to be accounted for properly.

Table 4
COMPARATIVE COMPONENTS OF NORTH KOREAN GSP* AND GNP**
(GNP in Parentheses)

Year	Industry	Agriculture	Other Production	Transportation and Communication	Construction	Trade	Other
1961	56.3 (45.0)	24.8 (27.1)	18.9 (27.0)	1.9	6.7	8.2	2.1
1962	61.0 (46.4)	21.3 (25.4)	17.7 (28.2)	2.8	9.1	3.6	2.2
1963	60.6 (46.0)	21.5 (27.4)	17.9 (26.6)	2.8	9.2	3.8	2.1
1964	60.3 (49.1)	20.3 (25.2)	19.4 (25.7)				
1965	60.3 (51.5)	20.3 (24.4)	19.4 (24.1)				
1966	59.5 (52.5)	21.2 (24.6)	19.3 (22.9)				
1967	(55.0)	(23.0)	(22.0)				
1968	(57.4)	(22.0)	(22.6)				
1969	(55.3)	(22.7)	(22.0)				
1970	(57.3)	(21.5)	(21.2)				

* Pong S. Lee, "An Estimate of North Korea's National Income," in Asia Survey, 1972, p. 522 (partially borrowed: 1961-1963), and Research Institute of North Korea, North Korean Economy, 1979, p. 291 (partially borrowed: 1964-1966).

** Research Institute of North Korea, Ibid., p. 294 sourced from Research Institute for Far Eastern Affairs.

NATIONAL INCOME AND SOCIAL WELFARE

In addition to GSP, North Korea's concept of national income, "domestic, net-valued and actually priced" material product, is employed for national income accounting. Here, components to be subtracted from GSP are mainly depreciation and factor income in the nonproductive sectors. Communist accounting practices consider actual turnover prices inclusive of taxes but excluding subsidies. When national income is evaluated in terms of actual transaction price, problems arise due to the unbalanced imposition of turnover taxes on individual subsectors, resulting in arbitrary and divergent estimates. For instance, the agricultural sector typically suffers relative underevaluation compared with manufacturing sector output, because turnover taxes are generally not imposed on the agricultural sector and because the prices of many agricultural products are set by government policy at a level below actual production costs in some instances. As seen in Table 5, the depreciation rate adopted during the 1960s was 3.7 percent^{*} and the factor income ratio of nonproductive sectors ranged from 5.5 percent to 7.4 percent. According to North Korean concepts NI is around 90 percent of GNP. In contrast to that percentage, NI was estimated to be 50 percent of the GSP in 1963.^{**}

Another point to consider when converting North Korea's NI--or that of Communist countries in general--into GNP is accounting for nonproductive

^{*}Based on the official announcement by the North in 1957, depreciation in the industrial sector is 3.7 percent of gross production cost. (See Research Institute of North Korea, *ibid.*, p. 288.)

^{**}Lee, *op. cit.*, p. 520. Estimated GSP was fitted to the official index of GSP.

Table 5

GNP AND NNP VS. NORTH KOREA'S NI

Year	GNP	Depre- ciation	NNP ^a	Factor Income of Nonproductive Sector	NI According to North Korean Concept
1960	100	3.7	96.3	6.1	90.2
1961	100	3.7	96.3	6.2	90.1
1962	100	3.7	96.3	5.8	90.5
1963	100	3.7	96.3	5.5	90.8
1964	100	3.7	96.3	7.3	89.0
1965	100	3.7	96.3	6.9	89.4
1966	100	3.7	96.3	7.0	89.3
1967	100	3.7	96.3	7.1	89.2
1968	100	3.7	96.3	6.6	89.7
1969	100	3.7	96.3	6.6	89.7
1970	100	3.7	96.3	7.4	88.9

SOURCE: Research Institute on North Korea,
North Korean Economy, 1979, p. 289, as cited
 by the Research Institute for Far Eastern Affairs.
^a Net national product, which is equal to GNP minus
 depreciation.

NOTE: Exchange rate is \$1 to W2.57.

services reflected in social welfare. It may be difficult to settle
 on a discount rate between Communist and capitalist economies by which
 North Korea's NI should be increased for conversion into GNP.*

In sum, improper or confused application of such concepts as
 GNP, GSP, communist NI and capitalist NI can be the basic sources of
 difference in various GNP estimates.

LIMITATIONS OF AVAILABLE DATA

Even aside from the fact that limited access to official published
 economic data is a characteristic of Communist centrally planned economies,

* The rate was estimated as 20 percent; J. Wilczynski, The Economics
 of Socialism, Aladine Publishing Co., Chicago, 1970, p. 65.

there are some difficulties in applying North Korean data to estimate GNP. For one thing, statistics, even when published, are rarely precise quantities but rather indexed numbers (e.g., 2 or 3 times, or 100 to 200 percent) with respect to some base for which information may or may not be available. Second, the true figures are tampered with by the authorities concerned for the sake of mass manipulation and overseas propaganda, so that the aggregated totals in their tables are often inconsistent and exaggerated, and cannot be accepted at face value.* Thus, for the most part, regardless of the method used, North Korea bases its estimate of GNP for a certain year on figures either published by the North Korean government, or carried by the journals of the Soviet Academy of Sciences, or acquired from other private sources. Using it as the base year, they then arbitrarily work out growth rates in the following years.

According to CIA reports, real GNP and per capita GNP in the North have grown at annual rates of 7.4 percent and 4.2 percent respectively since 1965, with data expressed in 1975 U.S. dollars. The CIA gives no details, however, on the data sources or methods it used to arrive at these figures. The World Bank's Asia Year Book for 1980 estimates North Korea's 1976 GNP at constant 1975 prices to be \$7,610 million in contrast to the CIA estimate of \$10,000 million calculated on the same base. And estimates in Choi Joo-Whan's estimates in Vantage Point relied heavily on materials and data concerning aggregate and sectoral distribution

* For example, in the General Report made in November 1974 at the Conference in Commemoration of the Tenth Anniversary of Kim Il Sung's Theses on the Rural Sector, Premier Kim announced that the annual growth rate in agriculture was 30 percent between 1973 and 1974. Such figure can have no possible basis in fact. See the CIA's estimates of growth rate in Table 7.

of North Korea's government budget. Since he may have arbitrarily adjusted the figures in the light of his own judgment, their credibility is also relative and weak. Nor could Choi take commodity prices into account, expressed in terms of current prices. One currency conversion rate--\$1 to W3.03, which is highest among those found in estimates--caused GNP to be underestimated by 128 percent in comparison with Choi's use of another rate, \$1 to W2.37, in his same report. Because there has been no consensus on a fair exchange rate for the Won, North Korea's monetary unit, North Korea disputes the Western conversion rates in trade. The basic rate is linked to the Soviet rouble at a parity of 1 Won = 75 kopeks.* KDI's report does not mention how it derived either its GNP estimates or its predictions for years after 1975.

COMPARISON AMONG THREE ESTIMATES

First of all, reviewing all the estimates for 1976 in Table 1, we see that the mean value of GNP is \$7765 million and that the median ranges between \$5600 million and \$10,000 million at a 98 percent confidence level.** On that scale, then, Vantage Point's figure of \$4822 million is an underestimate while ACDA's \$10,471 million is an overestimate. In the following paragraphs, we make comparative analyses with several common items which are components of GNP in terms of production among the CIA, Vantage Point, and KDI reports.

*The Far East and Australasia 1980-1981, Europa Publication Limited, 1980, London, pp. 640-644, in November 1979, U.S. \$1 was equivalent to 65.4 kopeks (and 1 rouble=100 kopeks). Thus, the principal conversion rate can be placed at \$1 = W1.15.

**This range includes a Vantage Point estimate of \$6,165 million based on an exchange rate of \$1 = 2.37 won.

FOREIGN EXCHANGE RATE

Assuming a 1975 exchange rate of one U.S. dollar to W2.05, CIA's estimate in 1976 is 179 percent of KDI's and 140 percent of Vantage Point's, as the latter is converted to \$7127 million. Thus the GNP indexes for comparison among the three sources' estimates, ceteris paribus, are the following:

<u>CIA</u>	<u>Vantage Point</u>	<u>KDI</u>
(179)	(127)	(100) -- same exchange rate (\$1 = W2.05)
(179)	(110)	(100) -- different exchange rate (CIA, KDI: \$1 = W2.05 <u>Vantage Point: \$1 = W2.37</u>)

FOREIGN TRADE

All three sources report similar trends in North Korea's foreign trade, even if the amounts in the same year are very different, when 1970 is used as the base year. Vantage Point estimated the largest imbalance of trade which shows deteriorating trends year by year, while KDI shows a smaller, but opposite trend (see Table 6). When foreign trade is omitted in 1976, the difference in GNP estimates between CIA and Vantage Point is \$2673 million on the base of the same exchange rate, which is 37 percent of the Vantage Point estimate.

<u>CIA</u>	<u>Vantage Point</u>
(137)	(100) -- same exchange rate (\$1 = W2.05)
(157)	(100) -- different exchange rate (CIA: \$1 = W2.05 <u>Vantage Point: \$1 = W2.37</u>)

Table 6

ESTIMATED TRENDS IN NORTH KOREA'S FOREIGN TRADE^a

Base Year: 1970

Year	Total			Exports			Imports			Balance		
	CIA	V.P. ^b	KDI	CIA	V.P.	KDI	CIA	V.P.	KDI	CIA	V.P.	KDI
1970	100	100	100	44	45	46	56	55	54	-12	-10	-8
1972	---	128	136	--	44	47	--	56	53	--	-12	-6
1973	---	135	159	--	35	47	--	65	53	--	-30	-6
1974	---	205	---	--	30	--	--	70	--	--	-40	--
1975	258	178	---	41	36	--	59	64	--	-18	-28	--
1976	194	184	---	40	37	--	60	63	--	-20	-30	--

^aThe indexes of export, import and balance are the components of total trade in the same year.

^bVantage Point.

AGRICULTURAL SECTOR

Table 7 shows that the CIA's estimates of the share of agricultural production in total output exceeds those of KDI by a considerable amount in the two years for which comparative data are available.

INDUSTRIAL SECTOR

In the three reports, there are no common subsectors in industry for comparisons. The CIA report shows indexes of industrial production between 1971 and 1976, with growth rates which seem to be overestimated when compared to the growth rate goal of 12 percent in the new seven-year plan (1978-1984), and to the growth rate of 14 percent per annum during the 1966-1976 period in the same report. In 1976 CIA's estimated growth rate amounted to 8.1 percent if it is assumed that other production

Table 7

CIA AND KDI ESTIMATES OF NORTH KOREA'S
AGRICULTURAL PRODUCTION^a

Year	CIA			KDI		
	Production	Growth Rate	Contri- bution to GNP Growth ^b	Production	Growth Rate	Contri- bution to GNP Growth ^b
1970	100					
1971	n.a.					
1972	79	-21%	-4.9%	100		
1973	107	36%	8.3%	105	5%	1.15%
1974	140	31%	7.1%	110	5%	1.15%
1975	154	10%	2.3%			
1976	160	4%	0.9%			

^aBased on annual grain production.

^bComponents of total GNP assumed here are: industry 57%, agriculture 23%, and other production 20%.

Table 8

ESTIMATED GROWTH OF NORTH KOREA'S INDUSTRIAL SECTOR

Item	1971	1972	1973	1974	1975	1976
Production	100	134	160	188	225	247
Growth rate	---	34%	19.4%	17.5%	19.7%	9.8%
Contribution to GNP growth ^a		19.4%	11.0%	9.9%	11.2%	5.6%

Source: CIA, op. cit., p. 11.

^aComponents of total GNP assumed here are: industry 57%, agriculture 23%, and other production 20%.

sectors grow as highly as the average growth of industry and agriculture. And this rate is not too different from the 9.0 percent in Vantage Point or 7.7 percent in KDI's report.

OTHER COMPARISONS

Table 9 compares other elements of the three reports' GNP estimates.

Table 9

COMPARISON OF ELEMENTS IN GNP ESTIMATES

Item	CIA	Vantage Point	KDI
Accounting base		Budget and expenditures	
Growth rate	7.4% per annum since 1965 1966-1976: double (to \$10 billion)	1975: 11.7% 1976: 9.0%, due to shortening the six-year plan by one year	1974: 4 to 5%
Military expenditures as % of GNP	Past decade: 15% to 20%	1974 1975 1976 25.4% 27.1% 27.2%	1974-1975: 13.9%
Investment as % of GNP	25% to 35% (domestic savings)	1974 1975 1976 25.3% 24.5% 24.5% (fixed investment)	1974: 35.2% (including foreign savings)
Bottlenecks to growth	Defense-heavy commitment Capital inefficiency Foreign trade		Lack of foreign economic cooperation Closed economy system Unbalanced industrial structure Labor shortage

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