An Analysis of the Effect of North Korea's International and Inter-Korean Trade on Its Economic Growth

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This study analyzes the growing influence of North Korea's and inter-Korean trade on North Korea's economic growth, and examines some of the implications for the future direction of economic or political policies.

Major analyses show that the North Korea's average economic growth rate for the years 1999-2003 that was driven by inter-Korean trade hovered at 1.2% up to 2.3% and the growth rate by North Korea's trade stood at 2.4%. The rates are surprisingly high, roughly equivalent to the 2.8% average growth rate for the corresponding years estimated by the Bank of Korea.

These results suggest that without the growth of North Korea's and inter-Korean trade for the years, North Korea could have slipped into negative economic growth. Another striking result arising from the analyses is that inter-Korean trade, although it accounts for one-fifth of North Korea's overall trade volume, has a significant effect on the North Korea's economic rebound, which stems largely from "non-trade" nature or South Korea's unilateral economic or humanitarian assistance.

JEL Classification Number : C5, F1, O1, P2

Key words : North Korea′s Trade, Inter-Korean Trade, North Korea′s Economic Growth

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I. Introduction

It is evaluated that the North Korean economy has entered a recovery phase, although it has not fully recovered from the economic crisis. The North Korean economy, which had posted negative growth since 1990, rebounded in the year 1999 and together with sustained positive growth until recently. Systematic restructuring and changed economic policies beginning in 1998, international aid including the inter-Korean economic cooperation are cited as major contributors of the recovery.[1] Since 1998, Kim Jeong-il′s regime has been stable, providing a basis for the putting in place of various economic measures. At the same time, the nation′s trade with the outside world, including inter-Korean trade, has significantly increased. In this context, there is a high possibility that internal and external factors have combined to contribute to the nation′s economic recovery. However, there has been no thorough empirical analysis as to the likelihood of this so far.

Against this backdrop, this study aims to provide an empirical analysis of how and to what extent North Korea′s international trade and inter-Korean trade affect its economic growth. This study separates North Korea′s trade with South Korea from that with other countries, given its unique character of ″national internal transactions″.[2]

This study is organized as follows: first, before analyzing their effect on North Korea′s economy, we compare and review North Korea′s trade with other nations and that with South Korea. Second, we develop a model which analyzes their effect on an economic growth in general and conduct an empirical analysis of their effect on North Korea′s economic growth using the model. The inter-Korean trade is short in history and quite different from North Korea′s trade

Notes : 1) ″The recent recovery trend of the North Korean economy is attributed to the fact that the expansion of fiscal spending to normalize the economy, inflow of large-scale grant-type aid since 1998 and inflow of the dollars from Mt. Geumgang tour project have led to the normalization of some plant operations, along with regime stabilization following the inauguration of Kim Jeong-il.″ Ministry of Unification, 「Understanding North Korea」 2002. p.109, 「Understanding North Korea」 2004, pp.139-140

2) In principle, inter-Korean trade is regarded as domestic trade in 「Act on Inter-Korean Exchanges and Cooperation」(Aug. 1990) and 「Special Act on the Implementation of the WTO agreement」(Jan. 1995). 「Agreement on Reconciliation, Non-aggression and Exchanges and Cooperation between the South and North」stipulates inter-Korean trade as ″national internal transactions″. Terms regarding inter-Korean trade are accordingly different from those regarding international trade, In inter-Korean trade, terms such as transactions, outflow and inflow are used to refer to trade, exports and imports, respectively. However, there is no difference in the coverage of the signified.

with other nations in nature so that separate methodologies are employed. Lastly, we suggest the limits and challenges of the inter-Korean trade, based on a comprehensive analysis of their implications to the North Korean economy.

II. The Current State and Features of North Korea′s International Trade and Inter-Korean Trade

1. International Trade

1) Overview

After liberation from Japan′s colonial rule and until the late 1980s, North Korea′s trade had been mostly with socialist countries, such as the former Soviet Union through barter based on the friendship price system and settlement clearance. However, the collapse of the Communist block at the end of the 1980s dealt a harsh blow to the North Korean economy since the socialist markets accounted for two-thirds of its trade. Under these circumstances, North Korea had to shift its settlement system to one based on hard currency. Lack of foreign exchange reserves worsened the shortages of electricity, natural resource and energy which, in turn, aggravated economic hardships. Against this backdrop, North Korea has begun seeking its way out of the difficulties, mainly relying on trade mainly relying on non-commercial trade including assistance from the international community.

2) Current State of Trade

a. Perception of Trade in the North Korean Economy

North Korea′s trade has been shaped by the policy for "the construction of a self-supporting national economy" which is Pyongyang′s economic development strategy.[3] North Korea defines a self-supporting national economy as "an economic system where all factors of production such as human and material resources are secured within the economy itself and a complete coupling between production and consumption allows its production and consumption cycle."[4] In accordance with this economic strategy, North Korea′s

3) "The most important thing in the international trade policy of the Workers' Party is to develop international trade based on self-supporting national economy." 「Economic Dictionary1」 (Pyongyang: Social Science Publishing Co., 1985) p.464,

trade policy initially focused on self-sufficiency. For instance, the North emphasized the production of raw materials and fuels on its own, which demonstrates its obsession with the principle of a self-supporting national economy: Exports were used only as a means to acquire foreign currency and only a minimum amount of producers' goods were allowed to be imported. Moreover, its imported industrial facilities were confined to those designed to produce commodities for domestic consumption, not for export, and only a minimum amount of part and component imports were allowed. These were parts of its efforts to produce facilities on its own through the development of its machinery industry.[5] In this context, its policy for the construction of a self-supporting national economy can be called an inner-directed and import-substitute development strategy.

However, North Korea came to face the limits of a small-scale economy and has begun to ease up "the policy for the construction of a self-supporting national economy" in an attempt to expand trade from the early 1970s. North Korea put more emphasis on trade as it became integrated into the global economy following the collapse of the socialist block. Nevertheless, it has maintained its inner-directed economic structure, only moderately easing up its isolation. This is clearly demonstrated in its trade dependency, which is set out below.[6]

Table 2-1 North Korea's Trade Dependency[1]

(Unit : %)

year	1965	1968	1971	1974	1977	1980	1983	1986	1989	1992	1995	1998	2001
dependency	20.1	19.7	23.3	28.5	15.1	24.2	17.3	19.5	21.4	12.1	9.2	11.4	14.5

Note : 1) Inter-Korean trade excluded

4) 「Economic Dictionary 21」(Pyongyang: Social Science Publishing Co., 1985) p.208,

5) 『North Korean Economy at the Crossroads - Realities Revealed through International Economic Cooperation』 written by Natalia Bazhanova & translated by Yang, Jun-yong. (Seoul: the Korea Economic Daily, 1992) p.112.

6) This low trade dependency is not irrelevant to self-supporting economic system: China's trade dependency was a mere 13.9% prior to its reform drive when the country sought an endogenous economic growth. In contrast, the trade dependency ratio of CMEA (Council for Mutual Economic Assistance) member countries pursuing a socialist international division of trade ranged from 40-80%. Between 1971 and 1989, China's trade dependency recorded 13.9% while that of Hungary, Poland and Romania was 83.7%, 43.2% and 43.5%, respectively. (http://pwt.econ.upenn.edu) The trade dependency of South Korea between 2000 and 2002 was 82.4%. China 50.9%, Japan 21.1%, Vietnam 112.5%, Taiwan 100.5%, Poland 62.1%, Hungary 143.6% and Romania 74.1%. (http://www.wto.org)

North Korea′s trade policy was based on the principle of the politico-economic linkage that political purposes take precedence over economic ones. This is the main feature of socialist countries′ trade policies. A country that adopts this principle places priority on its trade with socialist countries, thus maintaining the political economic relationship. If necessary, it can pursue trade relations with capitalist economies, yet these relations are solely confined to economic ones. Since the beginning of the 1990s, however, the principle has become meaningless with North Korea′s incorporation into the global market economy.

b. Major Trends

North Korea′s trade volume increased slightly only due to its initial policy for the construction of a self-supporting national economy. However, it began to soar as imports from Western countries grew sharply from 1970 through 1974. The accumulation of foreign debt[7] resulting from the excessive large-scale imports and the falling demand for North Korean products due to the oil shocks led to the contraction of the trade volume. Trade picked up temporarily at the end of the 1970s, mainly driven by mass mobilization movements. In fact, exports declined due to the side effects of export at below-cost price. In the mid-1980s, North Korean trade was greatly revitalized, backed by Kim Il-sung′s visit to the Soviet Union in 1984 and the conclusion of a trade and economic cooperation pact with the Soviet Union in 1985. However, imports from the Soviet Union dropped in 1989, leading to a sharp contraction in overall trade. Once again, North Korea′s trade volume began to expand as the international community′s aid flowed into the country to address severe food shortages from 1995 and South Korea and China expanded their trade with North Korea as a move to help the country from 1999.

On the other hand, North Korea′s trade account balance has always been negative except for 1978 and 1979. Recently, the trade deficit has been widening significantly to the extent that imports are almost double exports.[8]

7) In 1974, North Korea′s trade deficit with Western countries represented about 80% of the total trade deficit of $667million. This, combined with its low production capacity and credit standing, directly led to the accumulation of foreign debts. By 1975, the amount of foreign debt that North Korea owed Western countries reached $1.24billion due to the loans concentrated between 1971 and 1975. The all-out suspension of foreign loans from Western countries caused North Korea to default on its foreign-currency obligations, severely undermining its international credit standing.

8) North Korea was able to continue its trade with other countries despite its expanding trade deficits, thanks to a considerable share of trade of an assistance nature. such as grant-type aid. Therefore, deficits do not necessarily mean the accumulation of foreign debts in the case of North Korea.

Figure 2-1 Overview of North Korean Trade

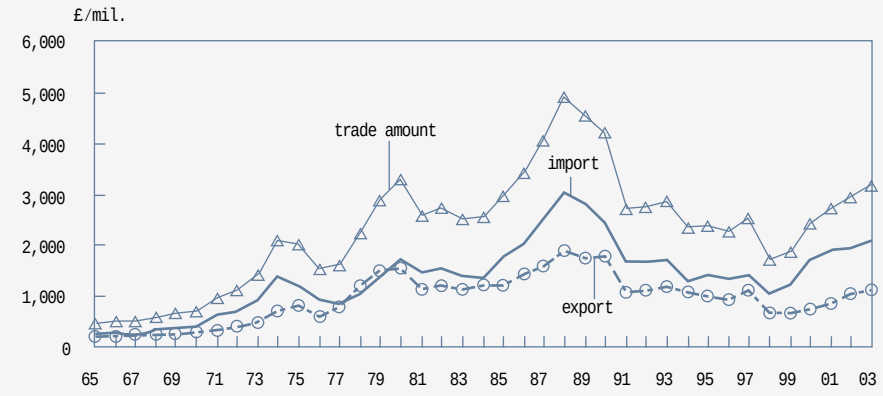


Table 2-2 North Korea's Trade Account[1)]

(Unit : $mil)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
export	1773	945	933	990	858	736	727	905	559	515	566	650	736	777
import	2437	1639	1622	1656	1242	1316	1250	1272	883	965	1407	1620	1524	1614
trade account	-704	-694	-689	-666	-384	-580	-523	-367	-324	-450	-841	-970	-788	-837

Note : Inter-Korean trade excluded
Source: KOTRA, 『North Korea's International Trade』, each year

The trade deficit began to expand as imports from Western countries rose sharply in the early 1970s. In addition, a lack of competitive goods to export and the price cut of export goods, such as non-steel metal, aggravated the trade deficit. This, in turn, led to a snowballing foreign debts, creating a vicious circle of reduced imports, production cuts, weak exports and falling imports, once again. As North Korea's default on foreign loans disrupted its trade with western countries, it shifted its eyes toward foreign direct investment(FDI), which does not require repayment. The North has made multifaceted efforts, such as the enactment of Joint Venture Law(1984) and the development of Special Economic Zones(1991). However, these policy efforts have until recently made little progress, failing to bring the desired effects.

As a result, the country is now on the verge of collapsing with a seriously high level of foreign debt. North Korea's total external debts, including loans and its

trade deficit, amounted to $12.5billion as of 2000.[9] The International Monetary Fund(IMF) defines a country with an external debt/export ratio more than 2.2 and a per-capita GDP less than $695 as a Highly Indebted Poor Country(HIPC). North Korea barely avoided being classified as a poor country, with per-capita GDP recording $818 as of 2003, but it still faces a serious external debt crisis considering that its external debt/export ratio is more than 10.

c. Composition of Trade

Trade Analysis by Product

Food and factors of production such as machinery, transport equipment, mineral fuels and manufactured goods have been the major imported items of North Korea since the country first engaged in trade with other countries. If we look at the trend by period, the share of production facilities, such as machinery

Table 2-3 North Korean Statistics by Import Item (1965-2003)

(Unit : $mil, %)

		1965	1970	1975	1980	1985	1990	1995	2000[1)]	2003[1)]
food	SITC0	19 (15.4)	30 (11.0)	31 (4.1)	123 (10.2)	43 (3.4)	108 (7.6)	153 (10.5)	269 (19.1)	325 (20.1)
mineral fuels	SITC3	16 (12.8)	46 (16.8)	49 (6.4)	191 (15.9)	394 (30.6)	216 (15.2)	239 (16.3)	171 (12.2)	338 (20.9)
manufactured goods by material	SITC6	25 (20.2)	23 (8.4)	106 (13.9)	202 (16.7)	189 (14.7)	315 (22.2)	299 (20.4)	172 (12.2)	128 (7.9)
machinery & transport equipment	SITC7	40 (32.1)	129 (47.4)	447 (58.3)	380 (31.6)	368 (28.6)	398 (28.0)	295 (20.2)	351 (25.0)	344 (21.3)
others		24 (19.6)	45 (16.4)	133 (17.3)	308 (25.6)	293 (22.8)	382 (26.9)	476 (32.6)	444 (31.5)	480 (29.7)
total		123 (100.0)	273 (100.0)	766 (100.0)	1,204 (100.0)	1,287 (100.0)	1,419 (100.0)	1,461 (100.0)	1,407 (100.0)	1,614 (100.0)

Note : 1) Since 2000, HS'' has been used to compile data instead of SITC,'' which was used between 1965 and 1995. HS and SITC have differences in categories. To ensure consistency between HS and SITC, we have combined "food & animal goods" and "oil & prepared food" into the category of "food", regarded "textile products' as 'manufactured goods classified chiefly by material", and combined "vehicles" & "machinery" into the"machinery & transport equipment" category.

Source: UNSTAT, recited in Lim Gang-taek(1998), KOTRA,『North Korea's International Trade』, each year.

9) The Bank of Korea(BOK) estimated that North Korea's total foreign debt has exceeded $12billion since 1996 while IBRD calculated that it registered $7.4billion as of 1998. IBRD, *External Debt Statistics, Historical Data* 1988~1999.

and transport equipment, grew in the 1970s. In the 1980s, with growing imports from Russia, the share of mineral fuels, especially coke and crude oil, were relatively high. In the early to mid 1990s, imports of textile raw materials for processing trade rose so that the share of manufactured goods classified chiefly by material grew remarkably. Food imports grew in proportion well into the end of 1990s, demonstrating North Korea's severe food shortages.

Meanwhile, North Korea's major export goods are manufactured goods, miscellaneous manufactured articles and food. More specifically, non-steel metal accounted for the largest share until 1993 and then, textile goods manufactured through process-on-commission between 1994 and 2000. Since 2001, fisheries products have topped the list.

Table 2-4 North Korean Statistics by Export Item (1965~2003)

(Unit : $mil)

		1965	1970	1975	1980	1985	1990	1995	2000[1)]	2003[1)]
food	SITC0	14 (12.1)	24 (11.7)	135 (24.9)	145 (12.9)	101 (9.6)	111 (10.6)	137 (18.3)	128 (22.9)	290 (39.4)
manufactured goods by materials	SITC6	69 (61.7)	109 (52.9)	288 (53.2)	682 (60.7)	532 (50.1)	289 (27.6)	114 (15.2)	43 (7.7)	58 (7.9)
machinery & Transport equipment	SITC7	26 (1.4)	10 (4.8)	21 (3.9)	54 (4.8)	98 (9.3)	146 (13.9)	106 (14.2)	103 (18.5)	84 (11.4)
other manufactured goods	SITC8	2 (2.2)	21 (10.0)	25 (4.6)	58 (5.2)	101 (9.6)	288 (27.5)	240 (32.0)	137 (24.6)	123 (16.7)
others		25 (22.7)	43 (20.6)	72 (13.3)	184 (16.4)	228 (21.5)	213 (20.3)	153 (20.3)	147 (26.2)	181 (24.6)
total		112 (100.0)	207 (100.0)	541 (100.0)	1,124 (100.0)	1,061 (100.0)	1,046 (100.0)	751 (100.0)	559 (100.0)	736 (100.0)

Note : 1) Statistics for the period between 2000 and 2003 are classified according to HS. To ensure consistency between HS and SITC, we have combined 'plant products' and 'animal products' into the 'food' category, regarding 'non-metal products' as 'basic manufactured goods by material', and 'machinery & electric, electronic goods' as 'machinery &transport equipment' and 'textile products' as 'miscellaneous manufactured goods'.

Source: UNSTAT, recited in Lim Gang-taek(1998), KOTRA, 『North Korea's international trade』, each year.

10) See www.foreign-trade.com for more information on HS(Harmonized System) Code.

11) SITC(Standard International Trade Classification) is composed as follows: SITC0: food & live animals; SITC1: beverage and tobacco; SITC2: raw materials except fuels; SITC4: animal & vegetable oils; SITC5: chemical products; SITC6: basic manufactured goods; SITC7: machinery and transport equipment; SITC8: miscellaneous manufactured goods; and SITC9: commodities & transactions not elsewhere classified.

Trade Record by Nature of Transaction

North Korea′s trade is quiet different from that of other nations since non-commercial trade accounts for a very large proportion. Unlike general import & export and capital transactions, non-commercial trade means provision of goods, financial income or expenditures gratis by one country to another.

The chronology of North Korea′s trade by period is set out below; First, in the wake of liberation, more specifically, immediately after the Korean War, North Korea received a huge amount of goods, such as raw materials, as grant-type aid from its socialist neighbors, including the Soviet Union and China. Since the 1960s, however, credit assistance has replaced grant-type aid. The total amount of credit assistance and grant-type aid North Korea received by the end of the 1960s amounted to $2.04billion.[12] Second, as the flow of assistance from socialist countries ebbed from the early 1970s, North Korea took out large-scale loans from Western countries which amounted to $1.24billion.[13] Third, Kim Il-sung′s visit to the Soviet Union in 1984 and the bilateral agreement on trade and economic cooperation in December 1985 laid the foundation for the expansion of North Korean trade.[14] The collapse of the Communist block, however, led to termination of the friendship price system that had been applied to the bilateral trade of military equipment and crude oil, etc. This meant a virtual end of assistance-in-kind to North Korea.[15] 4)From 1995, South Korea, Western countries and international organizations began to provide aid to North Korea which suffered from severe food shortages. Against this backdrop, the provision of grant-type aid, was resumed, making an increasing contribution to the North Korean economy.[16]

12) Ministry of Unification, 『North Korea Overview 2000』 2000, p. 385

13) Yet, loans from western countries have been virtually suspended so far since North Korea defaulted on foreign-currency obligations in 1976. Since then, only a small amount of loans were provided mainly by the former Soviet Union and China. Ministry of Unification, op. cit.

14) Signing this agreement, the two nations agreed to increase the bilateral trade volume by 2,7 times that of the preceding 5 years. In addition, the Soviet Union promised to provide about $100million of loans during the 3rd Round of 7 Year Plan(1987-1993) Far Eastern Affairs, 1986, no.3, p.188, recited by Natalia Bazhanova p.106.

15) Ministry of Unification, 『North Korea Overview 2004』 2004, p.296 In addition, the collapse of the Soviet Union resulted in the suspension of North Korea-Soviet Union cooperation in science and technology which, in fact, had been sustained by grant-type aid from the Soviet Union.

16) The proportion[1)] of humanitarian aid (grant-type aid) to North Korea

($mil. %)

	1995	1996	1997	1998	1999	2000	2001	2002
Assistance to North Korea(A)	287.9	102.3	310.7	333.8	406.8	295.5	492.6	392.2
North Korea′s import(B)	1,380.4	1,319.6	1,387.3	1,012.7	1,176.8	1,679.8	1,846.8	1,895.0
A/B	20.9	7.7	22.4	33.0	34.6	17.6	26.7	20.7

Note : 1) Complied based on statistics of Ministry of Unification. North Korea′s import includes South Korea′s humanitarian aid and outfow

Source: Ministry of Unification

Table 2-5 The Share of Each Trading Partners in North Korea's Trade[1)]

(Unit : %)

	1965	1970	1975	1980	1985	1988	1990	1993	1995	1998	2000	2003
total amount ($mil)	424	622	1847	3104	2780	4726	4190	2817	2293	1765	2337	2962
China	42.5	18.5	26.1	21.8	18.2	12.3	11.5	31.9	24.0	23.4	27.8	34.5
Soviet Union	42.0	58.9	24.6	27.7	49.5	55.4	53.1	8.0	3.6	3.7	2.0	4.0
Japan	7.4	9.2	13.9	18.5	14.6	11.8	11.4	16.8	25.9	22.4	19.8	9.0
South Korea	0.0	0.0	0.0	0.0	0.0	0.0	0.5	6.1	10.5	18.3	15.6	20.6
Others	8.0	13.4	35.4	31.9	17.7	20.6	23.6	37.2	35.9	32.3	34.7	31.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note : 1) Inter-Korean trade is included in total trade amount.
Source: Statistics by the year 1988 is based on data of the United Nations Statistics Division(UNSTAT) (Lim Gang-taek, 1998) and those since the year 1990 is from KOTRA.

Trade Records by Country

The overview of North Korea′s trade shows several changes in major trading partners. For instance, its trade was oriented towards the former Soviet Union and China before the 1970s. From the 1970s, Japan emerged as a major trading partner along with the two socialist neighbors. Then, in the mid 1980s, the Soviet Union occupied the dominant position in North Korea′s trade. After the collapse of the Soviet Union, however, the share of its successor states began to

17) The case in point is a decline in North Korea-Soviet Union trade & a pick-up in North Korea-China trade resulting from the strains in the Sino-Soviet relations in the early 1960s. The overthrow of Khruschev and China′s Cultural Revolution in the mid 1960s led to an increase in North Korea-Soviet Union trade & a contraction in North Korea-China trade. Another example is the 1983 Rangoon Bombing Incident, on which the Soviet Union sided with North Korea. This led to an increase in North Korea-Soviet Union trade & a contraction in North Korea-China trade.

18) North Korea′s trade with South Korea, Japan and China represents about 20% of total trade. On the other hand, their trade with North Korea accounts for a mere 0.05~0.20% of their total trade amount. Indeed, trade with these three countries has a significant meaning to the North Korean economy.

The Proportion of North Korea in Korea, China & Japan′s Trade (%)

		1999	2000	2001	2002
Inter-Korean Trade	inter-Korean trade / total trade of South Korea	0.13	0.13	0.14	0.20
	inter-Korean trade / total trade of North Korea	18.39	17.76	15.08	22.12
North Korea-China trade	North Korea-China trade / total trade of China	0.10	0.10	0.14	0.12
	North Korea-China trade / total trade of North Korea	20.42	20.38	27.59	25.44
North Korea-Japan trade	North Korea-Japan trade / total trade of Japan	0.05	0.05	0.06	0.05
	North Korea-Japan trade / total trade of North Korea	19.32	19.37	17.76	12.74

Source: Total trade amount of respective countries & North korea′s trade amount are based on statistics from KITA and KOTRA, respectively

shrink from the early 1990s. On the other hand, the share of China and South Korea rose to 55.1% in 2003 from 12.0% in 1990, which is comparable to that of the Soviet Union in the mid-1980s.

Before the 1990s, the shares of the Soviet Union and China fluctuated, mainly for political reasons.[17] Still, the influence of political factors remained far-reaching into the 1990s.[18] For instance, China resumed its assistance to North Korea in earnest in 1996, with a view to keeping a firm grip on the country. In 1999, their bilateral relations fully went back to normal, leading to a pick-up in bilateral trade. In contrast, North Korea′s trade with Japan has shown a downward trend for some time due to North Korea′s past record of default[19] and the hostility of public opinion in Japan to North Korea′s military actions.

2. The Current State of Inter-Korean Trade

1) Overview

Inter-Korean trade refers to direct and indirect trade in which goods flow in and out of North Korea. Inter-Korean trade is divided into two types; commercial transactions and non-commercial transactions. The two Koreas started bilateral trade in 1988 in accordance with 'the July. 7th declaration' and its follow-up measures, involving economic opening vis-a-vis North Korea. South Korea′s policy toward North Korea shifted towards the establishment of peace on the Korean Peninsula in 1998 and since then, inter-Korean trade has sharply increased. Currently, South Korea is North Korea′s second largest trading partner following China. At the same time, South Korea is the country with which North Korea enjoys the largest trade surplus and the largest aid provider to the North, thereby greatly contributing to the recovery of the North Korean economy.

2) The Current State

a. Overview of Inter-Korean Trade

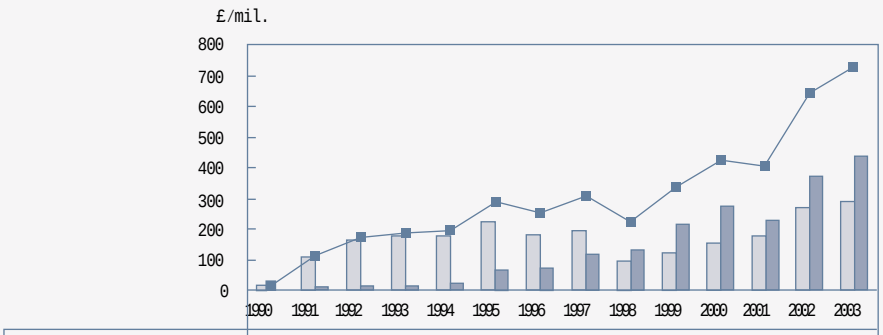
Trade volume between the two Koreas exceeded $100million on the back of the 1990 enactment of 'the Act on inter-Korean exchanges and cooperation'. This is a phenomenal achievement considering that trade volume stood at less

19) ￥11.5billion in principals and ￥28.5billion in interests were settled in 1982 out of a total of $300million in debts (or ￥80billion if then-foreign exchange rates are applied) North Korea owed to Japan as of late 1976. Since then, North Korea's trade amount with Japan increased again. However, North Korea has refused to pay principals and interests so far, citing Japan′s partial economic embargo following the Burma bombing incident(November, 1983) Shin, Ji-ho(2001) pp. 162-163.

than $20million at its initial stage. Inter-Korean trade fluctuated due to North Korea's nuclear weapons development in 1993 and a North Korean submarine's intrusion into South Korean waters in 1996. It contracted once again in 1998 due to South Korea's foreign exchange crisis. Nevertheless, the economic turnaround and the introduction of "Sunshine Policy" helped inter-Korean trade pick up again to exceed $300million. In 2001, due to South Korea's sluggish economy and unfavorable transport conditions between the two Koreas, inter-Korean trade turned somewhat subdued. However, for the first time in history, inter-Korean trade exceeded $700million in 2003, driven by a constant growth in commercial transactions and a pick-up in non-commercial transactions such as food aid and the provision of materials and equipment for railroads and road construction linking the two Koreas.

As for the trade account, the inflow of goods to North Korea is bigger than that of the outflow, so it can be said that North Korea runs a trade deficit. However, given that a considerable amount of this trade involves non-commercial transactions, in fact, it ends up in surplus. In reality, North Korea recorded a surplus every year in terms of commercial transaction. North Korea has chalked up $1.6billion in trade surpluses with South Korea between 1990 and 2003, making South Korea the country with which it enjoys the largest accumulated trade surplus.

Figure 2-2 Overview of Inter-Korean[1] Trade



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Outflow	12	106	163	178	176	223	182	193	92	122	152	176	272	289
Inflow	1	6	11	8	18	64	70	115	130	212	273	227	370	435
inter-Korean trade	13	111	173	187	195	287	252	308	222	333	425	403	642	724

Note : 1) From North Korea's perspective, if goods flow from the North to the South, it is outflow; the other way round is inflow.
Source: Ministry of Unification

3) Trade Statistics by Product

Chemical products such as plastic materials for agricultural use accounted for the largest proportion of goods from the South to the North in 1991 and 1992. Since the launch of processing trade in 1993 through 1996, however, textiles replace chemical products as the top item, accounting for more than 60%. The share of textiles began to shrink moderately from 1997 as a result of food aid and the heavy oil supply by KEDO since 1995. On the other hand, the share of machinery, transport equipment and petrochemical products has become larger. Agricultural & marine products, chemical products and textile products account for 28.9%, 21.0% and 20.5%, respectively. To be more specific, agricultural and marine products, chemical products are related to the provision of rice and fertilizer as assistance to North Korea while textiles are related to processing trade.[20)]

North Korea's major export items are primary products such as agricultural and marine products, textile products, steel & metal products and commission process products. Agricultural and marine products accounted for 44.2% in

Table 2-6 Composition of Inflow of Products from the South to the North[1)]

(Unit : $mil, %)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
total amount of inflow	5.5	10.6	8.4	18.2	64.4	69.6	115.3	129.7	211.8	272.8	226.8	370.2	435.0
agricultural & forestry products	29.0	0.6	0.8	18.1	14.4	9.6	14.7	15.1	8.0	9.6	14.3	29.8	28.9
chemical products	32.8	50.6	10.9	8.7	2.3	4.9	3.5	4.9	24.3	36.8	30.8	24.2	21.0
textile products	1.2	7.0	69.9	64.9	54.3	54.1	30.4	22.9	17.9	15.9	23.2	18.2	20.5
mineral products	25.1	0.0	0.0	0.0	19.0	18.4	25.4	15.8	20.1	5.9	2.5	1.4	1.4
machinery	0.0	0.2	0.0	0.4	2.4	1.3	11.3	22.3	12.6	11.8	11.7	10.2	6.5
others	12.0	41.6	18.4	8.0	7.5	11.7	14.7	19.0	17.0	20.0	17.5	16.2	21.8
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note : 1) Classified according to MTI(Statistical Classification of import and export items by the Ministry of Commerce, Industries and Energy).
Source : KOTRA

20) KOTRA, "North Korea's international trade 2003", 2004.

Table 2-7 Composition of Outflow of Products from the North to the South

(Unit : $mil, %)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total outflow	105.7	162.9	178.2	176.3	222.9	182.4	193.1	92.3	121.6	152.4	176.2	271.6	289.3
agricultural& forestry products	9.4	10.4	6.6	8.6	9.5	12.7	14.2	23.7	39.5	47.1	51.1	36.8	44.2
mineral products	20.8	27.0	48.9	42.8	38.8	35.5	32.5	2.6	1.8	0.2	2.1	3.2	5.9
textile products	0.0	2.1	4.7	10.2	12.9	24.4	24.4	42.1	37.6	35.2	31.2	31.6	33.4
steel &metal	63.7	51.3	35.4	35.8	36.6	24.3	24.8	22.0	13.3	7.7	5.6	6.9	11.3
others	6.2	9.3	4.4	2.6	2.3	3.2	4.1	9.8	7.8	9.7	10.1	21.5	5.2
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: KOTRA

2003, the largest share. Among them, marine products take up a larger share than agricultural products i.e 31.0% against 12.5%. The proportion of textile products began to increase with the expansion of commission-processing trade, reaching 33.4% in 2003. At the initial stage of the inter-Korean trade, most of the steel and metal products North Korea exported were mineral products such as gold bars, and zinc bars and pig iron. However, their proportion continually shrank to 11.3% as of 2003.

4) Trade Statistics by the Nature of Transactions

In general, inter-Korean trade is classified into two types according to its nature - commercial transactions & non-commercial transactions. Commercial transactions which had grown, went down since 1995, and then turned to an

Table 2-8 Overview of Commercial Transactions & Non-Commercial Transactions

(Unit : $mil)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
commercial	13.5	111.2	173.4	186.6	194.6	276.3	237.8	250.3	143.7	189.0	239.6	236.3	343.0	408.6
non-commercial	0	0	0	0	0	11.0	14.3	58.1	78.2	144.4	185.5	166.7	298.8	315.5
total	13.5	111.3	173.4	186.6	194.6	287.3	252.0	308.3	222.0	333.4	425.1	403.0	641.7	724.2

Source: KOTRA

increase again after 1998. Beginning in 1995, non-commercial transactions have been constantly on the rise, with their proportion approaching that of commercial transactions recently.

Commercial Transactions

Commercial transactions are divided into general trade and commission-processing trade. As of 2003, the proportion of general trade is 55% while commission-processing trade accounts for 45%.

Table 2-9 General Trade & Commission-Processing Trade

(Unit : $mil)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
general trade	13.5	111.2	172.6	179.6	168.9	230.4	163.4	171.2	72.7	89.4	110.4	111.4	171.8	223.6
commission -processing trade	0	0	0.8	7.0	25.7	45.9	74.4	79.1	71.0	99.6	129.2	124.9	171.2	185.0
total	13.5	111.2	173.4	186.6	194.6	276.3	237.8	250.3	143.7	189.0	239.6	236.3	343.0	408.6

Source: KOTRA

As for North Korea, outflow is much larger than inflow in general trade. The disproportionately lower inflow is attributable to North Korea′s inability to settle payment in hard currency. Consequently, North Korea makes the settlement for the inflow of goods mainly through the barter system.

Table 2-10 Inflow and Outflow in General Trade

(Unit : $mil)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
inflow to the North	1.2	5.5	10.4	4.4	6.9	28.7	17.2	23.8	21.9	21.7	31.9	10.5	4.4	46.2
outflow from the North	12.3	105.7	162.2	175.2	162	201.7	146.2	147.4	50.8	67.7	78.5	100.9	167.4	177.4
total	13.5	111.2	172.6	179.6	168.9	230.4	163.4	171.2	72.7	89.4	110.4	111.4	171.8	223.6

Source: KOTRA

Commission-processing trade[21] provides a win-win situation to both Koreas; It allows South Korea to make use of North Korea′s cheap labor; it is the most preferred trade type due to the low risk of investment. On the other hand, it allows North Korea to acquire foreign currency without other capital investment and foreign exchange transactions. In the 1990s, North Korea′s exports relied heavily on commission-processing trade. Major export items were textiles, and electric & electronic products, which accounted for 86.2% and 7.5%, respectively.

Table 2-11 Inflow & Outflow of Commission-Processing Trade

(Unit : $mil)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
inflow to the North	0.2	4.0	11.3	24.7	38.2	36.2	29.6	45.9	57.2	52.3	68.4	73.4
Outflow from the North	0.6	3.0	14.3	21.2	36.2	42.9	41.4	53.7	72.0	72.6	102.8	111.6

Source : KOTRA

Non-Commercial Transactions

Non-commercial transactions consist of trade of goods needed for inter-Korean cooperative projects such as the construction of light-water reactors, Mt. Geumgang tour program, other cooperation & humanitarian aid, food aid, loan provisions for materials and equipment needed for linking up railways and roads between the two Koreas.

As of 2003, non-commercial transactions account for 43.6% of total inter-Korean trade at $320million. They have represented about 70% of total inflow to North Korea since the late 1990s.

South Korea′s assistance to North Korea recorded $270million, accounting for most of the non-commercial transactions. Within it, purely humanitarian aid such as fertilizer provision, and food aid amounted to $160million and

21) Commission-processing trade is a sort of labor trade so that its record can not be compared with that of general trade by equal standards. Although revenues from toll processing is, in fact, the only gains that North Korea earns from commission-processing trade, it appears that there are a great deal of commodity exchanges because inflow and outflow are recorded respectively. For instance, if South Korea send $100 worth raw materials to North Korea and pay a processing fee of $20 to produce finished goods in North Korea and they are sent back to South Korea, the entire process is recorded as $220 in inter-Korean trade.

$100million, respectively.

Table 2-12 Overview of Non-commercial Transactions

(Unit : $mil)

	Inflow						outflow	total	
	LWR(light water reactor)	assistance to the North	heavy oil by KEDO	Mt. Geumgang project	other cooperative projects	total		Growth rate of total trade amount (%)	
1995	–	0.2	10.8	–	–	1.0	–	11.0	–
1996	–	1.0	12.8	–	–	14.3	–	14.3	30.0
1997	17.8	8.4	29.0	–	–	55.3	2.8	58.1	327.3
1998	4.0	15.6	19.8	37.6	1.2	78.1	0.1	78.2	30.0
1999	14.4	43.4	39.5	40.6	6.3	144.3	0.1	144.4	84.7
2000	35.6	104.5	11.7	14.6	17.2	183.6	1.9	185.5	28.5
2001	33.7	110.6	3.5	5.8	10.4	164.0	2.7	166.7	10.1
2002	58.6	213.2	2.0	11.9	11.7	297.4	1.4	298.8	79.2
2003	23.7	270.7	0.0	16.1	5.0	315.5	0.2	315.7	5.6

Source: Ministry of Unification

South Korea's humanitarian aid is made up of governmental and private sector's assistance. It has sharply increased since 2000, taking the lion's share among the total amount of the international assistance to North Korea.[22)]

22) At present, South Korea is the single largest donor country of humanitarian aid to North Korea, providing an amount larger than those combined of individual nations and NGOs following the United Nations.

South Korea and International Community's Aid to North Korea

(unit: $10,000)

	UN agencies	individual country	international NGOs	South Korea
June.1995 - Feb.1998	17,206	17,273	7,201	28,408
Mar. - Dec.1998	20,487	7,943	1,769	3,185
1999	20,263	15,100	492	11,376
2000	9,067	26	1,573	11,376
2001	21,389	1,753	2,707	13,539
2002	20,314	3,410	2,003	13,492
2003	11,622	876	3,575	15,762
total	120,348	46,321	16,616	97,138

Source: Ministry of Unification, "the state of humanitarian aid to North Korea", each year

Table 2-13 Overview of Humanitarian Aid

(Unit: $10,000)

		1995	1996	1997	1998	1999	2000	2001	2002	2003	total
South Korea	government	23,200	305	2,667	1,100	2,825	7,863	7,045	8,375	8,701	62,081
	private sector	25	155	2,056	2,085	1,863	3,513	6,494	5,117	7,061	28,369
	total(A)	23,225	460	4,723	3,185	4,688	11,376	13,539	13,492	15,762	30,450
int'l community(B)		5,565	9,765	6,350	30,199	35,988	18,177	35,725	25,768	16,013	203,550
total(A+B)		28,790	10,225	31,073	33,384	40,676	29,553	49,264	39,219	31,775	293,959
A/(A+B)(%)		80.7	4.5	15.2	9.5	11.6	38.5	27.5	34.0	50.4	44.4

Source: Ministry of Unification, "the state of humanitarian aid to the North", each year

3. Comparison Between International Trade and Inter-Korean Trade

We can draw the following conclusions from the statistics and analysis of North Korea's trade and inter-Korean trade mentioned above:

First, North Korea's trade has been so far directed by the policy for the construction of a self-supporting national economy which pursues inner-directed and import-substitute development. Accordingly, imports were allowed only for a minimum amount of producer's goods while exports were used as a means to earn foreign currency. Specifically, in the composition of North Korea's import & export items, factors of production such as machinery, transport equipment, resources and other raw materials dominate the import list while the share of consumers' goods is very low.

The export list mainly consists of primary products such as non-steel metals, textile and marine products, and commission-processing products. Due to North Korea's economic hardships since the 1990s, an increasing amount of grain as assistance and textile raw materials for process-on-commission have been imported while exports of non-steel metals have fallen. Exports of textile and marine products have been on the rise.

These general features of North Korea's international trade are also found in the composition of inflow and outflow of inter-Korean trade as well. Inflows mainly comprised factors of production such as fertilizer, heavy oil and textiles for process-on-commission. Since 2000, the share of agricultural products has been significantly growing. Compared with international trade, however, in inter-Korean trade, factors of production such as machine, transport equipment

and raw materials make up a small share while agricultural products account for a relatively larger share of imports. Initially, outflows were mainly comprised of steel and metal, but the share of textile and marine products has gradually been increasing in total outflow.

Second, North Korea′s trade has developed based on the principle of politico-economical linkage that political purposes precede economic purposes. This is clearly demonstrated in the fluctuation of its trade with socialist countries seen before the 1990s. However, countries with which North Korea can trade for political purposes no longer exist since the collapse of the communist block in the 1990s. Nevertheless, political reasons still have considerable influence upon its international trade. This is not North Korea′s own intention, but a reflection of the political interests of its neighboring countries, including China, which want to strengthen their political and military influence over North Korea.

On the same note, inter-Korean trade is vulnerable to non-economic factors as well as economic ones mainly due to the territorial division of the Korean peninsula. North Korea pursued economic interests more while South Korea placed priority on improving inter-Korean relations, eventually establishing peace for the Korean peninsula. Despite their different perspectives, both sides were able to meet halfway following the introduction of "Sunshine Policy" towards North Korea. This has led to a sharp increase in inter-Korean trade since 1998 and South Korea has emerged as the North′s second largest trade partner since 2002, following China.

Third, the significantly large share of non-commercial transactions shows the strong political nature of North Korea′s trade. Since the nation′s liberation from Japanese colonial rule, North Korea has heavily relied upon non-commercial transactions receiving grant-type aid & socialist countries′ loan provision aiming at helping the North in its economic hardships and applying the friendship price system. Since it opened its door to aid from the international community in 1995, the share of grant-type aid has grown again.

Non-commercial transactions account for about 70% of total inflow from South Korea in inter-Korean trade, which is much greater than that with other countries. South Korea is the single largest donor of humanitarian aid to North Korea in the world. In general, South Korea provides fertilizer and food to the North in the form of grant or loans and the amount has sharply increased since the mid 1990s.

Fourth, North Korea has always run a trade deficit except in 1978 and 1979. Its trade deficits have snowballed to the extent that imports are nearly twice exports. This has brought North Korea to the verge of a foreign exchange crisis.

North Korea runs a trade deficit in inter-Korean trade, half of which consists of non-commercial transactions. When it comes to commercial transactions which involves foreign exchange transactions, however, it runs a trade surplus every year. Between 1990 and 2003, North Korea recorded a $1.6billion trade surplus with South Korea, the largest surplus. On general trade, North Korea has recorded a bigger surplus with South Korea than any other country. Moreover, South Korea has recently outstripped Japan in commission-processing trade on which North Korea has concentrated its efforts since the 1990s.

To sum up, inter-Korean trade shows the bigger share of non-commercial transactions, compared with trade with other countries. In addition, inter-Korean trade is the largest source of foreign currency among commercial transactions to North Korea so that currently it is the most helpful to the North Korean economy.

III. Analysis of International and Inter-Korean Trade's Effects on Economic Growth

1. Overview

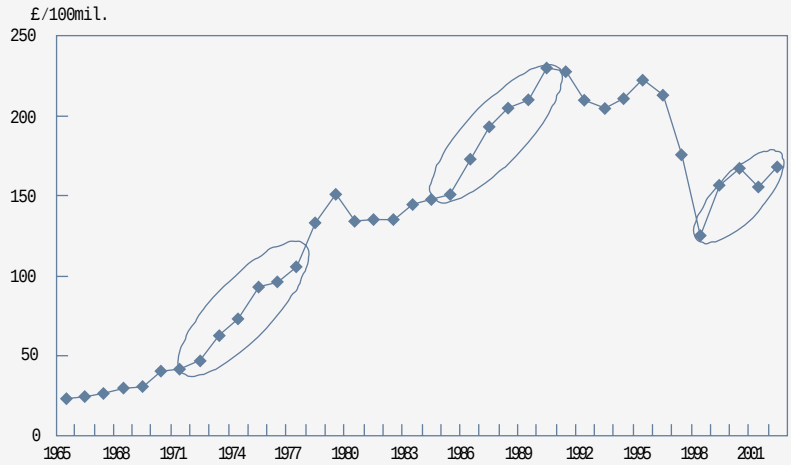
North Korea's trade dependency was around 20% until the turn of the 1990s and since then the figure has dropped to around the 10% level. Nevertheless, the national income grew when trade volume, especially the flow of aid to North Korea, grew: in the mid to late 1950s when assistance from socialists countries including the Soviet Union was concentrated[23]; in the early 1970s when imports and loans from advanced Western countries were concentrated; in the late 1980s when non-commercial transactions increased sharply due to loan provision by the Soviet Union and the friendship price system, and notably since the late 1990s when the inter-Korean economic cooperations began in earnest and the international community began providing foreign aid.

In this regard, this study provides an empirical analysis of the effects of international and inter-Korean trade on North Korea's economic growth. To that end, it is necessary to develop a model that reflects the features of North Korean

23) Owing to the national income statistics based on dollar-denominated standards for the 1950s, [Figure3-1] does not include statistics prior to 1965, According to North Korea's report, however, North Korea's annual average growth rate was 30.1% between 1954 and 1956, 21.0% between 1957 and 1960, and 9.9% between 1961 and 1965. 『Chung-Ang Nyun-Gam(North Korea's Central Annual Report)』 each year

trade and use statistical data. Based on the analysis, we will consider the influence of the North Korean trade and inter-Korean trade on the North Korean economy.

Figure 3-1 North Korea's National Income



2. Effect Analysis

1) International Trade

a. Analysis Model

Most of the products that North Korea imports are factors of production and export is just a means to earn the foreign currency needed to import goods. As a consequence, exports directly lead to foreign currency earnings, raising the national income.[24] On the other hand, factors of production are input in the production process, creating added value.

Given the features of North Korea's imports, this study analyzes the effects that imports have on its economic growth, using import-augmented production function. The rationale behind this model can be found in Pack(1994) and Sorensen(1996), and an example of its application to empirical analysis is given by Chang, Dongkoo(1997).[25]

24) This research regards exports in North Korea as being simply a means of earning foreign currency, thus excluding their production inducement effects

This study adopts a different approach from the previous studies. Unlike the preceding studies which see the output of import-augmented production function equals national income, this study sees the outcome as consisting of consumption, investment, government expenditures and exports, and equal to "national income + imports".

$$Q_t = AK_t^{\alpha}L_t^{\beta}M_t^{\gamma},\ Q_t = C_t + I_t + G_t + X_t \quad (1)$$

$$\text{GDP}: Y_t \equiv C_t + I_t + G_t + X_t - M_t \quad (2)$$

Given this difference, if we use an import-augmented production function and an identical equation of national income, the national income elasticity of exports and imports can be calculated as follows:

The elasticity of national income with respect to exports $\frac{\partial Y_t}{\partial X_t}\frac{X_t}{Y_t} = \frac{X_t}{Y_t}$ (3)

The elasticity of national income with respect to imports $\frac{\partial Y_t}{\partial M_t}\frac{M_t}{Y_t} = \gamma - \frac{M_t}{Y_t}$ (4)

Here, $\gamma = \frac{\partial Q_t}{\partial M_t}\frac{X_t}{Q_t}$ is the elasticity of output with respect to imports in the import-augmented production function. It is calculated as below by a regression analysis using (1) and (2).

$$ln(Y_t + M_t) = lnQ = a + \alpha lnK_t + \beta lnL_t + \gamma lnM_t + e_t \quad (5)$$

Y is national income, K is capital stock, L is economically-active population and M is imports.

25) The rationale behind the augmented production function model where connectivity with the global market is added as a new explanatory variable is set out as follows: if the national economy becomes more closely connected with the global economy, firstly, cross-border capital flows would be facilitated, accelerating capital stock increase by direct investment, Secondly, technology transfer and knowledge contained in imported goods enables early adoption of advanced technology. Thirdly, import of indispensible resources leads to an improvement in productivity. Fourthly, market expansion leads to the expansion of overall growth capacity, such as a greater inducement effect of technology innovation(Sorenson 1996). This model is also applied to South Korea where aggregate income is mostly made up of raw materials and capital goods, due to the insufficient naturally-endowed resources and a low level of technology. For more information, see Dongkoo, Chang. "Estimation of Potential GDP and the Effectiveness of Production Gap as an Inflation Index." 『Economic Analysis』 Vol.3, 4th edition, 1997.

b. Data

Data used in this study include North Korea′s GDP, exports & imports, the national economy expense[26], and the economically-active population. This analysis focuses on the period between 1965 and 2002. Sources cited in this study are 『South and North Korean Economic Index Guide』(1995) published by Korea Institute for National Unification(KINU), 『North Korean Economic Index』(1996) published by KDI, "Features of North Korean International Trade and Outlook for Its Trade Policy Change"(1998) published by Lim Gang-taek and on-line data of the Bank of Korea, the Ministry of Unification and KOTRA.

However, since data on capital stock were not available, 'basic construction investment'[27], which is equivalent to investment in North Korea, was used in the calculation, instead. This study estimates annual capital stock on the assumption that depreciation rates are 5%, using capital stock of 1954 and annual basic construction investment which were estimated on the basis of research of Kim, Seok-jin(2000).[28] Where capital stock and investment are K and I respectively, and depreciation rate is λ, the capital stock of the period t is written as follows:

$$K_t = I_t + (1 - \lambda)K_{t-1}$$

However, the national economy expense, which is needed to estimate North Korea′s basic construction investment, was not released between 1995 and 1999, and thus, we estimated the national economy expense for this period using the methods devised by Kaplan- Moorsteen[29].

As a result of the regression analysis of level(trans-log) variables, the relationship between labor and output was negative[30], and more significantly, the t value turned out very low. Therefore, we conducted the regression analysis by using per-capita variables of the economically-active population.

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26) The national economy expense refers to capital spent for the national economy, consisting of basic construction investment, circulating fund, large-scale repairing work fund and etc.『Economics Dictionary 2』p,683.

27) Basic construction investment is a part of the national economy price referring to capital expenditures for newly building or expanding a fixed asset. 『Economics Dictionary』p.279

28) The 1954 capital stock was calculated on the assumption that capital coefficient is 0.7 and depreciation rate is 0.05 as of 1954. Basic construction investment for the period when the figure was not released, was estimated based on the assumption which reflects then conditions. For example, basic construction investment since 1977 was calculated based on the assumption that it accounts for 50% of the national economy expense and military expenditures. For more information, see "The growth and crisis of the North Korean economy" Kim, seok-jin, a Ph.D thesis in Economics at Seoul National University. 2002.

29) see [Appendix 2]

30) It seems that the negative relationship between labor and national income reflects specificity of North Korean labor structure, i.e. overemployment resulting from the full employment policy.

Moreover, each of these variables are unstable time series with unit roots.[31] Yet, overall, there exists co-integration among level variables(trans-log)[32] thus, we used the level variables in the regression analysis.

c. The Result of the Analysis

The results of the regression analysis to find γ are set out below:[33]

$$\ln(y_t + m_t) = -0.956225 + 0.769044\ln k_t + 0.231055\ln m_t + e_t \qquad (5)$$
$$(-0.386591)\ \ (2.821772)\qquad (3.031351)$$
$$R^2 : 0.957939$$
$$D.W. : 2.172642$$

The relationship of per-capita national income with per-capita capital and per-capita income is positive(+), and $\gamma = 0.23$. This result has a couple of limitations; first, the number of time series data of each of the variables is 38, which is too small. Second, there are problems in statistical estimation of certain variables such as national income.[34] Therefore, the results of this study should be accepted cautiously, with these limitations taken into account.

We can calculate the national income elasticity with respect to income, using

31) Augmented Dickey-Fuller Test Results

	t-value	
	level	frist order difference
per-capita output	–2.542204	–4.416569
per-capita capital	–0.472163	–3.284545
per-capita income	–2.307300	–4.607814
5% critical value	–2.945842	–2.945842
1% critical value	–3.626784	–3.626784

Note: Intercept is included and optimal lag is 1 according to AIC.

32) Johansen Co-integration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace statistics	5% critical value	prob.
nome	0.441730	41.68918	35.19275	0.0128
At most 1	0.327793	20.70430	20.26184	0.0368
At most 2	0.162999	6.405481	9.164546	0.0994

Note: There is an intercept but no trend. Optimal lag is 1 according to AIC.

33) AR(1)model is applied due to the existence of serial correlation.

34) Except for North Korean trade statistics acquired through third countries, most of its statistics, including national income, capital stock and economically-active population, are estimates by South Korea so that they have a problem of a limit to estimation. For instance, North Korea′s national income is an estimate when South Korea′s prices are applied. Thus, there is a possibility of overestimation. The capital stock is an estimate based on the assumption that basic construction investment accounts for 50% of the national economy expense and military expenditures since 1977. However, this study uses the existing estimates for lack of statistical data to replace them.

the result of the analysis. From the expression(4), it is $(0.23-\frac{M_t}{Y_t})$%. Now we can calculate the national income elasticity with respect to exports and imports, using statistics of exports, imports and national income of each given year. The results are presented in the following table:

Table 3-1 National Income Elasticity with Respect to Exports and Imports

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
exports $\frac{X_t}{Y_t}$	0.08	0.04	0.04	0.05	0.04	0.03	0.03	0.05	0.04	0.03	0.03	0.04	0.04	0.04
imports $\gamma\frac{M_t}{Y_t}$	0.13	0.16	0.15	0.15	0.17	0.17	0.17	0.16	0.16	0.17	0.15	0.13	0.14	0.14

Note: $\gamma = 0.23$

According to [Table 3-1], national income elasticity with respect to exports is 0.04 from 1990 through 2003 while national income elasticity with respect to imports is 0.15, almost three times larger than that of exports.

Table 3-2 Effect of North Korea's Trade on Its Economic Growth

(Unit : %)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
export growth rate	1.4	-45.5	-1.3	6.1	-13.3	-14.2	-1.2	24.5	-38.2	-7.9	8.0	16.9	13.2	5.6
import growth rate	-13.2	-32.7	-1.0	2.1	-25.0	6.0	-5.0	1.8	-30.6	9.3	46.4	14.6	-5.9	5.9
$\frac{\partial Y_t}{Y_t}=\frac{X_t}{Y_t}\frac{\partial Y_t}{Y_t}$ [1]	0.1	-1.9	-0.1	0.3	-0.5	-0.5	0.0	1.3	-1.7	-0.3	0.3	0.7	0.6	0.2
$\frac{\partial Y_t}{Y_t}=\left(\gamma-\frac{M_t}{Y_t}\right)\frac{\partial M_t}{M_t}$ [2]	-1.7	-5.2	-0.2	0.3	-4.3	1.0	-0.9	0.3	-4.9	1.6	6.8	1.9	-0.8	0.8
economic growth rate by trade[3]	-1.5	-7.1	-0.2	0.6	-4.9	0.6	-0.9	1.5	-6.6	1.3	7.1	2.6	-0.3	1.1
annual average growth rate	-2.1(export -0.3 import -1.7)									2.4(export 0.3 import 2.1)				
economic growth rate[4]	-3.7	-3.5	-6.0	-4.2	-2.1	-4.1	-3.6	-6.3	-1.1	6.2	1.3	3.7	1.2	1.8
annual average growth rate	-3.8									2.8				

Notes: 1) Economic growth rate by export growth
2) Economic growth rate by import growth
3) 1)+2)
4) BOK's estimates of the North Korean economic growth rate

Now let us estimate the effect of exports & imports on national income, using the elasticity. It is affected by the elasticity and growth rates of exports and imports. The effect of exports on economic growth and that of imports can be calculated by $\frac{\partial X_t}{\partial X_t}\frac{Y_t}{Y_t} = \frac{Y_t}{Y_t}$ (3) and $\frac{\partial Y_t}{\partial M_t}\frac{M_t}{Y_t} = \gamma - \frac{M_t}{Y_t}$ (4), respectively. The results are presented in [Table 3-2].

According to [Table 3-2], the annual average growth rate by trade is a negative 2.1%(-2.1%) during the period between 1990 and 1998 when the North Korean economy suffered a downturn. This figure is more than half of negative 3.8%, the annual average growth rate estimated by the BOK. On the other hand, the annual average growth rate by trade is 2.4%, which is close to the 2.8% of the BOK′s estimate.

The high contribution of international trade to North Korea′s economic growth is attributable to low productivity stemming from its obsolete production facilities, lack of energy and investment resources needed for plant operations, and inherent problems of Socialist production systems. Moreover, it is concluded that the greater effect of international trade on the economy during the recovery phase than in the slowdown is also attributable to the fact that North Korea′s internal economic problems, such as obsolete production facilities, have worsened.

2) Inter-Korean Trade

The history of inter-Korean trade is short and its structure unique as general trade accounts for merely one quarter of the total inter-Korean trade. Unlike in other countries′ trade with North Korea, about half of the inter-Korean trade invloves non-commercial transactions, such as fertilizer and food provision. Moreover, commission-processing trade accounts for almost half of commercial transactions. Against this backdrop, it is inappropriate to use the same analytical method used previously. Rather, we need to develop an analytical method that can reveal the unique features of inter-Korean trade in detail.

To that end, this study first estimates North Korea′s national income growth rates by inter-Korean trade, using the international balance of payment table, in order to see the effect of inter-Korean trade on North Korea′s economic growth.

The international balance of payment table clearly shows the nature and features of various transaction types in inter-Korea trade within a general framework. Using the trade balance in the table, we can obtain national income growth rates by inter-Korean trade.

Statistical data of inter-Korean trade are collected through the customs clearance system. The Korea Customs Service(KCS) classifies the movements of goods by certain criteria and compiles them into statistics. It does not include service and capital transactions. The International balance of payment table is statistical data which provide comprehensive records on trade with other countries for a certain period of time. The customs clearance statistics are a basic source for the balance of payment table. International trade is composed of current transactions and capital transactions; current transactions are about buying and selling goods and services, and capital transactions are about borrowing and lending money. They are recorded as current account and capital account, respectively, in the international balance of payments table. More specifically, the current account consists of the goods account, service account, income account and current transfers account. The goods account shows the gap between imports and exports of goods; the service account represents service transactions with other countries. The income account is the record of income that workers earn by working overseas, and dividends & interest payments generated from overseas investment. The current transfers account represents unrequited transactions.

Among them, the current account alone is included in inter-Korean trade. If inter-Korean trade is reclassified into sub-categories, general trade among commercial transactions would be reclassified into the goods account, assistance to North Korea among non-commercial transactions into the current transfers account, and revenues from Mt. Geumgang tours into the service account. However, since commission-processing trade among commercial transactions is regarded as 'trade of labor force', the performance of commission-processing trade cannot be compared with that of general trade and revenues from toll processing earned by North Korea needs to be calculated separately. The trade account of commission-processing trade includes the costs of process-on-commission, transportation costs and other miscellaneous costs. Here, we calculated toll processing fees that North Korea receives, assuming that it accounts for almost half the commission-processing trade.[35] As for assistance to North Korea among non-commercial transactions, credit-in-kind is offered in the

35) According to an officer responsible for commission-processing trade at KOTRA, it is impossible to uniformly define revenues from toll processing, since they differ depending on goods and corporations, but in general, they account for about half of the trade account. In the case of textiles and clothing, they represent about 20% of the production cost.

36) Loans of rice, railroads & materials and equipment for road re-linking construction projects are provided under the condition of repayment in 30 years with a 10 years grace period and 1% interest rate. This not only seems a condition considerably favorable to North Korea, but, in fact, it is hard to think that this loan was provided with

Table 3-3 North Korea's Trade Account Broken Down by Inter-Korean Trade (as of 2003)

(Unit : $mil.)

transaction type	inflow	outflow	composition of international balance of account	debit	credit	account
commercial transactions	119.6	289.1				
· general trade	46.2	177.4	goods account	46.2	177.4	131.2
· commission – essing trade	73.4	111.6	revenues from process on commission			17.2
non-commercial transactions	315.5		current transfers account	0.2	315.5	270.5
· assistance to North Korea	270.7				270.7	
-humanitarian aid	135.0				135.0	
-food loans	102.6				102.6	
-materials for reconnecting inter-Korean railway & roads construction and equipment loans	33.0				33.0	
· material exchange for economic cooperation	44.9				44.9	
-light water reactor project	23.8				23.8	
-Mt. Guemgang tour project	16.1				16.1	
-other cooperation projects	5.0				5.0	
revenues from Mt. Geumgang tour			service account			13.1
			income account			

form of loans but, in fact, they are close to grants.[36] Therefore, credit-in-kind is classified into the current transfers account. Meanwhile, the trade of materials for inter-Korean cooperative projects is excluded from North Korea′s national income since it is the movements of materials to South Korean corporations doing business in North Korea. [Table 3-3] includes North Korea′s trade account broken down by inter-Korean trade.

The direct growth rates of North Korea′s income from inter-Korean trade are calculated as "goods account + service account + commission-processing trade". The indirect growth rates are added values created by inputting assistance to North Korea(non-commercial transactions) into production processes. Yet, it is difficult to apply specific production functions to each factor of production in

the premise of North Korea's repayment, considering North Korea's dire economic conditions and the current level of inter-Korean relations.

calculating added values created by assistance to the North, so we apply the amount of assistance as it is, based on the assumption that added values created by assistance are at least bigger than the input amount.[37)]

Table 3-4 National Income Growth From Inter-Korean Trade

(unit: $mil, %)

	1997	1998	1999	2000	2001	2002	2003
commodity account (general trade among commercial transactions)	123.6	28.9	46.0	46.6	90.4	163.0	131.2
*commission-process fee (commission-trade among commercial transactions)	3.4	3.4	5.9	4.0	7.4	10.1	17.2
service account (Mt. Geumgang tour)			206	136	37.2	21.5	13.1
current transfer account(assistance to North Korea among non-commercial transactions)	34.7	35.4	82.9	116.2	114.1	215.2	270.7
North Korea's national income growth by inter-Korean trade[1)]	17.0	32.3	257.9	186.6	135.0	194.6	161.5
north Korea's national income growth by inter-Korean trade[2)]	161.7	67.7	340.8	302.8	249.1	409.8	432.2
economic growth rate increase by inter-Korean trade[3)]	0.6	0.2	2.0	1.2	0.8	1.2	1.0
economic growth rate increase by inter-Korean trade[4)]	0.8	0.4	2.7	1.9	1.5	2.6	2.5

Notes: 1) national income growth by inter-Korean trade="goods account+revenues from process on commission+service account"
2) national income growth by inter-Korean trade="goods account +revenues from process on ommission+service account+current transfers account"
3) North Korea's growth rate increase by inter-Korean trade = national income growth by Inter-Korean trade 1)/ national income of the preceding year
4) North Korea's growth rate increase by inter-Korean trade = national income growth by inter-Korean trade 2)/ national income of the preceding year

Economic growth rates estimated by dividing national income growth rates(goods account & service account+the costs of process on commission)by national income of the preceding year are annual 1.2% on average, specifically recording 2.0% in 1999, 1.2% in 2000, 0.8% in 2001, 1.2% in 2002 and 1.0% in 2003. Calculating economic growth rates from inter-Korean trade, with added values created by inputting assistance to the North in the production process

37) Assistance to North Korea is composed of producers' goods and relief supplies, such as fertilizer, food, heavy oil and medicine. Interestingly, most of relief supplies are food, which enables a normal input of labor, thereby contributing to production. In this regard, they are classified as producers' goods, rather than consumers' goods. Moreover, the contribution of food to production would be much greater in a time of food crisis than under the normal conditions.

gives an annual average of 2.3%, specifically, 2.7% in 1999, 1.9% in 2000, 1.5% in 2001, 2.6% in 2002 and 2.5% in 2003. since North Korea′s annual average growth rate during the period between 1999 and 2003 stood at 2.8%, it may be concluded that inter-Korean trade plays a very significant role in maintaining the positive growth of the North Korean economy.

After the nine-years of negative growth in the 1990s, North Korea has posted positive growth since 1999. Now it is evaluated as entering a the recovery phase. And international trade(inter-Korean trade included) played a very critical role to North Korea′s economic rebound. Annual average growth rate by inter-Korean trade is about 1.2% and if added values created by assistance to the North are included, it is around 2.3%. Given BOK′s estimate of 2.8% for the same time frame, we can not exclude the possibility that the North Korean economy would still post a negative growth without an increase in international trade (inter-Korean trade included).[38)]

IV. Conclusions

We have so far analyzed the effects of North Korea′s international trade and inter-Korean trade on its economic growth.

North Korea′s trade has been shaped by the policy for the construction of a self-supporting national economy, an economic development strategy which pursues an inner-directed and import-substitute development. Accordingly, most imports are factors of production while exports are used as a means to earn foreign currency which is needed to import goods and most of the imported factors of production are machines, transport equipment and raw materials, with a very small share of consumer goods.

In this study, we have used an ′import-augmented production function′ and national income elasticity with respect to imports and exports, to analyze the effects of North Korea′s trade on its economic growth. The results of the analysis may be summarized as follows: First, the effect of imports is three times bigger than that of exports during the period from 1990 through 2003. This is attributable to its import-oriented trade structure. Second, from 1990 through 1998 when North Korea suffered a downturn due to trade reduction, its annual

38) North Korea′s international trade and inter-Korean trade are quiet different in history and features so that we have employed separate methodologies in analyzing their effects. Therefore, the results of the analysis should be viewed considering the difference in analytic methodologies.

average growth rate was negative 2.1%(-2.1%), which represents more than half of negative 3.8%(-3.8%), the figure estimated by BOK. On the other hand, from 1999 through 2003 when the North Korean economy rebounded backed by a pick-up in trade, its annual average growth rate was 2.4%, which is very close to 2.8%, a figure estimated by BOK.

Inter-Korean trade, as national internal trade, increased sharply after the introduction of "the Sunshine Policy" in 1998. South Korea has become North Korea's second largest trading partner, trailing only China, since 2002. Recently, compared with that of other countries, the share of non-commercial transactions has been very large in inter-Korean trade, accounting for half of the inter-Korean trade and about 70% of total inflow into North Korea. In addition, North Korea is running deficits in its trade with most countries while it enjoys its largest trade surplus with South Korea. In a nutshell, inter-Korean trade is highly conducive to the recovery of the North Korean economy.

We estimated the effects of inter-Korean trade on North Koreas' growth using the international balance of payment table as follows: First, we divided the growth rates of national income from inter-Korean trade(goods and service account+revenues from process-on-commission) by the national income of the preceding year, in order to calculate annual average growth rates between 1999 and 2003. The outcome was about 1.2%, and if added values created by assistance to the North(current transfers account) are included, it is about 2.3%. Given that North Korea's annual average growth was 2.8% during the same period of time, inter-Korean trade plays a very important role in maintaining the positive growth. Considering that its annual average growth rate was 2.8% between 1999 and 2003, North Korea would still have posted a negative growth without this increase in international trade since 1999. Certainly, the results of this study should be accepted cautiously since there are problems in the statistical estimation of certain variables such as national income. In particular, considering the high possibility that the estimated national income of North Korea is an overestimation, we can conclude that the effect of North Korea's trade on its economic growth may be, in fact, much greater than this study has estimated.

Based on these results, we can draw some implications for policies.

First, trade including inter-Korean trade has had a tremendous effect on the recent economic rebound of North Korea. The high contribution of international trade to North Korea's economic growth is attributable to the low productivity stemming from obsolete production facilities, lack of energy needed for plant operations and investment resources, and inherent problems of the socialist

production system.

Second, as inter-Korean trade is growing steadily, the North Korean economy is becoming more dependent upon South Korea. And its dependency is expected to grow further through inter-Korean cooperative projects, such as the four major inter-Korean agreements on economic cooperations, the construction of Geasung industrial complex and the re-connection of North-South railways and roads. Under these circumstances, even a temporary suspension of inter-Korean trade would pose a serious threat to the North Korean economy.

Third, there is a limit in using trade including inter-Korean trade, as a major driver of North Korea′s economic growth. First of all, as we can see from the fact that North Korea′s exports are led by maritime products, export competitiveness of North Korean products is so low that it is very hard for them to sharply grow, thereby causing hard currency shortages. This has set a limit to importing produces′ goods such as machines & facility, and raw materials. In addition, North Korea runs deficits with most of its trading partners, apart from that with South Korea. Therefore, hard currency shortages are worsening. Moreover, inter-Korean trade is so greatly affected by political factors, such as the North Korean nuclear issue, that there is a limit to expanding inter-Korean trade.

Fourth, it is inevitable for North Korea to open its door to foreign capital and technology which are indispensible to overcome the current economic hardships. To attract foreign capital and technology, North Korea should change itself. The longer the replacement and repair of production facilities is delayed, the more rapidly these facilities deteriorate, lowering the possibility of economic recovery.

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[Appendix 1] Assistance by Government ($735.9 million)

Year	Value US$	Channel(s) / Contents
1995	232,000,000	– Bilateral (rice 150,000 tons)
1996	3,050,000	– WFP $2,000,000 (CSB 3,409 tons) – UNICEF $1,000,000 (powdered milk 203 tons) –WMO $50,000(meteorological equipment and supplies)
1997	26,670,000	– WFP $20,530,000 (CSB 18,241 tons, maize 50,000 tons, powdered milk 300 tons) – UNICEF $3,940,000 (rehabilitation of oral rehydration salt plant, powdered milk 781 tons etc) – WHO $700,000 – UNDP $1,200,000 (emergency repair of agricultural roads) – FAO $300,000
1998	11,000,000	– WFP $11,000,000 (maize 30,000 tons, flour 10,000 tons)
1999	28,250,000	– Bilateral (fertilizer 115,000 tons)
2000	78,630,000	– Bilateral (fertilizer 300,000 tons)
2001	70,450,000	–Bilateral $52,740,000 (clothing 1,500,000 units, fertilizer 200,000 tons) – WFP $100,000 (maize 100,000 tons) – WHO $460,000 (for anti-malaria)
2002	83,750,000	– Bilateral $65,770,000 (fertilizer 300,000 tons) – WFP $17,390,000 (maize 100,000 tons) – WHO $590,000 (for anti-malaria)
2003	87,020,000	– Bilateral $69,670,000 (fertilizer 300,000 tons) – WFP $16,190,000 (maize 100,000 tons) – WHO $660,000 (for anti-malaria) – UNICEF $500,000 (relief assistance to the vulnerable groups)
2004 (1–12)	115,120,000	– Bilateral $89,250,000 · emergency relief supplies ($740,000) · fertilizer 300,000 tons ($88,510,000) – WHO $670,000 (for anti-malaria) – WHO $200,000 (emergency relief supplies) – UNICEF $1,000,000 (relief assistance to the vulnerable groups) – WFP $24,000,000 (maize 100,000 tons)
Total	735,940,000	

Assistance by NGOs ($452million)

Year	Value US$	Channel(s)
'95.9~'97.5	4,960,000	– Korea National Red Cross
'97.6~'97.7	8,500,000	– Korea National Red Cross
'97.8~97.10	8,900,000	– Korea National Red Cross
'98.3	170,000	– Korea National Red Cross
'98.4~98.6	9,350,000	– Korea National Red Cross
'98.9~12	11,330,000	– Korea National Red Cross
1999	18,630,000	– Korea National Red Cross ($13,065,000) – 10 NGOs ($5,565,000)
2000	35,130,000	– Korea National Red Cross ($9,416,000) – 12 NGOs ($25,714,000)
2001	64,940,000	– Korea National Red Cross ($22,000,000) – 19 NGOs ($42,940,000)
2002	51,170,000	– Korea National Red Cross ($6,923,000) – 25 NGOs ($44,247,000)
2003	70,610,000	– Korea National Red Cross ($5,860,000) – 29 NGOs ($64,750,000)
2004	141,080,000	– Korea National Red Cross ($37,000,000) – 33 NGOs ($104,080,000)
2005	27,250,000	– Korea National Red Cross ($809,000) – 25 NGOs ($26,290,000)
Total	452,020,000	

* Value in US$ is calculated at the average currency rate of the year concerned.

[Appendix 2] The Methods Devised by Kaplan-Moorsteen

Let us look at the estimation process of the national economy expense of the year 1995. National treasury disbursement is $19.18billion in 1994 and $8.4billion in 2000. The national economy expense is $13.03billion in 1994 and $3.84billion in 2000. However, the figures are not given from 1995 through 1999. We can estimate the national economy expense through the following method:

I(94) and I(95) = growth index of the national economy expense for 1994 and 1995

I′(94), I′(95), I′(96) = treasury disbursement growth index for 1994, 1995 and 1996

I″(94), I″(95), I″(96) = estimated growth index of the national economy expense for 1994, 1995 and 1996

α = average growth rate of the national economy expense growth index between 1994 and 2000

β = average growth rate of treasury disbursement growth index between 1994 and 2000

$$I''(95) = I''(94) \times \frac{I(95)}{I(94)} \times \frac{I(\alpha/100)}{(1+\beta/100)} = 0.7702$$

The national economy expense of 1995 = 130.3*0.7702 = $10.04billion