

# **Alternative Growth Strategies of North Korea: Lessons from Experiences of South Korea and Taiwan<sup>1</sup>**

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## **I. Introduction**

The economy of North Korea in recent years became a bottom of the worst including the shortage of foods and energy because of problems of the Juche system, the centrally planned and self-sanctioned socialist economy. There has been a conflict between politics to maintain the system and the economy to provide necessities for the people. Pyongyang (hereafter P'yang) wants to open the door to boost its economy but worries that freedom waves may strike the regime to fall like in previous communist countries in Europe. It must be a dilemma of whether to open or to close the door because either way threatens the existence of the regime. The only way to avoid the collapse of the regime is gradual transformation of the system toward the market economy -- to open the door but neutralize the freedom waves despite time costs. Shown in the Development Project of Rajin-Sunbong, P'yang intends to open a special economic zone by exploiting capitalistic benefits without external shocks to the system, duplicating the Chinese model. The performance has been reportedly slow because investment conditions are not attractive compared to China or Vietnam, the P'yang's Go-Stop policy and difficulty of coordination with authorities make the business difficult, expected risks coming from P'yang's behavior reduce the desire of business investment, and the avoidance of inter-government talks between Seoul and P'yang eliminates the major sources of capital coming from businesses of South Korea and other countries having joint-ventures with them. The sooner the better for P'yang to recognize the seriousness of the real problem.

The most valuable factor we must consider in economic growth is time. The slow transformation strategy to avoid the collapse of the Juche system must be an expensive trade-off in growth. For example, the Rajin-Sunbong Project may take five to seven years with intensive capital formation, production, and marketing. However, it may take more than ten to fifteen years if P'yang keeps the current pace of opening strategy. As of the end of 1995, the gross domestic product of South Korea reaches \$400 billion while that of North Korea remains at around \$20 billion in current prices. The growth portion of GDP in South Korea becomes more than total GDP in North Korea in coming years. There is no hope for North Korea to close the GDP gap with South Korea within next thirty years. This is the meaning of time in economic development. The leadership of North Korea should understand that the weapon system cannot produce the bread but must kill the economy. The productivity of the economy comes from capital formation in production facilities with proper infrastructure, recent technology from research and development, skilled labor from education and training, and workers' motivation from better compensation. It is impossible for P'yang to expect the productivity growth from rationing two meals a day for the people. Now is the time for P'yang to change its direction by normalizing inter-governmental relations for intensive economic cooperation between North and South Korea as well as by saving the time costs.

The study supports North-South economic cooperation, by examining the alternative growth strategies of North Korea based on lessons from experiences of economic development in South Korea and Taiwan. It provides a guidance for allocation of resources in the beginning stage of economic transformation in North Korea to maximize its efficiency. The allocation of resources in South Korea and Taiwan are evaluated by four categories. (a) The capital formation is evaluated by investment ratio to GDP, investment per capita, saving ratio to GDP, sources of capital, and allocation of capital by sector. (b) The efficiency of capital is estimated by incremental GDP ratio to capital and capacity utilization rates, and that of labor is estimated by income generation per employee. (c) The causality between GDP and labor, capital, and aggregate exports is tested, and its sensitivity is evaluated, and GDP multipliers of aggregate exports are estimated as an indicator of productive efficiency. (d) The impact of alternative investments is estimated by four scenarios: (i) export promotion without import substitution, (ii) export promotion with import substitution, (iii) import substitution without export promotion, and (iv) domestic demand generation.

From the analyses of economies of both South Korea and Taiwan, the study introduces several implications for economic growth strategies of North Korea. It recommends various sources of capital and allocation of resources by sector such as agriculture and labor-intensive manufacturing or elsewhere. Bottlenecks and idle capacities reduce capital efficiency so that utilization of production capacities should be reconsidered in capital formation. In the beginning stage, P'yang should choose the growth type of either Korea or Taiwan based on factor endowments and comparative advantages. The best growth strategy for North Korea is invited from evaluating four alternative growth strategies in two economies. The role of government is discussed in the process of economic transformation from the planned to the market economy in North Korea to promote the efficiency as well as the equality. It includes multi-dimensional factors including disarmament and human rights issues in inter-governmental economic cooperation.

The study consists of four main sections. Following this introduction, the second section visits the theoretical background about balanced versus unbalanced growth strategies and the role of government in the process of economic growth. In the third section, models and methodologies are invited for estimation, among which only the input-output method is discussed. The fourth section provides estimated results and analyses including domestic capital formation in terms of sources and allocation, factor productivity and GDP sensitivity for export growth, patterns of export promotion and import substitution, and the impact of alternative growth strategies. In the fifth section, lessons from experiences of S. Korea and Taiwan are evaluated, and application of those lessons for North Korea are discussed. The final section provides conclusions and recommendations.

The study applies the statistical comparison method in estimating capital formation and its efficiency, the regression analysis method in testing the causality between GDP and others, and the input-output method in evaluating the impacts of alternative allocation of resources. The most of data covers from 1953 to 1994 for both South Korea and Taiwan. The study suggests the optimum allocation of its resources to the Government of North Korea at the very beginning of the transition period from centrally planned economy toward the market economy. However, there must be certain limitations in applying lessons from two experiences. The initial condition of North Korea is very unclear because of lack of information, which is a matter of application. The uncertainty of political development and system transformation also creates difficulties in applying lessons from experiences of two economies for economic development in North Korea.

## II. Theoretical Background

The economies of South Korea and Taiwan have been based on export-led growth with consecutive economic development plans controlled by the central government. In the early stage of industrial development, a surplus in the primary sector raises demand for manufacturing products, so exports in the primary sector provide imports of nondurable and labor-intensive consumer goods.<sup>2</sup> Owing to investible funds generated by primary exports, increasing demand for imports, and improvement of technological potential, the economy begins the substitution for labor-intensive imports with protection and subsidization. As a result of this successful import substitution, labor-intensive industries including textiles and clothing expand their exports by exploiting cheaper labor. This stimulates more import demand for consumer and producer durables and accelerates more education and training for workers and entrepreneurs, capital accumulation, and technology transfer, but is strongly challenged by the movement of comparative advantage and protectionist threats against these labor-intensive imports in foreign countries.

**Balanced Growth and Import Substitution:** New ideas on the mechanism of economic development in traditional societies have evolved over the past five decades. Rosenstein-Rodan introduced the theory of 'Big Push' explaining that a minimum quantum of investment is necessary to initiate self-sustaining growth, a little like taking an airplane off the ground.<sup>3</sup> However, an isolated and small amount of investment does not provide a sufficient impact on growth. It is only the beginning of a departure from the concept of traditional static equilibrium owing to increasing returns and technological external economies and LDCs' market imperfection.<sup>4</sup>

Annexed to this big push, Ragnar Nurkse introduced a concept of balanced growth in limited markets and areas of mass poverty.<sup>5</sup> Balanced growth is an increase in production over a wide range of consumables, according to consumers' preferences with self-generated demand met with a given labor force, techniques, and natural resources, and only through the use of more capital. In the absence of a meaningful rise of world export demand for primary products, a pattern of mutually supportive investment in different lines of production can enlarge the size of the market and help to fill the vacuum in the domestic economy of low income areas."<sup>6</sup> This means balanced investment between agriculture and manufacturing, and horizontal diversification within manufacturing. Nurkse believed that international trade would not increase rapidly due to slow expansion of primary exports, supply and demand constraints of manufacturing exports in LDCs, and protectionist trends against labor-intensive exports in DCs. This implied that growth through foreign trade can hardly be expected to narrow differences of income between DCs and LDCs.<sup>7</sup>

Raul Prebisch argued that most Latin American countries faced a decline of primary exports due to their low demand elasticities and protectionist policies in DCs, and the difficulty of generating manufacturing exports due to the lack of industrial infrastructure in LDCs. He suggested that "import substitution stimulated by a moderate and selective protection policy was an economically sound way to achieve certain desirable effects."<sup>8</sup> His theory of center periphery system means that developed countries (center) organize the economy for their interests by using technological advantages, while developing countries (periphery) supply raw materials demanded by the center.<sup>9</sup> Thus, the strategy of import substitution by protection diverts primary resources to industrial products without export constraints. This expedites technology penetration, domestic job creation, structural changes to manufacturing despite massive demand for investment.

The growth through import substitution is linked to balanced growth, but the two

approaches differ from each other. Balanced growth is based on balanced allocation of resources but import substitution (IS) does have some limitations. (a) IS involves a strategy of improving the balance of payments by restricting import tariffs, quotas, and an overvalued exchange rate, all of which penalize exports. (b) IS requires protection and subsidization for a country's scarce factor; that increases costs of production and so consumption, distorts resource allocation, and worsens income distribution in labor-surplus LDCs by increasing the returns to capital. (c) Massive capital formation is financed by domestic savings which reduce consumption. But it is difficult to raise savings because enough consumer goods are supplied by domestic producers with lower prices, the income distribution shifts from importers to income recipients of new industries, more imports are required for industries to produce consumer goods, and the inefficiency of substituted industries lowers both profits and savings.<sup>10</sup> (d) If domestic market is small, growth through import substitution may be constrained by lacks of economies of scale in production and the limit of domestic consumption resulting in higher capital costs and lower efficiency. (e) The IS growth strategy maintains sellers' markets dominated by monopolists or oligopolists, and no incentives to improve productivity, which increases inefficiency and worsens income distribution.

**Unbalanced Growth and Export Promotion:** Albert Hirschman stresses the theory of unbalanced growth holding that investment concentrated in leading sectors of the economy generates more output, employment, and income through forward and backward linkages. He emphasizes decision-making for investment to economize scarce resources and prefers disequilibrium growth. The incentives such as business profits (in private) and social welfare (in public) attract investment which, in turn, creates a disequilibrium. If the economy is moving ahead, the growth policy tries to maintain a previous disequilibrium, which generates additional disequilibrium requiring a movement toward continuous growth.<sup>11</sup>

Hirschman considers two types of investment: substitution and postponement choices. He favors the latter involving in decisions regarding the sequence of several projects. He suggests social overhead capital (SOC) must precede or at least be kept in balance with directly productive activities (DPA). If SOC is expanded, for example, existing DPA becomes less costly, which attracts further DPA. If DPA is expanded first, production costs will rise so that demand for SOC will also rise. If investment motivations are deficient, it is safer to rely on development via shortage of investment rather than via excess capacity, while the opposite is true if motivations are sufficient. The balance between SOC and DPA is equally dangerous because there will be no incentive to induce investment.<sup>12</sup> Hirschman stresses that development policy must pursue linkage effects to maximize induced investment decision. His hypothesis is that countries having assigned the higher priority to high-linkage industries would have higher rates of growth than would countries that have assigned lower priority to them.<sup>13</sup> The theoretical contribution of this idea is a pioneering concept connecting interindustry linkages to economic development.

Hirschman introduces the concept of antagonistic growth from his experience in Argentina. The income receivers of one of the two sectors are gaining at the expense of those of the other sector at each stage in the sequential growth process. One concentration of resources may neglect other crucial objectives, which comes to public attention. This brings a new concentration for them, while creating a new neglect to existing beneficiaries. It reflects the interaction of politics and economy in LDCs,<sup>14</sup> explaining that unbalanced growth depends on resource allocation by the government.

In turn, growth through export promotion is combined with the concept of unbalanced

growth. The specialization based on a country's comparative advantages increases competitiveness in foreign markets. This competitiveness is reinforced by various tax exemptions, duty exemptions, lower interest rates, domestic currency devaluation, and lower utility rates. Owing to these protection and subsidization, the intensive allocation of limited resources to export industries pulls the economy more than the balanced one. Thus, growth through export expansion is analogous to a strategy of unbalanced growth due to different demand for industrial products in foreign markets and different allocation of resources to meet various foreign demand.

It is necessary to clarify the relationship between growth strategies of import substitution and export promotion. The former, as Raul Prebisch insisted, concentrates on domestic market demand by restricting imports and focusing less on exports, while the latter gives equal weight to import substitution and export promotion. Export promotion requires a certain degree of domestic technologies accumulated by import substitution, particularly in manufacturing. Meanwhile, earnings from exports can finance import substitution. Thus, import substitution is not an exclusive, but a supportive and complementary strategy for growth through export promotion.

However, export promotion (EP) has certain limitations. (a) EP via unbalanced resource allocation introduces conflicts between private profits and public services. Excess capacities in leading sectors cause an efficiency problem, and bottlenecks in other sectors spread inflationary pressures throughout the economy. The crucial question is not whether to create the unbalance,<sup>15</sup> but what is the optimum degree of unbalance, and where and how much should the economy accelerate growth. (b) EP via unbalanced growth provides intensive investment to key sectors with large linkage effects, which generates more growth than balanced investment. But linkage effects are neutralized by intermediate imports, underutilization of production capacities,<sup>16</sup> capital-intensiveness of products, trade patterns,<sup>17</sup> and ignorance of linkages in plans.<sup>18</sup> (c) The costs of protection and subsidization for export-led growth is paid in terms of production, consumption, allocation, and distribution. (d) EP faces difficulties from increasing factor costs and technology gap in production, foreign protectionism, pressures for market liberalization and currency appreciation.

**Pros and Cons of Growth Strategies:** First, balanced and unbalanced growth is on the same plane of economic development in the long run. If unbalanced investment (ex-ante) arrives at a certain saturated point (ex post), it becomes an equilibrium point of the economy with a balance which remains unchanged until new demand induces additional unbalanced investment stimulating the economy. The balanced allocation (ex-ante) does not necessarily invite economy-wide balanced growth (ex post) due to the following reasons. (a) Technological changes stimulate the change of industrial linkages, value added per dollar output, and imported intermediates eventually. (b) The change of relative prices causes the substitution of inputs in the production process and even causes the substitution of imports, which makes existing linkages vary. (c) New products and a change of product mix affect factor intensity, which alters the original stimulus of final demand. (d) Underutilization of production capacities rooted by constraints of input supply and output demand neutralizes linkage effects. (e) Economies' scale caused by an increase in demand for a particular sector affect linkage relations. Ex ante investment creates ex post structure of industries, which is different from ex ante structure. In sum, the balanced allocation does not allow a country to remain unchanged in the industrial structure eventually.<sup>19</sup>

Secondly, since import substitution and export promotion are sticky IS continuing even after EP begins. As shown in Table 1, suppose the economy begins with labor-intensive IS at time

one, and finishes major substitution at time two; and begins with capital-intensive IS at time three and finishes major substitution at time four. However, additional IS for labor-intensive products continues after time two, and additional IS for capital-intensive products continues after time four. The labor-intensive EP starts at time two when its major IS ends but continues until time four when capital-intensive IS ends and its EP starts. Thus, IS and EP arise together during time two through three for labor-intensive products and during time four through five for capital-intensive products.

Table II-1. Sticky Import Substitution and Export Promotion

Import Subst	Labor-In IS	Labor-In IS	Capital-In IS	Capital-In IS	
Export Subst		Labor-In EP	Labor-In EP	Capital-In EP	Capital-In EP
Time	1	2	3	4	5

Thirdly, trade patterns and factor productivity raise another issue. The efficient allocation of resources provides favorable patterns of trade for export promotion based on comparative advantage. In turn, factor inputs and its productivity are also crucial for competitiveness, owing to technology and labor quality. Research and development are essential to keep a leading edge of technology among suppliers, provided by funds, manpower and management,<sup>20</sup> and diffusion of technology invites high returns of investment.<sup>21</sup>

**The Role of Government in Growth:** The issue of the efficiency of public policies has been examined in the literature in the content of rational expectations. Sargent and Wallace argued that government policies are not effective because people expect the policy impact and behave or adjust to the policy at the same time with perfect foresight.<sup>22</sup> However, policy effectiveness can be justified by following reasons. (a) People's expectations can be applied not only to economic agents but also to policy makers so that future decisions expected by economic agents influence policy makers. (b) The equilibrium conditions in developing countries are remarkably vulnerable because of demand constraints, uncertainty, and inconsistency depending largely on the internal and external economic environment. (c) The flow of transborder information seem to be interrupted in developing countries though the control of information becomes difficult as the economy grows through foreign trade and foreign direct investment.

As arguments for economic planning, market imperfections in LDCs often fail in the efficient allocation of resources, and state intervention can increase its efficiency.<sup>23</sup> Since the market prices do not represent the opportunity cost of the use of factors or certain commodities to society, the optimum resource allocation cannot be provided by the free market.<sup>24</sup> In this case, economic planning is justified to fill the gap between private and social interests. Since the rapid structural change is not prepared by the market, coordinated massive investment introduces the rapid structural reform.<sup>25</sup> In turn, the major argument against planning is costs of intervention. The optimum degree of government intervention is based on necessity and sufficiency. The necessity of intervention is predictable, but its sufficiency for successful industrialization cannot easily be quantified as LDCs' planners intend or desire to achieve.<sup>26</sup> The positive impact of government intervention has shown in the economic miracle from East Asian countries.<sup>27</sup>

### III. Models and Methodologies

As mentioned previously, the study is involved in four issues including capital formation, productivity of capital and labor, significance of exports on GDP, and impacts of alternative growth strategies on GDP. The first two issues are analyzed by the statistical comparison, the impact of capital, labor, and exports on GDP is estimated by the regression analysis, and the impact of alternative growth strategies are evaluated by the input-output method as shown in Table III-1. In this section, only the input-output method is discussed as a methodology to estimate. The study considers four alternative growth strategies including IP without EP, EP without IP, EP with IP or IP with EP, and domestic demand generation.

Table III-1. Research Objectives and Methodologies

Research Objectives	Methodologies
1. Capital Formation: Sources and Allocation	Statistical Comparison
2. Factor and Total Productivity: Capital and Labor 2. Sensitivity: Impacts of Capital, Labor, and Exports on GDP	Statistical Comparison Regression Analysis
3. Patterns of Export Promotion and Import Substitution 4. Impacts of Alternative Growth Strategies on GDP	Input-Output Method Input-Output Method

**Patterns of Export Expansion:** Producers' transactions at current prices provide an input coefficient matrix (A) in input-output tables. Its coefficient ( $a_{ij}$ ) indicates a proportional cost of intermediate inputs coming from i-th industry to produce \$1.00 of j-th industrial output. Since the value-added coefficient ( $v_j$ ) indicates a proportion of value added to produce \$1.00 of j-th industry,

$$(3.A.1) \sum_i a_{ij} + v_j = 1 \quad \text{or} \quad v_j = 1 - \sum_i a_{ij}$$

where  $\sum_i a_{ij}$  represents an aggregate input coefficient of j-th industry, which includes imported and domestically produced intermediate inputs.  $\sum_i$  is a summation sign. So, we get a value-added matrix (Av). High value added in the industry requires fewer intermediate inputs per unit output.<sup>28</sup>

Using an input coefficient matrix, the Leontief inverse matrix  $(I-A)^{-1}$  is derived, explaining direct and indirect impacts of final demand on output. So, we get output generated by final demand.

$$(3.A.2) X(Y) = (I-A)^{-1} * Y \quad \text{where} \quad Y = Y_d + IMP$$

where  $X(Y)$  indicates output generated by competitive final demand (Y) for goods and services,  $Y_d$  denotes final demand for domestic goods and services, and IMP means import demand.

So, the domestic I-O model can be introduced by using domestic factors in the place of the competitive elements of equation (3.A.2).

$$(3.A.3) X(Y_d) = (I-A_d)^{-1} * Y_d \quad \text{where} \quad Y_d = C + I + EXP$$

where  $A_d$  indicates the domestic input coefficient matrix,  $X(Y_d)$  represents output demand for domestic products created by domestic final demand, which includes consumption (C), investment

(I), and exports (EXP). Domestic final demand is affected by two major elements: industrial linkages based on current technology, and the composition of final demand. The domestic model considers the flow of domestic resources only, while the competitive model includes the flow of all resources of domestic and foreign inputs.

The change of industrial composition of exports between two points of time [dExp(t)] is measured by the difference in export demand vector as follows.

$$(3.A.4) [dExp(t)] = [Exp(t)] - [Exp(t-1)]$$

where [Exp(t)] and [Exp(t-1)] indicate unit export demand vectors at time t and t-1. This is a basic element affecting output and GDP created by exports and evaluating the export structure. Domestic output demand created by exports, accordingly, is obtained by.

$$(3.A.5) X_i [EXP(t)] = [I-Ad(t)]^{-1} * EXP(t) \quad \text{and}$$

$$(3.A.6) X_i [EXP(t-1)] = [I-Ad(t-1)]^{-1} * EXP(t-1)$$

where  $X_i [EXP(t)]$  and  $X_i [EXP(t-1)]$  indicate domestic output demand generated by export demand at the time t and t-1,  $[I-Ad(t)]^{-1}$  and  $[I-Ad(t-1)]^{-1}$  denote Leontief inverse matrixes for the domestic model at time t and t-1. Note that  $[EXP(t)]$  and  $EXP(t-1)$  mean total export vectors at time t and t-1. So, the change of output generated by exports,  $dX_i [EXP(t)]$ , is obtained by the time difference of equation (3.A.5) and (3.A.6).

$$(3.A.7) dX_i [EXP(t)] = [I-Ad(t)]^{-1} * EXP(t) - [I-Ad(t-1)]^{-1} * EXP(t-1)$$

Average growth rates of output created by exports between two periods of time at time t,  $RdX_i [EXP(t)]$ , are estimated by output changes divided by output at time t-1.

$$(3.A.8) RdX_i [EXP(t)] = \{dX_i [EXP(t)] * 100 / X_i [EXP(t-1)]\}$$

Export expansion rates,  $REXEP_i (t)$ , are measured by changing ratios of output created by exports to that created by overall final demand of the i-th industry.

$$(3.A.9) REXEP_i (t) = X_i [EXP(t)] / X_i [Yd(t)] - X_i [EXP(t-1)] / X_i [Yd(t-1)]$$

The larger value of  $[REXEP_i]$  implies larger export expansion of the i-th industry.<sup>29</sup> Major elements affecting export expansion rates are the change of output multipliers for exports (so linkages and export vector), domestic final demand, and relative proportion of exports within domestic demand.

The value added created by export demand is obtained by the following equation. Note that value added here means value added generated by exports of i-th industry, but value added of the overall economy represents the gross domestic product (GDP) of the year t.

$$(3.A.10) \quad VA_i [Exp(t)] = A_v(t) * X_i [Exp(t)] \quad \text{and}$$

$$(3.A.11) \quad VA_i [EXP(t)] = A_v(t) * X_i [EXP(t)] = A_v(t) * [I-Ad(t)]^{-1} * EXP(t)$$



where  $V_{Ai} [Exp(t)]$  and  $V_{Ai} [EXP(t)]$  indicate a unit (Exp) or total (EXP) value added of i-th industry created by exports at the time t and  $A_v(t)$  denotes a diagonal matrix of value added at the time t. The equation includes three elements: value added matrix, Leontief inverse matrix, and final demand for exports. Value added multipliers of exports,  $V_{Ai} [Exp(t)]$  are obtained by multiplying output multipliers with the value-added vector as shown in equation (3.A.10).

The change of value added is obtained by taking the time difference of equation (3.A.11).

$$(3.A.12) \quad \begin{aligned} dV_{Ai} [EXP(t)] &= A_v(t) * X_i [EXP(t)] - A_v(t-1) * X_i [EXP(t-1)] \\ &= A_v(t) * [I - A_d(t)]^{-1} * EXP(t) - A_v(t-1) * [I - A_d(t-1)]^{-1} * EXP(t-1) \end{aligned}$$

The change of value-added shares generated by exports for the i-th industry,  $dVASH_i [EXP(t)]$ , can be estimated by the following equation.

$$(3.A.13) \quad \begin{aligned} dVASH_i [EXP(t)] &= V_{Ai} [EXP(t)] / S_i V_{Ai} [EXP(t)] \\ &\quad - V_{Ai} [EXP(t-1)] / S_i V_{Ai} [EXP(t-1)] \end{aligned}$$

This explains the transformation of industrial structure during two points of time in the economy. Note that the export share of i-th industry is different from its value-added share, and the change of the former is different from the change of the latter.

**Patterns of Import Substitution:** The matrix of imported input coefficients,  $[A_m]$ , is obtained from the transaction table of imported goods and services, explaining how imported goods and services are distributed to industries by final demand. Import demand generated by domestic final demand,  $IMP_i [Y_d(t)]$ , is obtained by

$$(3.A.14) \quad IMP_i [Y_d(t)] = A_m(t) * X_i [Y_d(t)].$$

Import demand created by exports,  $[IMP_i (EXP)]$ , is obtained by.

$$(3.A.15) \quad IMP_i [Exp(t)] = A_m(t) * X_i [Exp(t)] \text{ and}$$

$$(3.A.16) \quad IMP_i [EXP(t)] = A_m(t) * X_i [EXP(t)]$$

where  $IMP_i [Exp(t)]$  indicates import multipliers for one dollar of aggregate exports at time t. Major factors affecting imports for exports are import coefficients and output multipliers. Matching smaller import coefficients with smaller output multipliers can minimize imports induced by exports.

The change in imports induced by overall domestic demand and exports during two points of time is obtained by the time difference of equation (1.A.14) through (1.A.16) as follows.

$$(3.A.17) \quad dIMP_i [Y_d(t)] = A_m(t) * X_i [Y_d(t)] - A_m(t-1) * X_i [Y_d(t-1)],$$

$$(3.A.18) \quad dIMP_i [EXP(t)] = A_m(t) * X_i [EXP(t)] - A_m(t-1) * X_i [EXP(t-1)] \text{ and}$$

$$(3.A.19) \quad dIMP_i [Exp(t)] = A_m(t) * X_i [Exp(t)] - A_m(t-1) * X_i [Exp(t-1)].$$

Equation (3.A.17) represents the change in import volume created by overall domestic demand, and equation (3.A.18) explains the change in import volume generated by exports. The change of

import multiplier for exports at the time t,  $dIMP_i [Exp(t)]$ , is obtained by equation (3.A.19). The change of import shares for exports for the i-th industry,  $dIMSH [EXP(t)]$ , is obtained by.

$$(3.A.20) \quad dIMSH_i [EXP(t)] = IMP_i [EXP(t)] / S_i IMP_i [EXP(t)] \\ - IMP_i [EXP(t-1)] / S_i IMP_i [EXP(t-1)]$$

where  $IMP_i [EXP(t)] / S_i IMP_i [EXP(t)]$  indicates the proportion of i-th industrial imports among total imports for exports.

Import substitution rates for the entire economy,  $RIMSB_i [Yd(t)]$ , are measured by the ratio of total imports to output in the economy as follows.

$$(3.A.21) \quad RIMSB_i [Yd(t)] = IMP_i [Yd(t)] / X_i [Yd(t)] \\ - IMP_i [Yd(t-1)] / X_i [Yd(t-1)].$$

Import substitution rates for exports,  $RIMSB_i [EXP(t)]$ , can be obtained by the difference of import ratio to output generated by exports as follows.

$$(3.A.22) \quad RIMSB_i [EXP(t)] = IMP_i [EXP(t)] / X_i [EXP(t)] \\ - IMP_i [EXP(t-1)] / X_i [EXP(t-1)].$$

This explains the proportional change of imports to output, both of which are generated by exports during a certain period. Import substitution rates for intermediate inputs for the i-th industry,  $RIMSB_i [INT(t)]$ , are measured by the same notion as the equation (3.A.22).

$$(3.A.23) \quad RIMSB_i [INT(t)] = IMP_i [INT(t)] / X_i [EXP(t)] \\ - IMP_i [INT(t-1)] / X_i [EXP(t-1)].$$

The intermediate import vector is obtained from the transaction table of input-output tables. More substitution for imports provides more domestic production by the same amount of demand.

**Export Promotion without Import Substitution (Strategy I):** It is assumed that the export structure remains unchanged at the 1975 structure, but export volumes rise by actual amounts, and no further import substitution is expected during the period of 1975-1985. Based on this growth strategy, output and value added generated by 1985 exports is obtained by following equations owing to equation (3.A.6) and (3.A.11).

$$(3.B.1) \quad X_i [Exp(1985)] = [I-Ad(1975)]^{-1} * [Exp(1975)] \text{ and} \\ (3.B.2) \quad VA_i [Exp(1985)] = A_v(1975) * [I-Ad(1975)]^{-1} * [Exp(1975)]$$

where  $X_i [Exp(1985)]$  and  $VA_i [Exp(1985)]$  indicate output and value added generated by 1985 exports, and  $[Exp(1975)]$  denotes the 1975 export vector assumed as a composition of 1985 exports because no import substitution is assumed during this period.

**Export Promotion with Import Substitution or Vice Versa (Strategy II):** This is the

actual growth strategy which South Korea and Taiwan have pursued and demonstrated their performances. So, both output and value added generated by 1985 exports can be obtained by

$$(3.B.3) \quad X_i [\text{Exp}(1985)] = [I-\text{Ad}(1985)]^{-1} * [\text{Exp}(1985)] \text{ and}$$

$$(3.B.4) \quad V_{Ai} [\text{Exp}(1985)] = A_v(1985) * [I-\text{Ad}(1975)]^{-1} * [\text{Exp}(1985)].$$

Note that the export structure is based on 1985 exports.

**Import Substitution without Export Promotion (Strategy III):** This strategy assumes that export volumes in 1985 stay at the 1975 level, and the remaining proportion of 1985 exports are reallocated for import substitution. The 1985 import vector is readjusted by placing no import substitution for agriculture and mining. The representative vector for this growth strategy,  $\text{ImpSub}(1985)$ , is provided by 1975 export vector and adjusted 1985 import vector. Both vectors are combined by the proportion of 1975 exports in 1985 exports and the remaining proportion. So

$$(3.B.5) \quad \text{ImpSub}(1985) = g * [\text{Exp}(1975)] + h * [\text{ImpMod}(1985)]$$

where  $g$  indicates the proportion of 1975 exports in 1985 exports,  $h$  denotes the remaining proportion of 1985 exports,  $[\text{Exp}(1975)]$  means the 1975 export vector, and  $[\text{ImpMod}(1985)]$  represents the modified import vector based on 1985 imports.

From equation (3.B.5), output and value added generated by this growth strategy of import substitution without export promotion is obtained by owing to equation (3.A.6) and (3.A.11).

$$(3.B.6) \quad X_i [\text{ImpSub}(1985)] = [I-\text{Ad}(1985)]^{-1} * [\text{ImpSub}(1985)] \text{ and}$$

$$(3.B.7) \quad V_{Ai} [\text{ImpSub}(1985)] = A_v(1985) * [I-\text{Ad}(1985)]^{-1} * [\text{ImpSub}(1985)]$$

where  $X_i [\text{ImpSub}(1985)]$  and  $V_{Ai} [\text{ImpSub}(1985)]$  indicate output and value added generated by this growth strategy.

**Domestic Demand Expansion (Strategy IV):** If there are no demand and supply constraints in domestic market, domestic demand expansion can be a supportive growth strategy.<sup>30</sup> If this strategy is applied independently, it is linked to the balance growth theory. It is important to define a representative final demand vector for domestic demand expansion. The private consumption vector is assumed as a representative of final demand.<sup>31</sup> If resources are converted from exports to domestic consumption, they are reallocated to industries by the consumption vector  $[\text{Con}(t)]$ .

$$(3.B.8) \quad X_i [\text{Con} * \text{EXP}(t)] = [I-\text{Ad}(t)]^{-1} * [\text{Con} * \text{EXP}(t)]$$

where  $X_i[\text{Con} * \text{EXP}(t)]$  indicates output demand generated by domestic consumption, where resources are reallocated from exports at the time  $t$ , and  $[\text{Con} * \text{EXP}(t)]$  denotes converted final demand vector from exports to consumption. The change of this output is obtained by,

$$(3.B.9) \quad dX_i [\text{Con} * \text{EXP}(t)] = [I-\text{Ad}(t)]^{-1} * [\text{Con} * \text{EXP}(t)] \\ - [I-\text{Ad}(t-1)]^{-1} * [\text{Con} * \text{EXP}(t-1)]$$

This is like equation (3.A.7) for exports only. The difference in output created by the same

number of exports and domestic demand at time t is obtained by.

$$(3.B.10) \quad \begin{aligned} & X_i [\text{EXP}(t)] - X_i [\text{Con*EXP}(t)] \\ & = [I-\text{Ad}(t)]^{-1} * \{[\text{EXP}(t)] - [\text{Con*EXP}(t)]\} \end{aligned}$$

The positiveness of the equation represents that export expansion creates more output than expansion of domestic private consumption (balanced) in the economy. The difference of output created by export expansion and domestic demand expansion during two periods of time can be estimated by

$$(3.B.11) \quad \begin{aligned} & dX_i [\text{EXP}(t)] - dX_i [\text{Con*EXP}(t)] \\ & = [I-\text{Ad}(t)]^{-1} * \{[\text{EXP}(t)] - [\text{Con*EXP}(t)]\} \\ & \quad - [I-\text{Ad}(t-1)]^{-1} * \{[\text{EXP}(t-1)] - [\text{Con*EXP}(t-1)]\} \end{aligned}$$

Value added generated by exports and domestic demand can be obtained by

$$(3.A.12) \quad V_{Ai} [\text{Con*EXP}(t)] = A_v(t) * X_i [\text{Con*EXP}(t)]$$

where  $V_{Ai} [\text{Con*EXP}(t)]$  indicates value added generated by resources converted from exports to consumption as assumed. The change of this value added,  $dV_{Ai} [\text{Con*EXP}(t)]$ , is measured by.

$$(3.B.13) \quad \begin{aligned} dV_{Ai} [\text{Con*EXP}(t)] & = A_v(t) * [I-\text{Ad}(t)]^{-1} * [\text{Con*EXP}(t)] \\ & \quad - A_v(t-1) * [I-\text{Ad}(t-1)]^{-1} * [\text{Con*EXP}(t-1)] \end{aligned}$$

The difference of value added between that generated by exports and that generated by converted consumption at time t can be estimated by

$$(3.B.14) \quad \begin{aligned} & V_{Ai} [\text{EXP}(t)] - V_{Ai} [\text{Con*EXP}(t)] \\ & = A_v(t) * [I-\text{Ad}(t)]^{-1} * \{[\text{EXP}(t)] - [\text{Con*EXP}(t)]\} \end{aligned}$$

The change in value added generated by export expansion is compared to that generated by domestic demand expansion during the period. From equation (3.B.11) and (3.B.13), we obtain.

$$(3.B.15) \quad \begin{aligned} & dV_{Ai} [\text{EXP}(t)] - dV_{Ai} [\text{Con*EXP}(t)] \\ & = A_v(t) * [I-\text{Ad}(t)]^{-1} * \{[\text{EXP}(t)] - [\text{Con*EXP}(t)]\} \\ & \quad - A_v(t-1) * [I-\text{Ad}(t)]^{-1} * \{[\text{EXP}(t-1)] - [\text{Con*EXP}(t-1)]\} \end{aligned}$$

The positiveness of the equation implies that export expansion with import substitution generates more value added than the domestic consumption expansion.

In sum, we have developed a model evaluating four alternative growth strategies. Comparing their generated value added to each other, we can imply the best growth strategy contributing to the highest growth or GDP. Note that the strategy of domestic demand generation is not applicable to the economy with lack of capital and technology.

## IV. Estimated Results and Analyses

This section discusses about issues of investment and structural transformation, productivity of capital and labor, sensitivity of exports on GDP, and growth impacts of alternative allocations in both South Korea and Taiwan in the period of 1960-1994 in terms of a comparative analysis of export-led growth between two countries. But the application of lessons from experiences of both economies to the growth strategy of North Korea is not included in this section but is separately discussed in the next section based on this section's information.

### Domestic Capital Formation: Sources and Allocation

Much infrastructure was disabled and the withdrawal of key administrators and technicians could not be replaced after the World War II, so production was less than a half of the colonial peak in both countries.<sup>32</sup> A few years later, Korea endured the turmoil of the Korean War during 1950-1953, that devastated the entire land and business. In turn, Taiwan became the base of new KMT government, which moved from Chinese mainland in 1949. In the 1950s, the Korean government concentrated on providing necessities and reconstructing industries destroyed by the war mainly with U.S. aid, while the KMT government in Taiwan planned and implemented the first and second Economic Development Plans during 1953-1960. In general, the political environment in Taiwan was relatively more stable than that in Korea since the KMT leadership was fortifying its base to recover the lost land during the early period of movement from mainland.

Table IV-1. The Shares of GDP and Employment by Sector: Initial Conditions  
South Korea and Taiwan, 1953 and 1960, Percent in The Economy

Country by Year (GDP)		GDP			Employment		
		Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
S. Korea	1953 (\$ 67.0)	47.3	10.1	42.6	75.0*	5.0	20.0
S. Korea	1960 (\$ 79.0)	36.8	15.9	47.3	66.0	26.0	8.0
Taiwan	1953 (\$107.6)	38.3	13.0	48.7	55.6	14.8	29.6
Taiwan	1960 (\$139.3)	32.8	19.1	48.1	50.2	29.3	20.5

Sources: The Bank of Korea and The Council for Economic Planning and Development of Republic of China.

\* Indicates 1939 data from K. Kim and M. Roemer, *Growth and Structural Transformation*, Seoul: KDI, 1979, 88.

Table IV-2. Fixed Capital Formation: South Korea and Taiwan  
Selected Years, Percent at Current Prices

Period Country	1962-1971		1972-1981		1982-1991	
	South Korea	Taiwan	South Korea	Taiwan	South Korea	Taiwan
Investment/GDP	21.0	22.6	28.9	30.9	33.6	21.0
Dom. Savings/GDP	11.7	21.3	21.6	32.5	32.0	33.1
Dom. Savings/Inv	55.7	94.2	74.7	105.2	95.4	157.7

Sources: The Bank of Korea and The Council for Economic Planning and Development of Republic of China.

Shown in Table IV-1, the GDP share of primary sector in 1953 was 47.3% for S. Korea and 38.9% for Taiwan, while that of secondary sector was 10.1% and 13.0% respectively. But in 1960, the primary share became 36.8% and 32.8%, and the secondary became 15.9% and 19.1% respectively. Per capita income in S. Korea increased from \$67 in 1953 to \$79 in 1960, while that in Taiwan did from \$108 to \$139. The initial conditions of the economy in 1960 were worse in S. Korea than in Taiwan, though they were not much different from each other in 1945. It is obvious that S. Korea has paid the costs of the civil war. The education level of workers was much higher in Korea than in Taiwan in 1960, when the number of elementary school graduates was 47.4% in Korea but 30.5% in Taiwan, that of secondary was 17.3% and 5.5%, and that of college was 2.4% and 0.5%, and no education was received by 42.8% and 63.5% respectively.

Capital formation and its finance played a key role in the structural transformation in both economies. In Table IV-2, the average investment ratio to GDP in S. Korea was 21.0% during 1962-1971, 28.9% during 1972-1981, and 33.6% during 1982-1991; while that for that for Taiwan was 22.6%, 30.9%, and 21.0% for corresponding periods. Gross investment in S. Korea increased continuously and peaked at 38.8% of GDP in 1988 and declined slowly to around 35% in later years. That in Taiwan increased and peaked at 33.9% of GDP in 1980 but declined to around 24% in later years. On the other hand, average domestic savings in S. Korea were 11.7% of GDP during 1962-1971, that was 55.7% of gross domestic investment, but became 95.4% of that during 1982-1991 and most of domestic capital formation was financed by domestic savings. For Taiwan, average annual domestic savings became 94.2% of domestic capital formation during 1962-1971 and became 157.7% during 1982-1991. Since savings were 26.5% and investment was 23.8% of GNP in 1994, domestic savings still surpassed investment by around 3% of GNP in Taiwan.

Table IV-3. Amount of Investment per Capita: South Korea and Taiwan  
Selected Years, Current U.S. Dollars

Year	South Korea			Taiwan		
	Population	Investment	Invest/Cap	Population	Investment	Invest/Cap
1960	24,989T	410M	16.4	10,792T	316M	29.3
1970	32,241T	2,155M	66.8	14,676T	1,447M	98.6
1980	38,124T	17,944M	472.0	17,479T	14,013M	801.7
1985	40,429T	25,438M	629.2	19,258T	10,581M	549.4
1990	43,520T	92,554M	2,126.5	20,353T	36,673M	1,801.9

Sources: The Bank of Korea and The Council of Economic Planning and Development in Republic of China.

Table IV-4. Sources of External Capital: Korea and Taiwan  
Selected Years, Current U.S. Million Dollars

External Capital	1962-1971		1972-1981		1982-1991	
	S. Korea	Taiwan	S. Korea	Taiwan	S. Korea	Taiwan
Borrowing	3,419	493	18,939	2,276	18,774	0
Foreign Direct Invest	96	672	1,153	2,383	7,431	33,680
Foreign Aids	1,284	419	13	0	0	0

Sources: The Bank of Korea and The Council of Economic Planning and Development in Republic of China.

Note that FDI in Taiwan from overseas Chinese was only \$1,169 million (3.5%) during 1982-1991.

In Table IV-3, the investment per capita was \$16.4 for Korea and \$29.3 for Taiwan in 1960 and increased to \$2,126.5 and \$1,801.9 respectively in 1990. The table implies that initial investment per capita in S. Korea was lower than that in Taiwan, but in later years it became reversed, and that the amount of per capita investment in Taiwan declined in the middle of 1980s. The decline of capital formation in Taiwan in 1980s can be explained by the rise of wages and environmental protection costs,<sup>33</sup> appreciation of domestic currency against U.S. dollars,<sup>34</sup> difficulties of access to the U.S. market due to increasing its trade surplus,<sup>35</sup> the limitation of investment in small scale firms in Taiwan, and the uncertainty of Taiwan's political future which encouraged investment abroad instead of domestic investment. The movement of manufacturing plants to resource rich and low wage countries reduces production costs and trade conflicts.<sup>36</sup>

Domestic capital formation in S. Korea was financed heavily from foreign savings, while that in Taiwan depended on domestic savings. In Table IV-4, net borrowing in S. Korea was \$3.4 billion during 1962-1971, \$18.9 billion during 1972-1981, and 18.8 billion for 1982-1991; while that in Taiwan was \$0.5 billion, \$2.3 billion, and zero for the corresponding periods. The reason why S. Korea borrowed much from external savings was, first of all, that S. Korea could attract much less foreign direct investment than Taiwan did. The amount of FDI during 1972-1982 was \$1.2 billion for S. Korea and \$2.4 billion for Taiwan, and that in 1982-1991 was \$7.4 billion and \$33.7 billion respectively. Secondly, per capita income in S. Korea was much less than in Taiwan, remaining at 57% of Taiwan in 1960, though the gap became closer in later years. Lower income caused lower savings. Thirdly, S. Koreans want more consumption than Taiwanese for additional income. The marginal propensity to consume in the private sector was 0.514 for S. Korea and 0.473 for Taiwan during 1972-1981. Finally, negative rates of real interest in the 1970s discouraged savings, and high inflation attracted Koreans to purchase real assets rather than financial assets expediting inflation and increasing inequality of income distribution. As a result, outstanding external debt of S. Korea claimed by foreign commercial banks reached \$69.2 billion by the end of March 1995.<sup>37</sup>

#### IV-5. Domestic Capital Formation by Sector: South Korea and Taiwan 1962-1991, Average Percent at Current Producers' Prices

Sector	1960		1962-1971		1972-1981		1982-1986	
	S. Korea	Taiwan	S. Korea	Taiwan	S. Korea	Taiwan	S. Korea	Taiwan
Agriculture	12.8	18.3	8.4	13.1	7.9	6.3	7.4	3.6
Mining	1.3	2.1	0.8	1.1	0.7	0.9	0.8	0.4
Manufacturing	19.9	23.5	21.2	30.2	18.7	32.1	23.9	28.2
Utilities	4.0	11.2	8.3	11.1	7.4	14.4	9.2	14.2
Construction	0.9	0.3	1.7	1.0	1.8	2.6	2.5	3.3
TranspCommuni	19.0	17.9	22.9	17.3	22.6	18.2	13.9	16.5
Commerce	8.3	3.7	7.0	5.1	7.8	3.5	4.8	5.1
Dwelling	20.1	13.6	10.8	11.0	15.5	12.9	17.3	13.8
Others	13.7	9.4	18.9	10.1	17.7	9.3	15.6	14.9

Sources: The Bank of Korea and The Council of Economic Planning and Development in Republic of China. The average shares of investment in agriculture and manufacturing during 1953-1961 were 10.3% and 18.4% for S. Korea, and 21.2% and 23.2% for Taiwan respectively.

Shown in Table IV-5, (a) the share of capital formation in agriculture was 8.4% for S. Korea and 13.1% for Taiwan during 1962-1971, but the share in Taiwan declined continuously to 3.6% during 1982-1986; while that in S. Korea maintained its level about 7% to 8% during the entire period. Considering that the share of agricultural investment during 1953-1961 was 10.3% in S. Korea and 21.3% in Taiwan, that in Taiwan was intensive in the early stage of development, but declined very rapidly since 1971.<sup>38</sup> (b) The average manufacturing share in total investment for Korea was 21.2% in 1960s and 18.7% in 1970s and 23.9% in 1980s,<sup>39</sup> while that for Taiwan was 30.2%, 32.1%, and 28.2% corresponding periods. The share was much higher in Taiwan than in Korea, and the share in Taiwan increased until 1981 but declined gradually in 1980s. (c) The share of public utilities was 8.3% in Korea and 11.1% in Taiwan in 1960s but increased to 9.2% and 14.2% respectively in 1980s. Investment for electricity, gas and water was much higher in Taiwan than in S. Korea during the entire period. (d) Investment for transportation and communications in Korea and Taiwan shared by 22.9% and 17.3% in 1960s, 22.6% and 18.2% in 1970s, and 13.9% and 16.5% in 1980s. Korea invested proportionally more to this industry than Taiwan did until 1981 but became reversed in 1980s. (e) The average investment share for dwellings was closer in both countries at 11% during 1962-1971, but it rose to 17.3% for Korea and 13.8% for Taiwan during 1982-1986, so the former is 3.5% higher than the latter.

As a result of capital formation by sector, the industrial structure has been transformed in terms of GDP and employment as shown in Table IV-6. In 1994, the GDP share of the primary sector was 6.8% for S. Korea and 3.6% for Taiwan; while that of the secondary and the tertiary was 42.5% and 50.7% for S. Korea, and 37.3% and 59.1% for Taiwan. S. Korea generated much more GDP in the primary and the secondary while Taiwan did in the tertiary. The share of employment was different from that of GDP. For example, the share of GDP in the secondary sector in 1994 was 42.5% for Korea and 37.3% for Taiwan, but that of employment was 32.8% and 39.2% respectively, which is opposite direction of GDP shares. The ratio of employment to GDP indicates the labor intensiveness of the sector. In 1994, that ratio for the primary was 2.00 for S. Korea and 3.03 for Taiwan, that for the secondary was 0.77 and 1.05; while that for the tertiary was 1.06 and 0.84 respectively. The primary and the secondary were less in GDP shares, but more labor-intensive in Taiwan than in S. Korea, though the tertiary sector was the opposite.

Table IV-6. The Shares of GDP and Employment by Sector: Final Conditions  
South Korea and Taiwan, 1990 and 1994, Percent in The Economy

Country by Year (GDP)	South Korea			Taiwan		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
GDP Share 1985	12.5	41.0	46.5	5.8	46.3	47.9
GDP Share 1994	*6.8	*42.5	* 50.7	3.6	37.3	59.1
Employment 1985	24.9	33.2	41.9	17.5	41.5	41.0
Employment 1994	13.6	32.8	53.6	10.9	39.2	49.9
Employ/GDP 1985	1.99	0.81	0.90	3.02	0.90	0.86
Employ/GDP 1994	2.00	0.77	1.06	3.03	1.05	0.84

Sources: The Bank of Korea and The Council for Economic Planning and Development of Republic of China.

\* Indicates estimated numbers for the 1994 GDP share of South Korea.



## Factor Productivity and GDP Sensitivity to Export Growth<sup>40</sup>

The ratio of incremental GDP to domestic fixed capital formation is considered as a proxy of capital productivity if other things are equal between Korea and Taiwan. Shown in Table IV-7, the ratios of incremental GDP to domestic fixed capital formation were 0.283 for S. Korea and 0.376 for Taiwan during the period of 1960-1990. If the period divided by a decade, the ratio for S. Korea was 0.386 in 1960s, 0.232 in 1970s, and 0.230 in 1980s; while that for Taiwan was 0.461, 0.347, and 0.318 respectively. This implies the following. (a) One dollar of additional fixed capital formation raised GDP by 28.3 cents in the S. Korean economy and 37.6 cents for the Taiwanese economy in average during 1960-1990. (b) The ratios of incremental GDP to fixed capital formation fell continuously in both countries due to more capital formation per labor and capital-intensiveness of products. (c) Taiwan's capital utilization was more efficient than Korea's in terms of production per capita. The gap increased in 1970s but declined in 1980s. The gap was 0.075 in 1960s, and rose to 0.115 in 1970s, but declined to 0.088 in 1980s.

Table IV-7. Average Ratios of Incremental GDP to Investment  
South Korea and Taiwan, 1960 - 1990

Period	1960-1970	1970-1980	1980-1990	1960-1990
S. Korea	0.386	0.232	0.230	0.283
Taiwan	0.461	0.347	0.318	0.376
Difference	0.075	0.115	0.088	0.093

Sources: The Bank of Korea and The Council for Economic Planning and Development of Republic of China. This is a change of GDP (incremental GDP) divided by fixed capital formation (dGDP/dK) in the period.

The underutilization of production capacities reduces the productivity of capital. The export incentive regime including protection and subsidization attracted more investment to targeted industries in S. Korea than needed, which created over capacities. For example, shipbuilding industry was expanded in Korea when world demand began to decline, so that less than 40% of its capacity was utilized until mid-1980s.<sup>41</sup> This raised capital costs together with foreign debt in S. Korea and reduced the efficiency of growth. This inefficiency came from the politico-economic complex related to business concentration in Korea; but financial policies in Taiwan depended on the free-market mechanism pursuing high efficiency, so that small size firms could hardly make overcapacities. Idle capacities in one sector create bottlenecks in other industries, which introduces inflation in the economy because of shortage of supplies. If the economy becomes larger and is controlled by the authorities, the problems of bottlenecks and idle capacities would be serious, and its inefficiency is automatically invited like in planned economies.

The ratio of GDP to employment in the specific year is considered as a proxy of labor productivity if other things are equal between S. Korea and Taiwan. The amount shown in Table IV-8 indicates the average dollar amount of value added generated by an employee in that year, either in the economy or in sectors. (a) The average amount of GDP generated by one employee in S. Korea was \$3,997 in 1965 and continuously rose to \$16,570 in 1994, while that in Taiwan was \$3,772 and continuously rose to \$24,796 during the same period. The amount between two

Table IV-7. GDP per Employment by Sector: South Korea and Taiwan  
Selected Years, Constant U.S. Dollars 1990=100 for S. Korea and 1991=100 for Taiwan

Year	South Korea				Taiwan			
	Economy	Primary	Secondary	Tertiary	Economy	Primary	Secondary	Tertiary
1965	3,997	2,590	7,740	5,416	3,772	2,217	3,721	6,119
1975	6,821	3,639	9,829	9,336	6,264	3,065	6,102	9,237
1985	11,407	6,101	13,649	12,667	10,292	4,067	9,089	14,147
1994	16,570	8,282	21,453	15,684	24,796	8,176	23,581	29,397

Sources: The Bank of Korea and The Council for Economic Planning and Development of Republic of China. The amount of GDP by sector is divided by the number of employees in that sector in selected years.

countries were very close to around \$4,000 in 1965, but the gap became larger in 1994, when the amount in Korea was only two third of that in Taiwan. (b) In the primary sector, the amount of GDP generated by an average employee was closer in 1965 and 1975. But the speed of growth in S. Korea was almost doubled during 1975-1985, while that in Taiwan was doubled during 1985-1994 though the amount in both countries became closer to \$8,200 in 1994. (c) The amount of value added in the secondary sector was \$7,740 in S. Korea and \$3,721 in Taiwan, but the amount was reversed by showing \$21,453 and \$23,581 respectively. The amount in Taiwan rose very rapidly during the period of 1965-1975 and 1985-1994. (d) In the tertiary sector, the amount of GDP generated by an average employee was \$5,416 for S. Korea and \$6,119 for Taiwan, and the gap became closer to around \$9,300 in 1975. However, that in Taiwan grew very rapidly and make the amount of S. Korean tertiary sector become one half of that of Taiwan's.

Table IV-8 shows the average annual growth rates of labor productivity in S. Korea and Taiwan during the period of 1975-1994. The annual growth of labor productivity in S. Korea was 10.65% on average and that in Taiwan was 6.19% during the entire period, which means that the former was much higher than the latter by about 4.5%. It was 11.82% for S. Korea and 6.53% for Taiwan during the period of 1975-1984, and became 8.41% and 6.14% during 1985-1989, and 10.56% and 5.57% during 1990-1994. Considering GDP generated by an average worker in a year was \$16,570 for S. Korea and \$24,796 in 1994 as shown in Table IV-7, the productivity of average workers in S. Korea has been less than that in Taiwan. If S. Korea maintains the current pace of productivity growth due to continuous and aggressive investment in advanced technology, the GDP gap generated by an average worker between the two countries will be closed soon. In fact, S. Korean conglomerates have better conditions for R&D investment than smaller size of businesses in Taiwan, so that productivity may continue to grow faster in S. Korea than in Taiwan.

Table IV-8. Average Annual Growth Rates of Labor Productivity:  
South Korea and Taiwan, Selected Manufacturing, Selected Years, Percent

Country	1975-1984	1985-1989	1990-1994	1975-1994
S. Korea	11.82	8.41	10.56	10.65*
Taiwan	6.53	6.14	5.57	6.19

Sources: Ministry of Labor, *Yearbook of Labor Statistics*, Seoul: Republic of Korea, various years and The Council for Economic Planning and Development of Republic of China. \* 1994 data was assumed.

In Table IV-9, the first model regresses the growth rate of GDP  $[(dY/dt)/Y]$  as a dependent variable on capital accumulation per dollar of GDP  $[(dK/dt)/Y]$ , and the growth rate of employment  $[(dL/dt)/L]$  as independent variables for and Taiwan during 1953-1986. The coefficient of labor is significant in both countries, but that of capital is significant only in Taiwan. The growth elasticity of GDP to labor is 1.003 for Korea and 1.0727 for Taiwan. The second model adds the growth rate of exports  $[(dX/dt)/dX]$  as an additional explanatory variable. The new model improves R-square to 0.36 for Korea and 0.53 for Taiwan. The estimated coefficients are positively significant in capital and exports for Korea and capital and exports for Taiwan. The growth elasticity to exports was 0.078 for Korea and 0.124 for Taiwan, holding other variables constant, which is 0.046 higher than Korea's. So, a 100% increase in exports contributes to the growth rate of GDP by 7.8% in Korea and 12.4% in Taiwan: Taiwan's exports are more efficient than Korea's.

Thus, (a) GDP growth is positively related to employment growth in both countries in both models, and the growth elasticity to employment is higher in Taiwan than in S. Korea, holding employment constant. This is consistent with GDP per capita employment shown in Table IV-7, and labor productivity shown in Table IV-8. 1 (b) It is positively related to investment per dollar GDP in Korea but was not significant in Taiwan. 1 It is because that the average annual growth rate of GDP in Taiwan was 6.73% during 1981-1986, but that of capital formation was negative 2.57% in the same period as shown in Table IV-2. A viable way to raise production without investment is to utilize idle capacities, to substitute labor for capital, and to increase productivity; but the traditional theory suggests obvious limitations. (c) It is positively related to export expansion in both countries, and the elasticity of GDP to exports is higher in Taiwan than in S. Korea, holding other variables constant. This is because that Taiwan's exports less imported intermediate inputs and more labor-intensive exports than S. Korea's. (d) Estimated results by the regression method confirms those by the input-output method shown in later estimates. The GDP generated by \$1.00 of aggregate exports in the mid-1980s was 64.69 cents in Korea and 68.12 cents for Taiwan in terms of direct and indirect effects. These correspond to coefficient values of exports in the second regression model: 0.078 for S. Korea and 0.124 for Taiwan.

Table 9. The Sensitivity of GDP to Export Growth  
South Korea and Taiwan, 1953-1986, Two Regression Models

$(dY/dt)/Y$	Constant	$(dK/dt)/Y$	$(dL/dt)/L$	$(dX/dt)/X$	R-Square
South Korea (t-Statistic)	0.01307 (0.66934)	0.16192* (2.48754)	1.00307* (2.45393)	-----	0.27068 DW=2.219
Taiwan (t-Statistic)	0.06943 (3.90949)	-0.07261 (0.84591)	1.07272* (2.98632)	-----	0.30346 DW=1.914
South Korea (t-Statistic)	0.01109 (0.59515)	0.15942* (2.57116)	0.57450 (1.29574)	0.07804* (2.01940)	0.36059 DW=2.015
Taiwan (t-Statistic)	0.05318 (4.23768)	-0.41505 (0.70673)	0.73339* (2.61563)	0.12367* (1.06781)	0.52984** DW=1.751

Sources: The Bank of Korea and The Council for Economic Planning and Development of Republic of China. Y indicates GDP, dK/dt fixed capital formation, dL/dt the change of employment, and dX/dt means the change of exports. \* Indicates significance at the level of 95%. \*\* indicates Roh (1) = 3.092.

## Patterns of Export Promotion and Import Substitution

Shown in Table IV-10, the export share of textiles and clothing (7-8) in S. Korea was 19.45% in 1966, and increased to 30.41% in 1975, but declined to 21.71% by 1985; while that in Taiwan was 11.55% in 1966 and rose to 26.79% in 1974 but fell to 19.06% by 1984. The export share of processed foods (5-6) and wood and paper products (9-10) fell sharply in both countries. The dominant exports in the mid-1980s were in electronics (20) and transportation equipment (22) for S. Korea, and chemical products (11-13) and electronics (20) for Taiwan. Labor-intensive exports were expanded until mid-1970s, and its structure moved from labor- to capital-intensive industries in the 1970s, from capital- to technology-intensive industries in the 1980s in both countries. The share of manufacturing exports in S. Korea was 56.38% in 1966 and gradually increased to 77.49% in 1985; while that in Taiwan was 65.03% and 87.54%, respectively. The share of manufacturing exports in both countries increased further in 1990s. The structure of exports shows a difference between two economies. Taiwan's exports concentrated on chemical products and electronics, but Korea's were balanced. This implies that the structure of S. Korean economy is much stronger than that of Taiwan in terms of diversification of the economy and size of firms providing economies of scale and the foundation for growth in the future.

Table IV-10. The Composition of Manufacturing Exports: South Korea and Taiwan  
Selected Years, Percent at Current Producers' Prices

Sector	Exports/Total Exports, South Korea			Exports/Total Exports, Taiwan		
	1966	1975	1985	1966	1974	1984
05--06	8.140	5.509	1.829	24.092	11.296	4.161
07--08	19.450	30.412	21.714	11.550	26.785	19.058
09--10	7.600	4.381	0.972	8.090	6.952	4.116
11--13	2.190	3.643	4.353	6.210	9.546	12.632
14	1.490	2.015	3.147	0.720	0.225	2.275
15	1.140	5.087	5.853	2.990	1.130	1.852
16	1.900	3.974	5.295	1.290	3.796	1.748
17	1.660	2.192	5.572	2.900	1.005	4.955
18	0.870	0.618	1.167	1.750	3.234	3.065
19 & 21	(Incl.20)	0.916	2.248	1.380	2.908	4.533
20	1.380	8.272	11.246	1.540	16.008	15.159
22	0.350	2.944	8.632	0.800	2.399	3.645
23	4.470	4.667	5.462	1.120	6.822	10.338
<b>Total Manuf</b>	<b>56.380</b>	<b>74.450</b>	<b>77.490</b>	<b>65.030</b>	<b>92.170</b>	<b>87.540</b>

Sources: Input-Output Tables for S. Korea and Taiwan. (5) processed food products, (6) beverage and tobacco, (7) fiber yarn and textile fabrics, (8) fabricated textile products, leather and its product, (9) lumber and wood products, (10) paper products, printing and publishing, (11) basic chemicals, (12) synthetic resins, synthetic rubber, and chemical fiber, (13) other chemical products, (14) petroleum and coal products, (15) ceramic and nonmetallic mineral products, (16) iron and steel manufacturing and its primary products, (17) other metal manufacturing and metal products, (18) general industrial machinery and equipment, (19) household electrical appliances, (20) electronics and communication equipment, (21) electrical industrial apparatus and other electrical equipment and supplies, (22) transportation equipment, and (23) miscellaneous manufacturing including measuring, medical & optical instruments.

IV-11. Export Expansion Rates and GDP Generated by \$1.00 Aggregate Exports  
South Korea and Taiwan, Selected Year, Percent or Cents at Current Producers' Prices

Sector	South Korea 1975-1985				Taiwan 1974-1984			
	ExExRate (%)	GDP75 (Cents)	GDP85 (Cents)	GDP85-75 (Cents)	ExExRate (%)	GDP75 (Cents)	GDP85 (Cents)	GDP85-75 (Cents)
05--06	(6.289)	2.072	1.130	(0.942)	0.852	4.409	1.077	(3.332)
07--08	15.175	11.452	8.116	(3.336)	9.141	12.321	8.797	(3.525)
09--10	(8.440)	1.579	1.098	(0.481)	2.979	4.163	2.500	(1.663)
11--13	6.607	3.614	3.529	(0.085)	24.458	6.681	8.545	1.884
14	10.226	2.481	1.941	(0.540)	25.503	0.768	2.086	1.317
15	5.127	1.731	2.560	0.829	18.514	0.716	1.009	0.293
16	16.926	1.061	2.743	1.582	8.548	2.265	1.761	0.504
17	14.929	0.936	2.385	1.449	28.298	0.735	2.755	2.020
18	3.287	0.409	1.119	0.710	4.191	1.633	1.431	(0.202)
19 & 21	14.818	0.449	1.070	0.621	33.667	1.699	0.807	(0.892)
20	9.509	1.929	3.679	0.750	(2.365)	4.782	5.598	0.816
22	19.395	1.207	3.004	1.797	14.843	1.101	1.570	0.468
23	1.998	1.525	1.921	0.396	24.734	3.458	3.819	0.362
Total Manuf	3.557	64.116	64.691	0.525	14.203	65.633	68.120	2.488

Sources: Input-Output Tables for both countries. For industrial classification, see Table IV-10. ExExRate indicates the export expansion rate, GDP75 or GDP85 denotes 1975 or 1985 GDP generated by \$1.00 of aggregate exports, and GDP85-75 explains the change of generated GDP between 1985 and 1975.

The higher rate of export expansion in S. Korea during 1975-1985 was shown in textiles and clothing, petroleum products, iron and steel, metal products, electrical equipment, electronics, and transportation equipment. That in Taiwan showed in chemical products, petroleum products, nonmetallic products, other metal products, electrical equipment, and miscellaneous manufacturing as shown in Table IV-11. Since the export expansion rate is a changing ratio of export-generated output to total domestic output in *i*-th industry defined in equation (3.A.9), export expansion without domestic consumption shows the highest rate, but slow export expansion with rapid rise of domestic consumption shows the lowest rate in that industry. The relative share of exports of transportation equipment rose to 15.16% in Taiwan, but the export expansion rate showed -2.365% during 1975-1985, which is different from that in South Korea. The average export expansion rate during 1975-1985 was 3.56% in S. Korea but was 14.20% in Taiwan. The industries with the higher expansion rate in S. Korea than in Taiwan was in textiles and clothing, iron and steel, and transportation equipment; but those with the lower rate was in chemical products, petroleum products, nonmetallic products, other metal products, and electrical equipment.

One dollar of aggregate exports created 64.16 cents in 1975 and 64.69 cents in 1985 (rose by 0.52 cents) of GDP in Korea, and 65.63 cents and 68.12 cents (rose by 2.49 cents) of GDP respectively in Taiwan in terms of direct and indirect effects. This is partially because of the change of the export share in the economy, the change of linkages due to technological transformation, different share of imported intermediate input, and change of capital and labor costs. (a) The dominant share in GDP created by exports in Korea and Taiwan was in textiles and clothing (8.12%

and 8.80%), chemical products (3.53% and 8.56%), and electronics (3.68% and 5.60%); and additionally, transportation equipment (3.00%) in Korea and miscellaneous (3.82%) in Taiwan. (b) The rapid decline was in textiles and clothing (3.50% in both); and processed foods (3.33%) and wood products (1.66%) in Taiwan. The sharp increase in iron and steel (1.58%), metal products (1.45%), and transportation equipment (1.80%) in Korea; chemical products (1.88%), petroleum products (1.32%), and metal products (2.03%) in Taiwan. (c) The GDP share created by exports fell in Korea but rose in Taiwan for chemical and petroleum products, while it was opposite for industrial machinery and electrical equipment during 1975-1985. (d) The GDP created by exports increased in capital- and technology-intensive industries, but declined in labor-intensive industries in both countries, which is based on changes of export structure in two economies during the period.

Table IV-12. The Share of Exports in Final Demand and The Share of Export-Generated GDP South Korea and Taiwan, Selected Year, Percent at Current Producers' Prices

Output and GDP	South Korea			Taiwan		
	1975	1985	Change	1974	1984	Change
Exp-Generated Out/Output	24.79	28.35	3.56	30.66	44.86	14.20
Exp-Generated GDP/GDP	18.60	22.74	4.14	27.22	38.60	11.38

Sources: It is calculated by using equations in Section III and data from input-output tables. All values of changes indicate the differences during the period of 1985-1975 or 1984-1974.

Shown in Table IV-12, the GDP share generated by exports in S. Korea rose from 18.6% in 1975 to 22.74% in 1985 while the output share generated by exports rose from 24.79% to 28.35% during the same period. In Taiwan, the GDP share rose 27.22% in 1974 to 38.60 in 1984 while the output share rose from 30.66% to 44.85%. In other words, the share of export-generated output rose by 4.14% and the share of export-generated GDP rose by 3.14% in S. Korea during 1975-1985, while the former rose by 14.20% and the latter rose by 14.20% during 1974-1984.

The import index (1966=100) in Korea rose to 493 in 1975 and 1,291 in 1985' while that in Taiwan rose to 716 in 1974 and 1,103 in 1984. Imports in S. Korea increased more rapidly than those in Taiwan during 1966-1975, but the opposite became true during 1975-1985. In Table IV-13, the import share of chemical products declined from 13.20% to 11.00% in S. Korea and from 16.27% to 11.65% in Taiwan during 1966-1985. That of machinery declined from 20.22% to 10.53% in Korea and 11.73% to 7.77% in Taiwan; and that of transportation equipment declined from 17.35% to 3.27% in Korea and 8.44% to 3.18% in Taiwan during the same period. The import share of processed foods declined from 17.53% to 3.12% in Korea. The manufacturing share of imports in S. Korea declined from 81.90% in 1966 to 61.34% in 1975 and maintained the level in 1985. That in Taiwan remained at about 69% during 1966-1974 but declined rapidly to about 60%.

In Table IV-14, Aggregate import substitution was 3.47% in S. Korea during 1975-1985 and 5.32% in Taiwan during 1974-1984 because the share of imports in total output declined from 18.72% to 15.26% in Korea and from 22.98% to 17.65% in Taiwan during the same period. Higher import substitution was in chemical products, iron and steel, machinery, and transportation equipment for both countries, and additionally in petroleum products, metal products, electrical equipment, and electronics in Taiwan. But higher import ratio to output in 1985 was in machinery, transportation equipment in both countries, and additionally chemical products, electrical equip-

Table IV-13. The Composition of Manufacturing Imports: South Korea and Taiwan  
Selected Years, Percent at Current Producers' Prices

Sector	Imports/Total Imports, South Korea			Imports/Total Imports, Taiwan		
	1966	1975	1985	1966	1974	1984
05--06	17.535	4.814	3.121	5.730	2.810	4.175
07--08	5.105	2.928	3.948	1.600	4.584	2.659
09--10	2.423	1.817	2.128	1.660	1.309	2.673
11--13	23.196	12.937	11.000	16.270	11.344	11.652
14	3.371	2.559	4.001	2.220	2.455	2.929
15	1.540	0.667	1.398	0.640	0.333	0.654
16	8.203	6.137	4.803	9.240	12.060	5.049
17	7.084	2.225	3.429	4.490	2.586	3.466
18	20.223	10.614	10.259	11.730	13.910	7.769
19 & 21	(Inc.20)	2.322	3.141	2.440	4.940	3.271
20	5.253	5.498	8.060	2.270	5.984	8.960
22	17.346	7.322	3.273	8.440	4.230	3.179
23	0.579	1.658	2.966	2.400	2.252	3.535
Total Manuf	81.897	61.339	61.979	69.550	68.797	59.971

Sources: Input-Output Tables for S. Korea and Taiwan. See Table IV-10 for Classification.

IV-14. Import Substitution Rates and Import Demand Generated by \$1.00 Aggregate Exports  
South Korea and Taiwan, Selected Year, Percent or Cents at Current Producers' Prices

Sector	South Korea 1975-1985				Taiwan 1974-1984			
	ImSubRate (%)	IMP75 (Cents)	IMP85 (Cents)	IMP85-75 (Cents)	ImSubRate (%)	IMP75 (Cents)	IMP85 (Cents)	IMP85-75 (Cents)
The Economy	-3.486	35.834	37.170	1.336	-5.323	34.367	31.951	2.416
05--06	-5.158	1.385	0.989	0.396	4.583	0.177	0.738	0.561
07--08	1.609	2.507	3.014	0.507	-3.862	3.210	1.139	2.071
09--10	0.762	0.662	0.690	0.028	6.544	0.582	0.928	0.346
11--13	-10.90	6.358	5.411	0.947	-19.394	5.659	5.264	0.395
14	3.909	1.179	1.374	0.195	-19.587	0.815	0.861	0.045
15	2.261	0.270	0.575	0.305	-4.629	0.087	0.223	0.134
16	-17.89	2.959	2.601	0.358	-64.222	5.207	2.083	3.124
17	-8.572	0.949	1.451	0.505	-42.455	1.189	1.672	0.483
18	-164.8	0.667	1.172	0.505	-130.61	0.740	0.724	0.016
19 & 21	-9.531	0.293	0.753	0.460	-13.565	0.669	0.878	0.209
20	-5.031	3.135	3.787	0.562	-16.226	5.226	4.665	0.562
22	-52.47	0.316	0.515	0.199	-30.310	0.337	0.607	0.270
23	3.659	0.566	0.499	0.066	3.509	0.226	0.532	0.306

Sources: Input-Output Tables for both countries. For industrial classification, see Table IV-10. ImSubRate indicates the import substitution rate, IMP75 or IMP85 denotes 1975 or 1985 Imports generated by \$1.00 of aggregate exports, and IMP85-75 explains the change of generated Imports between 1985 and 1975.

ment, and miscellaneous in Korea. The major reason for high imports in those industries is that producer durables require advanced technology or high costs, which is desirable to be substituted.

Import demand for one-dollar exports in S. Korea rose from 35.84 cents in 1975 to 37.17 cents in 1985 (by 1.34 cents), while then in Taiwan fell from 34.37 cents in 1974 to 31.95 cents (by 2.42 cents) in average shown in Table IV-14. One dollar of exports demanded more imports in Korea than in Taiwan by 1.47 cents in 1975 and by 5.22 cents in 1985. Higher import demand for exports was in chemicals, iron and steel, and electronics in both countries, and textiles and clothing additionally in Korea. Thus, sophisticated manufacturing exports required more imported intermediate input, exports needed more imports for producer goods, and the economy performing more previous substitution required less imports than that performing less previous substitution.

The import substitution rate for exports was negligible in Korea but was 2.82% in Taiwan during 1974-1984 shown in Table IV-15. The intermediate import ratio to total output in S. Korea declined from 13.75% to 12.90% in 1985 (by 0.85%), and that in Taiwan declined from 15.11% to 13.55% in 1984 (by 1.56%). So total imports, intermediate imports, and imports for exports were more substituted in Taiwan than in S. Korea during 1975-1985, though Taiwan's total import ratio to output was 2.40% higher than Korea's in the mid-1985. Import demand for exports was higher than that for intermediate imports in both countries because of imports of producer durables for exports. Import demand for exports was about 19% of output in the mid-1970s for both countries, but in the mid-1980s, Taiwan's exports demanded less imports than Korea's because less sophisticated export products required less advanced technology. Note that major intermediate import substitution during 1975-1985 was in chemical products, iron and steel, and other metals.

Table IV-15. Import Shares in Output and Aggregate Import Substitution Rate South Korea and Taiwan, Selected Years, Percent at Current Producers' Prices

Import Substitution Rate	South Korea			Taiwan		
	IMP75/O	IMP85/O	SubRate	IMP75/O	IMP85/O	SubRate
Import Sub Rate for All	18.724	15.256	-3.468	21.202	17.654	-5.323
Import Sub Rate for Exp	19.450	19.061	-0.389	19.038	16.222	-2.816
Intermediate Imp Sub Rate	13.746	12.898	-0.848	15.109	13.552	-1.557

Sources: Input-Output Tables for both countries. Sub indicates substitution, Imp and Exp denote imports and exports. IMP75/O or IMP85/O represents 1975 or 1985 import ratio to total output.

### The Impact of Alternative Growth Strategies

**(a) Export Promotion without Import Substitution (Strategy I):** The strategy assumes follows.

(i) The export structure remains unchanged during 1975-1985 due to no further import substitution, but the volume of exports increased as much as actual expansion during the period. (ii) Technologies are phased in according to import substitution in both countries so that 1985 exports are based on 1975 inter-industrial relations. (iii) The demand structure in the domestic market is like an actual development so that imports may rise because of no substitution assumption. So, in the process of estimation, the export demand vector for 1975-1985 is assumed to be 1975-export vector. Since imports are not substituted, the technology remains unchanged at the 1975 level so that GDP generated by exports is obtained by multiplying the 1975 Leontief inverse matrix with



the 1975 export vector and the 1975 value added vector. This is the same as 1975 GDP multipliers, but the volume of exports is projected.

Table IV-16. Projected 1985 GDP Multipliers Generated by Growth Strategy I:  
Export Promotion without Import Substitution, South Korea and Taiwan

Five Sectors	South Korea		Taiwan	
	ExpVector	GDP(Exp)	ExpVector	GDP(Exp)
Agriculture	0.060080	0.067774	0.024329	0.058296
Mining	0.009347	0.012210	0.000407	0.010740
Manufacturing	0.744498	0.315508	0.921671	0.447309
SocialOverhead	0.002595	0.010904	0.000001	0.016891
Services	0.183480	0.235267	0.053592	0.123090
The Economy	1.000000	0.641663	1.000000	0.656326

Sources: Input-Output Tables for both countries.

Shown in Table IV-16, (i) the export share of manufacturing in the projected demand vector is 75.45% in Korea but 92.17% in Taiwan, and that of services is 18.35% and 5.36% respectively in the strategy. In turn, that of other sectors is higher in Korea and Taiwan. (ii) The GDP generated by \$1.00 of aggregate exports is 62.70 cents in Korea and 67.73 cents in Taiwan in 1985, which is 5.03 cents more than S. Korea's. (iii) The manufacturing share in created GDP is 32.10 cents in Korea and 43.57 cents in Taiwan, while that of services is 20.30 cents and 15.96 cents, respectively.

From the above estimates, the following three points can be implied. First, export promotion without import substitution may not require massive amounts of capital formation with external finance, particularly in Korea, so that over 40 billion of outstanding external can be reduced. Secondly, an increase in import demand for consumer and producer goods may cause a balance of payments problem in Korea, but not in Taiwan because Taiwan maintains a trade surplus from the beginning in this period. Finally, considering that the share of labor-intensive exports declined in both countries according to the change of international competitiveness during 1975-1985, this strategy may face demand constraint in foreign markets.

Table IV-17. Projected 1985 GDP Multipliers Generated by Growth Strategy II:  
Export Promotion with Import Substitution, South Korea and Taiwan

Five Sectors	South Korea		Taiwan	
	ExpVector	GDP(Exp)	ExpVector	GDP(Exp)
Agriculture	0.020330	0.031247	0.016171	0.024094
Mining	0.001380	0.009273	0.000187	0.006159
Manufacturing	0.774935	0.346476	0.875365	0.428106
SocialOverhead	0.007128	0.032845	0.000090	0.027378
Services	0.196227	0.227067	0.108187	0.194464
The Economy	1.000000	0.646908	1.000000	0.680201

Sources: Input-Output Tables for both countries.

**(b) Export Promotion with Import Substitution or Vice Versa (Strategy II):** This growth strategy represents the actual strategy pursued by both S. Korea and Taiwan, which is evaluated in the previous subsection. In Table IV-17, (i) estimated results show that the GDP multipliers is 3.33 cents larger in Taiwan than in Korea for \$1.00 of aggregate exports owing to less imports for exports, more labor-intensive products for exports and more productivity of capital and labor. (ii) Import substitution provides technologies needed for export promotion, which provides financial sources in turn. The proper degree of import substitution may increase the profit margin in exports. (iii) Movement of comparative advantage based on the product-life cycle requires continuous change of the export structure. The combination of export promotion with proper import substitution may improve international competitiveness and help adjust to the changing environment.

**(c) Import Substitution without Export Promotion (Strategy III):** The strategy assumes as follows. (i) The volume and composition of exports maintains the 1975 level. (ii) The aggregate amount of 1985 exports less 1975 exports are reallocated to import substitution based on 1985 import vector rather export expansion. (iii) Imports of agriculture and mining cannot be substituted in both countries. (iv) 1985 technologies are available for this import substitution. (v) 1985 domestic demand is not affected by this import substitution. So, in the process of estimation, the 1975 export vector represents the composition of exports. The 1985 import vector is readjusted by placing no import substitution for agriculture and mining, which represents the import substitution vector. The number of 1985 exports are divided into two figures: the number of 1975 exports at constant price and the remaining amount. The former is multiplied by the 1975 export vector and the latter is multiplied by adjusted 1985 import vector. The sum of two vectors becomes a representative vector for import substitution without export promotion. This vector is multiplied by 1985 Leontief inverse to get output multipliers, which are multiplied by value added per unit output for the same year.

Table IV-18. Projected 1985 GDP Multipliers Generated by Growth Strategy III:  
Import Substitution without Export Promotion, South Korea and Taiwan

Five Sectors	South Korea		Taiwan	
	ImpSubVector	GDP(Imp)	ImpSubVector	GDP(Imp)
Agriculture	0.017695	0.028710	0.009488	0.029518
Mining	0.002753	0.010487	0.000519	0.008538
Manufacturing	0.850435	0.338431	0.952445	0.435870
SocialOverhead	0.000906	0.032022	0.000000	0.028869
Services	0.128209	0.175112	0.037908	0.151885
The Economy	1.000000	0.584762	1.000000	0.654680

Sources: Input-Output Tables for both countries.

In Table IV-18, (i) the shares of manufacturing and services in the 1985 projected demand vector for S. Korea are 85.04% and 12.82%, while those for Taiwan are 95.24% and 3.79% respectively. (ii) The GDP generated by \$1.00 of aggregate import substitution without export expansion is 58.48 cents for S. Korea and 65.47 cents for Taiwan. Thus, Taiwan creates 6.99 cents

of GDP more than S. Korea for \$1.00 of import substitution with 1975 export level in this growth strategy. (iii) Among these GDPs, the share of manufacturing is 33.84% for S. Korea and 43.59% for Taiwan, while that of services is 17.51% and 15.19%, respectively.

From the above estimates, the following three points can be implied. First, additional import substitution requires much R&D manpower, capital formation, and advanced technology, which demand sufficient times. Additional and intensive import substitution ignoring export expansion invites inefficiency and is not even viable. Secondly, additional import substitution is financed by export earnings, while export promotion requires the technology induced by import substitution. Both are mutually supportive and complementary so that resource conversion from the latter to the former for additional import substitution breaks these relations. Finally, additional import substitution requires advanced technologies so that a part of substitution cannot be implemented due to lack of technologies and qualified manpower.

**(d) Domestic Demand Expansion (Strategy IV):** Suppose that domestic savings far exceed investment demand, and the economy maintains a trade surplus. If the world environment restrains projected exports, domestic production capacities are underutilized. In this case, a part of the resources to be allocated to exports can be purely converted or reallocated to domestic demand without any frictional costs. It is assumed that no domestic demand and supply constraints exist, and no high technologies are required for this demand expansion. Domestic consumption is considered as a strategic demand vector for the supportive strategy based on the balanced growth theory.<sup>42</sup> Note that most of investment, government expenditures, or exports are planned in both countries, which is unbalanced. So, in the process of estimation, a pair of consumption vectors (1975 and 1985) for each country is provided from input-output tables. Each consumption vector is multiplied by the Leontief inverse matrix (domestic model), which multiplied by the value-added matrix, so that GDP multipliers are obtained, by which amounts to be reallocated from a part of exports are multiplied.

Table IV-19. Projected GDP Multipliers Generated by Growth Strategy IV:  
Domestic Demand Expansion in 1975 and 1985: South Korea and Taiwan

Five Sectors	South Korea		Taiwan	
	1975	1985	1974	1984
Agriculture	0.290148	0.166032	0.200387	0.089907
Mining	0.008483	0.004639	0.009869	0.004171
Manufacturing	0.181209	0.177510	0.224071	0.210258
SocialOverhead	0.012541	0.034541	0.023759	0.031559
Services	0.334341	0.415231	0.328462	0.469261
The Economy	0.826722	0.797953	0.786548	0.805156

Sources: Input-Output Tables for both countries.

In Table IV-19, \$1.00 of domestic demand expansion generates GDP of 82.67 cents in 1975 and 79.80 cents in 1985 in S. Korea, and 78.65 cents and 80.52 cents in Taiwan, respectively. The agricultural share in GDP generated by domestic consumption fell, the service share rise

significantly, and the manufacturing share remains stable in both countries during 1975-1985. In this strategy, the GDP multiplier of agriculture is higher in Korea than in Taiwan, but the opposite is true in manufacturing.

The strategy of domestic demand expansion generates more GDP than the other three strategies though this is a supportive strategy for others. This is desirable only if (i) domestic investment can be fully financed by domestic savings, (ii) exports decline so excess capacities exist, (iii) the domestic market has enough potential to absorb its supply, and (iv) the trade balance has shown a continuous surplus. Domestic demand expansion contributes to more GDP growth in agriculture in 1975, but its share declines and that in services rises by the same degree in 1985. The sectoral GDP share depends on its demand share via expenditure elasticities. It is desirable for growth as a supportive strategy only if the conditions are matured in Taiwan since the mid-1970s.

Table IV-20. The Consumption Share in Final Demand and Sectoral Share in Consumption: South Korea and Taiwan, Selected Year, Percent at Current Producers Prices

Sector	South Korea			Taiwan		
	1966	1975	1985	1966	1976*	1984
Consumption %	72.47	58.43	51.61	64.58	45.00	46.93
Cons/Cap-Yr, \$	453	656	1,042	559	821	1,445
Agriculture	38.05	30.49	8.44	8.57	7.96	7.91
Manufacture	27.88	34.14	41.30	48.19	47.36	40.28
Social Overhead	0.83	1.06	1.83	1.07	2.28	2.64
Services	33.24	34.31	48.43	41.54	42.40	49.83

Sources: Input-Output Tables in both countries. \* To avoid the price impact of oil shock, 1976 consumption instead of 1974 is applied. Note that the sum of sectors for the year is 100 percent.

Table IV-20 shows the expenditure elasticities related to the Engel's law.<sup>43</sup> When consumer spending per capital is low, the share of necessities (agriculture) becomes larger, but it increases, the necessity shares falls, and other demand (manufacturing and services) rises. If a sector's expenditure elasticity is less than one, its demand share shrinks, and when it is more than one, its demand share expands. The consumption per capita year rose \$656 in 1975 to \$1,042 in 1985 for S. Korea, and from \$821 in 1976 to \$1,445 in 1984 for Taiwan, so the share of agriculture declined and in turn that of manufacturing and services rose correspondingly in both countries.

**(e) Comparison of Growth Strategies:** The input-output exercises based on four alternative growth strategies introduces that the growth strategy of export promotion with import substitution (Strategy II) is the best choice because of following reasons. First, this strategy can generate the largest GDP for the same amount of aggregate final demand. Secondly, import substitution requires a huge amount of physical and human capital, which is financed by export earnings. On the other hand, export promotion requires advanced technology, which can be accumulated by import substitution. Both are mutually supportive and complementary, but not exclusive. Thirdly, export promotion is accompanied by increasing demand for imports so that profits generated by exports may decline significantly without import substitution. Fourthly, movement of comparative advantage based on the product-life cycle theory requires structural

changes from time to time, which can be adjusted by import substitution to maintain international competitiveness of domestic products. Finally, as a supportive growth strategy, domestic demand expansion is desirable if the conditions as discussed previously are mature. If the rapid liberalization of the domestic market does not suppress consumption demand for domestic products due to increasing imports, S. Korea and Taiwan can apply this strategy as far as the domestic market can absorb the supply.

## **V. Alternative Growth Strategies of North Korea: Lessons from Experiences of South Korea and Taiwan**

The desirable growth strategies for North Korea are necessarily based on transformation of its socialist system toward the market economy like post-communist reform, so political-economic issues are considered first before applying growth experiences of S. Korea and Taiwan for it. This section discusses political-economic transformation and growth strategies of N. Korea, both which its government has faced seriously to avoid the collapse of its regime.

### **Political and Economic Transformation of North Korea**

The basic problem of N. Korea is a dilemma from conflict between politics to maintain the Juche system and the economy to pursue continuous growth. If P'yang pursues economic growth through exports, it is hard to keep the Juche system because foreign trade and direct investment invites liberalization of society. If P'yang tries to keep the current political system, the monopoly of politics by the labor party introduces the inefficiency of the economy and the economic decline invites internal uprising which may threaten the regime. If P'yang opens the door toward the market economy gradually to keep the Juche regime continuously, the speed of economic growth will be much reduced because of the costs of trade-off between economic efficiency and political stability. So, the strategic alternatives for P'yang to choose are limited to gradual transformation toward the market economy and democracy despite expensive time costs.

As discussed in the introduction section, time is a major element to be considered in economic growth. The GDP in S. Korea reaches \$400 billion while that in N. Korea may remain at about \$20 billion by the end of 1995, which is 5% of S. Korean GDP. Considering that the S. Korean economy grows by over 7.5% in recent years, the amount of N. Korean GDP is less than the portion of annual growth in S. Korea's, so that the GDP gap between North and South becomes larger. The gradualism of P'yang's opening strategy can never close the gap within next thirty years or before unification of two Koreas. This must be another dilemma P'yang has faced. The P'yang's grand strategy has been the unification of Korea by strengthening communist forces first in North Korea, second in South Korea, and third in neighboring countries. It seemed to be successful when the economy of S. Korea was in the infant stage in 1960s and labor-intensive exports in 1970s, when the bigger-pie growth strategy of President Park caused income inequality deeper, when it was possible for the authoritarian government to suppress labor movement ruthlessly, and when other communist countries were surviving without serious problem. But unexpected global developments -- the collapse of Soviet Union in 1990, improvement of diplomatic and economic relations between Seoul and Moscow with Beijing, rapid decline of the Juche economy in N. Korea,<sup>44</sup> and rapid growth of the S. Korean economy -- disturbed P'yang to achieve its goals.

The leadership of P'yang has been missing a sense of reality and a reasonable choice of national grand strategies. Its leadership should understand that N. Korea is now one of the poorest third-world countries, having no industries to absorb labor forces. P'yang cannot be a threat against Seoul anymore if Seoul allocates 3.5% of GDP for national defense. It was a big mistake for P'yang to terminate the possible Marshall Plan from Seoul by trying to alienate South Korea in the process of nuclear talks and investment in the special economic zone. The economy of South Korea has enough capabilities to be a main source of finance and technology for P'yang's need for its economic development in the future, which the leadership of P'yang should recognize. It is fair to say that Seoul is too rich and too big to be a competitor against P'yang. Economic relations between Seoul and Washington, Beijing, and Moscow have been improved dramatically for mutual benefits, which strengthens the diplomatic bond with them. Particularly, the United States and S. Korea have been in the strong security alliance which cannot be abandoned easily by P'yang's tactics. It is urgent for P'yang to understand the reality of current situations to expedite its economic growth and to escape from poverty and the vicious circle of the economy.

It is understandable for the leadership of P'yang has worried about the strength of S. Korea since 1989. but the absorption theory has been dead because it is not beneficial and desirable for both North and South. (a) S. Koreans learned from the experiences of Germany that sudden unification of two Koreas may require endless investment to revive the N. Korean economy which restricts private consumption at least for a decade with increased taxation.<sup>45</sup> Also the maturity of economic development in S. Korea is far behind Germany in terms of industrial capabilities to absorb labor and to supply necessary capital. The industries of S. Korea are not ready yet to absorb several millions of labor forces released from the North and to supply billions of dollars to provide infrastructure and production facilities in the North. (b) Considering that the S. Korean economy is not ready for economic unification, it would be more efficient if a separate system of N. Korea pursues its growth strategy in line with political and social reformation. Many of S. Koreans believe that they do not have desire to pay the price on behalf of N. Koreans. They are the people who insist that Seoul should maintain a separation line of DMZ for a certain period even in case of collapse of the P'yang regime. (c) The fall of the Berlin wall brought S. Koreans hopes for immediate unification of two Koreans which may end sufferings coming from hostile relations. The death of Kim Il Sung gave more expectations, but the leadership transfer to Kim Jung Il was delayed and his role became uncertain. When Kim's leadership was suspicious, P'yang arrested one of sailors delivering rice for aid by espionage charge and forced the ship to raise N. Korean flag. And then P'yang was arrested and held another fishing ship later. This kind of uncivilized behavior made S. Koreans disappointed and reconsider their emotion and desire for unification. In sum, the absorption theory is no longer attractive to the public of S. Korea.

The methodological question is then how to maximize the efficiency in the process of gradual systematic transformation toward capitalism and democracy in N. Korea? The strong leadership is necessary in the transition period to minimize the time costs. However, the conflict between military and civil services in N. Korea was observed in the process of nuclear weapons deals with the United States. As long as the voice of military hard liners remains strong, the speed of reform is delayed and so the time costs rise, which interrupts the modernization of the economy. The direction of system transformation needs multi-dimensional simultaneous approach toward capitalistic efficiency and democratic equality. Without simultaneous transformation of subsystems in the regime including politics, defense, economy, society, education, and so on; it is

not easy to maximize the efficiency and to minimize the various costs of transformation. Even though the economic reform pulls the system to move vigorously, the frictions coming from lagged parts of the system demand linkage costs to balance it. In the process of modernization, the conservative order reduces the pulling force of the main engine to reform so that the efficiency of overall transformation declines and accordingly the time costs rise desperately.

In politics, the monopoly of the labor party should be removed as soon as possible in the beginning of transformation, which is the main source of economic inefficiency because the process of decision-making is not democratic but dominated by the party line and loyalty. The monopoly of politics interrupts free competition in the opinion market, and the labor party monopolizes the power in the government and allocates resources unwisely without consensus reducing economic efficiency. It is important for the regime to maintain the opinion market free and competitive through the two-party system allowing free speech and press, freedom of meeting and organizing, eliminating secret censorship, and sharing information fairly in North Korea. The political reform should be as fast as possible if its leadership can maintain social stability. In fact, P'yang has been possible to control information flow from overseas into the country because N. Korea has been isolated from outside. But it is difficult to control information flow if its economy pursues growth through foreign trade and investment because of increased transportation and communications with foreign countries. If P'yang tries to monopolize information continuously, the economic activities are restricted and rising costs may reduce competitiveness in foreign markets. The liberalization of the political system must be a precondition for transformation toward the market economy. If the course is reversed, the time costs would be much higher.

The P'yang's leadership has been duplicating the socialist market economy, a Chinese model, exploiting capitalistic profits in the special economic zones with maintaining the socialist political system since 1978. This is a smart invention of Deng Xiaoping to modernize China. From the point of history, the socialist market economy is a transitory regime to maximize economic efficiency by avoiding political revolution in the process of transformation toward capitalism and democracy. The competitiveness in the market economy cannot compromise with socialist intervention because it is a trade-off and a zero-sum game. For example, the regionalization of the economy began to conflict with the centralization of politics in China where the ideology of communism has gone, and the new nationalism dominates the bureaucracy in Beijing. The Beijing's control power diminishes continuously while the economic forces in regions grow vigorously. Industrialization liberalized society, but conservative politicians want to enjoy their existing monopoly power in politics which reduces the economic efficiency continuously.

The economy pulls politics the Chinese model, while the politics pulls its economy with maximum efficiency in German unification. The bottom line is that simultaneous development of politics with the economy should be guaranteed in transforming the socialist system. If politics lead the transformation, the economy is better off like in Germany; and if the economy leads the transformation, the politics are struggling like in China. From the economic point of view, political unification is less expensive and less time-consuming than economic unification. So, it is wise for politics to pull the reform cart and for the economy to follow. The current situation of N. Korea is neither politics-led nor economy-led transformation. P'yang wants to duplicate the Chinese model led by the economy, but there seems to be no leadership to recognize the serious reality. The economy-led model requires at least a minimum degree of political support to lubricate the economy, but it has been missing in N. Korea as shown in the Rajin-Sunbong Development Project.

The first step of economic reform is the recognition of private property rights, which is the opposite concept of Marxism pursuing proletariat revolution. Private ownership is against the Marxist doctrine that all production measures including land, factories, and even houses have been owned by the government in N. Korea. In the beginning period of communist revolution, all personal properties were confiscated by the labor party whose members came from the poor laborers. All property owners lost their assets and became one of comrades having no property or escaped to S. Korea during the period of 1945-1950. There has been no motivation of workers having no hope to accumulate personal wealth for their future security. The party loyalists receive better payments with better jobs and positions, but ordinary workers get paid indifferently whether they work hard or not. So, the productivity declines continuously in N. Korea like in other communist countries. Deng Xiaoping understood the root of problems and opened five special economic zones introducing capitalistic system in 1978, and this policy has been successful and caused rapid growth of productivity. The revival of property rights in N. Korea may bring a similar impact on productivity, which is helpful and necessary to revive the economy. Without private ownership, decentralization of the economy is impossible toward the market economy and it is difficult to expect productivity growth.<sup>46</sup> As soon as the property rights are introduced in N. Korea, a new tax regime needs to be provided to impose taxes on properties and property income generated by newly owned properties. This is the first sign of movement toward capitalism.

The second step is privatization of government ownership.<sup>47</sup> In case of Russia, the 1992 privatization program authorized the sale of most state and municipal enterprises. Small businesses and medium-sized businesses were sold locally through tender offers or auctions. Some medium-sized and most large enterprises were transformed into joint-stock companies. The privatization of joint-stock companies allows employees to receive, free of charge, nonvoting shares representing 25% of book value of the enterprise and give them the right to purchase an additional 10% of the shares at 30% less than the July 1, 1992 book value.<sup>48</sup> Since employees in communist countries do not have property ownership, some of nonvoting stock were given them without charges. The updated 1994 privatization program in Russia declassified a large number of defense industries though it still excludes a broad range of enterprises including about 500 defense enterprises. Privatization is transfer of ownership from the state to private, so privatized enterprises are managed by a chief executive officer elected by the board of directors, not by the state.

As a result, since the government does not have the managing power of the business, the monopoly of politics can be eliminated, and the efficiency of management rises in general. (a) The privatized business pursues profits or asset-price maximization, so the management should invest more capital for production capabilities, education and training, and research and development. (b) The workers can get paid more than before if they work hard because the compensation is based on productivity, not their loyalty. As a result, the long waiting lines in front of retail stores will be disappeared. (c) Since workers have priority to purchase stocks in general, their ownership ratio within total stocks rises, which stimulates workers' motivation to produce more. (d) The state can collect various taxes including property tax, sales tax, income tax, employment taxes, and various legal fees more than before; and can be released from subsidization burdens faced in the socialist economy. Increased profits also provide more taxes. (e) The private ownership of land needs to be restructured through legislation allowing farmers to have their own land. This is an important foundation of social stability and a vital source of farmers' motivation.

The third step is in the price mechanism, which is the beginning of capitalism, and it creates



continuous problems in the market. For example, in the transition of the Chinese economy, the retail prices went up to 26.7% in 1988 though it was manageable. Recently, China experienced huge migration of workers from rural to urban areas reaching 100 million by December 1995.<sup>49</sup> The rootless labor forces help China to maintain the lower wage rate, contributing to competitive labor-intensive exports to the world market. (a) In the process of privatization, the political-economic complex may invite the monopoly power shown in developing countries including S. Korea. It is important to eliminate monopoly forces in the market to normalize the income distribution of the people. (b) In the early stage of transition, it is expected that the problems of bottlenecks and idle capacities in capital formation may cause demand-pull inflation. Preventive policies are needed against demand-pull inflation as well as cost-push inflation from external shocks. (c) The financial policies include liberalization and specialization of major banks allowing greater freedom in setting interest rates. The function of financial markets needs to be improved including various interbank transactions and credit expansion. In the early stage of development, the banks should support the policy loans to fade away gradually as the economy strengthens the market function. (d) In fiscal policies, the balanced budget is important to increase domestic savings for capital formation. This is closely related to the price policy in the areas of utilities, transportation, communications, and other enterprises owned by the government. (e) It is difficult to apply the automatic adjustment regime for the foreign exchange policies in the early stage of transformation though gradual reform would be desirable in the future. As the economy grows with exports, it is necessary to have proper foreign exchange reserves to liberalize foreign exchange rates in the market.

#### Pyongyang's Strategies for Capital Formation: Sources and Allocation

Since the information about the N. Korean economy is extremely limited, it is not reasonable to estimate quantitatively its current economic situation as an initial condition so that discussions in this section are directional rather than quantitative. The question must be how to provide funds and how to allocate them for capital formation in N. Korea. The N. Korean government has faced problems with international communities in borrowing, foreign direct investment, and foreign aid. First, the U.N. agencies including IMF, World Bank, and Asian Development Bank require a certain process to be qualified to borrow from them. Currently, N. Korea is not qualified yet by the established IMF standard. Secondly, P'yang has a bad record in creditability by defaulting debt repayments previously to Japan and other trade partners so that it is difficult to borrow from foreign commercial banks. The amount of outstanding debt is \$7.9 billion by 1993 statistics.<sup>50</sup> In addition to this, the current and expected strength of the economy does not show to the capability recovering bad reputation. Thirdly, the leadership of P'yang politics has been shaky and unstable in recent years in addition to economic difficulties, which conditions make P'yang difficult to borrow from various sources. In fourth, the investment conditions of N. Korea are worse than those of China which has a larger domestic market, endless supply of laborers with lower wages, and advanced conditions of the socialist market economy. In fifth, the hostile image of N. Korea and diplomatic isolation with advanced countries have lost the ground obtaining direct support from their central governments, so that it was rare to receive foreign aid from the world community. The aids for flood relief in 1995, for example, was exceedingly small from a few countries including \$225,000 of the United States. Finally, P'yang has intentionally been

avoiding inter-government relations and North-South talks and trying to alienate the S. Korean authority. This is a mistake as mentioned previously because Seoul is a main source of direct investment and aid. Without its approval or participation, S. Korean businesses and their joint venture would not invest in N. Korea.

Despite difficulties, P'yang needs to borrow from external savings, attract foreign direct investment, and receive foreign aid as much as possible. The possible fund-raising strategies are considered as follows. From the political-military perspective, the U.S. sanction against N. Korea has not been lifted yet except a few lines for step-by-step implementation of the Agreed Framework between Washington and P'yang.<sup>51</sup> P'yang should implement the agreement honestly and open the representative office in Washington as soon as possible to demonstrate its entrance to the world community as one of civilized countries. If P'yang keeps a hidden intention to develop its nuclear weapon continuously, modern technology can easily detect the progress of violation. It is believed that military gains from violation of Agreed Framework anytime in the future is much larger than losses from isolated and self-sanctioned economy eventually. A series of gradual development is expected including implementation of Agreed Framework, normalization of the representative office in P'yang and Washington, removal of economic sanction on P'yang, and intensive efforts for external finance and assistance. It is an optimistic sign that KEDO and N. Korea reaches an agreement to build two light water reactors in Shinpo.<sup>52</sup> It has been observed that N. Korean representatives have been cooperative during the period of negotiations with KEDO members including S. Korea. The next step is to access IMF and World Bank funds. It is important to submit appropriate economic statistics to IMF and World Bank as well as other U.N. agencies, which is required to be one of members and to borrow from them.<sup>53</sup> The release of economic statistics from N. Korea has important meanings: openness of the society economically as well as politically, which must be a dramatic change of P'yang's foreign policies. If P'yang does not have any intention to submit economic data to the United Nations, N. Korea cannot access those funds by self-sanctioning itself. If P'yang does not care for itself, nobody cares for N. Korean people. This is the reason P'yang could not get appropriate support for flood relief from the world community in 1995.

To borrow from foreign commercial banks, the creditability of the government is a basic consideration, which depends on debt repayment records, present and future economic potential, and risks to be expected in the future. It is fair to say that N. Korea has lost the qualification to borrow from foreign commercial banks which objective is profit maximization. First, the leadership of N. Korea should have a strong intention to transform the system toward capitalism and democracy to be a member of the world community, which is a main direction to build P'yang's creditability eventually. Secondly, P'yang should declare that outstanding debts will be repaid if the economy revives and start renegotiations with debtors for rescheduling outstanding debts with some of generous debt-forgiveness. This must be a positive sign that P'yang starts to try to respect international law and order. Thirdly, the provision of economic development plans with well-prepared detail projects is fundamental to attracting foreign bankers. The optimistic future of economic environment and profitable projects is a vital source of attraction to put the money by expecting more returns. Fourthly, the support from foreign leadership may indirectly increase the creditability of P'yang so that the improvement of diplomatic relations with advanced countries as well as S. Korea would be effective. It is not beneficial for P'yang to strengthen relations with terrorist countries like Iran, Libya, or Cuba which have been against humanity and civilization.

Finally, the general perception of risk free is critical particularly from the political-military threats. War destroys everything and the collapse of the current regime may cause another risk by nullifying previous obligations of the former regime. P'yang should know that the international perception of regime's hostility has deadly interrupted to attract foreign savings.

The volume of Foreign Direct Investment is a function of profitability eventually. Since N. Korea does not have much natural resources, the attraction to FDI firms is in low wages and domestic market in the first, and the export base to China and Russia in the second. So, N. Korea should either guarantee lower wages or not intervene in the labor market, allowing foreign firms to attract rural laborers without restrictions. Another point is that FDI products should be allowed to sell in both domestic and foreign markets by minimizing protection of infant industries. The main source of FDI to N. Korea could be from the businesses of S. Korea. There is no reason to avoid inter-governmental talks between North and South, and to alienate the Seoul government in business deals with foreign countries and nuclear deals with the United States. The S. Korean economy is large enough not to be an enemy of P'yang anymore which has twenty times of N. Korea's GDP in 1995. So, the smart strategy is to start dialogues with Seoul immediately and rebuild the credibility between the two governments. This is the beginning to attract foreign direct investment and to receive foreign assistance from the United States, Japan, and others. If conciliatory relationships between P'yang and Seoul are recovered based on democratic and capitalistic values, the impact on the economic relations would be tremendous by spreading around the world so FDI would rise soon. But if this is one of tactics as did before, it would not work. In this sense, the Rajin-Sunbong project should be reexamined. The lack of infrastructure including transportation and communications, and energy supplies delayed scheduled construction, production, and marketing which raised time costs in addition to problems of the system itself. It is delayed further because of the less attractive environment. If the first step of the special economic zone in N. Korea is delayed further, the second stage of SPEs is not attractive so that the transformation of the economy is delayed. As a result, the time costs rise unexpectedly, and the speed of growth diminishes desperately.

We can consider additional sources of capital for N. Korea. (a) P'yang has a viable card claiming compensation for sacrifice of World War II against Japan as did before which could be \$3 to \$5 billion according to the negotiation leverage. This could be an important source of capital in the first stage. (b) Disarmament through a peace treaty between North and South may provide an especially important source of funds. If North and South agree to cut defense expenditures by one half, about \$10 billion (\$3 billion from P'yang and \$7 billion from Seoul) can be saved in a year, which will rise as the economy grows. Considering S. Korea spent 3.5% of GDP on defense, about 2% of GDP can be diverted to this purpose annually. (c) In the process of privatization, N. Korea can sell business stocks to S. Koreans and other foreigners by competitive prices though this is a kind of ownership transfer. The land owned by the government can be sold to S. Korean government or businesses to supply more capital though the details of selling assets to foreigners should be carefully considered based on economic unification in the future. (d) P'yang can send reserves of labor forces to overseas until domestic industries can absorb them. S. Korean industries hire foreign laborers coming from Southeast Asian countries including Philippine and Thailand. The labor forces are the important sources to send labor income from overseas as S. Korean workers did in 1960s and 1970s from around the world including Vietnam War. They can provide a marketing base in foreign countries for N. Korea to sell its products in addition to technology

transfer. (e) Finally, Korean immigrants from North and South can be an important source of capital supplies shown in China. Since they have emotion loving homeland Korea, easy communications with the same language, and favorable opportunities to make money with pride; it is desirable to attract them like P'yang did in Japan during last fifty years. The Korean Americans in the United States could be the first candidate.

If the situations are matured, P'yang can provide at least \$15 to \$20 billion of foreign capital in a year flowing into the country and the amount may rise as the economy grows. As household income rises in N. Korea, for example, domestic savings rise so that capital availability increases. As the S. Korean economy grows, the capability supporting the North will rise accordingly. When the economic conditions in N. Korea improve, the attractiveness of foreign direct investment rises so that more capital flows into the countries than before. This implies that if P'yang invests \$200 billion in capital formation during the ten-year period of 1996-2005, the amount to be invested in the next ten years may rise to \$300 billion at least without difficulties subject to efficient allocation of resources and generation of profits. Then, how can N. Korea do this? So far we have discussed about political and economic transformation in N. Korea, which includes fundamental preconditions: removal of monopoly power in politics and liberalization of opinion markets; rapid transformation toward the market economy; admission to the international community by honest implementation of Agreed Framework; continuous efforts to attract foreign capital from borrowing, foreign direct investment, and foreign aids to maximize inflow of foreign savings. At this point, it is desirable to employ foreign brains from think-tank organizations advising resource allocation from the initial phase to make sure the efficiency of investment eventually.

What are the lessons from experiences of S. Korea and Taiwan in taking out the vicious circle in the early stage. Let us apply those lessons in fixed capital formation of N. Korea though there have been significantly different conditions in politics and the economy between them. The first guideline is that two interests should compromise each other. (a) N. Korea should apply the unbalanced growth strategy, investing in leading sectors generating more employment and income. (b) The industrial structure to be built in N. Korea should be coordinated with that of unified Korea in the future to avoid waste of resources. This is based on three assumptions: two Koreas will be unified, S. Korea will finance more than one half of foreign capital investment in N. Korea, and trade between North and South will be liberalized. The existence of huge idle capacities in economic unification is waste of resources, and requires adjustment costs unnecessarily for plants, equipment, and employment. Steel, shipbuilding, and automobile industries are strong in the South, for example, so that it is not a wise strategy for N. Korea to invest in those industries intensively. This is a political issue which should be coordinated with two governments to maximize returns from investment eventually.

Secondly, capital formation in the agricultural sector needs to be intensive in the first stage of the development plan as shown in Taiwan. Since the arable land in N. Korea is limited, the agricultural proportion of total investment needs to be 10% to 15% in the first ten years, and less than 10% in the following years though its proportion falls gradually as GDP rises. The main goals of early investment in agriculture are as follows. (a) It is important for nation's sovereignty to maintain self-sufficiency of foods. (b) Agricultural development is helpful to minimize the shortage of foreign exchange from agricultural imports. (c) It improves both utilization and efficiency of land resources though it is not abundant. (d) Agriculture is so labor-intensive that it is helpful to absorb labor forces unemployed in the rural area in the early stage of development.

(e) The majority of population is in the agricultural sector, so its development becomes the majority interests in domestic politics in terms of social stability. Those motivations forced both S. Korea and Taiwan to invest intensively in agriculture in the early stage of economic growth. The returns from agricultural investment in the early stage of development, generally speaking, is much higher than those from other sectors, so that it will be efficient to follow the lessons from the experiences of S. Korea and Taiwan.

Thirdly, investment in manufacturing should be coordinated with growth strategy of export promotion with import substitution for which investment in labor-intensive industries is desirable. N. Korea has a comparative advantage in labor, so specialization in labor-intensive goods introduces less expensive and more competitive products in the world market. In fact, N. Korea does not have enough capital and appropriate technology to develop capital- and technology-intensive industries with competitiveness in this stage. Labor-intensive industries substitute imports and provide a sturdy base of technology by learning by doing. Since export promotion of labor-intensive goods demands less imported-intermediate input than that of sophisticated goods, those exports like in Taiwan generate more value added than capital-intensive exports like in S. Korea. This provides a main source of domestic savings to supply capital for import substitution in capital-intensive industries. Then the industrial structure is gradually transformed toward more capital- and technology-intensive industries as the comparative advantage of labor diminishes as well as domestic savings rise and technology advances. Another point to be advised is to follow Taiwan's model which was more labor-intensive in the export structure rather than S. Korea's model. In sum, the growth strategy for P'yang to pursue is not one of 'pure' export expansion but one in which export expansion was associated with 'complementary' import substitution. Earnings from export expansion provides capital for investments in import substituting industries, while import substitution can improve domestic technologies for export expansion. Thus, the recommended growth strategy for N. Korea, which was pursued by S. Korea and Taiwan contrasts sharply with the growth strategy of 'pure' import substitution followed Latin American countries.

In fourth, investment in infrastructure such as energy, transportation, and communications, should not be follow-up jobs, but leading projects of the economy based on the long-range master plan. As discussed, social overhead capital must exceed or at least be kept in balance with direct productive activities in N. Korea. The argument of idle capacities in the social overhead sector cannot be judged by the same criterion of other sector because the expansion costs of highways or power plants, for example, are not much cheaper than the original construction. In other words, having some of idle capacities for five to ten years is economically reasonable in terms of cost-effectiveness. The formation of social overhead capital requires tremendous amount of funds and enough time to construct so that the long run master plan should be annually updated automatically by professionals. As shown in Agreed Framework, two white water reactors which is under control of KEDO may take about 10 years with over \$5 billion. Construction of airports, seaports, highways, subways, and railways may take over 5 years for each project. Lack of investment in social overhead requires huge time costs interrupting industrial efficiency. Traffic jams in Seoul, for example, make the street a parking lot which forces each citizen to spend additional hours a day in commuting.

Finally, formation of human capital provides a cornerstone of research and development for economic growth. To produce a qualified researcher, it will take 4 years college, 7 years doctorate education in graduate school, and at least 5 to 10 years of practical experience. At least

15 years are necessary to make a qualified member of researchers with about \$500,000 for each person. If P'yang sends students to college for overseas education now, the year 2010 is the earliest maturity to produce research products by those students. In the primitive stage it is not serious, but it becomes a vital element for development as the economy grows. If P'yang becomes liberalized, it is possible to hire S. Korean engineers and scientists without problem which may reduce costs of education and time which should have been paid anyway.

## **VI. Conclusion and Recommendations**

The study tries to examine the alternative growth strategies of N. Korea based on lessons from experience of economic development in S. Korea and Taiwan. The comparative analysis of export-led growth in both countries reveals certain shared economic characteristics. Their growth strategy was not one of 'pure' export expansion but one in which export expansion was associated with 'complementary' import substitution. Export expansion has moved through three stages: a labor-intensive stage followed by a capital-intensive one culminating in technology-intensive exports. At each progressing stage, the strategy of export-led growth was subjected to internal supply constraints from intermediate and capital inputs that needed to be addressed by domestic policies, and external demand constraints from protectionism abroad to be addressed through trade liberalization and negotiations. The study finds that the strategy of complementary import substitution was adopted to smooth the way for export expansion through each of the three stages. Import substitution also passed through the phases of intermediate input substitution followed by import substitution in capital goods and machinery. Since import substitution was supportive of and complementary to export expansion, the benefit from the latter strategy far outweighed the resource costs of the former. In fact, earnings from exports provided the wherewithal for investments in import substituting industries. The above strategy contrasts sharply with the growth strategy of 'pure' import substitution followed by Latin American countries, which explains their poor growth performance.

Capital formation was aggressive in both economies, which was financed by borrowing from abroad in S. Korea but by domestic savings in Taiwan. Agricultural investment in Taiwan was intensive in the early stage but declined sharply, while that in S. Korea kept its level continuously. The share of manufacturing investment was much higher in Taiwan than in S. Korea for the entire period. As a result, the production per employment for the agricultural sector was much higher in Taiwan in the early stage but became closer by 1985, while that for manufacturing was much higher in Korea, but this was reversed by 1985. In the process of capital formation and economic development, the government of S. Korea and Taiwan engaged in significant government intervention to promote exports along with complementary import substitution. The intervention was successful because the government policies helped rather than hindered private decision-making, the market mechanism was very much intact despite negative views of planning, the extended period of stable government provided consistent growth policies, and the existence of efficient bureaucracies ensured the effective implementation of policy directives. The government provided competitive market conditions for greater efficiency and improved social welfare by redistributing income and providing better education for the poor. The business increased competitiveness of products through managerial improvement and technological development. Employees worked hard and save more, contributing to the rise of productivity and

so competitiveness. In this regard, all three elements of government, business and labor played their roles properly to generate rapid growth.

The fundamental problem applying lessons from the above experiences lies in the trade-off between economic efficiency and political stability, which must be a dilemma P'yang has faced. The growth strategy of export promotion with import substitution is subjected to openness of the society through increasing transportation and communications. Since P'yang's loss of information monopoly means the fall of the regime, it maintains the self-sanctioned autarkic economy staying away from outside the world. The Rajin-Sunbong Project, which is copied from China's special economic zones, is the best solution P'yang has found, taking capitalistic profits without loss of monopoly in politics. There must be expensive prices, however, though P'yang undermines time costs. So, the study suggests that the first step of system transformation should be removal of monopoly in politics to make opinion markets free and competitive. As soon as political reformation pulls the economy toward capitalism, the economic transformation eliminates long-lasting inefficiency in the system by reviving property rights, privatizing state-owned businesses, and activating the price mechanism in goods and money markets. This is the process for N. Korea to transform its system toward capitalistic efficiency and democratic equality, and the precondition to apply capitalistic lessons for its growth strategy.

The first recommendation of the study is how to provide necessary capital for N. Korea. (a) Open the doors of financial agencies of the United States including IMF, the World Bank, and Asian Development Bank by providing economic statistics, which is subjected to honest implementation of Agreed Framework. (b) Rebuild the creditability of the P'yang government to borrow from foreign commercial banks by showing the evidence of system transformation, declaring repayments of debt with renegotiations, providing optimistic development plans eventually, improving diplomatic relations including Seoul, and eliminating general perception of political-military risks. (c) Attract foreign direct investment intensively through incentives including low wages, tax exemptions, profit transfer, and domestic sales. Attract S. Korean firms by normalizing inter-governmental relations. (d) Find various sources including foreign assistance from Washington-Tokyo-Seoul, compensation for WWII from Japan, a peace treaty and disarmament with S. Korea, privatization of state-owned business and land to S. Koreans, labor income by sending laborers to overseas, and overseas Koreans living in Japan and the United States. (e) Finally, maximize domestic capabilities in savings, which may rise as private property rights revive, and the economy grows.

The second recommendation is how to allocate resources efficiently for rapid growth of the N. Korean economy. (a) Compromise two different interests. P'yang should apply the unbalanced growth strategy investing in leading sectors generating more employment and income, while its industrial structure should be coordinated with S. Korea to minimize adjustment costs for economic unification. (b) Invest intensively in the agricultural sector from the early stage to maintain self-sufficiency of foods, to minimize shortage of foreign exchange from agricultural imports, to utilize land resources efficiently, to absorb unemployed labor in the rural area, and to stabilize politics by keeping majority interests. (c) Invest in labor-intensive manufacturing to promote exports followed by import substitution because of comparative advantage in labor and lack of capital and technology, which demands imported intermediate input less than sophisticated exports. (d) Provide appropriate infrastructure including energy, transportation and communications based on the master plan in the long run. Keep in mind that social overhead capital

must exceed or at least be kept in balance with direct productive activities. (e) Provide qualified human resources being a cornerstone of research and development. Remember that at least 15 years with \$0.5 million is necessary to produce one of qualified researchers from college admission. This is the engine of growth.

The chief of S. Korean Security Planning Board reported to the Parliament on December 14, 1995 saying that this winter would be in a very serious threats from the North because of internal political instability from food shortage and unclear transition of leadership, and because of forward deployment of fighter planes and other offensive weapons; when it is reported that the United States will partially lift sanction on P'yang in early January 1996 including agricultural products. KEDO and P'yang signed the agreement of construction process for two reactors under Agreed Framework in New York on December 15, 1995. KBS reported on the same day that two of U.S. aircraft carriers will be deployed on the sea of Korean peninsula for exercises in January 1996. From P'yang's point of view, the meaning of forward deployment of fighter planes could be a change of military strategy in N. Korea, and this could be a kind of tactic threatening Seoul to take advantage in on-going negotiations. From the Seoul's point of view, the YS leadership became shaky in the situations arresting two former presidents, so the urgent security issue may be helpful to pacify the society and to recover the credibility and the popularity of the ruling party.

In fact, this author believes that N. Korea cannot start the war against S. Korea except a small scale of local fire exchanges. (a) The objective of war is unclear considering that there is no possibility of winning the war. (b) Any of regional powers are not interested in that war, jeopardizing political and economic relations in the region, and damaging current peace-making environment led by the Clinton government. (c) Defense expenditures in S. Korea has been about 3.5% of GDP, which is almost 65% of N. Korean GDP in 1995. The size of the N. Korean economy is less than 5% of S. Korea in terms of GDP, that of population is less than one half. (d) The United States is the only country supporting N. Korea economically, though China and Russia have been watching development of U.S.-DPRK relationships. If these bilateral relationships remain "not bad," as shown in the KEDO agreement, the possibility of war diminishes. (e) The economy of N. Korea is in the bottom of the worst showing lack of foods and energy, which are the main factors sustaining the war. The morale of soldiers is very low because of malnutrition and sickness.

The ideal of equality in politics and economy introduced communism in Europe but perished except in N. Korea and Cuba because of economic inefficiency and political inequality, which is the opposite of original ideal. In the post-cold war period, the direction of history has been toward capitalistic efficiency and democratic equality. The extreme efforts for survival of N. Korean regime are understandable, but it must be a tragedy for the leadership of P'yang has lost a sense of reality in terms of historical directives. From the point of current situations, this study is premature to suggest capitalistic lessons to P'yang, which is still struggling to maintain interests of a small faction under the dictatorial regime. However, as long as the Juche regime remains unchanged or transforms so slowly that the time costs are too expensive to sustain it, the collapse of its regime would be a matter of time whether Seoul favored it or not. The government of S. Korea, therefore, should provide contingency plans according to scenarios. On the other hand, normal and optimistic economic cooperations need to be developed based on mutual understanding and peaceful unification, for which this study is expected to be a part of helpful opinions to improve North-South relations and economic unification. If the leadership of N. Korea is surrounded by reason and common sense, a soft landing would be better forecasted than a hard one.



Finally, as mentioned earlier, the study has limitations because of lack of data and unknown initial conditions of the N. Korean economy. As soon as N. Korea submits economic statistics to agencies of the United Nations, more practical and reliable studies may follow quantitatively with augmented information from the quasi-open society near future, which is expected by many of N. Korean watchers. As soon as its leadership appears outside, political economists may provide better forecasting of N. Korean winter weather.

## ENDNOTE

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1.  
This paper is the third part of a research project consisting of four series of presentations. For the first and second papers, see WheeGook Kim, "The Impact of Regional and Global Developments on The Korean Peninsula," presented to the Joint Conference on Change and Challenge on The Korean Peninsula: Developments, Trends, and Issues at The Center for Strategic & International Studies, 1800 K Street, N.W., Washington, DC on September 20-21, 1995 sponsored by The Center for Strategic and International Studies (USA) and The Research Institute for National Unification (ROK); and WheeGook Kim, "Performances and Prospects of The South Korean Economy and The Direction of Economic Cooperation between Two Koreas," presented to 10th Annual Conference on The Korean Peninsula: Security Issues while Moving into the Twenty First Century at the Hyatt Hotel, 1325 Wilson Blvd., Arlington, Virginia on October 26-27, 1995 co-sponsored by The Walker Institute of International Studies, The Council On U.S.-Korean Security Studies, and The Korea Society. The final paper would be WheeGook Kim, "A Peace Treaty, Disarmament, and Economic Cooperation between North and South Korea," to be presented to the 1996 International Conference on National Security and Globalization to be held on July 23-26, 1996, in Seoul, Korea sponsored by International Political Science Association and the Sejong Institute.
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Paul N. Rosenstein-Rodan, "Problems of industrialization of Eastern and South-Eastern Europe," Economic Journal 53 (June-September 1943): 202-11. \_\_\_\_\_, "Notes on the Theory of the 'Big Push'," reprinted in Economic Development for Latin America, ed. Howard S. Ellis and H. C. Wasllich, New York: St. martin's Press, 1961.
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\_\_\_\_\_, "Natura Facit Saltum: Analysis of the Disequilibrium Growth Process," in Pioneers in Development, ed. Gerald M. Meier and Dudley Seers, New York: Oxford University Press for World Bank, 1984, 207-21.

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5. Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Countries, New York: Oxford University Press, 1953, 12. W. Arthur Lewis, The Theory of Economic Growth, London: Allen & Unwin, 1955, 274-83. Tibor Scitovsky, "Two Concepts of External Economies," Journal of Political Economy 62 (April 1954), 143-52. Rodan and Nurkse stress the balance in demand (markets), but Lewis and Scitovsky emphasize the balance in supply (investment).
  6. Ragnar Nurkse, "Balanced and Unbalanced Growth," in Equilibrium and Growth in the World Economy, ed. Gottfried Haberler and Robert M. Stern, Cambridge, Mass.: Harvard University Press, 1961, 241-59.
  7. \_\_\_\_\_, "International Economy and the Problem of Growth," in Equilibrium and Growth in the World Economy, 304-24.
  8. Raul Prebisch, "Five Stages in My Thinking on Development," in Pioneers in Development, 179. He concerned about the disparities of income and wealth in the periphery as well as between center and periphery countries. The disparities in the periphery were explained by the concentration of land, protection, and inflation; but those between countries were considered by technological advantages.
  9. \_\_\_\_\_, The Economic Development of Latin America and Its Principal Problems, New York: United Nations, 1950. \_\_\_\_\_, Economic Survey of Latin America, New York: United Nations, 1950.
  10. John H. Power, "Import Substitution as an Industrialization Strategy," The Philippine Economic Journal 5(2) (1966): 169-74 and 191-9.
  11. Albert O. Hirschman, The Strategy of Economic Development, New Heaven: Yale University Press, 1958. Chapter 4. Arguments about Unbalanced Growth. He argues that balanced growth may not stimulate the economy in the absence of sufficient resources such as capital, entrepreneurs, and decision-makers because of lack of big pushing power.
  12. Ibid., Chapter 5. Investment Choices and Strategies.
  13. Ibid., p. 112 and 116 in Chapter 6. Interdependence. The backward linkages utilize significant amounts of intermediate inputs from other activities, while the forward linkages provide inputs to the other activities, generating further impact on domestic demand and supply.

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14.

Albert Hirschman, "A Dissenter's Confession: 'The Strategy of Economic Development' Revisited," in Pioneers in Development, 108-9. This explains the politico-economic complex in LDCs.

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Exporters exploit a country's comparative advantage, which does not necessarily represent larger industrial linkages.

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23.

Subrata Ghatak, An Introduction to Development Economics, London: Allen & Unwin, 1986, 309.

24.

A. P. Thirlwall, Growth and Development, 212-4. Bela Balassa, "The Lessons of East Asian Developments: An Overview," Economic Development and Cultural Change 36(3 Supplement) (April 1988): S273-90. The role of government is to create a modern infrastructure, to provide an incentive system, and to help export expansion.

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Martin Fransman, "International Competitiveness, Technical Change and the State: The Machine Tool Industry in Taiwan and Japan," World Development 14(12) (1986): 1375-96. Joseph E. Stiglitz, "Technological Change, Sunk Costs, and Competition," Brookings Papers on Economic Activities: Social Issue on Microeconomics, Washington, DC: Brookings Institution, 1987, 883-939.

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27.

Gustav Ranis, "Another Look at the East Asian Miracle," The World Bank Economic Review 9(3)

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(September 1995): 509-534. He pointed out that East Asian governments clearly understood the importance of human capital. World Bank, The East Asian Miracle: Economic Growth and Public Policy, New York: Oxford University Press, 1993, 79-103.

28.

Value added includes workers' compensation, business profits, capital consumption, and direct taxes.

29.

Jae Won Kim, Upgrading Industrial Structure and Improving Small Business, Seoul: KDI, 1985, 35.

30.

If domestic savings exceed demand for capital formation and the economy keeps trade surplus, and if production capacities are underutilized because of unexpected fall of exports, a part of resources to be allocated to exports is purely reallocated to domestic demand without any frictional costs.

31.

Because of following reasons, the private consumption vector is chosen as a representative vector. (a) Government expenditures, either consumption or investment, are planned by authorities, focused on several intended sectors (unbalanced). (b) Fixed capital formation, either private or public, is focused on construction, machinery, and transportation and communication equipment. (c) Fixed capital formation means investment for both exports and domestic demand, and it is not limited to domestic demand only. (d) The final demand vector of government consumption for South Korea in input-output tables is in one sector, government services and defense, showing data limitations.

32.

Kwnag-suk Kim and Michael Roemer, Growth and Structural Transformation, Seoul, Korea: Korea Development Institute, 1979, 31.

33.

Average monthly earnings of manufacturing employees in Taiwan increased from NT\$9,541 in 1981 to NT\$13,874 in 1986 by 23.12%. In the mid-1980s, Taiwan reinforced environmental protection requirements, which increased production costs.

34.

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Executive Yuan, Annual Review of Government Administration, Republic of China, Taipei, Taiwan: R&D Commission, 1985, 71-2.

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37.

Financial Flows and The Developing Countries: A World Bank Quarterly, November 1995, 22. Table A.2. Commercial Bank Claims on Developing Countries.

38.

The agricultural production index in Taiwan rose to 190.2 by 1968 (1952=100), but remained at 200 in 1980s, which is partially because of limited land. The area of total cultivated land was 8,900 Sq Km for Taiwan and 21,383 Sq Km for S. Korea in 1990, which is 2.4 times of Taiwan's.

39.

Manufacturing capital formation in Korea was intensive in 1965-1968 for import substitution of labor-intensive industries which was 26.1% of total investment, and in 1977-1979 for that of capital-intensive investment which was 20.1%.

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For the theory of productivity, see Dale W. Jorgenson, Productivity Volume 1: Postwar U.S. Economic Growth and Productivity Volume 2: International Comparison of Economic Growth, Cambridge, Massachusetts: MIT Press, 1995.

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42.

Bruce Herrick and Charles P. Kindleberger, Economic Development, New York: McGraw-Hill, 1983, 72, 73, and 89. The absence of gaps between supply and demand will be taken as evidence of what we are calling balanced growth.

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Breton F. Massel and Judith Heyer, "Household Expenditure in Nairobi: A Statistical Analysis of Consumer Behavior," Economic Development and Cultural Change 17(2) (January 1969): 212-34. The change of demand is related to the change of total expenditure rather than income elasticities.

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Janos Kornai, Highway and Byways: Studies on Reform and Post-Communist Transition, Cambridge, Massachusetts: The MIT Press, 1995, p. 14.

47.

Jeffrey D. Sachs, "Accelerating Privatization in Eastern Europe: The Case of Poland," Proceedings of The World Bank: Annual Conference on Development Economics 1991, Washington, DC: World Bank, March 1992, pp. 15-30.

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John Odling-Smee and His Team, IMF Economic Reviews 16: Russian Federation, Washington, DC: IMF, 1994, p. 55. For the case of China, see Michael W. Bell, Hoe Ee Khor, and Kapana Kochhar, China at The Threshold of a Market Economy, Occasional Paper 107, Washington, DC: IMF, September 1993. Wanda Cseng et al, Economic Reform in China: A New Phase, Occasional Paper 114, Washington, DC: IMF, November 1994.

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Marcus Noland, "Economic Prospects for The Korean Peninsula," presented to the 10th Annual Conference of The Council on U.S.-Korean Security Studies held at Hyatt Arlington Key Bridge Hotel, 1325 Wilson Blvd., Arlington, Virginia 22209 on October 27-28, 1995.

51.

"U.S. Partial Lift of Sanction on N. Korea Next Month," The Korea Times, December 15, 1995, p.2. The U.S. government informed that the United States will partially lift the sanction on N. Korea including grain exports by early January 1996. This is an improving sign of U.S.-DPRK relations owing to the shortage of food in N. Korea and the optimistic progress of KEDO operations. This may give the United States a good opportunity for agricultural exports to N. Korea though Seoul wanted to hold the sanction until P'yang comes normally to the dialogue table.

52.

"Government Approved Light Water Reactor Agreement: KEDO - N. Korea Will Sign Tomorrow," The Korea Times, December 14, 1995, p.1.

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53.

About the general policies of IMF and the World Bank, this author consulted with Jung-Ho Kang, Alternative Executive Director, International Monetary Fund, Washington, DC. and Mr. Hak Kuk Cho, Advisor for the Executive Director, The World Bank, Washington, DC. on December 15, 1995.