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External debt and the growth of the Korean economy

Kim, Joo Hoon, Ph.D.
University of Hawaii, 1987
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EXTERNAL DEBT AND THE GROWTH OF THE KOREAN ECONOMY

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF
THE UNIVERSITY OF HAWAII IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN ECONOMICS
MAY 1987

By
Joo Hoon Kim

Dissertation Committee:
Chung H. Lee, Chairman
Lawrence H. Nitz
Seiji Naya
Moheb A. Ghali
William E. James
Corazon M. Siddayao
ACKNOWLEDGEMENTS

I have incurred numerous debts from many persons during the course of writing this dissertation.

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My study at the University of Hawaii would not have been possible without the financial supports from the East-West Center, and I am, therefore, grateful to the funding source as well as to the staff of the East-West Center where I was affiliated during my graduate career. I also should thank the Bank of Korea which allowed me to have the long leave-of-absence for my study.

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I would like to take this opportunity to thank all my students and colleague teachers of the Korean Community School where I worked as a Korean-language teacher for the last two years. The friendly hospitality and supports they extended to me will be kept in my mind as a beautiful memory through the rest of my life.

Last but not least, I would like to express my sincere gratitude to all my family, my mother, my wife Eun Soo, and my two sons, Joon Young and Joon Hi, for their understanding, sacrifice and prayers for me during the long process of preparing for this dissertation.
ABSTRACT

The objective of this study is to analyze the growth effects of Korea's external borrowing with emphasis on the demand side and the heterogeneous nature of long-term and short-term borrowing. This study put forth the following research hypotheses; 1) Korea's external borrowing, considered in the disaggregated term, has had positive growth effects on real GNP, and 2) those positive effects have been large enough to compensate for the cost of external borrowing.

In order test the hypotheses, an econometric model was set up consisting of 16 simultaneous equations (8 behavioral equations and 8 identities). The model was fitted to annual time-series data for the Korean economy from 1961 to 1981.

The main empirical findings obtained through several historical policy simulations are summarized as follows:

1) Long-term debt has the largest income growth effect during the first seven simulation years and short-term debt has nearly as great income-augmenting effect as long-term debt.

2) However, more than 60 percent of the net increase in income with an increase in long-term or short-term borrowing is accounted for by a net increase in private consumption. In addition, the next largest income-augmenting source is a net increase in trade balance, and, in contrast, a net increase in investment turns out to be the least important source of income growth.

3) With respect to the positive impact of external borrowing on trade balance, it is found that the impact is imparted mainly
through export expansion in the case of long-term borrowing but
through import substitution in the case of short-term borrowing.

4) Being fueled by their effect on trade balance, both
long-term and short-term debt are found to have a strong positive
monetary expansion effect.

5) Through a comparative analysis of the results of policy
simulations starting in 1965 and those in 1975, it is found that the
income-augmenting effect of long-term and short-term debt has been
nearly halved since the middle of the 1970s with a drastic decrease
in their positive impact on private consumption and the trade
balance.

6) The empirical evidence on the benefits and cost analysis of
external debt, based on the simulation results, indicates that an
increase in long-term or short-term borrowing creates far greater
income benefits than the cost of borrowing and, however, fails to
generate enough foreign exchange to pay interest and repay the
principal on the old debt. These findings supports that the major
concern with respect to Korea's external debt is not the solvency
problem but the liquidity problem.
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CHAPTER I
INTRODUCTION

1.1 Statement of the Problem

Korea has achieved remarkable economic growth during last two decades but has depended heavily on external borrowing to finance her ever-increasing investment demands. The republic's external debt outstanding was $83 million at the end of 1961, but drastically increased to $43 billion at the end of 1984, marking about a 30-percent average annual growth rate of debt outstanding during the period 1961-1984.

It may be not too much to say that without the successful implementation of the strategy to attract foreign savings, the Korean economic expansion could not have occurred. The foreign savings in Korea (especially external borrowing, accounting for nearly 90 percent of the total foreign capital inflows) have relieved the shortages not only of investment resources due to the low domestic savings ratio but also of foreign exchange for imports. Korea's mounting external debt has contributed to the transformation of Korea into a semi-industrialized nation and, further, to the diversification of the commodity composition of Korea's exports in favor of more sophisticated, high-value-added industrial goods. However, the external debt outstanding rose to 54 percent of nominal dollar GNP in 1984 from only 4 percent in 1961. Export earnings also rose, but at a much slower rate. As a consequence, Korea's debt service as a proportion of exports climbed to about 20 percent
from less than 1 percent during the same period.

In a country that has a large accumulation of external debt and therefore faces an increasing debt-servicing burden, it is of importance for policy formation in the external debt management to study the effects of external borrowing on the growth of real GNP.

Several empirical studies have been done analyzing the growth impacts of Korea's foreign capital inflows. Most of them considered foreign capital inflows in aggregate term and attempted to examine their impacts on the rate of real gross national output putting emphasis on the supply side. In consequence, previous studies have paid little attention to the following aspects, leaving room for a further study on this issue.

First, most previous studies put emphasis on the role of foreign capital inflows in enhancing the supply capacity on the presumption that the income determination has been initiated by the supply side in Korea as in most developing countries. However, the pattern of Korea's economic development supports the view as shown in Scitovsky (1985) that income determination has been initiated rather by the demand side. Once an economic plan had been established, the Korean government ambitiously encouraged more investment than seemed feasible on the basis of expected domestic saving and expected foreign capital inflows. Accordingly, a rapid increase in demand has induced an excess demand over the available supply, which has been in turn followed by the raised supply. Based on this view, the main momentum for income growth in Korea has come from the demand side whereas the role of the supply side has been to respond to it to restore the equality between demand and supply.
Secondly, the earlier studies focused their attention mainly on the role of foreign capital imports only as a source of increased investment resources. However, other roles of foreign capital imports, for example, in smoothing the intertemporal consumption path or in competing with domestic savings which are stressed in the literature were ignored in those works.

Thirdly, the earlier works have not paid attention to the indirect effects of foreign capital inflows on the GNP growth through their influence on the money supply or price. If the effects of the balance of payments on the money supply are not sterilized by the monetary authority, the foreign capital inflows, through changing the net foreign assets held by the central bank, will influence the monetary base and, further, the money supply. Under the present foreign exchange management system in Korea, the foreign capital inflows, affecting the net foreign assets held by the Bank of Korea, has played a role in changing the monetary base and the money supply. During the period 1964-1979 an increase in net foreign assets accounted for 40 percent of the expansion of the monetary base on the average per annum, and during the period 1980-1981 a decrease in net foreign assets accounted for 56 percent of the contraction of the monetary base on average. The rapid increase in the domestic money supply due to the foreign sector became one of the main factors that caused a persistent high rate of inflation between 1972 and 1979.

Fourthly, the earlier works considered the foreign capital inflows in aggregate term assuming that all forms of foreign capital imports are homogeneous. However, the main components of foreign
capital imports are not likely to be homogeneous in nature. In particular the short-term external borrowing with a maturity less than one year which is composed of refinance, trade credit and "A" account fund of foreign bank branches is not appropriate, by its nature, for the purpose of investment, while long-term borrowing is designated for industrial investment. One conspicuous feature with regard to Korea's external financing is a rapid increase in the share of short-term debt in total debt. Short-term debt outstanding, which was only $0.7 billion at the end of 1973, strikingly increased to $11.4 billion at the end of 1984, and its share in total debt outstanding increased from 16 percent to 30 percent during the same period. If each component of foreign capital imports is not homogeneous in nature the change in the structure of Korea's external financing will result in the change in the growth impacts of total capital inflows.

1.2 Objective of the Study

The objective of this study is to analyze the growth effects of Korea's external borrowing with emphasis on the demand side and the heterogeneous nature of long-term and short-term borrowing.

The main hypothesis is established as follows; Korea's external borrowing has had positive effects on GNP growth. To test this major hypothesis this study put forth the following two sub-hypotheses:

(1) Korea's long-term and short-term external borrowing, considered in the disaggregated term, have had different positive
growth effects on real GNP.

(2) Further, the positive growth impacts of Korea's external debt have been large enough to compensate for the cost of external borrowing.

1.3 Sequence of the Study

Chapter II will briefly review the evolution of Korea's development strategies and indebtedness. Chapter III will present a survey of literature relevant to this study. In this chapter, theories about the impacts of foreign capital inflows on the recipient economy will be briefly reviewed. In Chapter IV an econometric model will be developed to test the research hypotheses mentioned earlier. Chapter V will present a discussion of the empirical findings. Finally Chapter VI will summarize the major empirical findings, discuss the policy implications and conclude the study.
CHAPTER II
KOREA'S DEVELOPMENT STRATEGIES AND DEBT ACCUMULATION

2.1 Overall Trends of Indebtedness

Following the liberation of Korea from Japan in 1945 and up until the end of 1960s, there was virtually no external finance in Korea other than foreign aid from the United States. The non-concessionary loan was initiated by the United States in 1959. 1 Through the periods of five Five-Year Economic Development Plans beginning in 1962 and two oil shocks in the 1970s, Korea's external debt increased rapidly to finance the rising shortage in investment expenditures and increasing deficits in the balance of payments. One of the main features with regard to Korea's external financing is its high dependence on debt. Foreign aid, the main source of foreign savings throughout the 1950s, decreased continuously to a minimal level in the 1970s. In addition, foreign direct investment which amounted to less than 5 percent of the total foreign capital inflows during the last two decades has been insignificant compared to the external debt. 2

Korea's total external debt outstanding, which was only $89

---

2 There are three major explanations for this; (1) Korea lacks abundant natural resources, one of the most important inducements for foreign investment, (2) Feelings towards foreign direct investment were adverse in Korea, especially towards Japanese investors, (3) Korea could easily access to foreign loans on favorable terms based on its good economic achievements. Refer to Park (1985), p. 294.
million at the end of 1962, increased to $3.6 billion at the end of 1972. But it recorded $40.1 billion at the end of 1983 with a drastic increase since 1979 (see Table 2.1). The average annual growth rate of external debt outstanding marked more than 30 percent during the period 1962–1983.

Table 2.1

(Units: Million U.S. $)

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<td>I. Long-term Debt</td>
<td>8.9</td>
<td>579</td>
<td>2,949</td>
<td>8,933</td>
<td>23,099</td>
<td>26,033</td>
</tr>
<tr>
<td>1. Loans</td>
<td>10</td>
<td>473</td>
<td>2,670</td>
<td>7,477</td>
<td>15,689</td>
<td>16,175</td>
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<td>Public</td>
<td>10</td>
<td>191</td>
<td>1,320</td>
<td>3,640</td>
<td>9,374</td>
<td>10,403</td>
</tr>
<tr>
<td>Commercial</td>
<td>–</td>
<td>282</td>
<td>1,350</td>
<td>3,837</td>
<td>6,315</td>
<td>6,114</td>
</tr>
<tr>
<td>2. Bank Loans</td>
<td>–</td>
<td>–</td>
<td>155</td>
<td>602</td>
<td>5,322</td>
<td>6,517</td>
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<td>3. IMF Facilities</td>
<td>–</td>
<td>13</td>
<td>8</td>
<td>341</td>
<td>1,259</td>
<td>1,354</td>
</tr>
<tr>
<td>4. Others</td>
<td>79</td>
<td>93</td>
<td>116</td>
<td>513</td>
<td>829</td>
<td>1,645</td>
</tr>
</tbody>
</table>

II. Short-term Debt

1. Private | – | 60 | 397 | 1,828 | 4,001 | 4,947 |
2. Banks | – | 6 | 203 | 1,095 | 6,287 | 5,620 |
3. Foreign Bank “A” Accounts | – | – | 40 | 792 | 3,908 | 3,494 |

III. Total Debt | 8.9 | 645 | 3,589 | 12,648 | 37,295 | 40,094 |

IV. Foreign Investment

| Investment | 1 | 33 | 252 | 743 | 1,043 | 1,112 |

Source: Bank of Korea and Ministry of Finance.

By period, total external debt outstanding can be divided into long-term and short-term debt. Short-term debt refers to the debt
induced through repayment or settlement within one year or less, while long-term debt means the debt with a maturity of more than one year which is usually industrial capital appropriated for production and investment activities.

Public and commercial loans, the largest sources of long-term debt has accounted for more than 60 percent of total long-term debt outstanding during the 1962-1983 period, as shown in Table 2.1. Bank loans, which began to be induced in 1968 from the international financial markets by domestic banks to finance the long-term industrial projects, emerged as another major source of long-term debt since the mid 1970s. Besides these, borrowing through bonds issued, IMF facilities, long-term trade credits and cash loans have been increasing since the 1970s, even though their shares in the total long-term debt are not significant.

Concerning the evolution of Korea's external debt, the most conspicuous phenomenon is the rapid increase in short-term debt. The share of short-term debt in total debt outstanding was less than 30 percent until 1978 but increased to 36-39 percent during 1980-83. This shows Korea depended mainly on the short-term borrowing for financing its current account deficit which greatly expanded after the second oil shock in 1979-1980. The short-term debt is composed of refinance, trade credit and so-called "A" account of foreign bank branches which they borrow from their parent offices and is used for operational expenditure or loanable fund. The borrowing outstanding from these "A" accounts of foreign bank branches marked nearly $4 billion during the 1982-1983 period, showing the share of about 30 percent in total short-term debt.
Korea depended on the United States and Japan for 60-70 percent of its external borrowing until the beginning of the 1970s. After the first oil shock, Korea borrowed also from EEC countries and the international financial institutions such as the World Bank and the Asian Development Bank. As of the end of June 1983, the shares of debt outstanding except for the bank loans from the United States and Japan declined to 30 percent and 15 percent, respectively, while the shares of those from the international financial institutions and EEC countries increased to 22 percent and 17 percent, respectively. In debt structure, the share of floating rate debt has increased over time, reflecting the decreasing share of public loans mainly associated with fixed rates. Floating-rate debt increased to 65.5 percent by the end of 1983 from 45.1 percent at the end of 1971.

Reflecting the rapid accumulation of external debt, Korea's debt service payments (i.e., interest and principal payments) increased to $3.1 billion in 1979 and further to $5.9 billion in 1983. Accordingly, the roll-over ratio of long-term debt (the ratio of principal and interest payments to the amount of new debt) remarkably increased to 95.3 percent in 1982 from 50.7 percent in 1972.

Long-run trends in major debt indicators based on only long-term debt are shown in Table 2.2. Judged from the trends of these debt indicators, Korea's debt servicing burden is becoming heavier. In particular the ratio of debt outstanding to GNP, which is often used in analyzing the long-run debt servicing capacity of a country, has increased over the last two decades.
### Table 2.2

**Trends in Korea's Major Debt Indicators** \(^a\) (1962-1982)  
(Unit: percent)

<table>
<thead>
<tr>
<th>Year</th>
<th>Debt Service Ratio (^b) /GNP</th>
<th>Debt Outstanding /GNP</th>
<th>Debt Service Interest Payments /GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962</td>
<td>0.7</td>
<td>7.2</td>
<td>0.1</td>
</tr>
<tr>
<td>1967</td>
<td>5.2</td>
<td>11.1</td>
<td>0.3</td>
</tr>
<tr>
<td>1971</td>
<td>20.4</td>
<td>26.2</td>
<td>3.5</td>
</tr>
<tr>
<td>1976</td>
<td>10.6</td>
<td>27.3</td>
<td>3.7</td>
</tr>
<tr>
<td>1981</td>
<td>13.8</td>
<td>33.3</td>
<td>6.0</td>
</tr>
<tr>
<td>1982</td>
<td>15.5</td>
<td>35.1</td>
<td>6.7</td>
</tr>
</tbody>
</table>

\(^a\) Based only on the long-term debt.  
\(^b\) The ratio of interest and principal payments to the current foreign exchange earnings (i.e., the sum of exports and invisible trade receipt).


### 2.2 Development Strategies and Debt Accumulation

The long-term economic growth of Korea has been based on a debt-financed development strategy, in particular, the way in which four five-year development plans have been formulated and executed since 1962.\(^3\)

In actual economic planning, the Korean planners set a reasonable target rate of growth in a five-year development plan. If the domestic savings expected to be available during any plan period could not meet the required investment, then the shortfall would be made up by foreign capital inflows, which were assumed to be available. When, however, a sufficient volume of investment was

induced to conform with the ambitious investment plans, the government has been ready to induce more funds than originally planned, rather than to reduce the excess demand.

Further, in the absence of well-functioning financial and capital markets, together with a low propensity to save, the government has intervened actively in mobilizing financial resources to support the development programs and allocating them in the desired directions. In particular the government resource allocation policy has been carried out to accommodate development strategies and investment policies in different stages of development reflected in the five successive five-year development plans.4

2.2.1 Outward-looking Strategy (1962 - 71)

Since Korea launched its First Five-Year Development Plan in 1962, it pursued an outward-looking development over the periods of the First and Second Five-Year Plan. The essence of the outward-looking strategy was to promote labor-intensive manufacturing exports in which Korea had a comparative advantage.

In order to implement this strategy, the government endeavored to mobilize both internal and external resources. For example, to mobilize domestic savings the government undertook a financial reform and raised interest rates on bank deposits and loans from 12 percent to as high as 26.4 percent. Further, in 1966 the government amended the Foreign Capital Inducement Law to grant repayment guarantees on foreign loans and investment. Even though the marked

increase in domestic interest rates caused a rapid increase in domestic savings, it made the borrowing cost from the domestic market much higher than that from abroad even after the foreign exchange risk was taken into account (Table 2.3). The interest rate differentials and the loan guarantee system provided foreign lenders with strong incentives to lend to Korea and, in consequence, led to a flood of foreign capital inflows for the next several years. As a result, the external debt outstanding increased from $89 million in 1962 to $2.9 billion in 1971.

Table 2.3

Trends in Differential between Domestic and International Interest Rates (1966-1983)

(Units: percent)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic interest ratesa(I)</td>
<td>24.4</td>
<td>16.1</td>
<td>19.9</td>
<td>12.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Financial cost of external borrowing (II)</td>
<td>11.5</td>
<td>14.8</td>
<td>19.1</td>
<td>20.6</td>
<td>15.7</td>
</tr>
<tr>
<td>LIBOR rate (3 months)</td>
<td>6.4</td>
<td>7.7</td>
<td>11.6</td>
<td>13.2</td>
<td>9.6</td>
</tr>
<tr>
<td>Loss in exchange rate</td>
<td>5.1</td>
<td>7.1</td>
<td>7.5</td>
<td>7.4</td>
<td>6.1</td>
</tr>
<tr>
<td>Interest rate differential (I-II)</td>
<td>12.9</td>
<td>1.3</td>
<td>0.8</td>
<td>-8.1</td>
<td>-5.7</td>
</tr>
</tbody>
</table>

aInterest rate on commercial loan with one-year maturity.

Source: Bank of Korea.
In order to promote exports the government readjusted the exchange rate. In 1964, the multiple exchange rate system was replaced by a unified exchange rate system and the Korean won was devalued by nearly 100 percent. In addition, a wide range of incentive measures for promoting exports was provided such as export credit to exporters, tax and tariff exemptions (or reductions) on raw materials used in the manufacture of export goods.\(^5\)

In the allocation of mobilized internal and external financial resources throughout the period of the First and Second Five-Year Plans, emphasis was put on allocating more resources to export-oriented industries in the manufacturing sector, especially labor-intensive, light manufacturing industries.\(^6\) Table 2.4 shows that, at the end of 1971, 47 percent of total loans and discounts outstanding of Korea's deposit money banks (commercial banks and specialized banks) was allocated to the manufacturing sector and, further, 61 percent of that portion was accounted for by the light manufacturing industry.

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5 With respect to the various incentives for promoting exports, refer to Oh (1985), pp. 20-25.

6 In order to effect a desired allocation of the funds in the banking sector, the Regulations Pertaining to the Use of Funds in the Financial Sector have been amended since it was promulgated in 1958, and government directives have modified from time to time their scope of and emphasis on the preferred industries. With respect to the loan allocation policies, refer to Hong (1979), pp. 110-45.
Table 2.4
Loans and Discounts of Deposit Money Banks by Industry
(1960-1984)
(Unit: Billion Won)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Industry</td>
<td>12.0</td>
<td>19.5</td>
<td>126.0</td>
<td>383.8</td>
<td>816.8</td>
<td>1,339.5</td>
<td>2,469.3</td>
</tr>
<tr>
<td>Mining and</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarrying</td>
<td>0.3</td>
<td>1.1</td>
<td>21.7</td>
<td>52.8</td>
<td>122.1</td>
<td>130.6</td>
<td>154.6</td>
</tr>
<tr>
<td>Manufacturinga</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy and Chemicalb</td>
<td>2.3</td>
<td>10.9</td>
<td>168.8</td>
<td>947.1</td>
<td>2,182.0</td>
<td>4,587.0</td>
<td>6,747.2</td>
</tr>
<tr>
<td>Lightb</td>
<td>4.9</td>
<td>18.0</td>
<td>259.0</td>
<td>1,186.5</td>
<td>2,392.2</td>
<td>4,102.8</td>
<td>5,548.2</td>
</tr>
<tr>
<td>Social Overhead</td>
<td>0.8</td>
<td>2.5</td>
<td>116.7</td>
<td>467.9</td>
<td>1,366.4</td>
<td>2,087.5</td>
<td>4,874.9</td>
</tr>
<tr>
<td>Services</td>
<td>3.4</td>
<td>13.8</td>
<td>142.6</td>
<td>411.6</td>
<td>1,023.4</td>
<td>2,251.5</td>
<td>4,874.9</td>
</tr>
<tr>
<td>Others</td>
<td>0.6</td>
<td>6.3</td>
<td>84.0</td>
<td>275.2</td>
<td>774.7</td>
<td>1,456.1</td>
<td>3,365.8</td>
</tr>
<tr>
<td>Total</td>
<td>24.3</td>
<td>72.1</td>
<td>919.5</td>
<td>3,724.9</td>
<td>8,977.8</td>
<td>15,955.0</td>
<td>27,978.9</td>
</tr>
</tbody>
</table>

aFigures in parentheses are shares of total loans and discounts.
bFigures in parentheses are shares of the loans and discounts for manufacturing sector.


In addition, the largest portion, about 40 percent of total public and commercial loans induced during the period of 1959-1971, was invested in the manufacturing sector (Table 2.5).
Table 2.5

Sectoral Distribution of Public and Commercial Loans
(1959-1982)

(Unit: Million U.S. $)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>39</td>
<td>378</td>
<td>499</td>
<td>1,322</td>
<td>2,238</td>
</tr>
<tr>
<td></td>
<td>(13.2)</td>
<td>(17.5)</td>
<td>(9.2)</td>
<td>(8.3)</td>
<td>(9.4)</td>
</tr>
<tr>
<td>Mining</td>
<td>9</td>
<td>13</td>
<td>-</td>
<td>24</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>(3.0)</td>
<td>(0.6)</td>
<td>(-)</td>
<td>(0.2)</td>
<td>(0.2)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>156</td>
<td>820</td>
<td>2,145</td>
<td>4,839</td>
<td>7,960</td>
</tr>
<tr>
<td></td>
<td>(52.7)</td>
<td>(37.9)</td>
<td>(39.7)</td>
<td>(30.3)</td>
<td>(33.4)</td>
</tr>
<tr>
<td>Lighta</td>
<td>42</td>
<td>217</td>
<td>570</td>
<td>540</td>
<td>1,342</td>
</tr>
<tr>
<td>Heavy</td>
<td>114</td>
<td>603</td>
<td>1,575</td>
<td>4,299</td>
<td>6,618</td>
</tr>
<tr>
<td>Social Overhead</td>
<td>75</td>
<td>739</td>
<td>1,389</td>
<td>7,083</td>
<td>9,286</td>
</tr>
<tr>
<td></td>
<td>(25.3)</td>
<td>(34.1)</td>
<td>(25.7)</td>
<td>(44.4)</td>
<td>(39.0)</td>
</tr>
<tr>
<td>Other Services</td>
<td>17</td>
<td>214</td>
<td>1,375</td>
<td>2,686</td>
<td>4,292</td>
</tr>
<tr>
<td></td>
<td>(5.7)</td>
<td>(9.8)</td>
<td>(25.4)</td>
<td>(16.8)</td>
<td>(18.0)</td>
</tr>
<tr>
<td>Total</td>
<td>296</td>
<td>2,164</td>
<td>5,408</td>
<td>15,954</td>
<td>23,822</td>
</tr>
<tr>
<td></td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

aIndustries; food and beverages, textiles and clothing, wood and paper and other unspecified manufacturing sectors.

Source: Economic Planning Board, Economic Indicators of Korea, various issues.

The social overhead capital sector was the second largest predominant recipient of those loans, since the government did not want to have any bottleneck to rapid economic growth.

Owing to the outward-looking strategy the average annual growth of exports during the 1962-1971 period was 39.6 percent and real GNP
grew at an annual rate of 8.7 percent during the same period. This rapid economic growth was accompanied by a modest rise in prices compared with that during the subsequent period. The average annual growth rate of GNP deflator was 17.5 percent during the period (see Table 2.6).

Table 2.6
Macroeconomic Development (1962-1984)
(Yearly Average)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GNP Growth Rate</td>
<td>7.9</td>
<td>9.6</td>
<td>9.7</td>
<td>9.6</td>
<td>0.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Gross Fixed Investment (percent of GNP)</td>
<td>16.3</td>
<td>25.4</td>
<td>27.0</td>
<td>31.5</td>
<td>30.2</td>
<td>28.2</td>
</tr>
<tr>
<td>Gross Domestic Savings (percent of GNP)</td>
<td>8.0</td>
<td>15.1</td>
<td>20.4</td>
<td>28.0</td>
<td>21.8</td>
<td>24.8</td>
</tr>
<tr>
<td>Export Growth Rate</td>
<td>43.9</td>
<td>35.3</td>
<td>49.6</td>
<td>23.6</td>
<td>26.1</td>
<td>8.5</td>
</tr>
<tr>
<td>Terms of Trade (1975=100)</td>
<td>126.8a</td>
<td>145.8</td>
<td>121.0</td>
<td>125.1</td>
<td>107.4</td>
<td>112.5</td>
</tr>
<tr>
<td>GNP Deflator Growth Rate</td>
<td>19.7</td>
<td>15.2</td>
<td>21.1</td>
<td>19.6</td>
<td>20.8</td>
<td>4.7</td>
</tr>
<tr>
<td>Money supply (M2) Growth Rate</td>
<td>28.4</td>
<td>44.0</td>
<td>31.2</td>
<td>33.1</td>
<td>26.0</td>
<td>16.6</td>
</tr>
</tbody>
</table>

*Annual average during the 1963-1966 period.


2.2.2 Promotion of Heavy and Chemical Industries (1972-1979)

In the early 1970s the Korean government began to modify its
outward-looking development strategy by emphasizing import substitution, particularly in heavy and chemical industries. The partial withdrawal of U.S troops from Korea which started in 1971 forced Korea to develop its own defense industry. In addition to this and facing growing protectionism, Korea was forced to restructure the commodity composition of its exports in favor of more sophisticated, high-value-added industrial goods.

Due to these developments the development of heavy and chemical industries was emphasized throughout the entire period of the Third Five-Year Development Plan (1972-1976) and of half of the Fourth Five-Year Plan (1977-1981). A massive investment program in these industries, financed largely by foreign loans and preferential banks credit, was put into effect in 1973 and pursued vigorously until 1979.

To finance this large increase in investment, the government allocated nearly 30 percent of total public and commercial loans approved during the 1972-1979 period to the heavy and chemical industries (Table 2.5). In order to direct domestic resources to those industries the government established the National Investment Fund in 1974, whose major sources are the public employee pension funds and a substantial portion of private savings from banking institutions. These funds were then channeled into heavy and chemical industry projects through the deposit money banks, the Korea Development Bank, and the Export-Import Bank acting as intermediaries. When these funds proved to be insufficient to

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7Kim (1985), p. 9
finance all such projects, banks were urged to make additional loans available on a preferential basis. As a result, more than 50 percent of bank credit absorbed by the manufacturing sector during the 1972-1979 period was directed to the heavy and chemical industries and the share of those industries in the total credit outstanding of manufacturing sector increased from 39.4 percent in 1971 to 50.9 percent in 1979 (Table 2.4).

Between 1972 and 1979 Korea achieved high annual average growth of 9.6 percent and upgrading its export structure. These achievements were obtained, however, at the cost of a high rate of inflation, 20.5 percent of average annual growth rate of GNP deflator during that period. Although the world-wide commodity boom of 1972-1973 and the quadrupling of oil prices in 1973-1974 originated the high inflation, two other internal factors were responsible for the high inflation throughout the period.

First, with the government's ambitious investment plan a large increase in investment was induced and an excess of effective demand over the available supply was the consequence. In particular with the prolonged world-wide recession since 1974, Korea's new industrial strategy resulted in excess capacity in the heavy and chemical sector. Accordingly the excess demand in the face of

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8 The lending rates of the National Investment Fund varied from 6 percent for export suppliers credit to 16 percent for the loans to the heavy and chemical industries with 3-8 year maturity. Refer to Park (1985), pp. 34-35.


10The share of heavy and chemical industrial products in total exports rose from 21.3 percent in 1972 to 34.7 percent in 1978.
capacity limitations for light industrial goods fueled inflationary pressures.11

Second, rapidly increasing money supply, showing more than 30 percent of the average annual growth rate in the 1970s (Table 2.6), aggravated inflation.12 The causes of changes in the monetary base13 by sources are presented in Table 2.7. Table 2.7 shows that the foreign sector, i.e., net foreign assets held by the Bank of Korea, has played a dominant role in fluctuation of the monetary base since the early 1960s. During the 1972-1979 period increases in net foreign assets accounted for about 40 percent of the expansion of the monetary base, and during the period of 1980-1981 the decrease in net foreign assets accounted for 56 percent of the contraction of the monetary base. Increases in net foreign assets until 1979 were mainly due to large inflows of foreign capital with relatively small debt service payments, while decreases in net foreign assets during the latter period were mainly due to a large increase in debt-service payments in spite of large inflows of financial capital.14

13Monetary base is composed of five kinds of the central bank's assets: net claims on the central government, net claims on the government agency, net claims on the banking sector, net foreign assets and other net assets.
Table 2.7
Changes in Monetary Base by Source (1962-1981)

(Unit: Billion won)

<table>
<thead>
<tr>
<th>Year</th>
<th>Government Sector</th>
<th>Government Agency Sector</th>
<th>Banking Sector</th>
<th>Foreign Sector</th>
<th>Other Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962-66</td>
<td>3.1</td>
<td>18.3</td>
<td>-2.8</td>
<td>30.7</td>
<td>5.5</td>
</tr>
<tr>
<td>1967-71</td>
<td>-10.1</td>
<td>13.5</td>
<td>8.4</td>
<td>88.6</td>
<td>32.0</td>
</tr>
<tr>
<td>1972-76</td>
<td>381.7</td>
<td>78.0</td>
<td>202.0</td>
<td>517.9</td>
<td>-29.0</td>
</tr>
<tr>
<td>1977-79</td>
<td>-154.1</td>
<td>130.0</td>
<td>1,373.6</td>
<td>714.0</td>
<td>-33.7</td>
</tr>
<tr>
<td>1980-1981</td>
<td>864.8</td>
<td>130.0</td>
<td>-349.8</td>
<td>-374.8</td>
<td>-936.7</td>
</tr>
</tbody>
</table>

(56.0) (42.6) (45.1) (35.1) (56.2)

Total (Monetary Base) 54.3 283.0 1,149.5 2,030.3 -666.4

*Figures in parentheses are shares in the monetary base.*


2.2.3 Emphasis on Continued Growth with Stability

(1979-present)

Between 1979 and 1981, the Korean economy was severely struck by a series of external and internal shocks that caused an economic downturn and a huge accumulation of foreign debt. As a consequence, the main priority of the government's policies was put on restoring continued growth with price stability since 1979.

High inflation precipitated by the second oil crisis in 1979 deteriorated the terms of trade by 14.7 percent during the period 1979-1981. The world-wide recession and the rapid increase in domestic labor costs reduced sharply the growth rate of Korea's exports in the years 1980 and 1981. Korea also experienced a
disasterous crop failure in 1980. In addition, the trends of high interest rates in the world financial markets aggravated Korea's interest payment burden of external debt (Table 2.8). As a result, the current account deficit recorded $5.3 billion in 1980, 8.7 percent of its share of GNP compared with 1.1 percent in 1976 (Table 2.9). A large current account deficit and rapidly increasing debt servicing burden led to a surge in external borrowing, especially since 1979 as reviewed in section 2.1. While facing these problems, Korea had to confront many political difficulties caused by the assassination of President Park in October 1979. The ensuing social and political uncertainties clouded the investment climate in the business sector. Owing to these unfavorable external and internal developments, the Korean economy experienced negative growth of minus 5.2 percent in 1980 while inflation soared to 25.6 percent measured in GNP deflator.

Table 2.8

Interest and Principal Payment of External Debt (1962-1984)

(Unit: Million U.S. $)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Payments</td>
<td>-</td>
<td>12</td>
<td>161</td>
<td>734</td>
<td>2,655</td>
<td>3,823</td>
</tr>
<tr>
<td>Short-term Debt</td>
<td>-</td>
<td>1</td>
<td>7</td>
<td>218</td>
<td>1,285</td>
<td>1,528</td>
</tr>
<tr>
<td>Long-term Debt</td>
<td>1</td>
<td>11</td>
<td>154</td>
<td>516</td>
<td>1,370</td>
<td>2,295</td>
</tr>
<tr>
<td>Principal Payments</td>
<td>1</td>
<td>23</td>
<td>255</td>
<td>823</td>
<td>1,578</td>
<td>2,121</td>
</tr>
<tr>
<td>(for long-term debt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>35</td>
<td>416</td>
<td>1,557</td>
<td>4,233</td>
<td>5,944</td>
</tr>
</tbody>
</table>

Table 2.9

(Unit: Million U.S $)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade Balance</td>
<td>242</td>
<td>-430</td>
<td>-1,046</td>
<td>-590</td>
<td>-4,384</td>
<td>-2,594</td>
<td>-1,035</td>
</tr>
<tr>
<td>Imports</td>
<td>263</td>
<td>680</td>
<td>2,178</td>
<td>8,405</td>
<td>21,593</td>
<td>23,414</td>
<td>27,370</td>
</tr>
<tr>
<td>Exports</td>
<td>41</td>
<td>250</td>
<td>1,132</td>
<td>7,815</td>
<td>17,214</td>
<td>20,879</td>
<td>26,345</td>
</tr>
<tr>
<td>Invisible Trade Balance</td>
<td>44</td>
<td>106</td>
<td>28</td>
<td>-72</td>
<td>-1,386</td>
<td>-554</td>
<td>-878</td>
</tr>
<tr>
<td>Unrequited Transfers</td>
<td>231</td>
<td>220</td>
<td>171</td>
<td>349</td>
<td>449</td>
<td>449</td>
<td>541</td>
</tr>
<tr>
<td>Current Balancea</td>
<td>33 (-1.4)</td>
<td>-103 (2.7)</td>
<td>-847 (9.0)</td>
<td>-314 (8.7)</td>
<td>-5,321 (4.2)</td>
<td>-2,650 (1.7)</td>
<td>-1,373</td>
</tr>
</tbody>
</table>

aFigures in parentheses are percentages of GNP.


One important development with regard to Korea's debt accumulation since 1979, as reviewed in section 2.1, was the Korean government's heavy dependence on short-term debt to finance enlarged current balance deficits. Due to unfavorable conditions for long-term borrowing in the international financial markets, such as high interest rates and growing concerns over high-borrowed countries, borrowings through the foreign bank branches were preferred by the monetary authorities.

Since the initial opening of four major U.S. and Japanese bank branches in Korea in 1967, there has been a large influx of foreign banks, particularly during 1977-1985 (Table 2.10). As of February 1985 there were 52 branches of 45 foreign banks from 11 countries.
Table 2.10
Number of Foreign Bank Branches Opened in Korea (1967-1985)

<table>
<thead>
<tr>
<th>(Opened)</th>
<th>1967-71</th>
<th>1972-76</th>
<th>1977-81</th>
<th>1982-85a</th>
<th>Totala</th>
</tr>
</thead>
<tbody>
<tr>
<td>(By Country)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.A.</td>
<td>3</td>
<td>1</td>
<td>12</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Japan</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>France</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>U.K.</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Canada</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Singapore</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Germany</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As of February 1985.


Table 2.11
Sources of Funds of the Foreign Bank Branches (1979-1984)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Currency</td>
<td>269.2</td>
<td>657.9</td>
<td>820.3</td>
<td>1,027.2</td>
</tr>
<tr>
<td>(23.1)</td>
<td>(22.8)</td>
<td>(19.5)</td>
<td>(20.2)</td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td>95.7</td>
<td>216.1</td>
<td>313.3</td>
<td>392.2</td>
</tr>
<tr>
<td>Capital, Reserves</td>
<td>26.1</td>
<td>64.7</td>
<td>132.5</td>
<td>158.3</td>
</tr>
<tr>
<td>Others</td>
<td>147.4</td>
<td>377.1</td>
<td>374.5</td>
<td>476.7</td>
</tr>
<tr>
<td>Foreign Currency</td>
<td>895.7</td>
<td>2,221.4</td>
<td>3,389.2</td>
<td>4,056.5</td>
</tr>
<tr>
<td>(76.9)</td>
<td>(77.2)</td>
<td>(80.5)</td>
<td>(79.8)</td>
<td></td>
</tr>
<tr>
<td>Inter-office Borrowings</td>
<td>876.7</td>
<td>2,113.7</td>
<td>3,005.6</td>
<td>3,650.0</td>
</tr>
<tr>
<td>(75.3)</td>
<td>(73.4)</td>
<td>(71.4)</td>
<td>(71.8)</td>
<td></td>
</tr>
<tr>
<td>Deposits in Foreign Currency</td>
<td>15.0</td>
<td>92.9</td>
<td>227.3</td>
<td>272.8</td>
</tr>
<tr>
<td>Others</td>
<td>4.0</td>
<td>14.8</td>
<td>156.3</td>
<td>133.7</td>
</tr>
<tr>
<td>Total</td>
<td>1,164.9</td>
<td>2,879.3</td>
<td>4,209.5</td>
<td>5,083.7</td>
</tr>
<tr>
<td></td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>

Source: Ibid., p.4.
It is noteworthy that 41 of the 52 branches opened during the 1977-1985 period. Thanks to various privileges extended by the government (including exemption from corporate tax) the share of foreign bank branches in the total assets of deposit money banks in Korea rapidly increased (6.2 percent in 1979 and 8.5 percent in 1984). In addition, their share in the loans of the deposit money banks was 11.7 percent in 1984 and 61.5 percent especially in case of foreign currency loans in the same year.\(^{15}\) With rapidly increasing business activities of foreign bank branches, their need for operational funds also increased markedly. Because of a poor share of deposits received in the total assets, however, the foreign bank branches have depended for more than 70 percent of total fund sources on inter-office borrowing: the so-called "A" accounts of foreign bank branches (Table 2.11). Borrowed funds through this channel were partly used for loans in foreign currency and the rest of them were converted into domestic currency funds under the swap agreement with the Bank of Korea. This type of borrowing accounted for about 30 percent of total short-term loans introduced into Korea during the 1978-1983.

Throughout the 1981-1982 period a series of reflational policies were introduced to stimulate investment and exports, including a devaluation of the won by about 12 percent\(^ {16}\) and a

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\(^{16}\)In January 1980, the Korean government devalued the won vis-a-vis the U.S. dollar, and raised the bank deposit and lending rates by 5 to 6 percentage points. However, these measures were mainly to improve the current account.
reduction of bank interest rates on both deposits and loans by an average of 4 percentage points.

Since 1982, due to a sharp decrease in the oil price and international interest rate, the terms of trade improved and Korea's exports began to increase with the recovery of world economy. As a consequence, Korea achieved 7.5 percent growth in GNP with a modest inflation rate of 4.7 percent during the 1982-84 period (Table 2.6). This also contributed to an upward shift in the gross domestic saving ratio and a corresponding improvement in the current account.

Recognizing the lessons obtained in the 1970s, the Korean government took a series of measures to reduce government intervention in the mobilization and allocation of financial resources. The government relinquished its holdings in all five of the major commercial banks by 1983. In January 1982 the monetary authorities abolished direct control over bank lendings and quotas in preference to indirect reserve control. In addition, these foreign investment was further liberalized in 1984 to adopt a negative list system for approving foreign investment applications.

2.3 Foreign Capital Inducement System in Korea

In 1961 the Foreign Capital Inducement Law was enacted to create an environment more conducive to capital inflows. One year later a supplement to this law established procedures for granting repayment guarantees on foreign loans. In 1966 the Foreign Capital

\[\text{Park (1984), p. 37.}\]
Inducement Law was amended to increase the attractiveness of lending and investing in Korea, making it clear that, if foreign-financed firms do default on repayment of loans, the government will supervise their management and property to achieve solvency. In addition, the Public Loan Inducement and Management Act was promulgated in 1973.

In December 1983 the government amended again the Foreign Capital Inducement Law which became effective since the 1st of July, 1984. The revision effected substantial changes in its system and contents in the previous laws. Basically this revision intends to consolidate diversified legal statutes concerning foreign capital inducement into one law to attract and manage foreign capital more effectively. In addition, the revision provides a more favorable environment for foreign investment.

2.3.1 Long-term Debt

Public loans, one of the major components of long-term debt, are negotiated by the government in accordance with the Foreign Capital Inducement Law. The Minister of Finance on behalf of the government formulates a public loan plan and obtains in advance the consent of the National Assembly prior to the formulation of the plan. When the Ministry of Finance draws up the plan, the government agencies or Korean corporations desiring to induce public loans should submit an application for a public loan to the Ministry of Finance. Then the Ministry of Finance refers the loan project to the Investment Project Review Committee in order to analyze it in

relation to the long-term economic development plan. Each project is granted after multilateral reviews at the Ministry of Finance, the Economic Planning Board and other government related agencies on its economic soundness, possibility of domestic capital procurement and its relation to the economic development plan. The repayment of public loans may be guaranteed by the government for a project that a bank finds difficult to guarantee.

The inducement of a private commercial loan must be authorized by the Ministry of Finance. The Ministry conducts, upon receiving the application, a preliminary review in accordance with the criteria enumerated in the Foreign Capital Inducement Law. When the Minister of Finance deems it necessary, he may order the said loan to be supplemented or modified. Finally the loan application is sent to the Foreign Investment Project Review Committee for further consideration. Repayments of commercial loans are generally guaranteed by banking institutions or, in some cases, by the borrower's parent company. In addition, loans can be made on the basis of the borrower's own credit.

Long-term borrowings from the international financial markets by banking institutions such as bank loans or bond issue for industrial project are induced under the provision of the Foreign Exchange Law. Banking institutions are required to consult in

This is an advisory body to the Minister of Finance, which consists of the chairman, the Director-General of the Economic Cooperation Bureau of the Ministry of Finance, and not more than 14 members, including second- or third-class officials of related ministries and experts on economic cooperation and international finance.
advance with the Ministry of Finance about the amount, terms and conditions of borrowings.

2.3.2 Short-term Debt

Short-term debt including short-term trade credit, bank refinance and "A" accounts of foreign bank branches is induced under the Foreign Exchange Control Law promulgated in 1961 (the inducement of long-term debt is controlled under the Foreign Capital Inducement Law).

According to the Foreign Exchange Control Law, a resident may borrow short-term currency funds from a nonresident in a foreign country with the permission of the Bank of Korea. To pay the principal and interest and any other incidental costs on short-term borrowing of foreign funds a payment license must be obtained from the president of a Class-A foreign exchange bank. When a foreign bank branch wants to borrow foreign currency from abroad, a license must be issued by a designated trading Class-A exchange bank or permission must be obtained from the Bank of Korea.

Despite these provisions no strict restrictions have been imposed on the inducement of short-term debt and, furthermore, short-term borrowing has been encouraged under the Foreign Exchange

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20 Foreign exchange banks, conducting foreign exchange business, are classified into two groups, Class-A and Class-B banks. Class-A banks are allowed to conduct almost all kinds of normal foreign exchange business. However, Class-B banks, in principle, are not allowed to establish correspondent arrangements but may open accounts at Class-A banks in order to settle their external transactions.

21 Obtaining license is enough if the borrowing is to finance the maintenance expenses, or if the amount of borrowing is not more than $1 million.
Control Law. 22 This is because, by the nature of short-term debt, it usually occurs as a by-product of trade transactions or foreign bank inter-office transactions.

2.3.3 Foreign Direct Investment

The inducement of foreign direct investment, another means of external financing, is controlled under the Foreign Capital Inducement Law. Foreign investment, as in public and commercial loans, is approved by the Ministry of Finance.

Prior to July 1984 a positive system was adopted, listing the industries where foreign investments are allowed. 23 Further, approval was granted after consultation with relevant ministries and screening by the Foreign Capital Inducement Deliberation Committee consisting of 9 ministers and 12 experts on economy and law.

Since then, more favorable conditions are created to facilitate foreign investment by simplifying government procedures. The most important change is a negative system listing for the industries where foreign investment is prohibited or restricted. 24

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22Oh (1985), pp. 33-34.

23Foreign investment was allowed for 521 industries among a total of 885 industries. Korea Chamber of Commerce and Industry (1985), p. 15.

24Among prohibited projects are public projects conducted by the government or by a public organization and projects causing harm to health, etc. Among restricted projects are those supported by the government on a special basis, projects based on excess use of energy or imported raw materials, projects for luxurious consumption, and so on.
Theories advanced by economists to explain the effects of foreign capital inflow on the recipient economy have an old tradition in the economic literature. The material surveyed in this section is divided into four parts. The first part deals with the role of foreign capital inflow in economic growth. In order to examine the indirect effects of foreign capital inflows on economic growth through their impacts on trade and money market, the second part discusses briefly the relationship between foreign capital inflow and the terms of trade, and money supply. The third part focuses on the debt servicing problem of a borrowing country. Finally, a brief summary of this section will be provided.

3.1 Foreign Capital Inflow and Economic Growth

3.1.1 Positive Growth Effects of Foreign Capital Inflows

Chenery and Strout (1966) offered a theoretical framework through which foreign capital requirement and its contribution to development process could be analyzed. According to their two-gap theory foreign capital inflows such as aid, external borrowing and foreign investment have a dual effect on economic growth of a capital-importing country. First, these inflows create additional resources over the total domestic consumption. Additional resources are channeled to capital formation for production of future goods and services. Second,
foreign capital improves the ability of LDCs to finance further imports of goods and services which are required for development. These goods and services could neither be produced locally nor substituted locally. Since LDCs are constrained by the shortage of domestic savings to finance all investment expenditures (internal gap) and by the shortage of foreign exchange to pay the imports bills (external gap), foreign capital is the only source which can be used to fill out these two binding gaps. In the presence of these unfilled gaps the target growth may not be achieved, and GDP growth is constrained by the inflow of foreign capital required to fill the larger of the two gaps.

Emphasizing external finance as a source of increased resources for investment, growth-cum-debt (debt cycle) models focus on the role of foreign capital inflow in enhancing potential growth capability of the borrowing country as well as raising the level of income. In the growth-cum-debt model, external borrowing progressively diminishes leading the country to a state of capital sufficiency as domestic savings exceed the sum of debt services and investment expenditures.

In the models of Avramovic et al. (1964), and King (1968) the behavior of gross capital inflow varies in different stages of the debt cycle which in turn is directly influenced by the process of importing foreign capital formation. In the first stage, when the domestic resources are inadequate to finance investment expenditures, the less-developed country has to borrow not only to finance the internal gap but also to repay debt services including interest and amortization charges. Debt inflow will assist development in the second stage as the domestic savings ratio rises and domestic savings
supplement external capital inflow to bridge the internal gap required for the target growth. Capital formation requires the country to have a gradual increase in its rate of savings. Since savings in the second stage are not sufficient to meet all debt services, debt would still continue to be accumulated but at a slower pace than in the first stage. Finally, the developing borrowing country enter the third stage of the cycle when domestic savings are large enough to pay back debt services and to finance domestic investment expenditures, and the country completes her debt cycle.

3.1.2 Negative Growth Effects of Foreign Capital Inflows

Against the traditional view that foreign finance is additive to the domestic savings and contributes to economic growth of the recipient country, some radical views warn negative effects of foreign capital inflows on economic growth. Nurkse (1954) and Singer (1950) pointed out that the so-called 'colonial' pattern of foreign investment in the underdeveloped countries, concentrating on industries producing raw materials for export mainly to the advanced countries, tended to promote lopsided economies and that it caused instability due to high dependence on foreign demand for one or two staple products. More recently Griffin (1970), Wasow (1979) and others have argued that aid and other foreign resource inflows reduce domestic savings, causing greater consumption and leading to long-term dependence on foreign savings. Their argument suggests that there exists a negative causal relationship between foreign inflows and domestic savings. Papanek (1972) and Heller (1975), however, have developed a counterargument against the negative causal relationship between foreign inflows and savings. They argue that exogenous
factors cause both high inflows and low savings rates and generally low growth rates as well. That is, as long as both savings and inflows are substantially affected by third factors, the negative correlation between the two may have little or no causal relationship. Furthermore, Papanek suggests strong likelihood of a bi-directional causal relation particularly between foreign capital inflows and domestic saving and between foreign capital inflow and growth rate.

3.1.3 Smoothing Intertemporal Consumption Path

Apart from the role of foreign savings as a source of increased investment resources, non-investment uses of foreign savings are assessed in achieving a more efficient intertemporal allocation of consumption. A rationale behind non-investment uses of external borrowing is smoothing of the consumption path over time. Consideration of the requirements of intertemporal efficiency helps us to understand the negative relationship between savings and foreign capital inflows.

McCabe and Sibley (1976) presents an intertemporal optimizing framework in which an economy subject to export revenue variability transfers income from years in which export performance is above trend to years when it is below trend. Sachs (1981) explains responses to real shocks in a model of intertemporal substitution of two periods. In the model, a temporary shortfall in the private wealth induces households to shift some of the loss to the second period, borrowing to smooth consumption over time in the process. With a permanent decline in the wealth, however, they reduce consumption instead of borrowing against second-period income.

Iwasaki (1985) shows in the following formula how foreign capital
inflow negatively affects the current domestic saving when part of it is used for consumption. The relevant national income identities of an open economy are,

\[(3.1) \quad Y = C + I + (X - M) = C + S\]
\[(3.2) \quad S = Y - C = I + (X - M)\]

where \(Y\) is gross national product, \(C\) gross national consumption, \(S\) gross national saving, \(I\) gross investment, \(X\) exports, \(M\) imports and \(X-M\) trade deficit (surplus) equal to \(F\) foreign capital inflow (outflow). Both investment and consumption can be also financed by foreign capital inflow. Now, we decompose variables by their financial resources, i.e., domestic income (subscript "d") or foreign capital (subscript "f") and rewrite equation (3.1) and (3.2) as;

\[(3.3) \quad Y = C_d + C_f + I_d + I_f + (X - M) = C_d + C_f + S\]
\[(3.4) \quad S = Y - (C_d + C_f) = (I_d + I_f) - F\]

\[= I_d - C_f \quad \text{(since } F = C_f + I_f \text{)}\]

\[= s_1 Y - (1 - s_2) F = s_1 Y - c_2 F\]

where \(s_1\) is the ex ante propensity to save out of national income and \(s_2\) and \(c_2\) are respectively propensities to save and consume out of foreign capital inflow \((0 < s_1, s_2, c_2 < 1)\).

Clearly from equation (3.4), as far as part of foreign capital is spread over to consumption (i.e., \(c_2 > 0\)), it will inevitably have a negative effect on the current domestic savings provided the propensity to save out of national income is independent of foreign capital. The propensity to save, \(s_2\), however, may not be independent of foreign capital inflow. It may rise in response to better investment opportunities created by foreign capital inflow which makes available more imported equipments, technologies, and managerial and
marketing skills to be profitably matched by domestic resources. Or foreign capital inflow may increase unproportionately the income of particular groups such as entrepreneurs or those engaged in external sector whose propensity to save is substantially higher than the national average. On the contrary, it may be negatively affected if the foreign capital preempts investment opportunities for domestic capital. Furthermore, given a target level of investment, a greater volume of foreign capital inflow may induce the government to lower the public saving.

3.1.4 Fungibility of Financial Resources

The role of foreign capital inflows in substituting domestic savings or smoothing the intertemporal consumption path, as reviewed above, can be related with the fungibility problem of financial resources. This issue concerns the question of to what extent external financing designated for investment purposes releases resources for other purposes.

It is often alleged that when the financial markets are imperfect and the financial sector is in an infant industry stage, credit fungibility is reduced.¹ That is, when financial markets are fragmented among regions and different classes and groups of borrowers, funds do not flow freely from one separated and artificially segmented market to another. In such a financial regime government intervention has a better chance of success in channeling bank credit to the desired uses. If the financial markets are, however, segmented largely because of government controls over the


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interest rates and management of financial institutions, such a situation tends to encourage credit fungibility. In the case of Korea this is closely related with the existence of unregulated money market which is partly attributed to the financial market fragmentation caused by the government's credit allocation policy. One of the functions of the unregulated money market has been to facilitate the flow of funds among markets that are geographically separated and artificially segmented by interest rates, sectors, and borrowers.

Korea's unregulated private money market in particular has acted as a retail credit market for consumers and small businesses, and the interest rates in this market have been much higher, sometimes three and four times higher, than those in the formal financial market. As a consequence, the existence of the huge unregulated money market implies a strong possibility of credit fungibility.2

The fungibility issue could be examined at the two stages of the credit allocation.3 At the first stage of credit allocation, it is possible that the financial intermediaries may simply evade or ignore the credit guideline and directions. At the second stage, which is related to the behavior of borrowers, it is likely that a part of bank credit can be diverted to other uses than those pre-designated. In Park's (1984) view, credit fungibility in the former case does not appear to have been serious in Korea, because of the government's

2Ibid., p. 22. With respect to this point Park and Cole (1983, ch. 3) asserts that even large businesses in Korea often borrow their working capital from and lend their idle funds through the unregulated money market.

3Ibid., pp. 22-24.
close supervision of the day-to-day operations of the financial intermediaries. He asserts, however, that credit fungibility in the latter case is quite conceivable when banks do not have an effective system of credit-use supervision.\footnote{As evidence to support the credit fungibility, a special measure issued in September 1980 in Korea shows that business firms hold a large share of their assets in the form of real assets such as land and buildings. Their holdings of those assets, the government points out, were far greater than the level that is normally required for their business operations and were financed mostly by the bank loans. In addition, Hong (1979, p. 149) asserts that the irregular practice of smuggling out loan funds for other unauthorized activities in Korea does not seem to have been uncommon even though such irregular practices were limited in absolute magnitude and were more or less exceptional.}

Being similar to the fungibility problem of domestic credit, the fungibility of foreign capital imports can be examined at the two stages, their inducement and uses. At the inducement stage of foreign capital inflows, the more restrictions are imposed the less fungibility of induced capital is likely to appear. Thus there may exist a greater possibility of fungibility in the case of short-term debt than long-term debt. For example, fungibility of short-term debt can occur when an importer reports higher amount of imports (accordingly, he receives higher trade credit) than the actual amount in conspiracy with the exporter in order to take, as a form of capital flight, the difference between the reported and actual amount of imports.\footnote{Economic Planning Board (1985), p. 184.} In addition, the fungibility of induced capital inflows is quite conceivable if the uses of foreign capital inflows are not well monitored and supervised by the government authority.

\subsection*{3.1.5 Debt Servicing Capacity of a Borrowing Country}
Aliber (1980) notes that a debt crisis in developing countries could arise from two sources: solvency problem or liquidity problem. The solvency problem would arise if the real interest on the marginal external loan exceeds the increase in national income made possible by this loan. So the solvency problem is of a long-term nature. On the other hand, the liquidity problem would rise if the borrower is unable to obtain foreign exchange to service the debt due to a shortage of funds, to the bunching of debt service payment and/or to the difficulties in roll-over process.

Using a growth-cum-debt model, Avramovic et al. (1964) argue that the debt servicing capacity of a developing economy should be discussed in terms of benefits and cost of foreign capital in the process of economic growth. Accordingly, if the cost of foreign capital determined by the borrowing conditions is assumed to be exogenously given, the long-run debt servicing capacity of a country will depend on the country's ability to generate domestic savings and to employ capital efficiently.

J.P. Hayes in Avramovic et al. (1964), using the Harrod-Domar model, presents the concept of the critical interest rate (CIR) as a criterion for evaluating the debt servicing capacity. It indicates the level of interest rate that will make the growth rate of external debt equal to the growth rate of GDP. In other words, CIR is the maximum interest rate that can be paid while not increasing the debt output ratio (the ratio of external debt to GNP).

Solomon (1977) shows, using the same Harrod-Domar model, the circumstances under which the debt situation becomes explosive. His model points out that the debt output ratio will reach a finite limit.
only if the target rate of growth is greater than the real interest rate. Clearly, if there is no limit to the debt output ratio, the country's debt policies are not sustainable. He estimated limits of debt output ratios for ten non-oil producing developing countries and the empirical test shows rather optimistic results about the debt problems of those countries.

Taking the same growth-cum-debt approach, Kharas (1981a, 1981b) focuses on a situation in which external borrowing is carried out by the central governments or semi-autonomous public agencies. The government relies on increases in the tax base (national output) to meet its revenue requirement for debt servicing purposes. With these assumptions, his model suggests that a borrowing country could keep a sound debt servicing capacity as long as the marginal future expansion in the tax base is larger than the marginal future cost of debt when one unit of domestic capital is added to the economy.6

3.2 Foreign Capital Inflows, Terms of Trade and Money Supply

3.2.1 Foreign Capital Inflows and Terms of Trade

Theories regarding the effects of foreign capital inflow on the terms of trade can be classified into two categories: theories of endogenous and theories of exogenous capital flow.

The first category, theories of endogenous capital flow, considers movements of international capital as motivated by previous

6Kharas (1981c) derives the same condition by applying the optimal capital accumulation approach to same issue.
changes in economic variables such as variations in interest rates, exchange rates, income, and profitability of investment. The second category, theories of exogenous capital flow, comprises the analytical treatment based on the transfer problem literature in which borrowing, reparation payments, and grants-in-aid are considered as a general transfer problem, i.e., transfer of purchasing power. Its main concern has been to explain the mechanism of adjustment in the current account of both borrowing and lending countries to an exogenous change in international capital movements.

In the 1930s, J.M. Keynes and others upheld the so-called orthodox position, namely, the view that the transfer causes the terms of trade of the transferor to deteriorate in order to generate the necessary export surplus and effect the transfer. So they claimed that the transferee will have the secondary benefit from improved terms of trade as well as the primary benefit from receiving the transfer. This orthodox position are favored later by Johnson (1956) and Samuelson (1971).

In contrast, B. Ohlin (1929) and his followers adopted what they called the modern view, i.e., the proposition that a transfer need not necessarily worsen the terms of trade of the paying country. In particular, Ohlin pointed out that Keynes and his followers neglected the income effects and asserted that no clear-cut presumption existed regarding the direction in which the terms of trade would move. Following this view, Jones (1970) maintained that the transferor's terms of trade would be improved if tastes differ between countries so

7For further discussion on this issue, refer to Hodjera (1973).
that the transferor's tastes are biased toward the transferee's exportables and the transferee's tastes are biased toward the transferor's exportables. In addition, Bhagwati and Brecher (1981) and Bhagwati, Brecher and Hatta (1983) argued that immiserizing transfer can arise in a bilateral transfer in a multi-country world when distortions are present in foreign trade. In their models the transferee would be worse off by receiving transfer while the transferor can be better off by paying the transfer.

3.2.2 Foreign Capital Inflows and Money Supply

In the traditional Keynesian approach as shown in Chenery and Strout (1966), only the role of foreign capital in filling the investment-saving or exports-imports gap is stressed and their impact on the monetary side is not considered. This means that any balance of payments effects on the money supply is assumed to be fully sterilized.

The monetary approach to the balance of payments, however, emphasizes the monetary considerations in the interpretation of balance of payments problems. The basic theoretic framework of this monetary approach was developed primarily by Mundell (1968) and Johnson (1956, 1977) among others. This approach assumes that a deficit or surplus in the overall balance of payments cannot be sterilized within a relevant period and thus influences the domestic money supply. From the balance sheet of the central bank the balance sheet identity is given as

\[(3.5) \quad \text{NFA} + \text{DC} = H\]

\[\text{Dornbusch (1980), pp. 24-27.}\]
The left-hand side of the identity shows the asset side of the balance sheet, net foreign assets held by the central bank, NFA, and domestic credit, DC. Here the size of net foreign assets is determined by the overall balance of payments situation including changes in foreign capital inflows. The right-hand side of the identity shows the liability side of the balance sheet, high-powered money, H. The identity shows that changes in high-powered money are equal to the sum of changes in net foreign assets and domestic credit. Accordingly, if the central bank fails to offset fully changes in net foreign assets by adverse changes in domestic credit through monetary and fiscal policy, this failure will change the monetary base, and further the variation in the monetary base will influence the domestic money supply.

3.3 Empirical Evidence

Empirical evidence in the literature on the impacts of foreign capital inflows on savings ratio and economic growth in developing countries is inconclusive.

Griffin and Enos (1970) regressed the growth rates in 12 Latin American countries on foreign aid and found a negative correlation. Especially with respect to the relationship between the level of external debt and economic growth indicators in the borrowing LDCs Nikbakht (1982) found that the values of economic growth indicators such as GDP growth rate, incremental capital-output ratio (ICOR), and export growth rate are not necessarily in the favor of the high borrowing LDCs. In contrast, some other studies based on time-series
and cross-country data for some Asian countries showed that foreign capital had contributed substantially to GDP growth (Dowling and Hiemenz, 1982, and Gupta, 1975). However, some cross-country studies including Gulati (1978) showed that the growth impact of foreign capital inflows varied among recipient countries.

Several works have been done to analyze the differential growth effects of foreign capital inflows in a disaggregated form. Papanek (1973) and Gupta (1975), both using cross-section data for the 1960s on LDCs, tried to analyze the differential growth effects of the main components of foreign capital inflows, i.e., aid, foreign private investment, and other foreign flows. Both found that foreign capital inflows in aggregate are positively related with the rate of growth. However, their findings about the differential growth effects of the components were different. Gupta found that foreign private investment has a greater effect than other forms of foreign inflows, while Papanek found foreign aid has the maximum effect. Go (1985) investigated the differential effects of seven disaggregated components of foreign capital inflows on investment using pooled time-series data for 13 Asian developing countries for the 1968-1982 period. The results indicate that official transfers have the greatest investment-augmenting effect, whereas long-term and short-term borrowing and private transfers were found to have lower investment propensities. Kangwanpornsiri (1985) attempted to find the differential growth impact of individual components of aggregate

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9Foreign capital inflows in Go (1985) are disaggregated into private and official unrequited transfers, long-term and short-term borrowing, private direct investment, and debt and equity service outflows.
saving, i.e., household saving, private business and public saving, using a macroeconomic model fitted to Thai data, she found that household saving had the largest growth effect.

In contrast with empirical findings for the borrowing LDCs in general, empirical studies for the case of Korea reach a consensus that foreign capital inflows in aggregate have been positively related with the rate of income growth in Korea.

Using a macroeconomic model with strong emphasis on the supply side, Yoon (1971) attempted to analyze the impact of long-term foreign capital imports on various economic aspects including the growth of GNP for the period 1953-1969. His macroeconometric model is divided into five submodels10 and contains 27 stochastic equations and 20 identities. Based on the model in which a strong emphasis is put on the aggregate supply side, his study concludes that long-term foreign capital inflows in Korea contributed positively to (a) GNP expansion, (b) employment, (c) price stabilization, and (d) the economy's attainment of a self-sufficient capacity. However, he asserts that those foreign capital imports did not contribute to an increase in net foreign exchange earnings. Nikbakht (1982) also found a strong, positive linear and logarithmic relationship between the level of external borrowing of Korea and major economic growth indicators using data for the 1963-1979 period.

In analyzing the effects of foreign capital inflows on the recipient economy previous works attempted to introduce actively the

10Production submodel, aggregate domestic demand submodel, foreign trade submodel, wage rate and employment of labor submodel, and monetary and fiscal submodel.
variables of foreign capital inflows in the relevant equation. In particular including foreign capital inflows in investment function was attempted by Yoon (1971), Papanek (1973), Gupta (1975), Leff and Sato (1975), Go (1985), and Ramstetter (1986). Yoon and Ramstetter viewed foreign capital inflows as part of capital stock. Other approaches stemmed from the recognition that foreign capital inflows provide an additional source of investable resources. The introduction of foreign capital stock in trade functions was attempted by Yoon (1971), Kojima (1985) and Ramstetter (1986) also viewed trade flows as a function of foreign direct investment.\(^\text{11}\)

Some works tried to estimate the induced increase in gross national products by Korea's external borrowing. Based on the sample survey data for 521 foreign-capital-using companies, Cha (1983) found that 9.6 percent of the increase in GNP during 1972-1980 was realized by external borrowing. The Bank of Korea (1984) also attempted to estimate the growth effect of external debt, using ICOR for the whole economy and foreign savings ratio based on a simple Harrod-Domar growth model. The results show that the effect of external debt on the growth rate of real GNP was 2.6 percent point out of 8.2 percent, the average annual growth rate during the period 1962-1983.

In spite of the positive growth effects of Korea's external

\(^{11}\)As a theoretical underpinning for doing this, Ramstetter uses Kojima's "structural change driven" theory for viewing both multilateral and bilateral trade flows as a function of all investment. Here investment determines the structures of trade flows (determined by production and demand structures of exportables and importables) which in turn determine trade flow levels. See Ramstetter (1986), p. 11.
debt, the evidence on the relationship between the foreign capital inflows and the national savings ratio appears to be inconclusive.

Using a savings function where gross national saving in constant term is explained by GNP and foreign saving expressed in constant term Yoon (1985) found a negative coefficient of foreign saving fitted to annual time-series data for the period 1960-1983 but a positive one for the period 1960-1969. Based on his findings he argues that the competitive nature of foreign saving with domestic saving became clear in the latter period of economic development in Korea. By contrast, Cha (1983) found a positive correlation between gross national saving and foreign savings expressed, respectively, in the form of the ratio to GNP for the period 1962-1981. Furthermore, Yusuf and Peters (1984) found a negative but statistically insignificant relationship between gross national income and foreign savings in a saving function where the rate of gross national income, inflation rate, real interest rate and foreign capital inflows are included as explanatory variables.

As reviewed above, most empirical studies applied to the case of Korea focused their attention on the quantitative aspect of foreign capital inflows in aggregate terms and its impact on GNP growth rate in models where the effects of foreign capital on the supply side of the economy are strongly emphasized.

3.4 Summary

In this chapter the theoretical contributions and empirical evidence on the foreign capital inflows and their impacts on the
growth of recipient economy were briefly reviewed. Since no general model is available which can treat various aspects in a unified manner, it is very difficult to draw a grand conclusion from the above discussion. Instead, it may be summarized briefly in the following three points.

(1) In the two-gap theory foreign capital inflows contribute to economic growth by relaxing two bottlenecks: the shortage of domestic savings and of foreign exchange. However, some radical views assert foreign capital inflows substitute domestic savings and endanger economic growth in the long-run. This assertion of the negative relationship between domestic saving and foreign capital inflow can be explained with the fact that non-investment uses of foreign savings achieve a more efficient intertemporal allocation of consumption. Further, the possibility of credit fungibility can be a source of non-investment uses of foreign savings. Finally, a borrowing country will not face a debt servicing problem as long as the marginal product of borrowed funds is larger than the marginal cost of borrowing.

(2) With respect to the effect of foreign capital inflow on the term of trade, theories have not shown any conclusive direction in which the terms of trade would move with exogenous inflow of foreign capital. However, the monetary approach to the balance of payments suggests that variations in the overall balance due to foreign capital inflow change the monetary base and, further, affect the money supply which in turn influences the real sector.

(3) Empirical studies on Korea show that foreign capital inflows have been positively related with the rate of income growth,
whereas empirical evidence for the borrowing LDCs in general has been inconclusive. Studies for Korea, however, focused their attention on the relationship between foreign capital inflows in aggregate and GNP growth in models where the effects of foreign capital on the supply side of the economy are strongly emphasized. Furthermore, they paid little attention to the indirect growth impacts of foreign capital through its influences on money supply or price level, and to the different growth effects of various components of external finance.
CHAPTER IV
FORMULATION OF AN ECONOMETRIC MODEL

4.1 Characteristics of the Model

In this chapter an econometric model is constructed in order to test the research hypotheses raised in section 1.2.

The model assumes a small open economy where the government exerts a substantial influence over various economic aspects. A short outline of the main characteristics of the model is as follows:

First, income is determined by the demand side in this model, while the supply capacity is adjusting to demand. The rationale behind this is based on the historical review of the pattern of Korea's economic development. That is, in Korea the government's ambitious investment plans have induced an excess demand over the available supply and worked as a momentum for rapid economic growth. In such disequilibrium situations, equilibrium has been restored mostly by raised supply, not by restricted demand.¹

Secondly, variables relating to foreign capital imports are explicitly introduced in the equations for the demand side such as private consumption, gross investment, exports and imports. Furthermore, foreign capital imports (net) are disaggregated into

¹Scitovsky (1985), pp. 250-254. Scitovsky asserts that in such disequilibrium situations three things helped to restore equilibrium; an increase in domestic supply mainly through increased utilization of exiting production capacity, an additional inflow of foreign capital, and a worsening balance of payments.
three main components: long-term borrowing, short-term borrowing and other net foreign inflows (aid, foreign direct investment and other unidentified inflows). Reasons for disaggregation of foreign capital inflows into these three components, treating each of them as a separate independent variable in the model, are:

1) As reviewed in section 2.2, inducement of foreign capital inflows has been controlled in direct or indirect ways by the government to attain internal and external balances. Accordingly, external borrowing and other forms of external financing should be considered as policy variables rather than endogenous ones in the model.

2) External financing inflows can be dichotomized into external debt and other inflows including aid and foreign direct investment. The former generates the burden of interest payment and principal repayment whereas the latter does not.

3) Furthermore, external debt which accounts for about 90 percent of total foreign capital induced during last two decades can be divided into long-term debt and short-term debt. Long-term debt and short-term debt are different in their use and inducement procedures (section 2.3). Long-term debt, with a maturity of more than one year, is used for the purpose of industrial investment, while short-term debt is usually used for relieving shortage of foreign exchange arising from trade settlements or for building-up international reserves. In addition, inducement of long-term debt has been in most cases strictly controlled under the Foreign Capital Inducement Law, while short-term debt has been rather encouraged under the Foreign Exchange Control Law especially since the end of
the 1970s (section 2.2 and 2.3).²

Thirdly, in this model, the Keynesian-oriented real sector approach is modified to account for monetary effects. This is to investigate the indirect effects of foreign capital inflows on the level of economic growth through their impact on the money market and price level. External borrowing along with other forms of foreign capital imports affect directly net foreign assets held by the central bank and affects the money supply through the money multiplier. Therefore, the overall growth effects of foreign capital inflows consist of the direct effect on the real sector and the indirect effect through the monetary sector of the economy.

Finally, given the fact that the government's direct controls have been prevalent in the economy, the model is not designed to be a full-fledged econometric model in which equilibrium is restored. However, if a disequilibrium situation occurs due to an excess effective, three things are expected to help to restore equality between supply and demand. First, domestic supply responds to an increase in demand through increased utilization of production capacity.³ Second, planned foreign capital inflows are expected to increase to meet the excess demand. Finally, to the extent that those two sources of additional supply are insufficient, the

²Oh (1985), pp. 33-34.

³The importance of increased utilization of capacity as a source of additional supply in Korea was pointed out by Kim and Kwon (1977) and Scitovsky (1985). Especially, Kim and Kwon asserted that the rate of capacity utilization in Korea increased at an annual growth rate of 8 per cent between 1962-1971, and accounted for 25 percent of the total growth of manufacturing output (Kim and Kwon, p. 13).
pressure of the remaining excess demand raises domestic price level.

Since the present model puts emphasis on the role of external finance in a small open economy, every relevant equation in the system is partially explained by external borrowing and other foreign capital inflows. The basic flow mechanism of the model is shown in Figure 4.1. The target amounts of long-term borrowing, short-term borrowing and other foreign capital inflows are determined by government planners on the basis of the overall economic plan. As a first step, foreign capital inflows affect directly gross investment, private consumption, imports and exports.

External financing inflows influence the money sector by changing net foreign assets held by the central bank. Further, the expanded money supply affects private consumption and increases the demand. Next, increased capacity utilization is assumed to respond to the demand. The price level is affected by the rate of capacity utilization in the non-primary sector and exogenous factors such as wage rate and import prices. Finally the raised price level affects all the factors on the demand side by changing the real money supply and relative prices.
Figure 4.1 Block Diagram of the Model
4.2 Specification of the Model

The model is composed of four blocks (a) GNP block, (b) monetary block, (c) price block and (d) balance of payments block. These four blocks contain altogether 8 behavioral equations and 8 identities.

4.2.1 GNP Block

4.2.1.1 GNP Identities

Gross national product (GNP) measured in real term is determined as the sum of private consumption (CON), government consumption (GC), gross investment (I) and net exports (exports, GX minus imports, GM), all measured in real term. (Except for the lagged variables, the time subscript for the present period is omitted)

\[(4.1) \quad GNP = CON + I + GC + GX - GM\]

The economy is divided into two sectors, the primary sector (agriculture, fishing and forestry) and the non-primary sector (mining and manufacturing, social overhead capital and service). Accordingly, the real gross national product is divided into two parts, GNP originating in the primary sector (GNPA) and GNP originating in the non-primary sector (GNPNA). However, the former is assumed to be exogenous since it depends greatly on natural conditions. Thus, GNPNA measured in real term is expressed as:

\[(4.2) \quad GNPNA = GNP - GNPA\]
4.2.1.2 Private Consumption Function

As a determinant of real private consumption (CON), GNP is chosen on the basis of the Keynesian income hypothesis. Next, the real money supply (money supply, MS, divided by GNP deflator, PGNP) is chosen, as a proxy for wealth, taking into account that a change in real liquid assets affects consumption behavior. In addition, two disaggregated forms of net foreign capital flows except for long-term debt, i.e., short-term borrowing (SEB) and other foreign inflows (OFCI) expressed in real domestic currency are included in the consumption function.

\[
(4.3) \quad \text{CON} = f_1(\text{GNP, MS/PGNP, SEB*ER/PGNP, OFCI*ER/PGNP}) + u_1
\]

\[
f_{11}>0, f_{12}>0, f_{13} \leq 0, f_{14} \leq 0
\]

where ER is official exchange rate of domestic currency for the U.S. dollar and u is an error term.

The government consumption is treated as an exogenous variable.

4.2.1.3 Investment Function

The investment function is specified for total investment. The specification of the investment function is partly based on the flexible accelerator hypothesis. The basic notion behind the flexible accelerator hypothesis is that the larger the gap between the existing capital stock and the desired capital stock, the greater the investment. An investment function based on this

\[^4\text{Zellner and Chow (1965).}\]
hypothesis is expressed as a function of capital stock at the end of last period \((K_{-1})\) and real output in current period (GNP).

In addition, to investigate whether various types of foreign capital imports have different investment propensities, three forms of net foreign capital imports, i.e., long-term borrowing (LEB), short-term borrowing (SEB) and other inflows (OFCl) expressed in real domestic currency, are included as explanatory variables. However, the signs of partial derivatives of disaggregated external financing inflows in investment function are not necessarily positive as these resources are fungible and substitutable.\(^6\)

Finally two dummy variables are included to detect the impacts of exogenous economic and political shocks on investment behavior. The first dummy variable \((D1)\) represents the 1974-1975 period, the first oil shock. The second dummy \((D2)\) stands for the 1979-1980 period when the second oil shock occurred and severe political instability followed the assassination of the president in Korea. The coefficients of these dummy variables would have a negative sign. They may, however, have a positive one if those external shocks were accompanied by a boom in investment as suggested by Sachs.\(^7\)


\(^6\)A negative sign is possible under such a circumstance in which the foreign capital took the form mainly of takeovers and the released domestic funds were not reinvested and in which, at the same time, there were competitive cutbacks in indigenous investment, rather restrictive conditions. Refer to Areskoug (1976), pp. 541-542.

\(^7\)Sachs asserts that the dominant determinants of current account movements after 1973 in the developing economies were shifts in investment rates. See Sachs (1981), p. 232.
Thus the gross investment function measured in real domestic currency is given as:

\[ I = f_2(GNP, K_{-1}, LEB\epsilon ER/PGNP, SEB\epsilon ER/PGNP, OFC\epsilon ER/PGNP, \]
\[ D_1, D_2) + u_2 \]
\[ f_{21}>0, f_{22}<0, f_{23}=0, f_{24}=0, f_{25}=0, f_{26}<0, f_{27}<0 \]

Capital stock at the end of the present year \( (K) \) is defined as capital stock at the end of the last year \( (K_{-1}) \) plus gross investment minus depreciation during the current year \( (D) \).

\[ K = K_{-1} + I - D \]

Here, depreciation is assumed to be a constant proportion (depreciation rate, \( r \)) of capital stock at the end of previous period.

\[ D = rK_{-1} \]

Substituting (4.6) into (4.5) obtains:

\[ K = (1-r)K_{-1} + I \]

### 4.2.1.4 Required External Borrowing

External financing is needed when domestic absorption exceeds gross national output. Thus, equation (4.8) shows that the required amount of net external borrowing \( (NEB) \) measured in real domestic currency...
currency is equal to the difference between total absorption
(CON+I+GC) and gross national product, and other foreign capital
inflows.  

(4.8) \( \text{NEB} = (\text{CON}+I+\text{GC}) - \text{GNP} - \frac{\text{OFCI} \times \text{ER}}{\text{PGNP}} \)

\subsection*{4.2.2 Price Block}

GNP deflator (PGNP) as a comprehensive price index is expressed
as a function of the GNP deflator for the primary sector (PA) and
that for the non-primary sector (PNA), which is weighted,
respectively, by the ratio of GNP in each sector to total GNP.

(4.9) \( \frac{\text{PGNP}}{\text{PGNP}_{-1}} = \left( \frac{\text{GNPA}}{\text{GNP}} \right) \times \text{PA} + \left( \frac{\text{GNPNA}}{\text{GNP}} \right) \times \text{PNA} \)

GNP deflator for the primary sector is treated as an exogenous
variable because the prices of major products in primary sector are
greatly affected by natural conditions and controlled to a
substantial extent by the government.

As Korea suffered from a high rate of inflation due to
demand-pull pressure and cost-push pressure mainly caused by rapid
increase in the prices of imported goods, the GNP deflator for the
non-primary sector is specified as a function of the following
explanatory variables; a change in the capacity utilization rate in
the non-primary sector \((\text{CAP}/\text{CAP}_{-1})\), a change in GNP deflator for
import goods \((\text{PM}/\text{PM}_{-1})\) adjusted by effective exchange rate\(^9\), a

change in wage rate \((W_L/W_{L-1})\) and two dummy variables \((D_1, D_2)\) representing the first and second oil shocks. Here, all the explanatory variables except the capacity utilization rate are considered as exogenous variables.\(^{10}\)

\[(4.10)\ PNA/PNA_{-1} = f_3(CAP/CAP_{-1}, P(ER+TAR)/P_{-1}(ER_{-1}+TAR_{-1})),
(W_L/W_{L-1}, D_1, D_2) + u_3
\]
\(f_{31} < 0, f_{32} > 0, f_{33} > 0, f_{34} > 0, f_{35} > 0\)

The rate of capacity utilization, \(CAP\) is measured as the ratio of actual real GNP in the non-primary sector \((GNP_{NA})\) to the potential output in that sector \((GNP_{PN})\). Here, the potential output is defined as the maximum level of output which the non-primary sector can produce under full utilization of its labor and capital stock. The potential output in the non-primary sector is estimated in a sub-model presented in the Appendix and used as an exogenous variable in the main model.\(^{11}\)

\[(4.11)\ CAP = GNP_{NA} / GNP_{PN}\]

\(9\) The effective exchange rate is equal to the official exchange rate, \(ER\), plus import tariff, \(TAR\) for a dollar's worth of import.

\(10\) The wage rate is taken as an exogenous variable because it tends to be rigid in an economy where an over-supplied labor market exists and the workers' collective bargains are not allowed freely.

\(11\) Methods to measure the potential output are discussed in Klein and Preston (1957), Kuh (1966) and Bank of Korea (1975).
4.2.3 Balance of Payment Block

Total exports can be disaggregated into two main components; commodity exports including non-factor services such as receipt of freight and insurance (BXC) and factor service exports (BXS). Factor service exports are treated as exogenous because a large portion of factor service exports has depended on the construction boom in the Middle East.

For the commodity and non-factor service export function, the purchasing power parity, i.e., the ratio of foreign price\(^{12}\) to domestic price (PGNPW/PGNP), is chosen first as an explanatory variable. Next, exports in the previous period (BXC\(_{-1}\)) are taken as a proxy for supply capacity in the exporting sector. In addition, three disaggregated kinds of foreign capital inflows are introduced in the export function as foreign capital inflows have been heavily invested in the export sector under the Korean government's export-led growth strategy and contributed to the diversification of the commodity composition of Korea's exports in favor of more sophisticated, high value-added industrial goods. As long-term external borrowing and foreign direct investment are usually invested in fixed capital formation while short-term external borrowing is used as working capital, mainly in the form of trade credit, commodity exports are assumed to be associated with the flow of short-term borrowing (SEB) but with the cumulative summation of

\(^{12}\text{The foreign price means the price level in the rest of the world. The weighted average GNP deflator, by the trade share, of two major trade partners of Korea (the United States and Japan) is used as a proxy for the foreign price.}\)
long-term external borrowing (SLEB) and other foreign capital inflows (SOFCl). The partial effects of disaggregated foreign capital are expected to be indeterminate.\textsuperscript{13} Thus the commodity exports (BXC) measured in current U.S. dollars is:

\[
(4.12) \quad BXC = f_4(\text{PGNPW}/\text{PGNP}, \text{BXC}_{-1}, \text{SEB}, \text{SLEB}, \text{SOFCl}) + \epsilon_4
\]

\[f_{41} > 0, f_{42} > 0, f_{43} \leq 0, f_{44} \leq 0, f_{45} \leq 0\]

Total import function with variables measured in current U.S. dollar is specified in (4.13). Since imports are assumed infinitely elastic at given world prices, they depend only on domestic demand conditions such as the relative price of foreign to domestic goods (PGNPW/PGNP), current income (GNP), and three kinds of foreign capital inflows. Further, imports in the previous period, \text{BMC}_{-1}, are chosen as another explanatory variable as an increase in imports is affected by a target amount of imports. In addition, two oil shock dummy variables, \text{D1} and \text{D2}, are included on the assumption that two oil shocks aggravated Korea's import bill.

\textsuperscript{13}The impacts of foreign capital on imports (exports) depends on the relationship between 1) the aggregate marginal product of capital multiplied by the marginal propensity to demand for importables (exportables) and 2) the marginal product of capital in the importable (exportable) sector. In general, it would seem reasonable to expect the marginal product of capital is higher in the importable and exportable sectors than in the aggregate (because foreign competition is thought to increase efficiency) and to expect the partial effect of foreign capital to be negative in the import case and positive in the export case. However, the relationship between marginal products may not conform to this expectation for various reasons. See Ramstetter (1986), pp. 13-14.
\[(4.13)\quad \text{BMC} = f_5((\text{PGNP}/\text{PGNP}, \text{GNP}/\text{PGNP}/\text{ER}, \text{BMC}_{-1}, \text{LEB}, \text{SEB}, \text{OFCI}, \\
\quad \text{D1, D2}) + u_5) \\
\quad f_{51}<0, f_{52}>0, f_{53}>0, f_{54} \leq 0, f_{55} \leq 0, f_{56} \leq 0, f_{57}>0, \\
\quad f_{58}>0\]

We need two equations, \((4.14)\) and \((4.15)\) for conversion of exports and imports expressed in current dollar term into exports \((GX)\) and imports \((GM)\) as components of GNP base expressed in real domestic currency. The one-year-lagged dependent variable in each equation is included to reduce serial correlation.

\[(4.14)\quad GX = f_6((\text{BXC}_{-1}-\text{BXS})/\text{PX}, \text{GL}_{-1}) + u_6 \\
\quad f_{61}>0, f_{62} \leq 0\]

where \(\text{PX}\) is a GNP deflator for exports.

\[(4.15)\quad GM = f_7(\text{BMC}/\text{PM}, \text{GM}_{-1}) + u_7 \\
\quad f_{71}>0, f_{72} \leq 0\]

where \(\text{PM}\) is a GNP deflator of imports.

Now, with the assumption that factor service exports \((\text{BXS})\) and transfer balance \((\text{BTR})\) are exogenous, the current account balance \((\text{BCB})\) measured in current U.S dollar can be expressed as:

\[(4.16)\quad \text{BCB} = (\text{BXC}-\text{BXS}) - \text{BMC} + \text{BTR}\]
4.2.4 Monetary Block

The money market is assumed to be characterized as a disequilibrium market where a chronic excess demand for money is prevalent. This assumption can be justified by the fact that the speculative demand for money in Korea has been highly elastic due to controlled interest rates at low levels\textsuperscript{14} and, in addition, the precautionary and transaction demand motives of holding money have been very high due to rapid increases in income level. Under this disequilibrium situation with an excess demand for money, the money market is constrained by the supply of money.

Money supply (MS) is defined as the monetary base (MB) multiplied by the money multiplier (MUL):

\begin{equation}
MS = MB \times MUL
\end{equation}

The monetary base (MB) measured in current domestic currency is composed of the central bank claims on the private sector (DCK), claims on the government (GCK), net foreign assets held by the central bank (NFAK) and its other assets (OAK).

\begin{equation}
MB = DCK + GCK + NFAK + OAK
\end{equation}

\textsuperscript{14}The interest rates in Korea have been kept at low levels by the monetary authority for the purpose of stimulating investment and enhancing the international competitiveness of domestic companies. Refer to Kim (1984), p. 6.
Substituting (4.18) into (4.17) we obtain:

\[(4.19) \; MS = (DCK+GCK+NFAM+OAK) \times MUL\]

In (4.19) DCK and GCK are treated as policy variables as their sizes are determined by the government through interest rates policy in the case of the former and tax policy in the case of the latter. And OAK is assumed to be an exogenous variable.

Net foreign assets are held by all the monetary institutions which consist of the central bank, domestic commercial banks, specialized banks and foreign bank branches under the foreign exchange control system in Korea.\(^{15}\) A change in net foreign assets held by the monetary institutions (NFAM) equals to the overall balance of payments (OBP) during the period. That is, it equals the sum of the trade deficit \((BXS-BMC)\) and net foreign capital inflows initiated by the non-monetary sectors. The latter equals net capital inflows \((LEB+SEB+OFCI)\) minus external borrowing by the monetary institutions\(^{16}\)(EBB). Thus, net foreign assets held by the monetary institutions measured in domestic currency is:

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\(^{15}\)By the Foreign Exchange Control Law promulgated in 1961, all the residents had to sell the foreign exchange for domestic currency to the foreign exchange banks or the central bank. Since 1980, this regulation became less restrictive to allow them to hold foreign exchange to some extent in the form of deposit.

\(^{16}\)External borrowings by the monetary institutions (e.g., bank loan or refinance) change the foreign assets as well as the foreign liabilities by the same amount, and exert no influence on their net foreign assets.
\[(4.20) \quad \text{NFAM} - \text{NFAM}_{-1} = \text{OBP} \times \text{ER} = ((\text{BXC} + \text{BXS} - \text{BMC}) + (\text{LEB} + \text{SEB} + \text{OFCl} - \text{EBB})) \times \text{ER}\]

Net foreign assets held by the central bank (NFAK) change in accordance with NFAM through the foreign exchange operation policy of the central bank.\(^{17}\) Accordingly, net foreign assets held by the central bank measured in current domestic currency are a function of two main components in NFAM (trade balance and total net capital imports by the non-monetary institutions) and one-year-lagged variable of itself: \(^{18}\)

\[(4.21) \quad \text{NFAK} = \delta_1 ((\text{BXC} + \text{BXS} - \text{BMC}) \times \text{ER}, (\text{LEB} + \text{SEB} + \text{OFCl} - \text{EBB}) \times \text{ER}, \text{NFAK}_{-1}) + \delta_2 + \delta_3 \leq 0\]

From the money supply function in (4.17), the money multiplier is taken as an exogenous variable.\(^{19}\)

\(^{17}\)The commercial banks which deal with foreign exchange business are required to keep a certain level of 'position', i.e., certain level of difference between the amount of foreign exchange bought from the residents and of that sold to them. Consequently, the change in overall balance is solely reflected in change in the net foreign assets held by the Bank of Korea if strict regulation of the 'position' is imposed on the commercial banks. Bank of Korea (1977), pp. 104-109.

\(^{18}\)Taking a similar approach Cheong (1983, p. 33) specified NFAK as a function of current account balance, total capital account balance and NFAK in one period lag.

\(^{19}\)Money multiplier is expressed as:

\[\text{MUL} = (1 + \text{CU}) / (\text{CU} + \text{RE})\]

where \(\text{CU}\) is the ratio of currency demand by public to total deposits, and \(\text{RE}\) is the required reserve ratio to total deposits.

(Footnote continued)
4.3 Data Sources

The data needed for testing the model are time-series annual data from 1961 to 1981. The macroeconomic data and data for external financing inflows are available from the following statistical periodicals:

1) Bank of Korea, Economic Statistics Year Book
2) Economic Planning Board, Main Economic Indicators of Korea
3) Ministry of Finance, Fiscal and Financial Statistics

In order to measure the capital stock, net fixed capital stock estimates for 1968 (Han, 1970) and inventory stock estimates for that year based on The Survey of National Wealth (E.P.B., 1968) are used as a benchmark. The level of gross capital stock in each year is then obtained by subtracting (or adding) the net annual fixed capital formation and inventory investment from (or to) the benchmark.

4.4 Lists of Equations and Variables

19 (continued)
The variable RE is determined by the monetary authorities. Accordingly a rapid change in MUL is mainly due to the change in monetary policy since the variable CU is expected to be stable for a quite long period.

20 There is an inconsistency problem for fitting the model to data beginning with 1982 since the Bank of Korea changed the method of measuring GNP in 1982 and no past-series in GNP data based on the new measurement method have been not provided.
The complete system of simultaneous equations in this model are represented as follows:

4.4.1 Equations

<Behavioral equations>

(1) \[ \text{CON} = f_1(\text{GNP, MS/PGNP, SEB*ER/PGNP, OFCI*ER/PGNP}) + u_1 \]
   \[ f_{11} > 0, f_{12} > 0, f_{13} \leq 0, f_{14} \leq 0 \]

(2) \[ \text{I} = f_2(\text{GNP, K-1, LEB*ER/PGNP, SEB*ER/PGNP, OFCI*ER/PGNP, D1, D2}) + u_2 \]
   \[ f_{21} > 0, f_{22} < 0, f_{23} \leq 0, f_{24} \leq 0, f_{25} \leq 0, f_{26} < 0, f_{27} < 0 \]

(3) \[ \frac{\text{PNA}}{\text{PNA}_1} = f_3(\text{CAP/CAP}_1, \text{WI/WL}_1, \text{PH*(ER+TAR)}/\text{PH}_1*(\text{ER}_1+\text{TAR}_1), D1, D2) + u_3 \]
   \[ f_{31} < 0, f_{32} > 0, f_{33} > 0, f_{34} > 0, f_{35} > 0 \]

(4) \[ \text{BXC} = f_4(\text{PGNPW/PGNP, BNC}_1, \text{LEB, SEB, SOFCI}) + u_4 \]
   \[ f_{41} > 0, f_{42} > 0, f_{43} \leq 0, f_{44} \leq 0, f_{45} \leq 0 \]

(5) \[ \text{BMC} = f_5(\text{PGNPW/PGNP, GNP*PGNP/ER, BMC}_1, \text{LEB, SEB, OFCI, D1, D2}) + u_5 \]
   \[ f_{51} < 0, f_{52} > 0, f_{53} > 0, f_{54} \leq 0, f_{55} \leq 0, f_{56} \leq 0, f_{57} > 0, f_{58} > 0 \]

(6) \[ \text{GX} = f_6((\text{BXC-BXS})*\text{ER/PG}, \text{GX}_1) + u_6 \]
   \[ f_{61} > 0, f_{62} \leq 0 \]

(7) \[ \text{GM} = f_7(\text{BMC*ER/PH, GM}_1) + u_7 \]
   \[ f_{71} > 0, f_{72} \leq 0 \]

(8) \[ \text{NFAX} = f_8((\text{BXC-BXS-BMC})*\text{ER, NFAX}_1, (\text{LEB*SEB*OFCI-EBB})*\text{ER}) + u_8 \]
   \[ f_{81} > 0, f_{82} > 0, f_{83} > 0 \]

<Identities>

(9) \[ \text{GNP} = \text{CON} + \text{I} + \text{GC} + \text{GX} - \text{GM} \]

(10) \[ \text{GNPNA} = \text{GNP} - \text{GNPA} \]

(11) \[ \text{K} = (1-r)K_{-1} + I \quad (r = 0.0264421) \]

---

21 The estimation result of r, using annual time-series data over the period 1961-81, is as follows:
\[ D = 0.0264421 K_{-1} \]
\( (t \text{ value: 0.997}) \quad R^2=0.958, \quad D.W.=2.03 \)
(12) \( \text{NEB} = (\text{CONS} + \text{GC}) - \text{GNP} - \text{OFCE} \times \text{PGNP} \)

(13) \( \text{PGNP} = (\text{GNPNA/\text{GNP}}) \times \text{PA} + (\text{GNPNA/\text{GNP}}) \times \text{PGA} \)

(14) \( \text{CAP} = \text{GNPNA/\text{GNPPN}} \)

(15) \( \text{BCB} = \text{BXC} + \text{BXS} - \text{BMC} + \text{BTR} \)

(16) \( \text{MS} = (\text{DCX} + \text{GCK} + \text{NFAK} + \text{OAK}) \times \text{MUL} \)

### 4.4.2 Variables

**<Endogenous variable: 16>**

- \( \text{GNP} \): Gross national product (in bil. won in 1975 price)
- \( \text{GNPNA} \): GNP in the non-primary sectors ("")
- \( \text{CONS} \): Private consumption expenditure ("")
- \( \text{I} \): Gross investment ("")
- \( \text{GH} \): Gross investment ("")
- \( \text{GM} \): Total imports on GNP basis ("")
- \( \text{NEB} \): Required net external borrowing ("")
- \( \text{K} \): Capital stock ("")
- \( \text{PGNP} \): GNP deflator (1975=1.0)
- \( \text{PNGA} \): GNP deflator for the non-primary sectors ("")
- \( \text{CAP} \): Capacity utilization rate in the non-primary sector (index)
- \( \text{BXC} \): Exports of goods on B.O.P. basis (in bil. U.S. dollars)
- \( \text{BMC} \): Total imports on B.O.P. basis ("")
- \( \text{BCB} \): Current account balance ("")
- \( \text{MS} \): Money supply, \( M_2 \) (in bil. current won)
- \( \text{NFAK} \): Net foreign assets held by the B.O.K ("")

**<Exogenous policy variables: 11>**

- \( \text{LEB} \): Net long-term external debt (in bil. U.S. dollars)
SLEB : Cumulative sum of LEB ( )
SEB : Net short-term external debt ( )
OFCI : Net other foreign capital inflows, i.e., the sum of net transfer balance, net foreign direct investment, net portfolio investment, and errors and omissions ( )
SOFCI : Cumulative sum of OFCI ( )
EBB : External borrowing by the monetary institutions ( )
DCK : B.O.K's net claims on private sector (in bil. current won)
GCK : B.O.K's net claims on government sector ( )
RE : Required reserve ratio to total deposits (in percent)
ER : Official exchange rate (in won per U.S. dollar)
TAR : Tariff rate for one dollar worth of imports (in won)

<Exogenous variables: 14>

GNPA : GNP in the primary sectors (in won in 1975 price)
GNPPN : Potential GNP in the non-primary sector ( )
GC : Government consumption and statistical discrepancy in the measurement of GNP ( )
PA : GNP deflator for the primary sectors (1975=1.0)
PX : GNP deflator for total exports ( )
PM : GNP deflator for total imports ( )
PGNFW : GNP deflator in foreign country, weighted average GNP deflator, by trade share, of two major trade partners, Japan and the United States ( )
BTR : Transfer Balance (in bil. U.S. dollars)
BXS : Exports of Services on B.O.P. basis ( )
WI : Index of wage rate (1980=1.0)
MUL : Money multiplier, i.e., $M_2$ divided by monetary base

OAK : B.O.K.'s other net assets than GCK, DCK and NFAK (bil. current won)

D1 : Dummy variable for the first oil shock period (1974-1975)

D2 : Dummy variable for the period of second oil shock and political instability (1979-1980)
CHAPTER V
DISCUSSION OF EMPIRICAL RESULTS

This chapter discusses empirical results obtained for the econometric model presented in the previous chapter. Since the equations in the model include composite variables consisting of several variables which should be estimated separately, the non-linear two-stage least squares method was used to estimate the model.\(^1\) Because the number of exogenous variables is larger than the number of observations the technique of principal components\(^2\) was used to reduce the number of instrument variables. In addition, in simulation of the model the Gauss-Seidel technique was used to solve the system.

The empirical findings are presented in the following three sections. The first section deals with empirical evidence on different effects of the three disaggregated external financing inflows on private consumption, investment, external trade, price and money supply. In the second section differential growth impacts of the financial components are analyzed through several ex post (or historical) dynamic policy simulations. Finally, the last section discusses the benefits and costs of external borrowing to evaluate

\(^1\)With respect to the detailed estimation procedure for a non-linear simultaneous system of equations, see SAS Institute Inc. (1982), pp. 277-318.

\(^2\)The principal component technique is a computational process in which a group of variables is reduced in number to a more fundamental set of variables. For more detailed theoretical background about principal components, see Johnston (1972), pp. 393-395.
Korea's debt servicing capacity within a growth-cum-debt context.

5.1 Effects of Disaggregated External Financing Inflows on the Demand-side Factors of GNP

As first step to estimate the model, individual equation was estimated to obtain the parameters. The presence of serial correlation in the estimation results of each equation was corrected by the Cochrane-Orcutt procedure. As next step, all the equations were estimated in a system based on the obtained parameters by the non-linear two-stage least squares method. The estimation results of the model are presented below for each equation. The number in parenthesis below each coefficient estimated is the t-value.3

5.1.1 Estimation Results of Private Consumption Function

Estimation results of private consumption function are:

\[
\text{CON} = 1,070.46700 + 0.45415 \text{ GRP} + 0.31644 \text{ MS/PGNP} + 0.71902 \\
\text{SSE/EPGR} + 0.59930 \text{ OFCIE/EPGR} \\
\text{R}^2 = 0.9983 \quad \text{D.W.} = 1.44
\]

Short-term borrowing expressed in real term has a positive relationship with private consumption and its coefficient is strongly significant at the 10 percent level. The sign of OFCIE, 

3Hypothesis testing in two-stage least squares is complicated by the unknown distributions. So the normal t and F tests are invalid. The unknown distributions with two-stage least squares, however, are interpreted here as being asymptotically normal since there exist no appropriate statistics for hypothesis testing in this case.
other foreign capital inflows (except for long-term debt) is also positive but extremely insignificant. These findings partially support the argument that external financing inflows have a direct substitution effect on domestic savings in Korea.

Real money supply is, however, found to have a significant and positive real balance effect on private consumption. In addition, the estimated marginal propensity to consume is highly significant and its size, 0.45 is consistent with the previous findings.4

5.1.2 Estimation Results of Investment Function

Empirical results of the estimation of gross investment function are:

\[
(5.2) \quad I = 432.36600 + 0.31201 \text{GNP} - 0.00905 \text{K}_{-1} \\
(0.86) \quad (4.65) \quad (-0.50)
\]

\[
+ 1.29613 \text{LEB}^* \text{ER/PGNP} - 3.76665 \text{SEB}^* \text{ER/PGNP} \\
(2.14) \quad (-4.44)
\]

\[
- 4.00360 \cdot \text{OCF}^* \text{ER/PGNP} + 847.39400 \text{D}_1 + 2,440.99600 \text{D}_2 \\
(-2.60) \quad (2.90) \quad (5.54)
\]

\[
R^2 = 0.9901 \quad \text{D.W.} = 2.33
\]

Three disaggregated external financing inflows are found to impart very different impacts on investment. Long-term borrowing has a significant and positive effect on gross investment. Its coefficient is larger than unity, which means that long-term debt tends to stimulate investment financed out of domestic savings. In contrast to this, both short-term and other forms of inflows have

4The empirical evidence on the estimation of consumption function in Korea shows that the estimated long-term marginal propensities to consume lie between 0.38 to 0.50 when GNP is used as explanatory variable. Chang (1983), pp. 136-138.
highly significant, negative impacts on investment. The size of their coefficients implies that these two types of external finance displace indigenous investment so that their net effect on gross investment is negative. This seems rather extreme and requires caution in interpretation of the results. However, specific economic conditions such as the existence of a huge non-regulated money market and the speculation boom on real estate which occurred through the 1960s and 1970s may explain this empirical evidence.

The non-regulated private money market, acting as a retail credit market for consumers and small businesses, where interest rates are three or four times higher than those in the regulated financial markets has increased the fungibility of financial resources. In addition, it is very likely that short-term borrowing and other forms of external financing inflows allow more room for fungibility of financial resources than long-term borrowing whose uses for investment purpose are designated from the beginning. Furthermore, the speculation boom on real estate might have played a role in shifting financial resources from investment uses to non-productive activities with high capital gain. The net negative effect of external finance on total investment can also be explained partially if capital inflows are highly import-generating and, in consequence, a demand shift from domestic goods to imported goods occurs. This is supported by empirical findings in the estimation of import equation discussed later.

The dummy variable, D1, for the first oil shock period

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(1974-1975) and the dummy variable, D2, for the period of the second oil shock and political instability (1979-1980) both have highly significant and positive impact on total investment. This means that investment activities in Korea during these two periods were rather encouraged by the government's ambitious investment plans than frustrated by the economic and social conditions. This finding also supports Sach's (1981) assertion that the current account deficit problem in the developing countries is mainly due to a boom in investment. That is, as reviewed in chapter II, a massive investment program particularly in the heavy and chemical industries, financed by foreign loans and preferential banks credit, was put in effect during those two oil shock periods.

Finally, the low and insignificant coefficient of one-year-lagged capital stock implies that the traditional flexible accelerator theory does not explain satisfactorily the investment behavior in Korea.

5.1.3 Estimation Results of Export Function

Estimation results of the export function are:

\[
(5.3) \quad E_{t} = -2.59340 + 0.79437 \frac{P_{GNPW}}{P_{GNP}} + 0.27601 \text{SLEB} \\
- 0.67644 \text{SEB} + 0.77726 \text{SOFCI} + 0.91804 \text{EIC}_t \\
R^2 = 0.9968 \quad \text{D.W.} = 2.10
\]

Empirical evidence shows that the effects of three disaggregated foreign capital inflows on exports vary. Long-term debt in the form of cumulative summation (SLEB) is found to have a positive effect on exports but the coefficient is statistically
insignificant at the 10 percent level. In addition, short-term borrowing has a negative impact on exports and, further, its coefficient is significant.\(^6\) This is likely in the case that the increase in exportable goods production with an increase in short-term borrowing has been overwhelmed by the increase in domestic demand for those exportable goods due to the income increase induced by short-term borrowing. This situation occurred in Korea during the latter half of the 1970s when a massive investment in the heavy and chemical industries created large income gains without immediate output gains. There emerged an excess demand for light industrial goods with excess capacity in heavy industries. Finally, in contrast to the cases of external borrowings, other foreign capital inflows are found to have a significant and positive relationship with export-expansion.

Besides external finance variables, one-year lagged exports, used as a proxy for production capacity in the exporting sectors, have a significant positive impact on exports. The coefficient of the relative price of foreign to domestic price has a positive sign conforming to a priori expectation but are not statistically significant at the 10 percent level.

5.1.4. Estimation Results of Import Function

Empirical results of the estimation of import function are

\(^6\)A negative relationship between short-term borrowing and exports can be explained in a different way such as low exports cause high inflows of short-term debt. This study, however, views that the causality flows from external borrowing to exports since short-term debt is induced by private borrowers, not by government authority, as a by-product of trade transactions or foreign bank inter-office transaction.
presented in (5.4).

(5.4) \quad \text{BMC} = -1.37926 - 0.02479 \text{PNFW}/\text{PGNP} + 0.12326 \text{GNP}/\text{PGNP}/\text{ER} \\
\text{(2.47)} \quad \text{(0.12)} \quad \text{(4.00)} \\
- 0.58961 \text{LEB} - 1.5331 \text{SEB} + 4.99666 \text{OFCI} \\
\text{(-0.99)} \quad \text{(-2.65)} \quad \text{(4.57)} \\
+ 1.01561 \text{BMC}_1 + 1.25261 \text{D1} + 3.64243 \text{D2} \\
\text{(10.54)} \quad \text{(2.81)} \quad \text{(2.88)} \\
R^2 = 0.9994 \quad \text{D.W.} = 3.02

Both short-term and long-term borrowings have a negative sign but only the coefficient of short-term debt is significant. This means that the import-substituting effect of external borrowing, especially short-term debt, through raising the supply of importable goods is larger than its import-generating effect. In contrast, other capital inflows are found to have a highly significant positive impact on imports, implying that the import-generating effect of other capital inflows exceeds their import-substituting effect. This result is partially supported by the finding in Cha (1983) that foreign-investment companies in Korea have much deeply depended on imported intermediate goods compared with foreign-borrowing companies or with other domestic companies. 7

Current income, imports with one-year lag, and two oil-shock dummies have a significant positive effect on imports. The ratio of

7Based on the sample survey data for 521 foreign-capital-using companies in Korea, his study shows that the ratio of intermediate goods imports by foreign-investment companies to their total domestic products was 33 percent at the end of 1980 whereas the ratio for foreign-borrowing companies was 24 percent and, furthermore, that for total domestic companies was 14 percent at the end of the same year.
foreign to domestic price has a negative sign as expected but is not statistically significant as in the case of exports.

5.1.5 Estimation Results of Net Foreign Asset Function

Estimation results of the function for net foreign assets held by the Bank of Korea are given below:

\[
(5.5) \quad \text{NFA}_{k} = -59.99400 + 0.44328 (\text{BEX} - \text{BXS} - \text{BMC})\cdot \text{ER} \\
\quad (-1.49) \quad (6.38) \\
+ 0.76699 (\text{LEB} + \text{SEB} + \text{OFCT} - \text{EBB})\cdot \text{ER} + 1.07372 \text{NFA}_{k-1} \\
\quad (5.51) \quad (10.70) \\
R^2 = 0.9998 \quad \text{D.W.} = 2.56
\]

Both trade balance and net foreign capital inflows by private sectors have a positive sign and their coefficients are highly significant. Furthermore, the empirical evidence suggests that net foreign capital inflows have a greater positive effect on the level of net foreign assets than the trade balance does.

5.1.6 Estimation Results of Non-primary Sector GNP Deflator Function

Regression results of the function for the change in GNP deflator in the non-primary sector are presented as follows:

\[
(5.6) \quad \text{PNA/PNA}_{1} = 1.08576 - 0.26855 \text{CAP/CAP}_{1} + 0.20753 \text{WI/WL}_{1} \\
\quad (4.78) \quad (-1.26) \quad (2.79) \\
+ 0.07205 \text{PMC(ER+TAR)}/\text{PM}_{1}(\text{ER}_{1}+\text{TAR}_{1}) \\
\quad (2.79) \\
+ 0.05658 D1 + 0.03965 D2 \\
\quad (3.41) \quad (3.57) \\
R^2 = 0.9998 \quad \text{D.W.} = 2.56
\]

The signs of all the explanatory variables conform with a
priori expectation. Changes in wage index and GNP deflator for import goods adjusted by exchange rate and tariff and two dummies have especially a highly significant positive impact on price increases in the non-primary sector. In contrast, an increase in capacity utilization rate alone has a negative sign. However, its coefficient is insignificant at 10 percent level even though it exceeds its standard error. The empirical evidence thus suggests that price increases in the non-primary sector in Korea have been more influenced by cost-push factors than by demand-pull pressure.

5.1.7 Estimation Results of Trade Conversion Functions

Finally, estimation results of the two equations for conversion of exports and imports on the balance of payment base into those on GNP base expressed in real domestic currency are presented as follows:

\[(5.7)\]  
\[G_X = 13.83176 + 0.99568 \left(\frac{\text{BEC+BSX}}{\text{ER/PX}}\right) + 0.00836 \text{G}_{X-1}\]  
\[R^2 = 0.9999 \quad \text{D.W.} = 0.93\]

\[(5.8)\]  
\[G_M = 6.05507 + 0.96543 \left(\frac{\text{BEC+BSM}}{\text{FM}}\right) + 0.03129 \text{G}_{M-1}\]  
\[R^2 = 1.0000 \quad \text{D.W.} = 1.36\]

Exports (or imports) on GNP base are obtained from the external transaction sheet which is formed through the reclassification of exports (or imports) on the balance of payment base. The estimated coefficients in (5.7) and (5.8) show that the amount of exports (or imports) on BOP base is roughly equal to that on GNP base when it is
simply expressed in real Korean won.

5.2 Differential Growth Effects of Disaggregated External Financing Inflows Through Dynamic Simulation

This section discusses empirical evidence on the differential effects of the three external capital inflows on the real GNP through ex post (or historical) dynamic policy simulations. Three ex post policy simulations, SIM.LEE, SIM.SEB and SIM.OFCI are performed in order to investigate the corresponding changes in the real GNP and its main demand-side factors with an increase in each of the three components of foreign capital inflows.

Since the model consists of a system of non-linear equations, the dynamic multipliers in policy simulation will differ according to the size of the variation of a policy variable as well as the starting values of all endogenous variables, i.e., the selection of the starting year. Two sets of simulations were carried out; the first set of individual policy simulations beginning in 1965 and ending in 1971 (CASE65), and the second set beginning in 1975 and ending in 1981 (CASE75). The year of 1965 marks the beginning of the period in which Korea was in the early stage of development and on a high economic development with no debt servicing problem, whereas the year of 1975 marks the beginning of the period when the country began to emphasize economic growth with stability with an emerging external debt problem. In addition, all the estimated coefficients, whether significant or not, were left in the model when simulations were carried out.
Before performing policy simulations, a historical simulation running from 1961 to 1981 was performed to test the validity of the model and to obtain the base series of simulated values for the endogenous variables. In the simulation of the model the Gauss-Seidel method was used to solve the non-linear system.

5.2.1 Test of Model Validity

Even though each of the estimated equations presented in section 5.1 showed a good statistical fit, we have no guarantee that the model as a whole, when simulated, will reproduce the actual data series closely. In order to test the validity of the model the RMS (root-mean-square) simulation error and RMS percent error are shown in Table 5.1.

Table 5.1

Results of Historical Simulation (1961-1981)

<table>
<thead>
<tr>
<th>Variable</th>
<th>RMS error</th>
<th>RMS % error</th>
</tr>
</thead>
<tbody>
<tr>
<td>COR</td>
<td>766.349</td>
<td>0.169</td>
</tr>
<tr>
<td>I</td>
<td>189.222</td>
<td>0.150</td>
</tr>
<tr>
<td>Gx</td>
<td>326.769</td>
<td>0.810</td>
</tr>
<tr>
<td>GM</td>
<td>247.099</td>
<td>0.213</td>
</tr>
<tr>
<td>GNP</td>
<td>1,040.190</td>
<td>0.152</td>
</tr>
<tr>
<td>GNPMA</td>
<td>976.409</td>
<td>0.250</td>
</tr>
<tr>
<td>k</td>
<td>4,527.950</td>
<td>0.128</td>
</tr>
<tr>
<td>NEB</td>
<td>529.432</td>
<td>5.013</td>
</tr>
<tr>
<td>PGNP</td>
<td>0.066</td>
<td>0.111</td>
</tr>
<tr>
<td>PMA</td>
<td>0.167</td>
<td>0.120</td>
</tr>
<tr>
<td>BXC</td>
<td>0.518</td>
<td>0.720</td>
</tr>
<tr>
<td>BMC</td>
<td>0.301</td>
<td>0.211</td>
</tr>
<tr>
<td>BCB</td>
<td>1.121</td>
<td>29.652</td>
</tr>
<tr>
<td>NFAK</td>
<td>349.740</td>
<td>7.483</td>
</tr>
<tr>
<td>MS</td>
<td>1,499.320</td>
<td>4.267</td>
</tr>
<tr>
<td>CAP</td>
<td>0.251</td>
<td>0.263</td>
</tr>
</tbody>
</table>
The statistics on Table 5.1 shows that the model performs a quite good simulation fit. The RMS percent errors for the variables except for BCB and NFAK are below than 5 percent. Only BCB and NFAK show comparatively high RMS percent error (30 percent and 7 percent, respectively) but they are acceptable.

As another important criterion for evaluating simulation performance, this study examined how the model simulates turning points in the historical data. In Figures 5.1 to 5.16 in APPENDIX B, actual and simulated values for the endogenous variables are plotted. Except for the case of NFAK, the ability of the model to reproduce the historical turning points are found to be satisfactory in general. In the case of NFAK, the model fails to capture the turning points correctly during the 1963-1972 period, but it replicates them quite well after 1972.

5.2.2 Results of Policy Simulations

Three policy simulations for the period beginning in 1965 (CASE55) and for the period beginning in 1975 (CASE75) were performed to detect the differential dynamic impacts of disaggregated components of foreign capital inflows on real GNP. One-hundred-million dollar increases in each component of inflows were simulated. The dynamic multipliers, i.e., net increases in GNP obtained from each simulation are presented in Table 5.2. With regard to the results in Table 5.2, two points deserve to be underlined.

First, long-term borrowing has the greatest income-augmenting effect, on an annual average, during the first seven simulation periods. However, short-term borrowing has greater growth effects
than long-term borrowing after the second year, even though it shows a negative impact multiplier in the first year. In addition, the other capital inflows have negative GNP growth impacts. These

Table 5.2

Net Changes in GNP through Policy Simulations

(Unit: Bil. real won)

<table>
<thead>
<tr>
<th>Year</th>
<th>CASE 65</th>
<th>CASE 75</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SIM. LEB</td>
<td>SIM. SEa</td>
</tr>
<tr>
<td>1</td>
<td>441</td>
<td>-394</td>
</tr>
<tr>
<td>2</td>
<td>238</td>
<td>278</td>
</tr>
<tr>
<td>3</td>
<td>267</td>
<td>306</td>
</tr>
<tr>
<td>4</td>
<td>432</td>
<td>483</td>
</tr>
<tr>
<td>5</td>
<td>512</td>
<td>583</td>
</tr>
<tr>
<td>6</td>
<td>498</td>
<td>602</td>
</tr>
<tr>
<td>7</td>
<td>597</td>
<td>752</td>
</tr>
<tr>
<td>Total</td>
<td>2,985</td>
<td>2,610</td>
</tr>
</tbody>
</table>

results are in sharp contrast to the previous empirical findings that foreign private investment (Gupta, 1975) or foreign aid (Papanek, 1973 and Go, 1935) has a greater growth effect than other forms of external finance.

Second, comparison of the results in CASE65 with those in CASE75 shows that the income-augmenting effects of long-term and short-term borrowings are reduced greatly in the latter case and the negative growth effect of other inflows appears to be weakened. These results suggest that the marginal contribution to GNP growth of external borrowing decreased in general in the latter half of the 1970s compared with that in the 1960s. This coincides with the
findings in a previous work which analyzed the growth effects of foreign capital inflows from the supply side.  

In order to investigate in detail the causes of variations in the growth effects of the three main components of capital inflows, policy simulation results on private consumption, investment, exports, imports, money supply and price were examined. Total net changes in these endogenous variables during the first seven years are presented in Table 5.3 (see APPENDIX C for yearly changes in endogenous variables).

<table>
<thead>
<tr>
<th></th>
<th>C A S E 6 5</th>
<th>C A S E 7 5</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SIM. LEB</td>
<td>SIM. SEB</td>
<td>SIM. OFCI</td>
</tr>
<tr>
<td>GNP</td>
<td>2,965</td>
<td>2,610</td>
<td>-8,490</td>
</tr>
<tr>
<td>CONS</td>
<td>1,919</td>
<td>1,913</td>
<td>-4,714</td>
</tr>
<tr>
<td>I</td>
<td>378</td>
<td>-183</td>
<td>-1,297</td>
</tr>
<tr>
<td>GX</td>
<td>517</td>
<td>-297</td>
<td>1,455</td>
</tr>
<tr>
<td>GM</td>
<td>-171</td>
<td>-1,177</td>
<td>3,934</td>
</tr>
<tr>
<td>GX-GM</td>
<td>688</td>
<td>880</td>
<td>-2,479</td>
</tr>
<tr>
<td>MS</td>
<td>1,740</td>
<td>1,832</td>
<td>-3,749</td>
</tr>
<tr>
<td>(bil. won)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PGNP</td>
<td>0.037</td>
<td>-0.498</td>
<td>0.293</td>
</tr>
<tr>
<td>(index)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PGNPW/PGNP</td>
<td>-0.194</td>
<td>3.095</td>
<td>0.483</td>
</tr>
<tr>
<td>CAP</td>
<td>0.840</td>
<td>0.613</td>
<td>-2.455</td>
</tr>
</tbody>
</table>

Table 5.3
Total Net Changes in Major Endogenous Variables

(Unit: Bil. real won)

8 The incremental capital output ratio in Korea was estimated by Cha (1983) to be increased sharply especially since the middle of 1970s.
These results show that the largest source of the income-augmenting effects of long-term and short-term debt is an increase in private consumption. A net increase in private consumption accounts for more than 60 percent of net change in GNP generated by an increase in each type of external borrowing. Their strong positive effects on money supply, the real balance effect, can be one explanation for this. The next largest source is the increase in net exports, i.e., trade balance (Gx-Gm). However, the positive effect of external borrowing on trade balance occurs mainly through an expansion of exports in the case of long-term debt and through a reduction of imports in the case of short-term debt. By contrast, the investment-augmenting effects of both long-term and short-term borrowing appear to be the least source of income growth. On the other hand, the income-disaumenting effect of other capital inflows is found to be mainly due to their strong negative effects on consumption, investment and real balance. Further, the strong negative impact of other capital inflows on money supply is attributed to their negative effect on trade balance.

With regard to their influence on prices, only short-term debt (both long-term and short-term debt in CASE75) contributes to a decrease in the GNP deflator by raising the rate of capacity utilization. Other capital inflows reduces the rate of capacity utilization. Their effect on prices are not, however, so significant although variations in their impact on prices play a role in making differential effects on exports and imports by changing relative prices.

When we turn our attention to the changed growth impact of
foreign capital imports after the middle of the 1970s, two points are noteworthy:

First, a sharp drop in income-augmenting effects of external borrowing in general during the latter half of the 1970s was mainly led by a marked decrease in their consumption-generating effects. In addition, their positive impacts on trade balance which are the second important source of the reduced income growth were also substantially weakened for both long-term and short-term borrowing. In the case of long-term borrowing this phenomenon was accompanied by a great drop in its export-expanding effect, which is partially due to the conversion of its negative impact on the relative price into a positive one as shown in Table 5.3. In the case of short-term borrowing it occurs, however, rather through a sharp reduction in import-substituting effects. In contrast to these findings, the income-disaugmenting effects of other capital inflows appear to have decreased since the middle of the 1970s, mainly due to a decrease in their negative impacts on consumption, investment and trade.

Second, the positive impacts of both types of external borrowing on money expansion more than doubled in the 1970s in comparison with those in the 1960s. The monetary consequence of short-term borrowing is found to be more significant than that of long-term borrowing. In contrast, the other forms of capital inflows exerted a more powerful contraction effect on money supply since the middle of the 1970s.

5.3 Benefits and Costs Analysis of External Borrowing
According to growth-cum-debt approaches the debt servicing capacity of a developing economy should be analyzed in terms of benefits and costs of external debt in the process of economic growth. In addition, the debt servicing problem entails the liquidity problem.

In this section a simple test for evaluating Korea's debt servicing capacity within the growth-cum-debt context is attempted, using the results of policy simulations beginning in 1975. In this test, a net change in GNP and required amounts of external borrowing (NEB) are treated as criteria for measuring the benefits of external borrowing. The actual, annual average interest rate of external debt calculated as the ratio of actual interest payments to total debt outstanding in each year since 1975 is used as a proxy for the cost of foreign capital. In addition, a net increase in the simulated value of BCB (the current account balance) is considered as being a barometer which shows the liquidity situation on the assumption that principal and interest of external debt are paid only from the current balance surplus. In addition to three policy simulations, a mixed policy simulation is performed in which the combined growth impacts are detected for a mixed increases in the three components of foreign capital inflows. In this policy simulation it is assumed that there is an exogenous increase in long-term debt by $65 million, an increase in short-term debt by $30 million and an increase in other inflows by $5 million, summing to $100 million in total. This distribution is based on the share of each component in net total capital inflows during 1975-1981.
Table 5.4
Analysis of Benefits and Costs of External Debt

(Unit: Mil. U.S. $)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Debt (A)</td>
<td>8,456</td>
<td>10,533</td>
<td>14,871</td>
<td>20,500</td>
<td>27,365</td>
<td>32,490</td>
<td>18,123</td>
<td></td>
</tr>
<tr>
<td>Interest Payments (B)</td>
<td>452</td>
<td>516</td>
<td>734</td>
<td>1,029</td>
<td>1,513</td>
<td>2,655</td>
<td>3,631</td>
<td>1,504</td>
</tr>
<tr>
<td>Principal Payments&lt;sup&gt;a&lt;/sup&gt; (C)</td>
<td>394</td>
<td>626</td>
<td>823</td>
<td>1,363</td>
<td>1,661</td>
<td>1,578</td>
<td>2,004</td>
<td>1,207</td>
</tr>
<tr>
<td>(B/C)</td>
<td>0.054</td>
<td>0.049</td>
<td>0.058</td>
<td>0.069</td>
<td>0.074</td>
<td>0.097</td>
<td>0.112</td>
<td>0.083</td>
</tr>
<tr>
<td>(B/A)</td>
<td>0.051</td>
<td>0.049</td>
<td>0.058</td>
<td>0.069</td>
<td>0.074</td>
<td>0.097</td>
<td>0.112</td>
<td>0.083</td>
</tr>
</tbody>
</table>

<sup>a</sup>The principal payments for short-term debt are excluded.


As can be seen in Table 5.4, the rate of return to external borrowing, expressed as the ratio of a net increase in GNP to $100 million increase in each type of external borrowing, is above one hundred seventy percent on an annual average for long-term and short-term borrowing and one hundred forty percent for foreign capital inflows in general, while the average interest rate of
external debt is 8.3 percent. This means that the benefits of external borrowing in terms of its income-augmenting effect far exceeds its cost. The benefits of external borrowing can also be evaluated with a change in simulated series of NEB, the required amounts of external borrowing which is equal to total absorption minus GNP and other capital inflows. Results of each policy simulation show a net decrease in NEB but the size of the net decrease in NEB gets smaller in each simulation result after the first four years (three years in case of long-term debt). These results suggest that an increase in long-term and short-term external borrowing and in foreign capital inflows in general contributes to Korea's self-sufficiency in capital but its marginal contribution decreases over time.

Results of each policy simulation show a net increase in the current account balance, BCB. This indicates that external borrowing and other foreign capital inflows contribute to earning foreign exchange. However, the sizes of the net increase in BCB—an annual average during the first seven years—vary from $97 million in the case of SIM.MIX to $140 million in the case of SIM.SEB, and they are less than $2.7 billion, the actual average interest and principal payments of external debt during the 1975-1981 period. This finding supports the view that the liquidity problem, not the solvency problem is the major concern with respect to Korea's external debt after the middle of 1970s.
CHAPTER VI
CONCLUSION

The main objective of this study has been to analyze the impact of Korea's external borrowing on her economic growth. Thus, the main research hypothesis of the study is that external borrowing has had a positive effect on economic growth. To test the hypothesis this study has put forth two sub-hypotheses:

1) Korea's long-term and short-term external borrowing have had different positive growth impacts on real GNP.

2) The positive growth impact of external borrowing has exceeded the cost of external borrowing.

In order to test the hypotheses, an econometric model was set up consisting of 16 simultaneous equations (8 behavioral equations and 8 identities). The model is designed for a small open economy, where the government plays an important role.

The following aspects of the model differentiate it from previous studies:

First, growth effects of external financing inflows on the demand side are stressed in this model whereas most previous studies put emphasis on the role of foreign capital inflows on supply capacity. The rationale for this is that income determination has been initiated by the demand side in Korea while supply has responded to the increase in demand.

Second, earlier studies focused their attention mainly on the role of foreign capital imports only as a source of increased investment resources. Here, the variables of foreign capital
inflows are explicitly introduced in the equations for private consumption, investment, and trade.

Third, the monetary sector is incorporated with the real sector to capture indirect as well as direct growth effects of external financing inflows through their influence on the money supply.

Finally, foreign capital inflows are disaggregated into long-term borrowing, short-term borrowing and other forms of inflows on the basis of the assumption that foreign capital inflows are not homogeneous in characteristics.

In the estimation of the model, annual time-series data for the Korean economy from 1961 to 1981 were used.

As a first step for obtaining empirical evidence, the model was estimated by the non-linear two-stage least squares method. Further, using the estimated structural coefficients several ex post (or historical) policy simulations were performed to find indirect as well as direct growth effects of an increase in each of the disaggregated capital inflows. Policy simulations were done based on the appropriate stability test of the model.

6.1 Summary of Empirical Findings

Estimation of single equations in the model led to the finding that each of the disaggregated foreign capital inflows has different effects on the demand-side factors. The main empirical findings are as follows:

1) Short-term borrowing is found to have a significant positive effect on private consumption. Accordingly, this finding partially
supports the assertion that foreign capital inflows have substituted for domestic savings in Korea.

2) Impacts on gross investment vary among the three components of foreign capital inflows. Only long-term borrowing has a positive impact on investment, whereas short-term borrowing and other inflows have a negative one. In each case the structural coefficient is larger than unity. Based on this finding, we conclude that there exists some possibility that short-term debt and other capital inflows induced shifting of financial resources from investment to other uses, while long-term debt encouraged indigenous investment. In addition, two dummy variables representing two oil shock periods in Korea are found to have had a strong positive impact on investment, reflecting that a mass investment was put into effect during those two periods mainly encouraged by the government's active investment plan.

3) External borrowing has not contributed significantly to export-expansion in Korea. The cumulative long-term borrowing has a positive but statistically insignificant (at the 10 percent level) impact on exports, and short-term borrowing has rather a negative relation with exports. In contrast other capital inflows are found to have a positive impact on exports.

4) Both long-term and short-term borrowing have an import-substituting effect but the coefficient is significant in the case of short-term borrowing. By contrast other capital inflows have a strong positive impact on imports.

5) Foreign capital inflows in aggregate by private sectors as well as trade balance have a highly significant positive effect on
net foreign assets held by the Bank of Korea. This indicates that they have played an important role in changing money supply.

Empirical evidence on the differential growth effects of the three disaggregated external financing inflows is summarized as follows:

1) The three components of foreign capital imports have different growth effects. In particular, long-term debt has the largest income growth effect during the first seven simulation years and short-term debt has nearly as great income-augmenting effect as long-term debt. In contrast, other capital inflows are found to have a negative income growth effect.

2) One of the noteworthy findings is that more than 60 percent of the net increase in income attributable to an increase in long-term or short-term borrowing is accounted for by a net increase in private consumption. In addition, the next largest income-augmenting source is a net increase in trade balance, and, surprisingly, a net increase in investment turns out to be the least important source of income growth.

3) With respect to the positive impact of external borrowing on trade balance, it is found that the impact is imparted mainly through export expansion in the case of long-term borrowing but through import substitution in the case of short-term borrowing.

4) Being fueled by their effect on trade balance, both long-term and short-term debt are found to have a strong positive monetary expansion effect. This in turn affects private consumption through the real balance effect. However, other capital inflows contract money supply mainly due to their negative effect on trade balance.
5) Through a comparative analysis of the results of policy simulations starting in 1965 and those starting in 1975, it is found that the income-augmenting effect of long-term and short-term debt has been nearly halved since the middle of the 1970s with a drastic decrease in their positive impact on private consumption and the trade balance.

As a final step of empirical analysis, benefits and costs of external debt were examined using the results of simulations beginning in 1975. The results indicate that an increase in long-term or short-term borrowing creates far greater income benefits than the cost of borrowing and contributes towards the Korea's self-sufficiency in capital. The findings, however, also suggest that the marginal contribution of external debt to the self-sufficiency of the economy tends to decrease over time. It is also found that Korea's external debt has failed to generate enough foreign exchange to pay interest and repay the principal on the old debt. This finding supports that the major concern with respect to Korea's external debt is not the solvency problem but the liquidity problem. This finding also implies that external debt has been invested mainly in the industries with a long gestation period.

The empirical findings so far presented are based on the data prior to 1982. The findings may be, however, different if data covering the period since 1982 are included. The growth rate of Korea's total external debt outstanding decreased since 1981. Furthermore, due to factors such as low oil price, low inflation rate and a devalued won vis-a-vis the Japanese yen, Korea's exports
have showed a rapid increase particularly since 1983 and the current account balance is expected to record a $3-4 billion surplus in 1986 for the first time in 9 years.

6.2 Policy Implications

Given various problems inherent in the model, our empirical results should be interpreted with caution. Nevertheless, the following are some of the policy implications of this study:

1) The liquidity problem is the major concern with respect to Korea's external debt situation. Continuous emphasis should be put on export expansion and import substitution in the future.

2) Since long-term borrowing has the greatest positive effect on income growth and export expansion, long-term borrowing should continue to be an important source of external financing.

3) Since net external financing inflows cause more significant consequences on monetary expansion than trade balance, it is necessary to take such flows into account in formulating monetary policy.

4) Since the marginal contribution of Korea's external borrowing towards self-sufficiency in capital tends to decrease as time elapses, efforts should be made to mobilize domestic savings. To this end the government may consider measures to curb extravagant consumption behavior on some part of the Korean society and to reduce the fungibility of financial resources designated for investment purposes.
APPENDIX A

ESTIMATION METHOD OF POTENTIAL OUTPUT IN THE NON-PRIMARY SECTOR

The potential output in the non-primary sector, defined as the maximum level of output which is produced under full utilization of the labor and capital stock in that sector, can be expressed in the form of the Cobb-Douglas production function as:

\[
GNPPN_t = A(LHPN_t) KNA_t e^{rt}
\]

where, \(GNPPN\): potential output in the non-primary sector expressed in real term.

\(LHPN\): potential manhours under full utilization of labor force in the non-primary sector.

\(KNA\): capital stock in the non-primary sector.

\(e^{rt}\): a proxy of technical change in the non-primary sector.

\(t\): time.

Let \(GNPNA\) be actual output in the non-primary sector, and multiply both sides of equation (A.1) by \(GNPNA/GNPNA\) to obtain:

\[
GNPNA_t = A(GNPNA_t/GNPPN_t)(LHPN_t) KNA_t e^{rt}
\]

1 Methods to measure the potential output are discussed in Klein and Preston (1967), Kuh (1966) and Bank of Korea (1975), pp.68-71.
Here, let assume that;

\[(A.3) \quad \frac{GNPNA_t}{GNFPN_t} = (\ell_1) (\ell_k)^\alpha\]

where \(\ell_1\) is the rate of labor utilization, and \(\ell_k\) the rate of capital utilization.

From equation (A.2) and (A.3), equation (A.2) can be rewritten as:

\[(A.4) \quad GNPNA_t = A (\ell_1 LHPN_t) (\ell_k KNAt)^\alpha e^{rt}\]

To relate capital utilization to manhour utilization, we assume, as R. Solow has done:

\[(A.5) \quad \ell_k = \frac{KNA_t}{KNAt} = \frac{LHU_t}{LHPN_t} : \ell_1\]

where KNAU is the capital stock which is utilized in the non-primary sector at time t, and LHU is the utilized manhours at time t.

Equation (A.4) can be expressed as a production function for actual output in a logarithmic linear form as in (A.6), rewriting \(\ell_1 LHPN\) as average man-hours (H) multiplied by the number of employed labor force (L);

\begin{align*}
(A.6) \quad \ln(GNPNA_t) &= \beta_0 + \beta_1 \ln(HL) + \beta_2 \ln((HL/LHPN) \cdot KNA) + \beta_3 T \\
\end{align*}

\cite{Klein and Preton (1967), p. 37.}
where $T$ is time trend.

Equation (A.6) can be changed into the production function for the potential output ($\text{GNPP}_N$) as in equation (A.7) by assuming that $\text{LHU}$ is equal to $\text{LHPN}$ under full employment.

\begin{equation}
\ln(\text{GNPP}_N) = \beta_0 + \beta_1 \ln(\text{LHPN}) + \beta_2 \ln(\text{KNA}) + \beta_3 T
\end{equation}

Taking potential working man-hours, $\text{LHPN}$ as maximum working hours ($\text{HPN}$) multiplied by potential maximum number of employed in the non-primary sector ($\text{LPN}$), actual output and potential output equation can be rewritten, respectively, as in (A.8) and (A.10).

\begin{equation}
\ln(\text{GNPN}_t) = \beta_0 + \beta_1 \ln(\text{HPN}_t) + \beta_2 \ln(\text{KNA}) + \beta_3 T
\end{equation}

\begin{equation}
\ln(\text{GNPN}_t) = \beta_0 + \beta_1 \ln(\text{HPN}_t) + \beta_2 \ln(\text{KNA}) + \beta_3 T
\end{equation}

The parameters in (A.8) can be estimated if the variable $\text{LPN}$ is given. Further, the potential output can be measured from equation (A.9) taking maximum working hours during the observation period as a proxy for the maximum potential working hours, $\text{HPN}$.

As a first step to measure the potential maximum number of employed in the non-primary sector, the function of labor participation ratio to total population in an economy is specified as in (A.10) based on the discouraged worker hypothesis:
(A.10) \[ (\text{LPAR/POP})_t = a_0 + a_1(\text{LALL/POP})_t \]

where LPAR is the number of labor participation in all industries, POP total population over 14 years old and LALL the number of employed in all industries.

Now we assume that the unemployment rate under full employment be less than \( r \) per cent, the potential maximum number of employed in all industries (LALLPN) can be expressed as:

\[ (A.11) \quad \text{LALLPN}_t = (1-r)e^{\text{LPAR}_t} \]

From (A.10) and (A.11), the potential maximum number of employed in all industries (equals to LALL under full employment) can be estimated in equation (A.12).

\[ (A.12) \quad \text{LALLPN}_t = \frac{(a_0(1-r))/(1-a_1+a_1r))e^{\text{POP}_t}}{} \]

As the next step, the potential maximum number of employed in the non-primary sector, LPN is obtained by assuming that the ratio of LPN to LALLPN be same as the ratio of the number of employed in the non-primary sector (L) to that in all industries (LALL).

\[ (A.13) \quad \text{LPN}_t = \text{LALLPN}_t \times (L/L\text{ALL})_t \]

With the estimated LPN3 plugged into (A.8), the function of

\[ \text{Footnote continued} \]

From the estimation result of equation (A.10) \( a_0 \) was 0.208 and \( a_1 \) (Footnote continued)
actual output in the non-primary sector was estimated as:

(A.14) \( \ln(GNPNAt) = -2.484 + 0.853 \ln(R^*L) + (-0.784) (3.071) \)

\[ + 0.039 \ln(H^*L^*KNA/(HPN*LPN)^t + 0.048 e^T \]

\( R^2=0.997, \ D.W.=1.05 \)

(Figures in parentheses are t values.)

By plugging the estimated parameters in (A.14) into (A.9),
estimated values of potential output in the non-primary sector are
as follows (expressed in bil. won in 1975 price):

<table>
<thead>
<tr>
<th>Year</th>
<th>1961</th>
<th>1,604</th>
<th>1962</th>
<th>1,714</th>
<th>1963</th>
<th>1,856</th>
<th>1964</th>
<th>2,029</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>1965</td>
<td>2,412</td>
<td>1966</td>
<td>2,792</td>
<td>1967</td>
<td>3,191</td>
<td>1968</td>
<td>3,481</td>
</tr>
<tr>
<td>Year</td>
<td>1973</td>
<td>5,694</td>
<td>1974</td>
<td>6,259</td>
<td>1975</td>
<td>6,987</td>
<td>1976</td>
<td>7,918</td>
</tr>
<tr>
<td>Year</td>
<td>1981</td>
<td>12,305</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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3(continued)

The minimum unemployment rate during the observation period (3.2 percent) was used as a proxy for the unemployment rate under full employment, r.
APPENDIX B

SIMULATION FITS OF ENDOGENOUS VARIABLES IN BASE SIMULATION

Note: 5 observations are hidden.

Figure 5.1 Historical Simulation of Private Consumption (CON)
Figure 5.2 Historical Simulation of Gross Investment (I)
Figure 5.3 Historical Simulation of Total Exports on GNP Base (GX)

Note: 6 observations are hidden.
Note: 14 observations are hidden.

Figure 5.4 Historical Simulation of Total Imports on GNP Base (GM)
Figure 5.5 Historical Simulation of Gross National Product (GNP)

Note: 8 observations are hidden.
Note: 9 observations are hidden.

Figure 5.6 Historical Simulation of GNP in the Non-primary Sector (GNPNA)
Figure 5.7 Historical Simulation of Capital Stock (K)

Note: 5 observations are hidden.
Figure 5.8 Historical Simulation of Commodity Exports on B.O.P. Base (BIC)
Figure 5.9 Historical Simulation of Total Imports on B.O.P. Base (EMC)

Note: 18 observations are hidden.
Figure 5.10  Historical Simulation of Current Balance Account (BCB)

Note: 3 observations are hidden.
Figure 5.11 Historical Simulation of Net Foreign Assets Held by the B.O.K. (NFAK)
Note: 9 observations are hidden.

Figure 5.12 Historical Simulation of Money Supply (MS)
Note: 10 observations are hidden.

Figure 5.13 Historical Simulation of GNP Deflator in the Non-primary Sector (PNA)
Figure 5.14  Historical Simulation of GNP Deflator (PGNP)

Note: 11 observations are hidden.
Note: 4 observations are hidden.

Figure 5.15 Historical Simulation of Required External Borrowing (NEB)
Figure 5.16 Historical Simulation of Capacity Utilization Rate in the Non-primary Sector (CAP)
### APPENDIX C

**SIMULATION RESULTS OF ENDOGENOUS VARIABLES IN EACH POLICY SIMULATION**

#### Table 6.1

Simulation Results of SIM.LEB Beginning in 1965

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The first letter "D" in the name of each variable means the difference between the simulated and the base case.

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**Table 6.6**

Simulation Results of SIM.OFCI Beginning in 1975.
### Table 6.7

**Simulation Results of SIM.MIX Beginning in 1975**

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