THE RELATIONSHIP BETWEEN DOMESTIC SAVINGS
AND OTHER ECONOMIC INDICATORS
IN KOREA

THESIS

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

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This study is an analysis of the relationship between domestic savings and three economic indicators in the Republic of Korea during the 1950s through 1980s. While domestic saving is affected by many economic phenomena, the analysis is confined to national income, exports, and inflation.

The study is divided into five chapters. These are entitled (1) Introduction, (2) Domestic Savings, (3) Income and Domestic Savings, (4) Exports and Domestic Savings, (5) Inflation and Domestic Savings. In chapter I, Korea and the Korean economy are introduced, and the scope of the study is stated. Chapter II reviews the related realm of domestic savings: definition, kinds, and determinants of domestic savings. Chapter III presents the relationship between different incomes and domestic savings, and shows non-labor income contributes more powerfully to the formation of domestic savings than labor income. Chapter IV contains effects of exports, and hypothesis testing. The effect of exports suggests that export expansion affects domestic savings positively via an increase in gross national product. Chapter V deals with the correlation between inflation and domestic savings, and its testing. The correlation between
inflation and domestic savings is not generally clear except for some specific cases.
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CHAPTER I

INTRODUCTION

Korea and the Korean Economy

The Republic of Korea is relatively small, and very densely populated. The population in 1983 was 39.95 million. Korea has an area of 38,022 square miles (98,477.48 square kilometers). The mountains are the dominant element of the area, but the lowlands are the economic core. Twenty-three and half per cent of the total land area is cultivated, and there is one-fifth of an acre of cultivated land per capita (3; 5, pp. 2-20, 137). Korea is one of the most strategic geographical areas in the world. It is bordered by Soviet Siberia and Manchuria on the north, Red China to the west, and Japan, 120 miles by water to the east. It has been both a bridge and a buffer between these powerful neighbors.

Korea has very limited mineral resources. About two hundred minerals and ores are known to exist in Korea, but their value lies in their variety rather than in quantity. The mineral products still account for less than 2 per cent of GNP. There is no petroleum in the country. Thus, natural resources have made a limited contribution to recent growth,
and offer little reason for optimism in the future. However, Korea has an abundant and relatively highly trained stock of human resources (5, pp. 137-138).

### TABLE I
TOTAL POPULATION AND ANNUAL GROWTH RATE

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<tbody>
<tr>
<td>Total Population (millions of persons)</td>
<td>27.2</td>
<td>30.1</td>
<td>32.9</td>
<td>35.3</td>
<td>37.6</td>
<td>39.9</td>
</tr>
<tr>
<td>Annual growth rate of population (per cent)</td>
<td>2.9</td>
<td>2.38</td>
<td>2.22</td>
<td>1.76</td>
<td>1.62</td>
<td>1.53</td>
</tr>
</tbody>
</table>


Korea's population density of 406 persons per square kilometer of the total land is among the world's highest (6, pp. 15-16). Rising levels of education and income, and a strong effort to disseminate family planning services have halved the rate of population growth from about 3 per cent a year in 1964 to 1.5 per cent in 1983 (TABLE I, p. 2).

Korea's foreign economic relations have been subject to pressure from or direct control by other countries. Japan occupied Korea from 1910 to 1945, because of its importance
as a source of essential raw materials: agricultural products, fishing, and forestry. Korea had no sovereignty while under Japanese control, and was therefore unable to establish long-range economic policies or measures to develop trade and industry for the welfare of its people. Since the liberation of Korea at the end of World War II from the thirty-six years of Japanese rule, the United States of America played an important role in shaping the development pattern of the Korean economy. First, massive economic assistance from the United States was the major source of foreign exchange required to maintain the stability of the Korean economy. Subsequent to the Korean War of 1950-1953, the postwar reconstruction program was carried out mainly with United States assistance. Heavy reliance on United States assistance was a major characteristic of the Korean economy prior to the rapid growth period of the 1960's (4, pp. 14-40).

In 1961, Korea was one of the poorest developing countries, with heavy dependence on agriculture and a weak balance of international payments. Deficits in the balance of international payments were almost totally financed by foreign grants and assistance. Korea remained a backward, rural nation, with the primary sector of its economy consisting of agriculture, forestry, and fishing.

During the 1962-1981 period, Korea had four Five-year Economic Development Plans. For that period the Korean
The Korean economy grew at an average growth rate of about 10 per cent a year. It grew at 7.8 per cent in 1962-1966, 10.5 per cent in 1967-1971, 10.9 per cent in 1972-1976, and 5.7 per cent in 1977-1981 (1). Per capita income in current price rose from $100 in 1961 to about $1998 in 1984 (8). By 1976 it had become a semi-industrialized middle-income nation. The primary industries accounted for about 40 per cent of the GNP, and the manufacturing sector for only about 13 per cent (9, pp. 181-196).

Due to Korea's small domestic market, full employment of the vast labor force could not be attained through the development of domestic market-oriented industries. An export-oriented industrialization strategy was therefore adopted which took advantage of foreign resources and markets as well as the abundant labor force (6, pp. 15-16). As a result, the volume of exports increased at an annual rate of 34.6 per cent after 1961 (7). This caused the value-added in manufacturing to rise from 15 per cent of the GNP in 1961 to 30 per cent in 1982. Social overhead and services rose from 44.6 per cent of GNP in 1961 to 53.3 per cent in 1982 (2), reflecting the continuous, large investment required to support rapid industrialization (Fig. 1, p. 5).

Investment and saving rates were changed largely in this period shown in TABLE II (p. 6). The investment ratio rose

Fig. 1 -- Industrial structure of Korea
## Table II

**Achievement of Five-Year Development Plan**

<table>
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<tr>
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<tbody>
<tr>
<td><strong>Growth rate of GNP (%)</strong></td>
<td>7.8</td>
<td>10.5</td>
<td>10.9</td>
<td>5.7</td>
</tr>
<tr>
<td><strong>Growth rate of export (%)</strong></td>
<td>43.7</td>
<td>35.2</td>
<td>46.2</td>
<td>19.9</td>
</tr>
<tr>
<td><strong>Investment ratio of GNP (%)</strong></td>
<td>16.6</td>
<td>26.3</td>
<td>27.0</td>
<td>29.6</td>
</tr>
<tr>
<td><strong>Domestic saving ratio (%)</strong></td>
<td>7.3</td>
<td>14.7</td>
<td>19.3</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>Foreign saving ratio (%)</strong></td>
<td>8.3</td>
<td>10.6</td>
<td>9.5</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Statistical discrepancy</strong></td>
<td>1.0</td>
<td>1.0</td>
<td>-1.8</td>
<td>2.7</td>
</tr>
</tbody>
</table>

from 16.6 per cent in 1962-1966 to 29.6 per cent in 1977-1981. Meanwhile savings ratio also rose from 7.3 per cent during the period of 1962-1966 to 25.5 per cent during the period of 1977-1981 (1). The degree of dependence upon foreign savings was reduced dramatically in this period. As dependence on foreign savings declined due to increased self-reliance in investment financing, an important factor contributing to the reduction in past balance of payment deficit was domestic savings. In Korea, rapid growth rate of GNP was caused mainly by exports. In spite of two oil-shocks in 1973 and 1979, the average annual growth rate of exports was 36.25 per cent in 1972-1981 (1; 2; 7).

According to W. W. Rostow (10, p. 39), an economy reaches "the take-off stage," only when the savings ratio begins to exceed 10 per cent of the national income. In this respect, as TABLE III using data from the Bank of Korea shows (p. 7),

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<tr>
<td>per cent</td>
<td>2.8</td>
<td>6.9</td>
<td>7.0</td>
<td>8.0</td>
<td>11.8</td>
<td>11.0</td>
<td>13.2</td>
<td>18.6</td>
<td>16.3</td>
<td>14.5</td>
</tr>
</tbody>
</table>

the savings rate jumped from 8.0 per cent in 1965 to 11.8 per cent in 1966, so that Korea's economy began to meet Rostow's necessary condition for take-off in 1966.

In sum, the Korean economy has undergone a rapid and dramatic structural change toward an export-oriented economy based on labor intensive manufactures. Political stability, strong authoritarian long-term leadership, a firm commitment to development, and a firm will to economize were the prerequisites for economic growth (11, pp. 22-32). Since 1962, economic growth has been the most important issue in Korean economic policy, and as a result, the first priority of the economic policy has been the economic growth rate. In recent years the Korean economy has faced problems in achieving a higher economic growth rate: relatively higher unemployment, enormous foreign debts, deteriorating balance of payments, reduced export growth rate, reduced economic growth rate, etc. However, it does not seem to me that the Korean economy will have difficulty solving these temporary setbacks.

Organization of the Text

Chapter I outlines Korea and its economy. It also describes Korea's geographical features, foreign relations, and recent rapid economic growth. In addition, it deals with Korea's domestic savings ratio, and five Five-year Economic Development Plans for the last two decades. Chapter II
describes the definition, kinds, determinants of domestic savings and domestic savings in Korea. Chapter III discusses the effects of wage and salary income and non-labor income on domestic saving. Chapter IV deals with the relationship between exports and domestic savings in Korea. Korean exports have been increasing rapidly for the last two decades in harmony with the rapid economic growth. During this period, domestic savings also have been increasing fast. As development theories suggest that there exists a relationship between exports and domestic savings, we will test Alfred Maizels hypothesis that variations in exports are closely related to variations in domestic saving by using Korean real data. Chapter V tests the effects of inflation upon domestic savings if inflation really affects. For this analysis previous empirical studies show that there is no clear relationship between inflation and domestic saving, but we will review this conclusion by dividing inflation into two types -- cost-push inflation and demand-pull inflation -- by its causes. Korean data will be used in this study.
CHAPTER BIBLIOGRAPHY


CHAPTER II

DOMESTIC SAVINGS

Introduction

Domestic savings play an important role in the process of economic development, especially in the developing countries, because domestic savings are transformed to investment, and ex post domestic savings are equal to the ex post investment. Capital accumulation comes from savings, and it is essential to economic development. Developed countries experienced a capital accumulation stage as they began to develop in the Eighteenth Century.

Domestic savings are realized by restraining current consumption from the current income. Developing countries have difficulties inducing domestic savings, since it is not easy to control the level of consumption due to low level of income. The reason for the low income of developing countries is widely believed to lie in their poor capital accumulation. The primary condition for breaking the so-called "vicious circle of poverty" in poor countries and achieving a satisfactory rate of economic growth is to prompt capital formation through effective mobilization of savings.
The mobilization of savings is attainable in various ways from a variety of sources, both domestic and foreign, public and private.

Definition of Saving

The terminology saving has various meanings. According to the *Dictionary of Modern Economics*:

Saving is the amount of current income which is not spent on consumption. A decision to save is basically a decision not to use up income but to hold it - in a bank, in securities, or in the form of cash. An individual may set aside current income for future consumption for a number of reasons. . . . A corporation can also save, usually by withholding part of its earnings from stockholders, in order to invest the money in the future (2, p. 310).

Saving occurs within all three major sectors of the economy -- households, business, and government. Two concepts of saving are used in national income accounting, net saving and gross saving. On a net basis, individuals save when personal income after tax exceeds personal outlays, business saves through retained profits, and governments save when current receipts exceed current expenditures. In addition, gross saving includes depreciation allowances covering the wear and tear on real assets for future replacement (4, pp. 837-839). Real saving is the unconsumed amount of GNP in a certain year. In formulating a social accounting definition of saving, one is guided by the desire
to come closer to the concept of change in the stock of assets. These assets are a source of economic services extending beyond the end of the accounting period (7, p. 69).

Domestic saving is different from financial saving. Domestic saving is the total amount of the financial assets. Financial assets come from financial balance between individuals in an economy, and include deposits, securities, bonds, and insurance policies. The financial market controls deficits and surpluses of the money. In other words, one's debt is the other's credit which is the same amount of financial saving. If every one saves, invests the same amount which he saves, and there is no flow of money between individuals through the bank system, the financial saving would be zero.

Saving can be generally classified by the saver largely into three groups: personal savings by individuals, business savings by corporations, and government savings by different levels of government. Household savings might come from wages and salaries, and peasant incomes and rent. Savings from wages, salaries and peasant incomes are small. Present goods are of more value to poor peasants and worker than are future goods, and the trend is to consume now rather than save for the future. Governmental savings can take place through taxation, public borrowing, or inflation. Taxation, imposed by government, forces the public to reduce spending in order to save enough money to pay off taxes (5, pp.
169-170). However, it can also be classified more in detail. More detailed classification by Raymond W. Goldsmith (6, pp. 87-94) is introduced in this chapter in connection with the kinds of saving. Figure 2 (p. 15) shows his classification of savings. Saving is also classified into realized saving or actual saving, and potential saving. The word, "saving" frequently used in economics means actual saving which has ex post definition. The maximum amount of possible saving is potential saving which is ad hoc saving. Potential saving is expressed as the difference between GNP and subsistence level consumption.

According to the motives to save, saving is divided into voluntary saving and forced saving. When saving is realized by those participants in the process of production, with their own judgement, it is voluntary saving. Voluntary saving is, to a large extent, insufficient in low income countries because of the low capacity to save on the part of the majority of the people of these countries (5, p. 168). To the contrary, forced saving is made intentionally by the government for a particular purpose. Tax, inflation, manipulating relative prices of goods, exchange rate, and interest rate are generally classified as kinds of forced savings (12, pp. 100-102).

Determinants of Domestic Saving

Many theories have been advanced and empirical studies
Figure 2.

Classification of Saving by Goldsmith

1. Nonagricultural household
   - Individual saving

2. Agricultural household
   - Personal saving

3. Unincorporated
   - Business saving
   - Private saving
   - Nonfederal saving

4. Corporation
   - Domestic saving

5. State Government

6. Local Government
   - Collective saving

7. Federal Government

made to explain the saving behavior of individuals, both as separate entities or groups. One of the most important factors influencing the level of personal income is the size of family income. As income increases, the amount saved generally increases. This is easily tested, and income is regarded as the main factor which affects saving. This result from one of the empirical researches is seen in G. F. Papanek's paper (11, p. 130). Consumer saving also depends on expectations regarding future income; the greater individuals think their incomes will be in the future, the less incentive they have for rainy-day saving. The more certain this anticipated future income, the less motivation individuals accumulate a fund of saving. The assumption that source of income has a profound effect upon saving behavior has strong roots in growth theory. The assumption plays a prominent role in the classical models, where recipients of property income are most likely to save.

Some empirical works on saving behavior suggest that the dependency rate affects the saving rate in developing countries (10, pp. 893-894). Since the dependency rate in terms of a household is closely related to family size, the family size itself is inversely related to household saving (9, pp. 211-212).

Another important factor which affects some types of saving is the rate of interest. The higher the rate of interest on invested funds, the greater the inducement to
save income (2, pp. 310-311). It has been asserted that the neutral way to raise saving is to raise the return available to savers. This thinking has influenced tax policy in the United States (7, pp. 16-19). But can we generally expect an increase in the interest rate to increase savings? It is true that when the interest rate rises, saving is made more attractive. But the fact that saving depends on interest rate is ambiguous. Many researches have analyzed this question, but only a few have found strong positive effects of interest rate increases on saving (3, pp. 191-192). Quite different from the classical assumption, typical research indicates that the effects of interest rate on saving are small and certainly difficult to find (1, pp. 100-115). For example, J. G. Williamson's empirical research shows that changes in the real rate of interest don't affect the long-run savings decision very greatly while the short-run savings decision is enormously influenced (14, pp. 194-209).

Besides the interest rate, and income as determinants of savings, there are more minor factors in the real world. Since J. G. Williamson's savings function contains as many real world factors as possible, his model is introduced in this section. J. G. Williamson's empirical saving model includes various factors as follows (14, p. 195):

1. $S = S(Y_k, Y_w, T)$
2. $S = f(Y_p, Y_t)$
3. \( S = g(Y_d, P, R) \)

where \( S \) = personal saving

\( Y_k \) = wage and salary income

\( Y_w \) = non-labor income (including property income and entrepreneurial income)

\( T \) = direct tax on households minus net transfers

\( Y_p \) = permanent income

\( Y_t \) = transitory income

\( Y_d \) = disposable income

\( P \) = price

\( R \) = real interest rate

The conclusions for this model show several things. Increased direct taxes have a negligible short-run impact on aggregate real saving, although the effect is significantly negative in the long-run. The most interesting result is the large difference between the regression coefficients on non-labor income and labor income. In J. G. Williamson's tests, the marginal propensity to save labor income ranges between zero and 0.10, while marginal propensity to save non-labor income lies between 0.25 and 1.47. The marginal propensity to save out of transitory income exceeds that of permanent income. In his tests, marginal propensity to save transitory income shows 0.32 while marginal propensity to save normal income shows 0.20. Interest rates appear to influence the short-run savings decision far more powerfully than the long-
run savings decision, but there is no reliable correlation between saving and interest rate. Price level does not play an important role in affecting saving. Actually in the test, the sign on the price level coefficient of the savings equation is quite mixed (11, pp. 121-122).

Review of the Literature

In Chapter I, various books which introduce Korea and the Korean economy are used to explain Korea's recent economic history in connection with five Korean government's active Five-year Economic Development Plans begun in 1962. The books are written in English outside Korea. Every author agrees to the fact that Korea is one of the sample countries which achieved rapid economic growth after World War II.

The Economic Statistics Yearbook issued every year by Korea's central bank, the Bank of Korea, and the Monthly Bulletin issued by the same institution are used to collect data. So is the International Financial Statistics issued by the International Monetary Fund. Domestic savings, exports, gross national product are obtained from the International Financial Statistics, and labor income and non-labor income are obtained from the Economic Statistics Yearbook by the Bank of Korea.

Seung Park's development economics, which is the only Korean source cited, plays a useful role in deriving models, and arranging the structure of the paper. Another useful
source of development economics material is A. P. Thirlwall's *Growth and Development*, 2nd ed. The material shown in these books has been helpful in determining the frame of this study, and in deciding its direction.


To define the savings function, I make use of Jeffrey G. Williamson's savings model from his article, "Personal Savings in Developing Nations: An Intertemporal Cross-section from Asia" in *Economic Record NO. 44* (14).
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CHAPTER III

INCOME AND DOMESTIC SAVINGS

Introduction

In the capitalist economy, it is important to raise the saving rate which contributes to capital accumulation. Capital accumulation within the capitalist system is influenced by two major factors. One of the factors is how to raise productivity, and the other is how to distribute income to the sector which has higher marginal propensity to save. In other words, saving depends upon income, if marginal propensity to save is the same. And saving also depends on marginal propensity to save, if the same income is given. Under these assumptions, forced saving played a very important role in the process of Korea's rapid economic growth in the 1960s and 1970s since the forced saving which was practiced by the Korean government manipulated the distribution of national income (7, P. 101). That is, the Korean government allocated more income to industrialists and capitalists on purpose.

The effect that forced saving and exports have had on the Korean economy has been studied by many development
economics researchers in order to analyze how those two factors have affected Korean economic development. Forced savings has allocated resources and income from consumers to producers and from the sector which has a lower saving rate to the sector that has a higher saving rate (7, p. 101).

In developing countries, the government is most important in controlling the flow of capital and income. In the real economy, forced savings are revealed through the will of government and government's economic policies. To accomplish these economic policies the government tends to protect entrepreneurs, corporations, capital income, and modernized industries rather than consumers, households, labor income, and traditional industries with lower productivity.

The governmental methods used in developing countries to stimulate forced savings are as follows: higher inflation rate, lower wage rate, the difference among tax rates, lower interest rates for the producers, overvalued exchange rate, higher indirect tax, and manipulated relative prices (3, p. 100). Higher inflation acts just like a tax because people are forced to spend less than their income and pay the difference to the government. Since inflation is regarded to raise tax brackets, taxpayers have to pay more tax, though their real incomes do not increase (6, p. 525). The government thus can spend more resources, and the public less, just as if the government had raised taxes to finance
extra spending. In other words, when the government finances its deficit by issuing money, we say the government is financing itself through the inflation tax (2, pp. 519-521).

Higher indirect tax makes a contribution to an increase in government saving. The reason why the government relies upon the high indirect tax comes from its shifting and incidence. Generally speaking, the more direct the tax, the more difficult shifting becomes, since market transactions are more further removed; and the more indirect the tax, the greater the possibility of transferring its burden, since market transactions are more readily available (4, pp. 136-137).

Hypothesis and Testing

To promote forced savings, the government should rationalize its economic policies, and it should also have a theoretical background for the economic policies. The theoretical background for forced savings is that forced savings have a strong influence on the production and distribution of the national output or income. It is assumed that forced savings transfer national income from labor income-receiving people to the people who receive property income, entrepreneurial income, and dividends. The reasoning is that the marginal propensity to save for those who enjoy wage or salary income is considerably lower than that for the other income classes (7, p. 102).
In sum, the hypothesis is summarized as follows: When saving is regressed by two alternative incomes such as labor income and non-labor income, labor income has a lower coefficient than that attached to the non-labor income variable (l; 5).

**TABLE IV**

LABOR INCOME AND NON-LABOR INCOME OUT OF GNP

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Savings</th>
<th>Labor Income</th>
<th>Non-labor Income</th>
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<tbody>
<tr>
<td>1953</td>
<td>1.84</td>
<td>12.12</td>
<td>36.18</td>
</tr>
<tr>
<td>1954</td>
<td>5.20</td>
<td>21.79</td>
<td>48.51</td>
</tr>
<tr>
<td>1955</td>
<td>5.54</td>
<td>34.75</td>
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<td>1974</td>
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<td>4264.20</td>
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</table>


Unit: Billions of Korean Won.
A test with time series data for Korea is displayed as follows:

\[ S = -55.75 - 0.08Y_L + 0.36Y_N \]

\[ (\text{-3.30}) \quad (\text{-0.33}) \quad (\text{2.57}) \]

\[ R^2 = 0.9741 \quad F = 357.03 \quad DW = 1.6922 \]

where \( S \) = domestic saving

\( Y_L \) = labor income

\( Y_N \) = non-labor income (\( GNP - Y_L \))

Figures in parenthesis indicate t statistic, and \( F \) stands for F statistic and \( DW \) stands for Durbin-Watson d-statistic. The dependent variable is domestic savings during the year 1953 to 1974, and the independent variables are labor income and non-labor income (TABLE IV, p. 26). The model has an excellent goodness of fit, as the coefficient of determination, \( R^2 \) shows about .98. Except for the low t value for the coefficient of independent variable \( Y_L \), every statistical factor about this regression model is highly significant.

The coefficient of labor income shows \(-0.08\), that is, negative 8 per cent. \(-0.08\) means that the marginal propensity to save is negative 8 per cent. The t statistic for the labor income is not significant at even 10 per cent level of significance. On the other hand, the propensity to save non-labor income is 36 per cent, and it is statistically
significant at almost one per cent level of significance. This result implies that by transferring income from the labor income side to the non-labor income side domestic saving may well increase.

Two coefficients in the model are consistent with those of J. G. Williamson's empirical research (8, pp. 194-209). As a matter of fact, the Korean government's economic development policies have emphasized this conclusion for the rapid development period that falls on the 1960s and 1970s. In order to accomplish policy objective, that is, to raise the domestic saving rate, the Korean government traditionally has relied on the following economic policy directions (7, pp. 102-103).

First, the Korean economy has experienced a high inflation rate for almost the entire period since the Liberation from Japan in 1945. The major reason for a high inflation rate comes from the government's tremendous money growth policy. The government's incentive to promote inflation derives from the increased tax revenue and the reduced real cost of servicing the government's outstanding debt that results from increases in inflation. Under a progressive tax structure, inflation-induced increases in nominal income will push taxpayers into higher tax brackets. Thus taxpayers' tax payments increase more than in proportion to the increase in their nominal incomes, thereby raising real tax revenue (6, p. 525). It is well-known that under
higher inflation, government and producers have advantages, with the sacrifices by consumers and creditors.

Second, wage increases have been controlled intentionally by government policy, even though labor productivity has continuously increased faster than the inflation rate. Low wages and salaries have contributed to the increment of saving by capitalists.

Third, by differentiating tax rates, the government has intended to boost saving, and has prepared the favorable atmosphere for saving. The government has initiated higher indirect tax rates on consumer's consumption and exempted tax on export goods, foreign capital inflow, and investment activities.

Fourth, the dual system for interest rates and foreign exchange rate has continued for the economic development plan period started in 1962, and under way at present. The bank interest rate has been set lower than the real interest rate for most of the 1960s and 1970s. Therefore, bank loans used to be regarded as a privilege and were strictly confined to productive activities and export-oriented industries. Debtors for the inflowed foreign funds were also privileged, because the interest rate of the foreign capital was much below the market interest rate, and the official rate of foreign exchange was lower than the market exchange rate.

Fifth, there were government economic policies which induced savings by manipulating relative prices of goods.
Mandatory price controls take the form of either freezes on prices or statutory ceilings on price increases, although some prices are often exempted from controls (6, p. 519). The prices of agricultural goods, and primary products were regulated to lower levels in order to sustain the living cost of urban workers. Most of the manufacturing industry workers were paid a minimum level of sustenance wage (7, pp. 100-107).

In sum, non-labor income for capitalists contributes more powerfully to the increase in domestic savings in developing countries, as the test of the Korean economy indicates. This conclusion is generally accepted among researchers studying development affairs for low-income nations.
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CHAPTER IV

EXPORTS AND DOMESTIC SAVINGS IN KOREA

Exports in Korea

The rapid growth of Korea's exports, from 55 million dollars in 1962 to 23.2 billion United States dollars in 1983 (37.25 per cent of 1983 GNP) has been one of the most publicized aspects of Korea's recent growth (5). The exchange rate and trade reforms during the last two decades contributed to bringing about the rapid growth of exports. Since 1965 export promotion has reflected some further devaluation (particularly in June 1971) to partially offset domestic inflation, but increases in export subsidy and promotion techniques have played greater roles in maintaining the attractiveness of exports relative to domestic market sales.

In the 1950s, Korean currency was overvalued and in particular in 1953 it was overvalued at twice its realistic value (3, p. 132). The effect of this gross overvaluation of the exchange rate is evident in the slow decrease of merchandise exports from 40 million dollars in 1953 to 19 million dollars in 1959 compared with those increases in the
1960s. This situation changed after the First Five-year Economic Development Plan was set in 1962 by the new military government. Selective subsidy and a preference incentive to export took a major proportion of the 1965 Korean government's economic reform decree (11, p. 125-132). Since that time, the custom duty subsidy has increased. Prior to 1960, the chief form of export subsidy was a modest amount of direct subsidy payment, but more active governmental support programs for the export industries began in the early 1960s. The reduction of taxes on income earned from exports began in 1961. Interest rate subsidies on credit for export became significant during 1962-1963, when the interest rate on loans for export production was lowered in several steps from 12.8 per cent to 8 per cent, while the interest rate on regular loans was raised from 15.7 per cent to 16.0 per cent (3, pp. 179-182).

The decision to adopt a realistic exchange rate in 1964 was to prepare a comprehensive export promotion plan. This comprehensive export promotion plan has been gradually expanded and broadened, with a variety of subsidies increased, and techniques and marketing assistance expanded.

In addition to the export incentives, technical assistance and official marketing services have also been an important component of Korea's development effort. Technical assistance and quality control programs have grown increasingly efficient and provided more and more incentives
TABLE V
DOMESTIC SAVINGS, EXPORTS, AND GNP IN KOREA

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Savings</th>
<th>Exports</th>
<th>GNP</th>
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</thead>
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<td>5.5</td>
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<td>5.0</td>
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Unit: Billions of Korean Won.
and advantages to export producers. There is another important subject that must be emphasized: the comparison of relative price incentives for domestic and export sales. Owing to the already-mentioned various benefits, export commodities enjoyed considerable advantages in price competition in international trade. It is interesting to quote William G. Tyler's empirical results in this context:

Economic growth regressed by export expansion presents additional empirical evidence demonstrating a strong cross-country association between export performance and GNP growth. This suggests that countries which neglect their export sectors through discriminatory economic policies are likely to have to settle for lower rates of economic growth as a result (14, p. 129).

Korea's exports, domestic savings, and gross national products from 1955 to 1984 (2; 5) are shown at TABLE V (p. 34). For the last two decades exports have expanded continuously, much faster than domestic saving and gross national product. Although the Korean economy experienced two world-wide oil shocks which caused world-wide recession and a decrease in the rising trend of international trade, the average annual growth rate of export was 36.25 per cent during the period 1962-1981 (5).

Effects of Exports on Domestic Savings

Export expansion contributes to economic growth by increasing the rate of capital formation and enhancing the growth of factor productivity (4, p. 484). Many studies have
examined the effects of trade strategies on the economic performance of individual countries, and have analyzed extensively the consequences of policies biased in favor of or against exports (7, pp. 241-242). For example, I. B. Kravis argued as following:

> International trade cannot provide a differential diagnosis to explain the varying growth records of countries in the nineteenth century. The United States, the greatest success story of the nineteenth and the best documented case, owed the pattern and speed of its development mainly to internal factors, while trade expanded just as rapidly for some countries, such as India and Ceylon, that did not experience fast growth. . . . It is to deny that the presence of such an external demand is a necessary or sufficient condition for growth or even for trade to play a helpful role in growth. It is to say that trade is one among many factors affecting growth, and that it is unlikely to be the dominant variable in many instances (8, p. 869).

The method in which exports contribute to the increase in saving is largely classified into two ways; demand side and supply side. That is, exports affect domestic saving through two channels.

The numerical expressions for the relationship between domestic savings and exports are, therefore, divided into two groups of equations as follows: First, the equations in the demand side are expressed (12, p. 138):

\[
\begin{align*}
Y &= X \quad \text{(1)} \\
S_d &= \beta Y \quad \text{(2)} \\
S_d &= \beta \hat{X} \quad \text{(3)}
\end{align*}
\]
where \( Y \) = an increase in income by export

= income multiplier of export

\( X \) = export

\( \beta \) = propensity to save the income attained by export

\( S_d \) = saving attained by the income effect of export

The income multiplier of export is defined in the following:

From the GNP equation \( Y = C + I_0 + X - M \), the following differentiated form is obtained.

\[
dY = dC + dX - dM
\]

\[
= dY + dX - mdY
\]

Because we assume that investment term \( I_0 \) is constant, \( I_0 \) is dropped out from the differentiated equation. Therefore, we can arrange the above last equation for the term \( X \) as follows:

\[
dX = \alpha dY(1 - \alpha + m)
\]

It is changed to the following form.

\[
\frac{dY}{dX} = \frac{1}{1 - \alpha + m} = \frac{1}{\beta + m} = \lambda
\]

where \( Y \) = gross national product

\( C \) = consumption

\( I_0 \) = investment

\( X \) = export

\( M \) = import
\( \alpha = \) marginal propensity to consume
\( \beta = \) marginal propensity to save
\( \gamma = \) marginal propensity to import

Exports make a contribution to the increase in savings by converting consumer goods to capital goods. Through this process, export reveals potential saving, and converts potential saving to realized investment (1, pp. 844-846). The net amount to which consumer goods are changed to capital goods through export is equal to the amount of consumer goods export minus the amount of consumer goods imported, given the balance of trade is in equilibrium. This amount is also equal to the amount of capital goods imported minus the amount of capital goods exported. These relationships are mathematically expressed as the following equation (12, p. 139):

\[
S_s = X_C - M_C = M_K - X_K = \iota_1 M - \iota_2 X \quad \ldots \ldots \ldots \quad (4)
\]

where \( S_s = \) an increase in saving through the supply of capital goods

\( X_C = \) consumer goods export
\( M_C = \) consumer goods import
\( M_K = \) capital goods import
\( X_K = \) capital goods export
\( \iota_1 = \) capital goods ratio to import
\( \iota_2 = \) capital goods ratio to export
The savings increase effect of exports is the sum of the demand-side effect ($S_d$) plus supply-side effect ($S_s$). Therefore, the total savings increase effect of export is the sum of equations (3) and (4). Mathematically $S$ is formulated as the following equation:

$$S = S_d + S_s = \beta X + i_1 M - i_2 X$$

$$= (\beta X - i_2 X) + i_1 M \quad \quad \quad \quad \quad (5)$$

The final equation has a few factors which influence domestic savings. If we assume that exports and imports are the same, the total savings increase effect of export is determined by four elements. Those four elements are propensity to save export income ($\beta$), income multiplier of export ($\lambda$), capital goods ratio to export ($i_2$), and capital goods ratio to import ($i_1$). The bigger $\beta$, $\lambda$, and $i_1$ are, the more domestic saving increases. In contrast, $i_2$ has the opposite direction. In terms of economic policy, the coefficients imply that to maximize domestic savings, the government needs to have policies to raise the savings ratio of export income, to export as many consumer goods as possible, and to import as many capital goods as it can (12, pp. 139-140).

Maizels Hypothesis

A simple regression using domestic saving as a dependent variable, and the amount of export as an explaining variable
is fitted as follows:

\[ S = 0.5027 + 0.9022 \ln X \]

(4.10) (45.08)

\[ R^2 = 0.9859 \quad F = 2032 \quad DW = 1.7362 \]

where \( S \) = Domestic saving

\( X \) = Value of export

Equation 1) shows the results of a semi-log linear regression equation fitted by the least square to the data for 29 years. Student t-values are presented in parentheses below each parameter.

The regression model fits well, and the two parameters are consistent with our a priori knowledge that both of them must have positive values. Since this model is not a saving function equation, the value of the intercept term cannot be negative (6, pp. 321-333). Every statistic has a confidence level of more than 99 per cent, and the explained variation by the regression line, \( R^2 \) is extraordinary high. The value of the intercept is stable, but the coefficient of the explaining variable, \( X \) is much more stable. The value of the coefficient 0.9022 shows that savings are deeply affected by exports. In other words, export has a very strong power in explaining domestic saving.

Alfred Maizels argued that variation in exports might very well result in domestic savings. This is called Maizels hypothesis (10, p. 58). Maizels hypothesis is an attempt to
introduce exports as an additional variable to explain a shift in saving level (9, pp. 342-343). In connection with Maizels hypothesis,

Maizels was concerned almost exclusively with what may be termed the direct effects of exports on saving which ultimately cause the aggregate saving schedule to shift. According to him, the direct effects can occur (1) because the propensity to save is higher in the export sector than elsewhere; (2), because government savings rely heavily on taxes on foreign trade; (3) or, even because a sustained growth in exports could result in a rise in the marginal saving propensities in other sectors (10, p. 58). The first factor he mentioned is the income effect of exports on saving. Inasmuch as exports are the source of income for the export sector, it is to be expected that exports will add to the level of aggregate savings. Maizels' point, however, is that the income effect of export earnings can be quantitatively different from that of non-export income (9, p. 343).

If we regress 29 yearly observations of domestic saving from 1955-1983 according to Maizels hypothesis, the following model is obtained.

\[
2) S = -2.0762 + 0.4898 X + 0.6516 \ln N
\]

\[
(-1.98) \quad (2.92) \quad (2.48)
\]

\[R^2 = 0.9885 \quad F = 1198.83 \quad DW = 1.7103\]

where \( S \) = Domestic saving
\( X \) = Value of export
\( N \) = GNP - \( X \)

Equation 2) also shows the results of a semi-log linear regression equation fitted by the least square to the data.
for the same 29 years. Student t-statistics are presented in parentheses below each coefficient.

Equation 2) fits the conditions better because of its higher $R^2$ than Equation 1). In other words, the dependent variable, domestic saving ($S$) is better explained by the other two regressors than by those in equation 1). This fact is in accordance with the finding by Lee (9, p. 349). This fact also backs Maizels' finding that relating the volume of savings to exports and the remainder of the gross national product, by using data from 11 countries of the Sterling Block, which resulted in a reliable goodness of fit of the same regression. Though Alfred Maizels said that the regression results must be taken purely as illustrative of the probable relationships existing between exports and savings, the regression results in this study show a highly confident estimation of parameters (10, pp. 95-96). Two coefficients are statistically significant at the 1 per cent level of significance, and the t test statistic of the constant term is also significant at the 5 per cent level.

Conclusion

This chapter has attempted a test of the Maizels hypothesis of the association of exports with domestic savings. The results obtained from fitting Maizels' equation to the Korean data covering a total of 29 years from 1955 to 1983 seem to be consistent with Maizels hypothesis.
According to Maizels hypothesis, variation in exports is strongly associated with variation in domestic savings (10, p. 58).

The regression model 2) is well-fitted and displays reliable economic meaning. Although the coefficient of exports is lowered from .9022 in Equation 1) to .4898 in Equation 2), it still has the confidence level of more than 99 per cent. The results here fall within the range of Lee's empirical test of Maizels hypothesis covering 28 countries over the period of 1950-1967, where the coefficient values range from a negative -.47 to 1.19, and have a reliable confidence level, and is also consistent with what economic theories suggest. The negative value is quite contrary to the Maizels hypothesis and a priori information concerned with exports (9, p. 348). The only thing that is not similar is that the value of the coefficient of non-export income is a little larger than that of export income. However, the t value of the coefficient of export income in equation 2) is more stable than the t value of the other coefficient (2.92 versus 2.48), even though both are significant at the 5 per cent level. In a word, Maizels hypothesis is empirically tested at the higher level of confidence for Korea (10, pp. 93-96).
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CHAPTER V

INFLATION AND DOMESTIC SAVINGS

Introduction

A major reason for lower income and poor living conditions in developing countries is explained by their low capital accumulation. Therefore, the first step to break poverty is derived from the accumulation of capital. Here, we can take a broad view of capital to include education and training (human capital) as well as physical capital, since the economic forces that influence the accumulation of human capital are similar to those that affect physical capital. However, I confine the accumulation of capital to that of physical capital (2, p. 273). As the main way to accumulate capital, accumulation of savings is possible from various sources. Inflation as a way of forced saving is being popularly used by developing countries' governments while they carry out economic development plans in order to boost their economy (9, pp. 169-170). The reason why many developing countries have had recourse to inflation is derived from its easiness and simplicity (14, pp. 101-104).

Some development economists are in favor of this kind of
inflationary way of savings mobilization, because they believe that inflation redistributes income in such a way as to raise saving and investment, thus accelerating growth. For example, W. A. Lewis (8, p. 107) suggests that investment in the modern sector be financed by a net increase in the supply of money - especially bank credit. This would absorb disguised unemployment from the traditional sector and would increase the capitalist surplus, which will lead to capital accumulation in the economy with unlimited supplies of labor (6, pp. 304-305). J. A. Schumpeter also was in favor of inflationary credit creation to finance entrepreneur's innovation as a prime mover of economic growth (16, pp. 286-311). Some others, for example monetarists, are against inflationary credit creation. Milton Friedman says "Inflation is always and everywhere a monetary phenomenon (7, p. 29). They believe that excess supply of money and credit tends to result in inflation and is more likely to hinder savings and growth than prompt them (10, pp. 290-291). They think that inflation penalizes savings because it reduces purchasing power of income that has been set aside. Over this conflicting view, many empirical studies have been conducted on the correlation between inflation and domestic savings and or economic growth to examine the possibilities of inflationary capital formation.

Their conclusions are, by and large, that there is no clear correlation between inflation and domestic savings and
or economic growth, as long as inflation rates are not very high (20, pp. 204-209). These conclusions, however, seem to have been drawn under a homogeneity assumption of inflation. Inflation comes from divergent origins, and different inflation caused by different causes may have different effects on the economy.

The purpose of this chapter is: 1) to detect different effects of demand-pull type inflation and cost-push type inflation on domestic savings in developing countries, and 2) to assess and investigate the validity and possibilities of inflationary capital mobilization in developing countries. Then a hypothesis is derived that inflation caused by demand increases tends to raise domestic savings, while cost-push inflation hinders them. To test this hypothesis, empirical research will be done on the case of Korea for the 1954-1983 period.

A cross-country analysis will also be undertaken with data of 20 developing countries to test the hypothesis on the international level. Estimation and econometric analysis presented in this chapter are based on annual data on the variable representing the domestic savings ratio, consumer price index, wholesale price index, and wage increase rate.

Data used on a test with a time series for Korea 1954-1983 is collected from the International Financial Statistics published by the International Monetary Fund during 1954-1984. Since the data on wage increase rates
before 1959 is not available from the *International Financial Statistics*, the first observation of the corresponding equation using the wage increase rate data begins in 1959 (13).

The annual observations on the net economic growth rate are taken from the "National Income in Korea" section in the *Economic Statistics Yearbook* published by the Bank of Korea (Korea's central bank) in 1975, 1977, and 1984(1). Data used on a test with cross-country statistics is also taken from the same *International Financial Statistics*.

Most developing countries do not distinguish the wholesale price index (WPI) and the consumer price index (CPI), and frequently use the CPI alone for a general price index. Thus, it is impossible to collect much more than 30 observations from a group of less developed countries. The economic growth rates used in this chapter are net values.

The savings ratio as a dependent variable took the form of \( \frac{S}{Y}_t - \frac{S}{Y}_{t-1} \), because the ratio of domestic savings to GNP rose sharply by almost fivefold during the observed period (13). The reason data 1968-1971 instead of current data are taken in a test with cross-countries is that in the sixties and early in the seventies, the savings ratio was on a rising trend in the developing countries. This has statistically significant meaning when compared with other economic indicators such as the economic growth rate, and price index, etc. Once the domestic savings ratio in
developing countries has reached around 25 per cent as the result of economic growth, the domestic savings ratio does not have any significant economic meaning showing some strong relationship between it and other economic variables (18, pp. 154-173).

Types of Inflation by Causes

According to Paul A. Samuelson, inflation is defined as generally rising prices for goods and factors (15, p. 255). Since most prices in a mixed economy result from the interaction of supply and demand, we can logically distinguish between explanations of causes of inflation that stress the demand side of the market (the so-called "demand-pull" school), and those which emphasize conditions of supply (the so-called "cost-push" and "structuralist" school).

Demand-pull inflation is caused by an excess of aggregate demand for goods and services over available supplies, at a given level of prices (17, p 148). Monetarists suggest that change in the price level is consistent with that of money supply in the long run, and the current rate of price level change was caused by the lagged rate of change of money supply. They also regard non-monetary factors such as oil crises, and bad harvests as the short-term movements in price indexes (3, p. 9). For example, the monetarist theory of inflation emphasizes increase in the supply of money faster than increase in the
demand for money as the cause of rising prices. An excess supply of money causes a larger demand for commodities, thus tending to pull prices up (12, p. 9).

On the contrary, the cost-push theory ascribes inflation to increases in costs which are independent of the state of aggregate demand (11, pp. 270-271). For example, price increases for imported goods caused by world inflation, foreign exchange devaluation, etc. will both directly raise the cost of living through higher prices for finished commodity imports and indirectly through more costly imported materials used by domestic producers (4, pp. 13-19). In addition, trade unions may force wages up more rapidly than increases in productivity, raising labor costs per unit.

Effects of Inflation on Domestic Savings

Inflation will affect domestic savings in various ways. It may change outputs, the distribution of real incomes, balance of payments, assets preference, interest rates, etc. These changes will necessarily affect domestic savings, but the way in which inflation affects domestic outputs, the distribution of incomes, etc. may be different, depending upon the initiating causes of inflation (14, p. 188).

Output Effect

If the economy is not operating at full capacity production, the principal effect of an increase in demand
will be to induce greater output and income. Since saving is a function of income and positively related to it, it may safely be said that under demand-pull inflation domestic savings would have more chances to increase than decrease. The point is illustrated schematically in Figure 3(p. 53). This presents a single aggregate supply curve for the economy as a whole and three aggregate demand curves, with $D_1$ representing the lowest level of demand and $D_3$ the highest. With demand held at $D_1$ the productive system is underutilized, with levels of real output and utilization at $Y_1$ (19, p. 268).

The consequence of increasing total demand from $D_1$ to $D_2$ is to raise output and capacity utilization from $Y_1$ to $Y_2$ and to raise the price level from $P_1$ to $P_2$. However, from the point at which the total supply curve has been drawn as vertical, indicating that the economy has achieved full capacity utilization at the level of output $Y_2$, the only effect of increasing total demand, from $D_2$ to $D_3$ is to raise the price level from $P_2$ to $P_3$, leaving real output unchanged at $Y_2$.

In practice, however, the aggregate supply curve will not usually become completely vertical. The concept of full utilization is difficult to apply in practice, especially in developing countries where there is always much unemployment which cannot be cured by increasing total demand. Thus, we may say that the effect of demand-pull inflation on domestic
Fig. 3--An illustration of demand-pull inflation

Fig. 4--Cost-push inflation
saving is more to raise it than to depress it via an increase in employment and real income, but the effect of cost-push inflation on output is different as is shown in Figure 4. The axes are the same as those of Figure 3, but this time aggregate demand is held constant at \( D_1 \). Because of rising import prices, trade union pressures and so on, unit costs go up and the supply curve shifts to successively higher levels — from \( S_1 \) to \( S_2 \). With demand held at \( D_1 \), this results in some loss of output from \( Y_1 \) to \( Y_2 \) and a rise in price level, from \( P_1 \) to \( P_2 \) (19, pp. 268). Thus, one of the results of increasing costs with total demand held constant is to reduce output, capacity utilization, and possibly capitalist profit margin, lowering living standards and increasing unemployment. Such a result would lead to decreasing domestic savings (14, p. 188).

**Income Redistribution Effect**

Cost-push inflation and demand-pull inflation have different distributional results. In the case of demand-pull inflation, it is most probable that profits will increase. Companies operating in condition of general excess demand find themselves able to raise prices, initially without any comparable rise in costs. Their profit margins therefore widen. Then, companies often reinvest large portions of increases in profits, rather than paying them all out to stockholders. Most firms will also be net debtors and will
thus benefit from the declining real burden of their debts. Wage workers and many consumers, on the other hand, will experience possible decline in their real incomes. There will thus be a redistribution of incomes from low to high savers.

In case of cost-push inflation, however, the distributional result will be in the opposite direction (17, p. 149). Increased wage cost, rising import prices, etc. will squeeze capitalist profit margin. This change in income distribution to the disadvantage of profit earners whose propensity to save is high, compared with other income earners would mean that the distributional result is to discourage domestic savings.

Thus, one could say that the correlation between demand-pull inflation and domestic savings via the income redistribution effect is positive, while that between cost-push inflation and domestic savings is negative (14, p. 188).

**Assets Preference Effect**

Price rises, whatever their causes may be, will diminish the net utility of holding money, thus reducing the demand for money and increasing the demand for goods. The larger demand for goods will bid up prices, the further accelerating is inflation and perhaps creating a cumulative situation in which there is a flight out of holding money because of inflation. With the value of money falling, people will try
to minimize their money balance in order to buy goods. This flight from money will surely cause a reduction in financial savings and may possibly lead to an increase in consumption expenditures on consumer durables etc., thereby reducing domestic savings. It may also have an effect on real output because money plays an important role in modern economies and a collapse of confidence in money is liable to retard output. This diminishing output will keep domestic savings even lower.

**Balance of Payments Effect**

Inflationary pressure may hold back the growth of the economy and domestic savings through its impact on the balance of payments. Assume that the rate of exchange between the domestic currency and foreign currencies is fixed. In this case, excess demand at home will spill over into an increased demand for imports which may be greater than the availability of foreign exchange. Moreover, domestic inflation will raise the cost of producing exports without compensating rises in the world prices at which they are sold. The profitability of exports will decline, and the export sector may stagnate, and the balance of payments may be further worsened. Potential foreign investors may also be discouraged from investing into a country with high inflation and an overvalued currency, thus further reducing the availability of foreign exchange and the quantity of
investment which will otherwise have generated more incomes and savings (14, p. 188).

**Interest Rate Effect**

In the process of demand-pull inflation, the money supply increases. When the real balance grows, the interest rate falls down. On the other hand, cost-push inflation does not change the money supply, but causes prices to rise, thus making the interest rate rise due to decreased real balance. We have to distinguish carefully between the real and the nominal rate of interest. Here the interest rate is the real interest rate, which is the nominal interest rate minus the real rate of inflation. The notion of the real rate of interest is important especially in connection with the interest rate effect on saving (6, pp. 211-213).

The interest rate is a discount rate between present consumption and future consumption. In other words, the interest rate penalizes the present consumption, and gives allowance to the future consumption. Therefore, when the interest rate goes up, saving increases and consumption decreases. Through this process, demand-pull inflation reduces saving via a decrease in the interest rate, contrarily cost-push inflation raises saving via an increase in the interest rate (14, pp. 188-190). TABLE VI shows all of these conflicting effects (14, p. 189).
### TABLE VI

**CAUSES OF INFLATION AND ITS EFFECTS ON SAVING**

<table>
<thead>
<tr>
<th>Items</th>
<th>Demand-pull Inflation</th>
<th>Cost-push Inflation</th>
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<tbody>
<tr>
<td>Output Effect</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Income Redistribution Effect</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Assets Preference Effect</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Balance of Payment Effect</td>
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<td>-</td>
</tr>
<tr>
<td>Interest Rate Effect</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>


**Hypothesis Testing**

The conclusions of this survey of alternative effects of inflation on domestic savings can now be summarized as follows:

1) There is no clear correlation between general price movement and domestic savings. If inflation is classified by causes into demand-pull and cost-push, then, a reliable but opposite relationship of inflation to savings may be found in the two cases.

2) Demand-pull inflation raises domestic savings via increased output and redistribution of resources in favor of high savers. At the same time, it has a negative effect of
reducing domestic savings, too. The negative effect comes mainly from change in assets preference of people and deterioration of balance of payments. But it is hypothesized that the positive effect outweighs the negative effect, thus that the net effect of demand-pull inflation on domestic savings is to raise them.

Cost-push inflation is completely negatively correlated to domestic savings. The output effect, the distribution of income effect, balance of payments effect, and assets preference effect which would change if cost-push inflation was under way, do not move in the direction of encouraging domestic savings (14, p. 190).

**A Test with Time Series Data for Korea 1954-1983**

Inflation was a striking phenomenon in most years of the observed period. During the observed period between 1954 and 1983 the annual average price rise in terms of the wholesale price index was about 16.9 per cent (13). The causes of inflation before the first oil shock in 1974 were attributed mostly to demand-pull forces except for some years like 1960, 1964, etc., when the national currency was devalued at a relatively high percentage. Implementation of the ambitious five-year economic development plans, which were first launched in 1962, brought about a drastic expansion in aggregate demand.

In the course of this rapid expansion of the economy,
domestic savings ratio rose to 22.1 per cent in 1973 from 2.1 per cent in 1962 (13). From 1974 on, however, many cost-push forces began to occur following the so-called first oil shock. A sudden four-fold increase in the price of imported crude oil in 1974 dealt a severe blow to the Korean economy which does not produce any petroleum. Besides the deterioration of balance of payments, the inflation rate rose sharply, as high as 42.1 per cent in 1974, and 26.5 per cent in 1975, caused mainly by increased import prices which are called "imported inflation" (4, p. 13). In addition, after over a decade of rapid economic growth, there appeared signs of supply shortage in the labor market from mid-1970's, tending to raise wage cost over labor productivity increase. On the other hand, growth rates of investment and exports after 1974 were reduced to almost half those for 1962-1973. Meanwhile, the domestic savings rate during the 1975-1983 period fluctuated between 20 per cent and 29 per cent, forming a contrast to the pace of rapid rise in the 1962-1973 period.

First of all, a simple regression using \((S/Y)_t - (S/Y)_{t-1}\) as a dependent variable and growth rate as an independent variable is as follows:

\[
1) \quad (S/Y)_t - (S/Y)_{t-1} = -2.881 + .4797Y \\
\quad (-2.94) \quad (5.63)
\]
\[ R^2 = .5312 \quad F = 31.72 \quad DW = 2.2255 \]

where \((S/Y)_t - (S/Y)_{t-1}\) = difference between domestic savings to GNP in period \(t\) and \(t-1\)

\[ Y = \text{annual GNP growth rate} \]

Figures in parentheses under the coefficients indicate t statistics and DW stands for Durbin-Watson d-statistic.

Since \((S/Y)_t - (S/Y)_{t-1}\) is used as a dependent variable, one of the dependent variable observations has negative values, as the savings ratio fluctuates year by year. Every statistic has a confidence level of over 95 per cent except for the coefficient of determination, \(R^2\). The explained variation by the regression line is not comparatively high compared with the unexplained variation. Though \(R^2\) is not high, it does not seem to be a serious problem.

In fact, researchers sometimes tend to play the game of maximizing \(R^2\), that is, choosing the model that gives the highest \(R^2\). But this may be dangerous. In empirical analysis it is usual to obtain a very high \(R^2\) but find that some of the regression coefficients are either statistically insignificant or have a sign which are contrary to a priori expectation. Therefore, the researcher should be more concerned about the logical or theoretical relevance of the explanatory variables to the dependent variable and their statistical significance (10, pp. 111-112). Our objective
is, however, not to obtain a higher $R^2$, but to obtain meaningful estimates of the true population coefficients and draw statistical inferences about them. We can say that equation 1) is significant at the 5 per cent level, and it proves a distinctive economic relationship between the change in savings ratio and the economic growth rate.

The Koyck distributed lag model is affixed to equation 1), and the following Equation 2) is obtained (10, pp. 265-266).

2) \[ \left( \frac{S}{Y} \right)_t - \left( \frac{S}{Y} \right)_{t-1} = -2.4487 + .4013Y_t + .1251Y_{t-1} \]
\[ (-2.94) \quad (4.01) \quad (1.50) \]
\[ R^2 = .6093 \quad F = 20.27 \quad DW = 2.3545 \]

Except for the coefficient of $Y_{t-1}$ (one period lagged $Y$), t values of the other two parameters are improved from the unlagged simple model.

When the Almon distributed lag model is used, Equation 3) is obtained through the following procedures. Only a two-period lagged model is introduced in the next step.

\[ Y_t = \alpha + \alpha_0 Z_{ot} + \alpha_1 Z_{1t} + u \]
where \[ Z_{ot} = \sum_{i=0}^{2} Y_{t-i} = (Y_t + Y_{t-1} + Y_{t-2}) \]
\[ Z_{1t} = \sum_{i=0}^{2} i Y_{t-i} = (Y_{t-1} + 2Y_{t-2}) \]

When $Z_{ot}$ and $Z_{1t}$ are regressed on dependent variable $\left( \frac{S}{Y} \right)$
- \( (\frac{S}{Y})_{t-1} \), the following equation is derived.

\[
Y_t = -1.3437 + .4322Z_{ot} - .3400 Z_{1t}
\]

\[
(-1.37) \quad (5.48) \quad (-4.93)
\]

\[
R^2 = .5466 \quad F = 15.07 \quad DW = 2.8042
\]

The next step is necessary to have the estimates of each parameter as following:

\[
\begin{align*}
\alpha &= -1.3437 \\
\beta &= a_o = .4322 \\
\gamma &= a_o + a_1 = .4322 - .3400 = .0922
\end{align*}
\]

Thus the final equation is obtained as follows:

3) \( (\frac{S}{Y})_t - (\frac{S}{Y})_{t-1} = -1.3477 + .4322Z_t + .0922Z_{t-1} \)

\[
(-1.37) \quad (5.48) \quad (-4.93)
\]

Contrary to the Koyck model of equation 2), the t value of \( Z_{t-1} \) now shows 99 per cent level of confidence, though other significant factors remain constant.

Following are additional results obtained by using two independent variables which are believed to represent demand-pull factor and cost-push factor, respectively, in domestic inflation during the same observation period. One of the independent variable is the difference between rate of annual
nominal wage increase and annual wholesale price rise, and
the other explaining variable is the difference between
annual consumer price rise and annual wholesale price rise.

4) \( \left( \frac{S}{Y} \right)_t - \left( \frac{S}{Y} \right)_{t-1} = -0.4037 + 0.6416Y - 0.0613(W - P) \)
\[ \begin{array}{ccc}
& (-4.30) & (5.30) \\
R^2 = 0.6299 & F = 18.72 & DW = 1.9456 \\
\end{array} \]

5) \( \left( \frac{S}{Y} \right)_t - \left( \frac{S}{Y} \right)_{t-1} = -2.6621 + 0.4515Y + 0.0628(CPI - WPI) \)
\[ \begin{array}{ccc}
& (-3.39) & (4.98) \\
R^2 = 0.5455 & F = 16.20 & DW = 2.3046 \\
\end{array} \]

where \( W \) = rate of annual nominal wage increase

\( P \) = annual wholesale price rise

\( CPI \) = annual consumer price rise

\( WPI \) = annual wholesale price rise

In Equations 4) and 5), we might understand the real
wage cost increase \( (W - P) \) as an indicator of cost-push
forces, and the difference in consumer price and wholesale
price rises \( (CPI - WPI) \) as an indicator of demand-pull
forces. If labor unions push up costs and force prices
higher, there must be an increase in aggregate expenditures
in order to sell the same quantity of goods. Otherwise, the
higher costs and prices would lead to an undesired
accumulation of inventories (5, p. 57).

Some explanations are needed in using \( CPI - WPI \) as an
indicator of demand-pull inflation. TABLE VII shows the
weight of major goods and services covered in Korea's CPI and WPI (1). As is shown, there is a big difference in the coverage of items and their weights between the CPI and WPI. One striking difference concerns intermediate goods and services.

### TABLE VII
WEIGHTS OF MAJOR ITEMS IN KOREAN CPI AND WPI

<table>
<thead>
<tr>
<th>Items</th>
<th>WPI</th>
<th>CPI</th>
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<tr>
<td>Agricultural products</td>
<td>17.9%</td>
<td>36.7%</td>
</tr>
<tr>
<td>Final consumer goods</td>
<td>32.9</td>
<td>35.5</td>
</tr>
<tr>
<td>Final capital goods</td>
<td>5.3</td>
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</tr>
<tr>
<td>Intermediate goods</td>
<td>43.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Service</td>
<td>0.0</td>
<td>27.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>


The WPI is seen to give the greatest weight to intermediate goods while the CPI doesn't cover them at all. The WPI is also seen to contain no service items, while they are represented with a relatively heavy weight in the CPI. We know that intermediate goods are inputs of business firms, and services are demanded mostly by consumers. These facts
enable us to believe that the WPI is more closely related to costs of firms, and CPI to the movements of demand on the part of consumers. Thus, it is likely that under demand-pull inflationary pressure the CPI would rise ahead of the WPI, but the CPI would lag behind the WPI in the case of cost-push pressure.

Now back to the four equations; evidence is again seen that domestic savings are correlated negatively to cost-push inflation, but positively to demand-pull inflation. Equation 5) shows that the higher the GNP growth rate, the higher the savings ratio goes up, and the faster the CPI rises ahead of the WPI, the greater are the chances for the savings ratio to rise. When demand-pull inflation is under way, we can say that the CPI goes up faster than the WPI (14, p. 190).

Equation 4) shows that the higher the GNP growth rate, the higher the savings ratio goes up, and the higher the real wage rises ahead of the WPI, the higher domestic savings ratio becomes negatively.

A Test with Data of 20 Developing Countries

Based on cross-country data of 20 developing countries the following results were obtained (13):

6) \( \left( \frac{S}{Y} \right)_{1971} - \left( \frac{S}{Y} \right)_{1968} = -1.6271 + .3008Y + .5312(CPI - WPI) \)

\[ (-1.14) \quad (1.36) \quad (2.40) \]

\( R^2 = .5622 \quad F = 10.91 \quad DW = 2.378 \)
7) \( \left( \frac{S}{Y} \right)_{1971} - \left( \frac{S}{Y} \right)_{1968} = -3.3077 + .7490Y - .1783(W - P) \)
\((-2.58) \quad (4.08) \quad (-1.69)\)
\[ R^2 = .4982 \quad F = 8.44 \quad DW = 2.5495 \]

where \( \left( \frac{S}{Y} \right)_{1971} \) = domestic savings ratio for 1971
\( \left( \frac{S}{Y} \right)_{1968} \) = domestic savings ratio for 1968
Y = annual average GNP growth rate
(1968-1971)
WPI = annual average WPI rise (1968-1971)
CPI = annual average CPI rise (1968-1971)
W = annual average nominal wage increase
(1968-1971)
P = annual average price rise (WPI) (1968-1971)

The dependent variable is the percentage difference in domestic savings ratio between 1971 and 1968. Independent variables are the 1968-1971 annual average figures of GNP growth rate, difference in consumer price rises and wholesale price rises, and difference in wage increases and wholesale price rises. Here again, the (CPI - WPI) variable was used as a proxy of demand-pull inflation and the real wage variable as an indicator of cost-push inflation.

Equation 6) indicates that domestic savings are positively correlated to GNP growth rate and demand-pull inflation variable. The coefficient of each variable is statistically significant. In Equation 7) we see that cost-push inflation variable has a negative sign in determining
the level of domestic savings. These results are all consistent with the results obtained early from the time series data of Korea in equation 4) and 5).

Conclusions

1. It is difficult to find a distinct association between price movements in the market system and domestic savings of developing countries. But if inflation is grouped into two types by its origin (demand-pull inflation and cost-push inflation), then a significant relationship of inflation to domestic savings is obtained from the two types of inflation. The two types of inflation have the opposite relationship to domestic savings (14, p. 190).

2. The correlation between demand-pull inflation and domestic savings is positive but that between cost-push inflation and domestic savings is negative. This has been evidently proved in the regression analyses of both time series data of Korea and cross-country data of 20 developing countries.

Demand-pull inflation raises domestic savings via increased output and redistribution of income in favor of high savers (capitalists). In the case of cost-push inflation, however, the output effect and redistribution effect move in the opposite direction (14, p. 191). Increased wage cost, rising import prices may squeeze profit margins, reducing output and real incomes of capitalists.
This result certainly discourages domestic savings.

3. The positive correlation between demand-pull inflation and domestic savings may be ascribed to the surplus of labor, relatively long price-wage lag, and relatively rigid foreign exchange system of developing countries. If price rises were followed sooner by wage increases and exchange devaluations, the positive correlation might become ambiguous.

4. Therefore, it is likely that developing countries can increase their domestic savings by way of wage control or infusion of some demand-pull factors like increased money supply. Inflationary credit creation as a means of capital formation in developing countries seems to have some validity (14, pp. 190-191).

5. Nevertheless, it is believed that sustained and high inflation would cause tremendous amounts of efficiency loss in the economy and would eventually lead to socio-economic instability by ever-worsening income distribution among the people. Therefore, the validity of the inflationary capital mobilization as a fiscal tool in developing countries should be used limitedly (14, p. 191).
CHAPTER BIBLIOGRAPHY


13. International Monetary Fund, International Financial


APPENDIX
<table>
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<tr>
<th>Year</th>
<th>S</th>
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<th>G</th>
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<th>CPI</th>
<th>W</th>
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