The impact of foreign capital inflow on domestic savings in Thailand 1970-1984

Kornkanok Tapphavimol
Atlanta University

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ABSTRACT

ECONOMICS

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The Impact of Foreign Capital Inflow on Domestic Savings in Thailand between 1970-1984

Adviser: Dr. Fred O. Boadu

Thesis dated May 1986

For the last two decades, foreign capital was considered as one of the most important factors in Thailand because of an attempt to raise the level of economic growth. After 1962, domestic savings were not adequate for the accumulation of capital, which allowed foreign capital to flow into the country in many forms, i.e., foreign aid, foreign private investment and other capital inflows. Economists had argued that effects of foreign capital inflows would either increase or decrease the economic development in Thailand.

The objective of this study is to estimate the impact of foreign capital inflows on the level of domestic savings. The disaggregated foreign capital inflows are in three parts: 1) foreign aid (AID); 2) foreign private investment (FPI); and 3) other capital inflows (RFI), and used time-series data in Thailand between 1970 and 1984. By using the two-stages least square approach, results show that both foreign aid and foreign private investment have inverse relationships to both domestic savings and growth rate of GNP. In effect, one can conclude that an increase in foreign capital inflow leads to a decrease in domestic savings. But for the overall economy, foreign capital still is the
important factor in order to increase employment, technology and other things.
THE IMPACT OF FOREIGN CAPITAL INFLOW ON DOMESTIC SAVINGS IN THAILAND BETWEEN 1970-1984

A THESIS
SUBMITTED TO THE FACULTY OF ATLANTA UNIVERSITY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

BY
KORNKANOK TAPPHAVIMOL

DEPARTMENT OF ECONOMICS

ATLANTA, GEORGIA
MAY 1986
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Any errors are solely my responsibility.
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CHAPTER I
INTRODUCTION

Saving has a very important role in the process of economic development of a country. Since most developing countries possess a lot of natural resources but lack capital, capital formation for investment purposes has to come from outside. Thus, foreign capital has been considered as one of the most important factors in developing countries over the last two decades. Foreign capital inflow will substitute or complement domestic savings which may lead to economic growth in recipient countries. In Thailand, foreign capital is a major source of economic development.

Since 1962, domestic savings in Thailand have not been adequate for the accumulation of capital so that foreign capital has been necessary for proper development planning. The ratio of gross domestic savings to gross domestic product (GDP) is less than the ratio of gross domestic investment to gross domestic product. Investment, as a share of GDP, has grown steadily, although savings have not kept pace and there has been increasing reliance on foreign financing of investment (see Table 1).

Foreign capital is a subject of increasing importance not only in capital-importing countries, but also in capital-exporting countries. For the advanced capital-exporting countries, foreign investment in developing countries is becoming a new area of exploration, as developing countries continue to grow and participate in world export markets. For the capital-importing countries, foreign capital is the primary source
TABLE 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Domestic Investment</th>
<th>Gross Domestic Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>1971</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>1972</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>1973</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>1974</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>1975</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>1976</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>1977</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>1978</td>
<td>27</td>
<td>22</td>
</tr>
<tr>
<td>1979</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>1980</td>
<td>28</td>
<td>21</td>
</tr>
<tr>
<td>1981</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>1982</td>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td>1983</td>
<td>26</td>
<td>18</td>
</tr>
</tbody>
</table>

of economic development and modern technology.  

Broadly speaking, foreign capital inflows may be expected to benefit Thailand in the following ways:

1) It should affect the immediate expansion of national production, either for domestic consumption or for exports;

2) It may increase employment in Thailand, to take advantage of cheap labor resources; and

3) It has the potential to support technology transferred from the developed countries to Thailand. Thus, Thailand will benefit from both more efficient production techniques and management know-how.

Foreign capital inflows have assumed an important role in the industrial development of Thailand. It has also become a major component in Thailand's balance of payments, working as an important offsetting factor to chronic and huge balance-of-trade deficit.

Thailand encourages foreign investment and offers a number of attractive features such as low wages, favorable attitudes towards the private sector and a strongly growing domestic market. Foreign capital inflows have increased noticeably since 1977, notably in natural gas development. Japan, followed by the United States, EEC and Taiwan, are the major foreign investors.

The Thai government recognizes the need to improve external debt management. Capital flows are relatively, although not completely, free Most foreign loans can be contracted without approval by commercial banks,

---


although nonfinancial companies are not free to hold foreign exchange abroad. Foreign capital flows have also proven sensitive to interest rate differentials between Thailand and foreign market. Interest rate ceilings in Thailand have produced sharp fluctuations in inflows and outflows in the past few years.

The amount of foreign capital inflow has increased vastly in recent years. Foreign aid rose from 1.9 percent in GNP in 1975 to 5.2 percent in GNP in 1982 (see Table 2). Foreign private investment also increased from 2.4 to 5.4 percent in GNP in 1975 to 1981, respectively. Total foreign capital inflow grew from $797.6 million U. S. dollars to $6,124.6 and $11,508.5 million U. S. dollars in 1980 and 1983, respectively. ³

Objective of the Study

Given the strategic importance of foreign capital inflows to Thailand's economic development, this study will examine the relationship between foreign capital inflows, the level of domestic savings and economic growth rates for Thailand during the period 1970 to 1984. Specific objectives of this study are:

1) To identify the factors that influence the amount of capital inflows, the level of domestic savings and economic growth;

2) To identify the interactions between capital inflows, the level of domestic savings and economic growth using an appropriate economic model; and

3) To estimate in a simultaneous framework the quantitative impacts of the identified interactions.

TABLE 2
(AS PERCENTAGE OF GDP)

<table>
<thead>
<tr>
<th>Year</th>
<th>Foreign Aid</th>
<th>Foreign Private Investment</th>
<th>Other Capital Inflows</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>3.8</td>
<td>2.3</td>
<td>.0.9</td>
<td>6.0</td>
</tr>
<tr>
<td>1971</td>
<td>4.8</td>
<td>1.6</td>
<td>1.4</td>
<td>7.8</td>
</tr>
<tr>
<td>1972</td>
<td>5.7</td>
<td>2.9</td>
<td>1.5</td>
<td>10.1</td>
</tr>
<tr>
<td>1973</td>
<td>3.2</td>
<td>1.4</td>
<td>2.7</td>
<td>7.3</td>
</tr>
<tr>
<td>1974</td>
<td>0.2</td>
<td>4.3</td>
<td>2.6</td>
<td>7.1</td>
</tr>
<tr>
<td>1975</td>
<td>1.9</td>
<td>2.4</td>
<td>2.5</td>
<td>6.8</td>
</tr>
<tr>
<td>1976</td>
<td>4.5</td>
<td>2.2</td>
<td>1.5</td>
<td>8.2</td>
</tr>
<tr>
<td>1977</td>
<td>3.0</td>
<td>2.2</td>
<td>3.8</td>
<td>9.0</td>
</tr>
<tr>
<td>1978</td>
<td>3.1</td>
<td>2.5</td>
<td>2.6</td>
<td>8.2</td>
</tr>
<tr>
<td>1979</td>
<td>2.3</td>
<td>4.8</td>
<td>2.7</td>
<td>9.8</td>
</tr>
<tr>
<td>1980</td>
<td>4.4</td>
<td>6.8</td>
<td>0.7</td>
<td>11.9</td>
</tr>
<tr>
<td>1981</td>
<td>3.1</td>
<td>5.4</td>
<td>3.7</td>
<td>12.2</td>
</tr>
<tr>
<td>1982</td>
<td>5.2</td>
<td>3.6</td>
<td>0.6</td>
<td>9.4</td>
</tr>
<tr>
<td>1983</td>
<td>2.8</td>
<td>3.4</td>
<td>5.6</td>
<td>11.8</td>
</tr>
<tr>
<td>1984</td>
<td>2.7</td>
<td>3.4</td>
<td>5.6</td>
<td>11.7</td>
</tr>
</tbody>
</table>

The Definition and Measurement of Variables

Foreign Capital Inflows

In order to explicitly test the hypothesis that different components of total capital inflows have different impacts on savings rate and growth rate, we have classified capital inflows into three categories following the Papanek's study,\(^4\) namely:

1) **Ratio of Foreign Aid to GNP (AID):** Foreign aid is a major component of aggregate foreign capital inflow. This is measured as net transfer received by government plus official long-term borrowing expressed as a percentage of GNP.

2) **Ratio of Foreign Private Investment to GNP (FPI):** Foreign private investment includes private long-term borrowing plus net private direct investment. These are expressed as a percentage of GNP.

3) **Ratio of Other Capital Inflows to GNP (RFI):** This indicates net private transfers, net short-term borrowing, other capital (net), and errors and omissions in the balance of payments as percentage of GNP.

Savings Rate (S/Y)

It is measured as gross domestic savings expressed as percentage of the GNP at current market price in Thailand. Gross domestic savings is measured as gross domestic investment at current prices plus export of goods and non-factor services.

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Growth Rate of GNP (G)

This variable is measured as the annual average compound rate of growth of GNP over the relevant time period. This growth rate data are available in World Table 1971, 1976, 1981 and 1984.
CHAPTER II
LITERATURE REVIEW

There have been a lot of studies on the impact of foreign capital on the saving rates, among other aspects, of developing countries. However, there has been no attempt to study the impact of foreign capital inflows on savings in Thailand, explicitly. This chapter will focus on the previous studies which investigated the impact of foreign capital inflow on savings. In recent years, there have appeared several studies on this topic. The studies by Chenery and Strout, Rahman, Chenery and Eckstein, Singh, Gupta, Griffin and Enos, Weisskopf, Papanek, and Bhagwati and Srinivasan are among the more significant in this area.

A common theme among these studies is that although foreign aid is expected to supplement and even induce domestic savings and capital formation, empirical results appear to suggest that capital inflow replaces the domestic savings, thus reducing the country's capital formation.

The study of Chenery and Strout summarizes the view of several development economists who believed that foreign assistance or foreign aid had the positive effects on domestic savings and increased capital formation and economic growth. Foreign capital inflows decreased savings gap and consequently, it could expand the economic growth much more than using only domestic resource. In developing countries, capital was the scarcest factor of production.5

Chenery and Strout indicated the probabilities of calculating external resources in order to reduce savings gap. They estimated projected investment and domestic savings and estimated the gap between them. In this way, a government could bring foreign capital until it met the aim of the national development plan. This is achievable because there is a relationship between foreign capital inflow and savings behavior.

From Haavelmo's suggestion, the domestic savings is not a function of national income alone but is also related inversely with the inflow of foreign capital. This may be expressed as:

\[ I(t) = a [Y(t) + F(t)] \]

where,

\[ I = \text{Gross investment}; \]
\[ Y = \text{Gross national product}; \text{ and} \]
\[ F = \text{Capital inflows}. \]

"That is to say," in Haavelmo's words, "that investment is a function of income including what they get from abroad." He adds, "I think we see the possible implications. It means, for example, that domestic savings could be negative if F is large enough."\(^6\)

Rahman\(^7\) interpreted this to mean that domestic savings depend not only on income but also, and negatively, on foreign capital inflows. For the purpose of testing his hypothesis, Rahman introduced a slight modification. Thus, he postulated that,

\(^6\)Ibid.

I(t) = aY(t) + bH(t)

and since $I(t) = S(t) + H(t)$ where $S(t)$ denotes savings, he obtained a domestic saving function:

$$S(t) = aY(t) + bH(t)$$

where

$$b^1 = b - 1.$$ 

Hence, $S(t) / Y(t) = a + b^1 H(t)$.

Using the data for 31 less developed countries from Chenery and Strout, he estimated his model and concluded that it was quite likely that foreign capital inflows were used not only for augmenting investment, but also as a substitute for domestic savings.

Gupta, however, criticized the selection of only 31 countries and repeated the test using all 50 countries' data. He found that the coefficient of F/Y was positive ($a_1 = 0.03$) but not significantly different from zero, $t = 0.4$. With this, Gupta concludes: "From this equation it would appear that foreign capital inflows have virtually no effect on domestic savings in the less developed countries." 8

Gupta further classified the 50 countries into three groups, based on the level of GNP per capita. His findings are in Table 3 below.

His results show that practically no relationship exists between the savings rate and net capital flows. The estimated coefficient of $a$ is negative only in the $125 - 249$ group. However, the t-statistic

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TABLE 3
THE RESULTS OF GUPTA'S CLASSIFICATION

<table>
<thead>
<tr>
<th>Y/Population</th>
<th>$a_1$</th>
<th>t</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - $124$</td>
<td>0.33</td>
<td>1.1</td>
<td>0.35</td>
</tr>
<tr>
<td>$125 - $249$</td>
<td>-0.02</td>
<td>-0.3</td>
<td>0.08</td>
</tr>
<tr>
<td>$250 - $675$</td>
<td>0.42</td>
<td>1.3</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Note: $a_1$ = The coefficient of F/Y  $S/Y = a_0 + a_1 (F/Y)$  
  $t$ = The value of the t-statistic for testing $a_1$  
  $R^2$ = The coefficient of determination


indicates that the estimated coefficient is not significantly different from zero.

Chenery and Eckstein regressed savings on net capital inflow, GNP and the share of exports in GNP. Finally, the capital inflow was found to be negatively correlated with savings rate.9

Chenery and Eckstein suggest that Latin American countries have been primarily subjected to a foreign exchange constraint on investment in accordance with the dual-gap model of economic growth. This model assumes

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a "potential" marginal propensity to save (MPS) which may be above the actual MPS due to a binding foreign exchange constraint. An increase in export revenue is accompanied by a rise in the savings ratio since it permits a larger volume of investment. An inflow of capital also provides the foreign exchange for additional investment but at the same time serves as a "one-to-one substitute for domestic savings in financing investment." While both increased the export earnings and capital inflow provides the foreign exchange needed to support a higher level of investment, the increase in capital imports also increase the current account deficit.

Singh investigated the relationship between an increase in the ratio of F to Y or of F to S and the APS. He found both correlations to be significantly negative. Thus, Singh also concludes that foreign capital is a substitute for domestic savings. However, the degree of substitution varies inversely with the level of APS behavior. Furthermore, for an APS greater than 0.15, an increase in F will lead to increased savings.

Thus far, the models from these studies under review are aggregate analysis employing a standard Keynesian saving function with an additional variable (i.e., F or F/Y) in the equation.

Weisskopf's study departs from these studies by using the time-series data to estimate savings function for selected countries. Finally, he pooled his data to claim the negative relationship and the result is


as following:

\[ S = a + 0.183Y - 0.227F + 0.176E \]

\[ (65.9) \quad (-5.2) \quad (4.6) \]

where

- \( S \) = Gross domestic savings;
- \( Y \) = Gross national product;
- \( F \) = Exports minus imports; and
- \( E \) = Export revenue.

With that Weisskopf concludes: "Approximately 23 percent of net capital inflow substitutes for domestic savings." He added further in the footnote that, "the estimate of 23 percent should be regarded as a lower limit to the extent of substitution of foreign for domestic savings; the true value may be substantially higher." \(^{12}\)

Few economists have gone so far as to suggest that foreign aid is likely to retard development, a position taken by Griffin and Enos. \(^{13}\) In their 1970 article, Griffin and Enos carried out a regression similar to that of Rahman's. They used data for 32 countries for the three-year period 1962 to 1964. The result is shown as:

\[ \frac{S}{Y} = 0.11 - 0.73 \frac{F}{Y} \]

\[ (-6.6) \]

The extent of substitution must have convinced the authors to take that pessimistic position. Weisskopf criticized Griffin and Enos on the

---


ground that some of the 32 countries under observation were actually experiencing a net outflow of capital, rendering their result to be inconclusive.

The next significant and a substantially more detailed analysis, using a single equation approach, was carried out by Papanek.\textsuperscript{14} He introduced one innovation of considerable importance. Instead of treating all capital inflows as a single group implying that it consisted of homogeneous components in the sense that all of them had the same effect, he disaggregated them into three parts: foreign aid (AID), foreign private investment (FPI), and all other inflows (RFI). The model used are represented by the following equations.

1) \( \frac{S}{Y} = a_0 + b_0G + c_0y + d_0DR + e_0 \frac{F}{Y} \)

2) \( \frac{S}{Y} = a_1 + b_1G + c_1y + d_1DR + e_1AID + f_1FPI + g_1RFI \)

3) \( \frac{F}{Y} = AID + FPI + RFI \)

where, in addition to the variables already defined,

\( Y \) = Per capita income; and

\( DR \) = Dependency rate.

Therefore, given this formulation, we will expect a positive relationship (\( b_0 > 0 \)) between \( G \) and \( (S/Y) \). Papanek found a strong confirmation of Haavelmo's hypothesis, whether judged by the effect of total capital inflows or by their components.

The case for the inclusion of the dependency rate has been persuasively argued by Leff. Dependency rate is related to birth rate and the latter

has significant impact on the age distribution of the population. Following Modigliani-Brumberg-Ando's (MBA) "life-cycle" hypothesis, it is postulated that age distribution of population will influence the savings behavior. Leff found that dependency rate will exert negative influence on the saving rate because as the percentage of dependents in the population increases, the potential for savings decreases as additional people have to be provided with the given resources.\textsuperscript{15}

Bhagwati and Srinivasan investigated the impact of foreign capital on domestic savings of India. Using model as follows:\textsuperscript{16}

1) $C_t = b_0 + b_1 (Y_t + F_t)$

where $F_t$ is the foreign capital inflow, defined as the negative of the balance on current account. Then they estimated the following form of the equation:

2) $S_t = a_0 + a_1 Y_t + a_2 F_t + u_t$.

Bhagwati concluded that there is not enough evidence on the issue as to whether the absorption of external resources has adversely affected India's domestic saving effort.

Like Rahman's thesis, Bhagwati and Srinivasan's studies indicated that an inflow of capital is likely to influence the public sector's savings. This is because the pressure to reduce domestic savings in response


to aid inflow is likely to be felt mainly in tax effort and hence, public savings.

Gupta and Islam\textsuperscript{17} examined empirically the role of foreign capital as a determinant of the behavior of growth and savings in developing countries. Using data on 52 developing countries for two time periods, 1950 to 1960 and 1965 to 1973, classified two types of sample disaggregations. The first type of classification was based on three income groups. The second type was based on the geographic regions. They produced the simultaneous model to find the total effects (direct and indirect) and found that direct effect will overestimate the total effect because it cannot capture the indirect positive effects of foreign capital on savings via growth. His model is as follows:

1) \[
\frac{S}{Y} = a_1 + b_1y + c_1G + d_1DR + e_1AID + f_1FPI + g_1RFI + u_2
\]

2) \[
G = a_2 + b_2\frac{S}{Y} + c_2AID + d_2FPI + e_2RFI + u_2
\]

They concluded that foreign aid has greater adverse effect on savings than foreign private investment. This result holds, in terms of the signs, the magnitude and the statistical significance of the coefficient estimates. These results sound plausible because foreign aid is negotiated on a government to government basis and it is quite likely that the government of the recipient country may tend to relax its efforts to mobilize resources domestically once it has found large commitments of foreign aid from external sources. The author found that other types

of capital inflows have significantly positive impact on growth as well as significantly negative impact on savings.

Summary

The role of foreign capital inflows, measured as an aggregate, has been examined by Rahman, Gupta, Chenery and Eckstein and Weisskopf. Papanek has argued that it is more appropriate to treat the different components of total inflows as heterogeneous, exerting quantitatively different effects on savings rates. Thus, whether or not the capital inflow has an adverse impact on the domestic savings of Thailand will require a disaggregation of the foreign inflow into its principal components and examining the role each component plays in encouraging domestic savings. So far, the case of Thailand is inconclusive. It is possible that dissaggregation of foreign capital inflows can throw a new light on this issue.
CHAPTER III
MODEL AND METHODOLOGY

In the previous chapter, some of the existing literature on the effects of foreign capital inflows on growth rate and savings rate were reviewed. However, almost all of these studies concentrated only on the direct effects of these inflows using single-equation models. In this chapter, it is shown that once indirect effects are allowed via a simultaneous equation model, better conclusion will be made. Because simultaneous equation models can capture total effect (direct and indirect effect) of foreign capital inflows on growth rates and saving rates, this method is used in this study.

Gupta's model\(^{18}\) is adapted in this study to examine the effects of foreign capital inflows on savings rate and growth rate in Thailand between 1970 and 1984. The approach is quite recent and uses simultaneous equations framework in the determination of savings rate and growth rate in developing countries.

The Model

The model used in this study consists of nine structural equations. All the equations are expressed in linear form both in variables and parameters. There are nine endogeneous variables in this model, that is, S/Y, G, y, TLPR, DR, BR, FPR, IMR and ALF. The variables other than these are exogeneous in the model.

\(^{18}\)Ibid., pp. 64-70.
A brief discussion of each equation in the model is presented in the following paragraphs.

1) Savings Rate Equation. Per capita income and growth rate are explanatory variables in this equation and are expected to have a positive effect on savings rate. Since a rapid increase in the rate of per capita income can change life-time consumptions patterns and directly influencing savings rate, the case for the inclusion of dependency rate has been suggested by Leff. Dependency rate is related to birth rate and the latter has made a significant impact on the age distribution on population following the "life-cycle" hypothesis proposed by Modigliani-Brumberg-Ando's (MBA). It can easily be shown that dependency rate has a negative influence on the savings rate since as the percentage of dependents in population increases, the potential for savings decreases as additional people have to be provided with the given resources.

This study introduces foreign capital inflows into the model, according to Papanek's study, in order to explicitly test the hypothesis that different components of total capital inflows exercise significantly different impacts.

2) Growth Rate Equation. Like the savings equation, this study allows for savings and growth to be jointly determined and allows for the indirect effects of foreign capital inflows on the growth rate via the savings rates, and also observes that capital inflows variables

---


appear in both equations.

3) **Per Capita Income Equation.** This equation can be derived from the production function of an economy. This can be described as:

\[ \text{GNP} = f(K, L, D, Q) \]

where,

- GNP = Gross national product;
- K = Physical capital;
- L = Labor;
- D = Natural resources (land); and
- Q = Quality of labor.

Assuming this function is linear and homogeneous in K, L, and D, we obtain:

\[ y = \frac{\text{GNP}}{P} = F\left(\frac{K}{P}, \frac{L}{P}, \frac{D}{P}, Q\right) \]

where,

- Y = Per capita income; and
- P = Population.

To estimate the equation, this study will use EN (per capital energy consumption) as a proxy for K/P, total force participation (TLPR) is used for L/P, population density (DEN) is used for D/P, and finally, the literacy rate (LIT) is used for the quality of labor, Q.

4) **Total Labor Force Participation Rate.** This study specifies TLPR as an endogeneous variable, a very simple linear but inverse relationship between TLPR and dependency rate.

5) **Dependency Rate Equation.** It has been indicated that birth rate will affect a population's age composition.
6) **Birth Rate Equation.** As for the variable ALF, agricultural activity is more conductive to higher birth rates than nonagricultural activity. The inclusion of infant mortality is justified in terms of the replacement needs of a family for children. FPR is included as a proxy for the "opportunity income of women and their access to the labor market." The inclusion of per capita income follows from the theory of consumer choice, children appear as an argument in the utility function of the consumer. As children are not an inferior commodity, an increase in income is expected to increase the demand for children.

7) **Female Labor Force Participation Rate Equation.** Birth rate affects the supply of female labor so that it is included in this equation. In nonindustrial countries, the female labor force participation rate is higher in agricultural labor force.

8) **Infant Mortality Rate Equation.** The number of persons per hospital bed is used as an index of the availability of health care service.

9) **Share of Agricultural Labor Force Equation.** During the process of economic development, the proportions of labor force in agriculture and nonagriculture tend to decline. So this study uses per capita income as an indicator of the level of economic development.

The above discussions may be summarized into an economic model of the following form:

1) \( S/Y = f(y, G, DR, AID, FPI, RFI) \)
2) \( G = f(S/Y, AID, FPI, RFI, GL) \)
3) \( y = f(EN, TLPR, LIT, DEN) \)
4) TLPR = f(DR)
5) DR = f(BR)
6) BR = f(LIT, Y, ALF, IMR, FPR)
7) FPR = f(ALF, BR)
8) IMR = f(LIT, y, ALF, HB)
9) ALF = f(y)

where,

S/Y = Gross domestic saving rate;
G = Gross rate of GNP;
y = Real per capita income;
DR = Dependency rates, defined as the percentage of population between 0-14 years of age;
BR = Birth rate (per 1,000);
FPR = Female labor force participation rate;
IMR = Infant mortality rate;
AID = Net transfers received by government plus official long-term borrowing as percentage of GNP;
FPI = Foreign private investment which includes private long-term borrowing plus net private direct investment as percentage of GNP;
RFI = Other foreign inflows which include net private transfers, net short-term borrowing, other capital (net), and errors and omissions in the balance of payment as percentage of GNP;
EN = Per capita energy consumption (measured in kilograms per capita coal equivalents);
TLPR = Total labor force participation rate;
DEN = Population density;
LIT = Literacy rate;
ALF = Percentage of labor force in agriculture;
HB = Number of persons per hospital bed; and
GL = Rate of growth of labor force.

**Hypotheses**

The associated hypotheses are: 1) there is negative relationship between foreign capital inflow and savings rate in Thailand between 1970 and 1984; and 2) there is a positive relationship between foreign capital inflow and growth rate in Thailand between 1970 and 1984.

Based on the economic model, a statistical model for estimation purpose is specified below:

1) \( \frac{S}{Y} = a_1 + b_1 Y + c_1 G + d_1 DR + e_1 AID + f_1 FPI + g_1 RFI + u_1 \)
2) \( G = a_2 + b_2(\frac{S}{Y}) + c_2 AID + d_2 FPI + e_2 RFI + f_2 GL + u_2 \)
3) \( y = a_3 + b_3 EN + c_3 TLPR + d_3 LIT + e_3 DEN + u_3 \)
4) \( TLPR = a_4 + b_4 DR + u_4 \)
5) \( DR = a_5 + b_5 BR + u_5 \)
6) \( BR = a_6 + b_6 LIT + c_6 Y + d_6 ALF + e_6 IMR + f_6 FPR + u_6 \)
7) \( FPR = a_7 + b_7 ALF + c_7 BR + u_7 \)
8) \( IMR = a_8 + b_8 LIT + c_8 Y + d_8 ALF + e_8 HB + u_8 \)
9) \( ALF = a_9 + b_9 y + u_9 \)

All definitions are previously given and \( u \) is a disturbance term with a zero mean and constant variance.
The Impact Multipliers

An impact multiplier is defined to be the change in an endogeneous variable as a result of a change in an exogeneous variable, ceteris paribus. The impact multiplier is a useful tool in analyzing the effect of an exogeneous variable on the endogeneous variable. The following are the impact multipliers of each capital inflows on savings rate and growth rate, respectively.

\[
\frac{d(S/Y)}{dAID} = c_1c_2 + e_1/1 - b_2c_1; \quad \frac{dG}{dAID} = c_1 + b_2c_1/1 - b_2c_1
\]
\[
\frac{d(S/Y)}{dFPI} = c_1d_2 + f_1/1 - b_2c_1; \quad \frac{dG}{dFPI} = d_2 + b_2f_2/1 - b_2c_1
\]
\[
\frac{d(S/Y)}{dRFI} = c_1e_2 + q_1/1 - b_2c_1; \quad \frac{dG}{dRFI} = e_2 + b_2q_1/1 - b_2c_1
\]

The Identification

The rank and order conditions indicate that each of the structural equations as well as the whole system is over-identified. Under these circumstances, the appropriate estimation technique is the two-stage least squares procedure.

Before proceeding further, it is to be emphasized here that the coefficient estimated from the structural equations measure only the direct effect of the explanatory variable on the endogeneous variable. The total effect is given by the reduced form coefficient (impact multiplier) which included both the direct and indirect effects.

The Source of Data

The data used in this study were gathered from: 1) The International Financial Statistics Yearbook 1985, published by the International

**Statistical Estimation Procedures**

A simultaneous equations approach was used in the estimation of the equations. Data value used in the estimating were taken over the period of 1970 to 1984 in Thailand.
CHAPTER IV
STATISTICAL ESTIMATIONS AND RESULTS

The main objective of this study is to examine the quantitative impact of foreign capital inflows and its components on savings and growth rates using a simultaneous equation model approach. To do this, two-stage least squares procedures were used to estimate the parameters of the econometric model. Results are shown in the following table.

The Estimations

The model specified in the previous section was estimated for Thailand, using data between 1970 and 1984 as described in Chapter III. The results are presented in Table 4.

The effect of foreign capital inflows on savings rate can be analyzed by using Table 5. Based on Table 5:

\[
\text{Saving rate} = 28.0715 - 0.0045 \times \text{real per capita income} + 0.2795 \times \text{growth rate of GNP} - 5.8386 \times \text{dependency rate} - 1.1570 \times \text{foreign aid} + 0.0839 \times \text{foreign private investment} - 0.6319 \times \text{other foreign inflows}.
\]

\[R^2 = 0.87\] means 87 percent of the variation of savings rate was explained by the variables in this model.

Based on equation 1, AID and RFI have a negative effect on savings rate, significantly at one percent level of significance. Only FPI has a positive effect but is not significant.

The table also shows some interesting deviations from the widely held belief that foreign capital inflows in general have a negative
### TABLE 4
NINE EQUATIONS SIMULTANEOUS MODEL OF GROWTH FOR THAILAND

<table>
<thead>
<tr>
<th>Equation</th>
<th>Expression</th>
<th>Coefficients</th>
<th>T-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) S/Y</td>
<td>$28.0715 - .0045y + .2795G - 5.8386DR - 1.1570AID + .0839FPI - .6319RFI$</td>
<td>$(11.24)$</td>
<td>$(-2.74)$</td>
</tr>
<tr>
<td>2) G</td>
<td>$-7.4567 + .5951S/Y + .2696AID - .3427FPI + .5886RFI + .0648GL$</td>
<td>$(-0.44)$</td>
<td>$(1.10)$</td>
</tr>
<tr>
<td>3) Y</td>
<td>$-1.848.4637 - 3.7043LIT + 1.7833TLPR + 28.9107DEN$</td>
<td>$(-5.02)$</td>
<td>$(1.10)$</td>
</tr>
<tr>
<td>4) TLPR</td>
<td>$94.1665 - 56.9244DR$</td>
<td>$(93.20)$</td>
<td>$(-16.18)$</td>
</tr>
<tr>
<td>5) DR</td>
<td>$0.1527 + 0.0038BR$</td>
<td>$(0.56)$</td>
<td>$(0.45)$</td>
</tr>
<tr>
<td>6) BR</td>
<td>$15.4648 + 0.0861LIT - 0.0110y + 0.2044ALF - 0.0252IMR + 0.0193FPR$</td>
<td>$(0.91)$</td>
<td>$(1.77)$</td>
</tr>
<tr>
<td>7) FPR</td>
<td>$132.5860 - 0.5983ALF - 1.3684BR$</td>
<td>$(4.58)$</td>
<td>$(-0.961)$</td>
</tr>
<tr>
<td>8) IMR</td>
<td>$-21.7672 + 0.0748LIT - 0.2047y + 1.444ALF - 0.5862HB$</td>
<td>$(-0.68)$</td>
<td>$(0.78)$</td>
</tr>
<tr>
<td>9) ALF</td>
<td>$82.1231 - 0.0128y$</td>
<td>$(79.24)$</td>
<td>$(-6.63)$</td>
</tr>
</tbody>
</table>

**Note:** The figures in parentheses are t-value.

**Source:** Derived from the Appendix.
Effect on savings rate. It should be repeated that right now it is talking about direct effect only.

The elasticity estimated of AID on S/Y is -0.195, this means increasing foreign aid by 10 percent decreases savings rate in Thailand by 1.95 percent, so foreign aid is inelastic. The elasticity estimated of FPI on S/Y is 0.013, this means increasing in foreign private investment by 10 percent increases savings rate in Thailand by 0.13 percent, so foreign private investment is inelastic. The elasticity estimated of RFI on S/Y is -0.077, this means increasing in other foreign inflows by 10 percent decreases savings rate in Thailand by 0.77 percent, so other foreign inflows are inelastic.

Based on Table 6, the following equation for the growth rate of GNP is obtained:
TABLE 6

ESTIMATED PARAMETERS OF EQUATION 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Elasticity Estimate</th>
<th>SE</th>
<th>$R^2$</th>
<th>D-W</th>
</tr>
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<tbody>
<tr>
<td>Intercept</td>
<td>-7.4567</td>
<td></td>
<td>16.8874</td>
<td>0.36</td>
<td>2.357</td>
</tr>
<tr>
<td>S/Y</td>
<td>0.5951</td>
<td>1.8709</td>
<td>0.5387</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AID</td>
<td>0.2696</td>
<td>0.1429</td>
<td>0.9319</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPI</td>
<td>-0.3427</td>
<td>-0.1703</td>
<td>0.3988</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RFI</td>
<td>0.5886</td>
<td>0.2283</td>
<td>0.7936</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GL</td>
<td>0.0648</td>
<td>0.0579</td>
<td>0.0828</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Derived from the Appendix.

Growth rate = -7.4567 + 0.5951 savings rate + 0.2696 foreign aid
-0.3427 foreign private investment + 0.5886 other foreign inflows + 0.0648 growth rate of labor force

$R^2 = 0.36$ means 36 percent of the variation of growth rate was explained by the variable in the model.

The growth rate equation does not perform very well. Both AID and RFI have positive effects on growth rate, but FPI does not. The results reconfirm earlier findings of Papanek and Gupta that different components of capital inflows have different effects even in qualitative terms and even considering direct effect only. In addition, there are certain consistent patterns that foreign private investment (FPI) does not exercise a significant effect and RFI would appear to be the most
important of the three types of inflows.

The elasticity estimate of AID on growth rate is 0.142. This means that increasing foreign aid 10 percent increases growth rate in Thailand by 1.42 percent, so foreign aid is inelastic. The elasticity estimate of FPI on growth rate is -0.17. This means that increasing foreign private investment 10 percent decreases growth rate in Thailand by 1.7 percent, so foreign private investment is inelastic. The elasticity estimate of RFI on growth is 0.228. This means that increasing other foreign inflows 10 percent increases growth rate in Thailand by 2.28 percent, so other foreign inflows are inelastic.

Now, turn to a brief analysis of other equations in the model.

1) The total labor force participation equation (equation 4) performed very well, dependency rate variable has the expected negative sign and highly significant. The total labor force participation rate = 94.1665 - 56.9244 dependency rate.

2) The dependency rate equation (equation 5) also performs satisfactorily. As expected, the coefficient of the birth rate retains a positive sign and is highly significant. Dependency rate = 0.1527 + 0.0038 birth rate.

3) The performance of agricultural labor force (in equation 9) is also very good. The coefficient of per capita income is negative as expected. Agricultural labor force rate = 82.1231 - 0.0128 per capita income.

4) Considering the birth rate equation, literacy rate has the positive sign. Per capita income has a negative influence on birth rate.
Agricultural labor force (ALF) has the expected positive sign. But the signs of infant mortality rate and female participation rate do not seem to be as expected. The FPR has a positive sign instead of the expected negative sign. This result is not surprising because the family system in Thailand allows the participating women to work outside while the other members can take care of the babies at home, requiring no extra cost in term of money or parent's time.

Birth rate = 15.4648 + 0.0861 literacy rate
- 0.0110 per capita income
+ 0.2044 agricultural labor force
- 0.0252 infant mortality rate
+ 0.0193 female labor force participation rate.

5) In the female labor force participation rate equation, ALF has a negative sign. The birth rate variable, as expected, has the negative influence on female labor force participation rate. Female labor force participation rate = 132.5860 - 0.5983 agricultural labor force - 1.3684 birth rate.

6) In the infant mortality rate equation, literacy rate has the positive sign and the per capita income variable also exerts negative influence on infant mortality rate as expected. The variable hospital bed (HB) as a proxy for availability of health care performs very good and shows the expected negative sign.

Infant mortality rate = - 21.7672 + 0.0748 literacy rate
- 0.2047 per capita income
+ 1.4444 agricultural labor force
- 0.5862 hospital bed.
Briefly, this study interpretes the quantitative result of the structural equation 1 in Table 4. For the 1970 to 1984 period, the estimated coefficient of foreign aid (AID) is -1.1570. These implies that one dollar of AID reduces the saving effort by 1.157 dollar. For the foreign private investment (FPI), the whole period's estimated coefficient is 0.08, suggesting that 10 dollars inflow of FPI increases the savings rate by eight cents, and etc. These are the direct effect of a given exogeneous variable on the endogeneous variable. In order to allow for the indirect effects, the simultaneous equation model must be solved to get the reduced form.

The reduced form coefficients (impact multipliers) measure the total, that is, the direct and indirect effect of a given exogeneous variable on a particular endogeneous variable, keeping all other exogeneous variables constant.

**Direct Versus Total Effects of Capital Inflows**

This study examines the direct and total effects of various types of foreign capital inflows on savings and growth rate. These effects are summarized in Table 7. Based on Table 7, a number of conclusions can be drawn.

1) The sign of the total effect can be different from the direct effect even if direct effect is assumed to be negative. For example, in savings rate equation, FPI is positive in direct effect but negative in total effect.

2) Total effect is smaller than direct effect in almost all of the cases.

3) In growth rate of GNP equation, AID is the only one that has a positive sign in direct effect and changes to a negative sign in total effect because FPI and RFI remain the same sign in both direct and total effect.
TABLE 7
THAILAND: DIRECT AND TOTAL EFFECTS OF CAPITAL INFLOW ON SAVING AND GROWTH RATE

<table>
<thead>
<tr>
<th></th>
<th>Direct Effect</th>
<th></th>
<th>Total Effect</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>AID</td>
<td>FPI</td>
<td>RFI</td>
</tr>
<tr>
<td>SY</td>
<td>-1.1570</td>
<td>0.0839</td>
<td>-0.6319</td>
</tr>
<tr>
<td>G</td>
<td>0.2696</td>
<td>-0.3427</td>
<td>0.5886</td>
</tr>
</tbody>
</table>

Source: Results from Tables 5 and 6.

Summary

From this study, it may be concluded that foreign aid and foreign private investment have an inverse relationship to both domestic savings rate and growth rate of GNP in Thailand between 1970 and 1984. However, other foreign capital inflows have a positive effect on them. There have been both qualitative and quantitative changes in that period. This discussion also confirms the importance of treating the savings rate and growth rate of GNP as jointly dependent variables and for disaggregating foreign capital inflows into its various components.
CHAPTER V
CONCLUSIONS AND SUGGESTIONS

The major aim of this study has been to examine empirically the role of foreign capital as a determinant of the behavior of growth and savings in Thailand. In this chapter, the methodological approach and major findings are summarized and some suggested directions for further research.

**A Brief Summary of the Methodology**

This study is a time-series analysis and uses data for Thailand between 1970 and 1984. Disaggregating foreign capital inflows into three components has been made following the study by Papanek to capture the impact of difference in foreign aid (AID), foreign private investment (FPI), and other foreign inflow (RFI) factors.

Using a simultaneous equation approach, the results show that foreign capital affects savings and growth both directly and indirectly, because of the interdependence between savings and growth. Total effect, which consists of the direct and indirect effects, may be different from the direct effect both in terms of the magnitude, and sometimes even more significant, in terms of the direction; that is, the sign of the total and the direct effects may be opposite.

This study assumed that foreign capital has a positive effect on growth and that growth has a positive effect on savings. Additionally, foreign capital can have either a negative or positive effect on savings.
Summary of the Major Findings

Considering the relative effects of different types of foreign capital on domestic savings, the results are shown that foreign aid has the greatest significantly negative effect in both direct and total effect on savings. This result holds in terms of the sign, the magnitude and the statistical significance of the coefficient estimates. More interesting is the result that the positive coefficient of the foreign private investment is statistically insignificant in direct effect, but in total effect the sign is negative. The results, based on total effects (from reduced form coefficients), support the rank of foreign aid, that it has a larger effect than others. These results sound plausible because foreign aid is negotiated on a government to government basis and it is quite likely that the government of the recipient country may tend to relax its efforts to mobilize resources domestically once it has found large commitments of foreign aid from external sources.

Other foreign capital inflows (RFI) do not provide an instrument of policy to the recipient country. It mostly consists of short-term capital flows and thus, is more determined by short-term economic forces rather than long-term consideration. The results also show that other types of capital inflows have a significantly positive impact on growth as well as a significantly negative impact on savings.

One important policy implication of this study is that although foreign capital has a positive role to play, capital accumulation from internal sources remains by far the most significant determinant of growth in Thailand. Consequently, if the country wishes to achieve
rapid economic growth, maximum efforts will have to be directed towards raising domestic savings rates. This may involve difficult choices and even unpleasant policies, but there is no escaping the implication that reliance on foreign capital does not offer the solution for high and rapid growth.

In Thailand, where domestic resources do not provide an adequate amount, it should be careful in deciding on the type of foreign capital inflow. The answer will depend on the relative productivity and effectiveness of different types of capital. Suggestion that other capital inflows (RFI) do not provide a choice instrument, the real choice will remain between foreign aid and foreign private investment. The results of this study have suggested a slight advantage of foreign aid over foreign private investment. The two types of foreign capital influence savings and growth differently. For example, while foreign private investment has quantitatively less adverse effect on domestic savings compared to foreign aid, foreign aid makes a more significant contribution to growth than foreign private investment. Therefore, the real choice will depend on the demand and supply conditions encountered.

On the demand side, the choice will be influenced by patterns of domestic economy and internal reaction. This will require an understanding of the mechanism through which different types of foreign capital inflows influence the internal economic forces.

On the supply side, it depends on the availability of the two types of foreign capital, the institutional set-up in which donor countries operate in the market for international capital and also the motivation
of the donor countries. Given the bargaining power of Thailand at the present time, it may well be the cases that Thailand does not possess much freedom of choice.

Suggestions for Further Research

This study suggests a lot of areas for further research. But the following stand out to be the most interesting.

1) While such disaggregation is obviously useful, it should be followed in future research dealing with cross-section data, focusing on the groups of similar countries.

2) While disaggregating foreign capital into three components, other variables such as growth of GNP and savings rate are in highly aggregated form. For example, domestic savings should be decomposed into urban versus rural savings and private versus public savings. It would be interesting to examine whether and to what extent different types of foreign capital have differential impact on different types of domestic savings. Disaggregations may provide useful and illuminating results for policy purposes.
BIBLIOGRAPHY


APPENDIX

(n = 15)

<table>
<thead>
<tr>
<th>Endogenous Variables</th>
<th>Exogenous Variables</th>
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</tr>
<tr>
<td>G</td>
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</tr>
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<td>y</td>
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<td>TLPR</td>
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