Thailand's terms of trade (1975-1981)

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ABSTRACT
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Thailand's Terms of Trade (1975-1981)

Adviser: Mr. Keith Hinch

Thesis dated December, 1984

Attempts have been made in this study to examine the terms of trade of Thailand during export situation relative to import situation, and the gains or losses and welfare condition of the country in international trade can be known.

On account of the unavailability of some of the relevant data, this study cannot cover all the concepts of the terms of trade. Hence, this study will concentrate only on the analysis which can be measured. The concepts of the terms of trade in this study are the net barter terms of trade, the gross barter terms of trade and the income terms of trade.

This study will investigate the trend of Thailand's terms of trade in the period between 1975 and 1981, terms of trade of Thailand and Japan, terms of trade of Thailand and the United States, terms of trade of Thailand and ASEAN, and terms of trade of Thailand and EEC.

The net barter terms of trade can be measured by dividing the price index of exports by the price index of imports. The gross barter
terms of trade can be measured by dividing the quantity index of imports by the quantity index of exports. The income terms of trade is the net barter terms of trade multiplied by the quantity index of exports.

In the cases of price, or quantity index number, the chain Paasche, the chain Laspeyres and the chain Fisher formula will be used in this study. However, the unit value will be used as the proxy for prices because of unavailability of actual prices of exports and imports. The data used in this study come from the Annual Statement of the Foreign Trade of Thailand reported by the Department of Customs and Financial Statistic reported by the United Nation.
THAILAND'S TERMS OF TRADE (1975-1981)

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

BY
SAITHARNTIP SADUBBUNDIT

DEPARTMENT OF ECONOMICS

ATLANTA, GEORGIA
DECEMBER 1984
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CHAPTER I
INTRODUCTION

Statement of the Problem

Thailand, like most other underdevelopment countries, is rightly much concerned with her international trade position because international trade has been a source of supply of the technological know-how, capital machinery, implements, etc., which are essential for her economic development. Knowledge of the terms of trade gives information on the export situation relative to the import situation. Thus, the gains or losses in international trade can be known. An improvement in a country's terms of trade which results from a change abroad is always favorable for that country, unless it leads to widespread unemployment in the country. Given the level of employment, an improvement in the terms of trade resulting from any change in a foreign offer curve is always favorable because the new equilibrium point of international trade (the point at which the country's own offer curve intersects with the new foreign offer curve--point Q in Figure 1) will always be on a higher trade indifference curve. Similarly, the deterioration of the terms of trade resulting from any change in a foreign offer curve is always unfavorable. On the other hand, a change in terms of trade resulting from a shift in the country's own offer cannot be said

\[J. \ D. \ Theberge, \ ed. \ Economic \ of \ Trade \ and \ Development \ (New \ York, \ 1968), \ pp. \ 324-325.\]
FIGURE 1
OFFER CURVE

Source: "World Trade and Payments" by Richard E. Caves and Ronald W. Jones, p. 50.
to be good or bad according to the direction of change, even if full employment is maintained. This is because the new equilibrium point of international trade may fall on either a higher or a lower trade indifference curve.

Scope and Objective

Due to the unavailability of some of the relevant data, this study cannot cover all the concepts of the terms of trade. Hence, this study will concentrate only on analysis of net barter, gross barter, and income terms of trade.

Generally, the terms of trade has a horizontal and a vertical dimension. The horizontal aspect involves the terms of trade between one country or any group of countries, or it can be in the form of some important commodity items. The vertical aspect involves factors behind the movement of terms of trade, and the impact of this movement on the economy.

This study will investigate the trend of Thailand's terms of trade in the period between 1975 and 1981. Net barter, gross barter, and income terms of trade will be calculated for Thailand's total trade, trade between Thailand and Japan, Thailand and the United States, Thailand and ASEAN, and Thailand and EEC.

Review of Literature

There are differing hypotheses concerning the trend of terms of trade in underdeveloped countries. Some economists see a deter-
riorating trend, other a favorable trend. The following is a review
of some of these hypothesis.

J. M. Keynes believed that the comparative advantage in trade
and terms of trade is moving against industrial countries. This is
because the primary industries are subject to deminishing returns
and manufactures to decreasing cost. Primary products are often
said to be the exports of the underdeveloped countries and manufac-
tured products to be exports of industrial countries (developed
countries). Therefore, the terms of trade turn in favor of under-
developed countries.

On the other hand, Prebisch and Singer believed that the terms
of trade would turn in favor of industrial countries because monopo-
listic elements in their product and factor markets would allow
industrial countries to keep the benefit of their technological
progress in the form of rising factor incomes, whereas in primary
producing countries the gains in productivity are distributed in
price reduction. However, even if the commodity terms of trade do
deteriorate in poor countries, the question still remains whether
this is a significant obstacle to development. It might be so if
the deterioration also entails a negative production effect in the
sense that the input of factors per unit of exports increases, or
if it entails a negative income effect in the sense that it reduces

\[2 \text{R. Harrod and D. C. Hague, ed. International Theory in a}
\text{Developing World (London, 1963), p. 54.}

\[3 \text{J. D. Theberge, ed., Economics of Trade and Development (New}
\text{York, 1968), p. 258.}\]
the country's purchasing power on international markets. For the income effect, the relevant measure is the income terms of trade. These show the volume of imports obtainable from income earned from exports. Since exports from poor countries have grown so considerably, their income terms of trade have undoubtedly tended to improve. Accordingly, the volume of imports purchasable with export income have risen, notwithstanding and possible deterioration in the commodity terms of trade.

Kindleberger said that the terms of trade favor developed countries and hurt the underdeveloped countries because of systematic differences in the capacity of the two types of countries to shift resources. Underdeveloped countries are said to be less able than developed countries to shift their resources from downward price escalators to upward price escalators. Any one underdeveloped country runs the risk, as it raises the costs of its exports, of pricing itself out of the world market. Moreover, if all underdeveloped countries together raise their costs and price quotations, they may find themselves in a worst net position if demand for the exported product falls off sharply.

In 1968, India's terms of trade were studied by Dennis R. Appleyard. He attempted to ascertain the movement of India's long-run terms of trade through the construction of unit value index

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numbers and to investigate possible domestic consequences of the movement of these external prices. The period 1903/04 through 1952/53 was selected because of his desire to cover a reasonably long period. From his point of view, it was necessary to calculate both of the common price indices—Laspeyres (base-year weights) and Paasche (given-year weights). On the terms of trade side, only net barter were used. His major conclusion was that, over the long run, India's terms of trade did not deteriorate to any marked degree. He also found that India's terms of trade did not improve in periods of unusual price increase (the two wartime periods).

Terms of trade and economic growth was studied by Batra in 1971. Batra studies a controversial question in the field of economic development concerning the tendency of terms of trade to deteriorate among underdeveloped countries. This decline was said to be caused by a falling world demand for primary products and the rising prices of manufactured goods. Concern over this decline was expressed, primarily by Prebisch and Singer, because they believe that economic growth is retarded when a country's terms of trade are deteriorating. Critics of Prebisch hypothesis, such as Haberler, tacitly accepted this implication of the impact on growth of changing terms of trade. They based their counter arguments on essentially empirical grounds, suggesting that the terms of trade show no long-run tendency to deteriorate among underdeveloped countries.

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In conclusion, both theoretical and empirical studies disagree. Where some find deterioration, others find improvement. Thus, it appears that there is no consensus of opinion among economists concerning the trend of terms of trade in underdevelopment countries.
CHAPTER II
THEORETICAL FRAMEWORK

Concepts of Terms of Trade

There are seven concepts of terms of trade which can be distinguished as follows.

1. The Net Barter Terms of Trade

It can be measured by \( \frac{P_x}{P_m} \) where \( P_x \) and \( P_m \) are price index numbers of exports and imports respectively. This measure is also called the commodity or merchandise terms of trade. A rise in it indicates that a large volume of imports could be received on the basis of price relation only, in exchange for a given volume of exports.\(^1\) The use of this terms of trade measure is appropriate when we apply it to a small country. This is because a small country has no influence on the price of its exports and imports. The import price will not increase even though import volume rises. Export prices will not decrease when export volume expands. Hence, the demand for exports and supply of imports which such a country faces, are perfectly elastic. In this case, the foreign offer curve facing the country is perfectly elastic (see Figure 2).

\(^1\)G. M. Meier, The International Economic of Development (Singapore, 1968), p. 43.
2. The Gross Barter Terms of Trade

This can be measured by $Q_m/Q_x$ where $Q_m$ and $Q_x$ are quantity index numbers of imports and exports respectively. A rise in the gross barter terms of trade represents a favorable change because more imports are received for a given volume of exports than in the base year. This measure will be equal to the net barter terms of trade when value of exports equal value of imports. This terms of
trade measure cannot accurately indicate the gains or losses from international trade when there are smuggled imports or exports. This is because we will not know the actual volume of imports and exports.

3. The Income Terms of Trade

\[ \frac{P_x Q_x}{P_m} \]

is the measure of the income terms of trade. A rise in this terms of trade indicates that the country can obtain a larger volume of imports from the sale of its exports.\(^2\) The use of the income terms of trade would be especially appropriate if the prices of exports were a function of the quantities of exports. This might be the case if the measure were applied to a country with a large share of the world's market for the commodities exported.\(^3\) In this case, the prices of exports tend to decrease if this country increases its exports.

4. The Single Factorial Terms of Trade

It is equal to \( \frac{P_x R_x}{P_m} \) where \( R_x \) is a productivity index in the export sector. The productivity can be measured by dividing total output by total factors used. This terms of trade can be interpreted as a capacity to import per factor used in export sector. This terms of trade would be particularly appropriate if the change in the world


price of the country's exports were compensated for or brought about by changes in productivity in the export sector.4

5. The Double Factorial Terms of Trade

PxRx/PmRm will be the measure of the double factorial terms of trade where Rm is the productivity index in import production. It looks to the real quantity of factors exchanged for each other through the intermediation of commodities. The net barter and double factorial terms of trade amount to the same thing if there are constant proportions among the factors used in each of two countries' trading, and constant returns to scale. Conversely, they diverge to the extent that there is technological improvement and/or diminishing returns due to limited supply of one of the factors.

6. The Utility Terms of Trade

This concept is logically achieved by the real cost terms of trade multiplied by an index number of the average relative marginal utility per unit of imported commodities and of domestic commodities that would have been produced had resources not been shifted to producing exports.5

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7. The Real Cost Terms of Trade

It is shown by the single factorial terms of trade multiplied by the reciprocal of an index of the amount of disutility (amount of irksomeness) per unit of productive resources used in producing exports. If it rises as a result of a change in the methods of producing exports, or change in the factor proportions used in exports, this would indicate that the amount of imports obtained per unit of real cost was greater.

The sixth and seventh concepts of the terms of trade are hardly calculable even given such statistical coverage. The single and double factorial terms of trade are also difficult to calculate because of productivity index is difficult to construct (in the case of many kinds of factors used). Mostly, the income terms of trade, the net barter terms of trade, and the gross barter terms of trade are used to see the international trading situation in empirical studies.

Causes of the Changes in Terms of Trade

The terms of trade may vary as a result of changes in tariffs or exchange rates, or it may vary with business cycles or economic growth. Tariffs may be changed for the protection of underdeveloped countries as a result of concern about the deterioration of these

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countries' terms of trade. Generally, the causes of the changes in the terms of trade can be short run or long run. In the short run period, the terms of trade will change with changes in commercial policy, exchange rate, and business cycles. In the long run period, analysis of change concerns itself with terms of trade and economic growth.

Commercial Policy

The belief that a poor country can alter the distribution of the gains from trade in its favor is based on the terms of trade argument for protection. An expected deterioration in their terms of trade is a common concern of poor countries. This expectation rests partly on an extrapolation of the alleged secular deterioration in their terms of trade, and partly on a belief that future improvements in primary production, together with a low income elasticity of demand for primary products will lower the prices of the poor country's exports relative to its imports. It is argued that a tariff which restricts exports or imports, and results in a rise in export prices or a fall in import prices, may bring about an improvement in the terms of trade.

A tariff usually causes the terms of trade to improve. This is because the imposition of tariff shifts the offer curve of the country and the new equilibrium point of trade is at the higher terms

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of trade (see Figure 3). However, if the exporables are inferior in social consumption, or if the importables are luxury goods, it is possible that a rise in the tariff rate may lead to a rise in the demand for imports and will result in deterioration in the terms of trade. In this case, the imposition of a tariff will shift the offer curve of the country to the position that intersects to the foreign offer at lower terms of trade (new equilibrium point).

The optimum tariff concept concerns how high a tariff rate should be for optimal effect. A country will gain from imposing a tariff if the new equilibrium point is on the higher trade indifference curve. However, the new equilibrium point need not be on the higher trade indifference curve. So, the optimum tariff will be that which results in the equilibrium being on the highest trade indifferent curve. (In this case, we will maximize the country's economic welfare by changing the country's terms of trade.)

However, the terms of trade will move in favor of the tariff-imposing country if the latter possesses monopoly power in trade. If the country has no power in trade, the foreign offer curve will be perfectly elastic. In this case, the country's terms of trade which is equal to the slope of the foreign offer curve will not vary with the imposition of the tariff because the imposition of tariff will affect only the country's offer curve.

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9Ibid., p. 123.
FIGURE 3
THE TARIFF PULLS CONSUMPTION OF
THE CONTRACT CURVE

In the case of Thailand, she has no monopoly on products exported or imported from the world market. This is because Thailand, like most other underdeveloped countries, exports primary products which have been more homogeneous than the exports from developed countries. Moreover, the capacity of advanced industrial countries to develop synthetic products as substitutes for natural raw materials can also disturb the demand for the primary products from the poor countries. Thus, Thailand has no monopoly power in the world market. On the import side, Thailand is a small country and has a relatively small domestic market for any particular import from the developed countries. This prevents Thailand from having monopoly power. So Thailand, like most other underdeveloped countries, has no monopoly power in international trade. Thus, the imposition of a tariff will have little effect on her terms of trade.

Exchange Rate

When a country devalues, the foreign price of its export typically falls. By contrast, the domestic price of imports normally rises. Therefore, many people conclude that devaluation worsens the terms of trade because it reduces export prices and increases import prices. This seemingly straightforward interpretation rests upon an incorrect definition of the terms of trade because it uses the foreign price of exports and domestic price of imports. The correct

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procedure is to compare export and import prices in the same currency, either domestic or foreign. Devaluation normally causes both export and import prices to rise in domestic currency and to fall in foreign currency. More information is needed to determine whether export prices fall relative to import prices, with both expressed in the same currency.

Devaluation will affect foreign demand for exports and foreign supply of imports. When the country devalues, foreign demand for exports will increase and demand for imports will decrease in the domestic currency. Suppose that elasticities of demand for imports were infinite for both home and foreign countries. Devaluation would cause the domestic prices of imports to rise in proportion but would leave the domestic prices of exports unchanged. If the devaluing country was small and had no effect on world prices (foreign supply of imports and foreign demand for export both are infinitely elastic), devaluation would not affect the terms of trade because the domestic prices of imports would both rise in proportion to the devaluation. So far, it is clear that the effect of devaluation depends upon foreign demand elasticities for exports and foreign supply elasticity of imports.

Business Cycle

This part will be concerned with price behavior between primary products and industrial products during upswing and downswing. The primary products and the industrial products are often said to be
the export products of underdeveloped countries and developed countries, respectively. During the upswing, the prices of primary products rise more than prices of industrial products. This is because during the upswing, demand for both primary product and manufactures increase but the supply of primary products cannot increase as much as the increase in demand. This is contrast to the supply of manufactures which are more flexible in response to the demand condition. Thus, underdeveloped countries' terms of trade should improve and developed countries' terms of trade deteriorate during the upswing. During the downswing, the prices of manufactures should fall less than the prices of primary products. This is because during the downswing, the supply for primary products cannot decrease as much as the decrease in demand. Moreover, the price of industrial products and wage in industrial countries are relatively rigid because of imperfect competition among industrial producers and the superior organization of labor. Thus, underdeveloped countries' terms of trade should deteriorate and developed countries' terms of trade should improve during the downswing.

Terms of Trade and Economic Growth

This section will summarize the aspects of the effect of growth on the terms of trade. Economic growth means simply increased output (whether caused by technical progress, capital accumulation, or increase of the labor supply). The analysis relies upon the usual model with two countries, two factors, and two commodities. Both
countries maintain continuous full employment and factors cannot move
from one country to the other, and growth occurs in one country only.

The first step is to show the possible outcomes resulting from
growth, assuming that economic growth occurs without changing tastes.
Economic growth will affect consumption and production. On the
consumption side, an expansion will be described as neutral if it
increases the total demand for importable goods in the same proportion
as it increases the demand for exportable goods; anti-trade biased
if it increases the demand for importable goods in lesser proportion
than it increases the demand for exportable goods; and pro-trade
biased if it increases the demand for importable goods in greater
proportion than it increases the demand for exportables. In formal
terms, it will be pro-trade biased, neutral, or anti-trade biased
as the output elasticity of demand for importable goods (the percentage
changes in consumption of importable, at constant relative commodity
prices, divided by economic growth rate) is greater than, equal to,
or less than unity. This statement can be proven mathematically as
follows.\[12\]

\[
P_1 X + P_2 M = Y
\]

\[
P_1 dX + P_2 dM = dY
\]

Multiplying through by \(Y/Y\), multiplying the first term on the
left by \(X/X\), the second by \(M/M\) and dividing through by \(dY\),

\[
P_1 X / Y \cdot Y / X \cdot dX / dY + P_2 M / Y \cdot Y / M \cdot dM / dY = dY / dY
\]

\[12\] J. M. Henderson and Richard E. Quandt, Microeconomic Theory:
\[ aA + bB = 1 \]

and where

\( X = \) demand for exportable goods
\( M = \) demand for importable goods
\( P1 = \) price of exportable goods
\( P2 = \) price of importable goods
\( Y = \) total income
\( A = \) output elasticity of demand for exportable goods
\( B = \) output elasticity of demand for importable goods
\( a = \) expenditure proportions of exportable goods
\( b = \) expenditure proportions of importable goods.

According to the final equation, an expansion will be described as neutral if \( B = 1 \) and \( A = 1 \) (because \( a + b = 1 \)) anti-trade biased if \( A > 1 \) and \( 0 < B < 1 \); pro-trade biased if \( 0 < A < 1 \) and \( B > 1 \).

Moreover, if \( B < 0 \) and \( A > 0 \), the expansion will be described as ultra-anti-trade biased. If \( A < 0 \) and \( B > 0 \), the expansion will be ultra-pro-trade biased.

On the production side, an expansion will be described as neutral if it increases the supply of exportable and importable goods in the same proportion; anti-trade biased if it increases the supply of importable goods in greater proportion than the supply of exportable goods; and pro-trade biased if it increases the supply of importable goods in less proportion than the supply of exportable goods. In formal terms, it will be pro-trade biased, neutral, or anti-trade biased when the output elasticity of supply of importable goods is
less than, equal to, or greater than unity. The way to prove this statement mathematically is like the above. If output elasticity of supply of importable goods is less than zero and output elasticity of supply of exportable goods is greater than unit, the expansion will be ultra-pro-trade biased. Similarly, if output elasticity of supply of exportable goods is less than zero and output elasticity of supply importable goods is greater than unit, the expansion will be ultra-anti-trade biased.

Total effect of expansion is the result of combining the production and consumption effects. An expansion which is pro-trade biased or anti-trade biased on both sides will be pro-trade biased on total effect. Likewise, an expansion which is neutral on both sides will be neutral on total effect. However, an expansion which is equally pro-trade biased on one side and anti-trade biased on the other will not be neutral because consumption of importable goods which exceeds domestic production bias on the consumption side must be offset by a greater opposite bias on the production side. Ultra-anti-trade biased on the production side implies ultra-anti-trade biased on total effect, because it means that domestic production of importables increases more than total output and therefore more than demand for importables. Ultra-pro-trade biased on the production side excludes the possibility of ultra-anti-trade biased on the total effect for similar reasons, but it does not exclude the possibility of anti-trade biased on total effect.
In fact, the rate of growth of demand for imports and the rate of growth of supply of exports which result from an expansion in production side and consumption side are the direction of the total effect. However, we can see only the rate of growth of demand for imports because it is equal to the rate of growth of supply of export in equilibrium point of international trade which will be shown as follows:

\[ P_x + P_2 M = Y \]
\[ P_1 (P - E) + P_2 (Q + I) = Y \]
\[ P_1 P - P_1 E + P_2 Q + P_2 I = Y \]
\[ P_1 \frac{dp}{dy} - P_1 \frac{dE}{dy} + P_2 \frac{dQ}{dy} + P_2 \frac{dI}{dy} = \frac{dY}{dy} \]
\[ P_1 Y \frac{dp}{dy} - P_1 E \frac{dE}{dy} + P_2 Q \frac{dQ}{dy} + P_2 I \frac{dI}{dy} = 1 \]
\[ P_2 I \frac{dI}{dy} = 0 \] (because \( P_1 Y \frac{dp}{dy} + P_2 Q \frac{dQ}{dy} = 1 \))

\[ P_2 I \frac{dI}{dy} = P_1 E \frac{dE}{dy} \]
\[ P_2 I \frac{dI}{dy} = P_1 \frac{dE}{dy} \]
\[ \frac{I}{R} = P_1 E \frac{dE}{dy} \]
\[ \frac{I}{R} = \frac{E}{R} \]
\[ I = E \] (because \( P_2 I = P_1 E \) in equilibrium point of international trade)
where,

\( X \) = demand for exportable goods  \\
\( M \) = demand for importable goods  \\
\( P_1 \) = prices of exportable goods  \\
\( P_2 \) = prices of importable goods  \\
P = domestic production of exportable goods  \\
E = quantities of exports  \\
Q = domestic production of importable goods  \\
Y = total income  \\
I = quantities of imports  \\
\( i \) = growth rate of demand for imports  \\
E = growth rate of supply of exports  \\
R = growth rate

The rate of growth of demand for import is:

\[
\frac{dI}{I} = (B \frac{M}{I} - K \frac{Q}{I}) R
\]

where,

\( B \) = output elasticity of demand for importable goods, and  \\
\( K \) = output elasticity of supply of importable goods.

The total effect will be pro-trade biased, neutral, anti-trade biased, according as the rate of growth of demand for imports is greater than, equal to, less than \( R \) but greater than zero, or less than zero.

The total effect of an expansion will change the country offer curve.\(^{13}\) It will shift to the left hand side of the offer curve if

\(^{13}\)G. M. Meier, *International Trade and Development* (Tokyo, 1965), pp. 17, 46, 47.
total effect of an expansion is the ultra-anti-trade biased. Not only that, it will shift to the right hand side of home offer curve (see Figure 4 below).

FIGURE 4
COUNTRY OFFER CURVE


So the terms of trade will improve if the total effect of an expansion is ultra-anti-trade, not only that, it will deteriorate. The deterioration for a given increase in total output is least, however, when there is an anti-trade biased, and the demand for imports
increases less than proportionately to the expansion in total output. The deterioration is greatest when there is an ultra-pro-trade biased, and the absolute demand for imports increases more than total output.

In the case of Thailand, Thailand is a small country compared to the world market. Thus, the foreign offer curve we face will be perfectly elastic (straight line foreign offer curve). Whatever kind of total effect of an expansion, the terms of trade will not change.
CHAPTER III
MEASUREMENT OF TERMS OF TRADE

Data Availability

This study will use data from Foreign Trade Statistics of Thailand reported by the Department of Customs. The data is reported in six-digit commodity classifications of the BTN (Brussels Tariff Nomenclature) code. The import items are reported in C.I.F. (cost, insurance, freight or charge in full) value and export items in F.O.B. (free on board) value.

Unit Value

The practical difficulty is that the data to be used in this study is incomplete since it lacks information of the actual prices. This is because the statement in Foreign Trade Statistics of Thailand report only the merchandise value and quantity of import and export. The way out of this difficulty is to use a substitute estimator for prices. The substitute estimator for prices in this study will be the unit value (the proxy for prices). This unit value can be calculated by dividing the value by its quantities.

Criteria for Selection of Data

When we calculate price index number for calculating the terms of trade, we will face a problem about coverage and homogeneity.
This is because homogeneity and coverage are two conflicting conditions, although each of them is important in an attempt to measure an accurate price index number.

Homogeneity means that each of the commodity items included in the calculation is of the same kind while the coverage is the share of value of commodity items included in the calculation to the total value. The more homogeneous the commodities, the more accurate the unite value would be, as the representative of the prices of commodities in question. Yet coverage is also important to obtain an accurate result. Higher coverage is better than lower, and more homogeneity is better than less.¹

Criteria for selection of data in this study will consider both coverage and homogeneity. This study will use six-digit commodity classification of BTN code to calculate terms of trade. This study will omit the commodity items that cannot be adjusted into the same unit code as the unit code changes from one period to another; nor will it include those items whose reporting is not continuous.

**Unit Code Adjustment**

Unit code of some commodity items may be the same in some years because their quantities' trading changes very much. Unit code may be changed from kilogram (unit code 03) in one year to metric ton (unit code 04) in the next year. Thus, this study has to adjust

the unit code into a common unit of measurement.

Index Number

Mostly, this study will be concerned with index number (prices index number and quantity index number) which will be mentioned as follows: There are two kinds of index numbers--unweighted and weighted. An unweighted index number will be used when all commodities included in the calculation are equally important, while a weighted index number will be used when all commodities are not equally important. In reality, commodities are not equally important in the calculation of index numbers, so the weighted index number will be used in this study. Generally, the weighted index number for economists can be separated as follows.²

The Laspeyres Index Number

This weighted index number which is weighted by the base period weights:

\[\frac{P_0}{n} = \frac{\sum_{i=1}^{r} P_{in} Q_{io}}{\sum_{i=1}^{r} P_{io} Q_{io}}\]

\[\frac{Q_0}{n} = \frac{\sum_{i=1}^{r} Q_{in} P_{io}}{\sum_{i=1}^{r} Q_{io} P_{io}}\]

where

\[ P = \text{the price index number} \]

\[ Q = \text{the quantity index number} \]

\[ n = \text{given period} \]

\[ o = \text{base period} \]

\[ P = \text{the price of commodity} \ i \]

\[ Q = \text{the quantity of commodity} \ i \]

\[ r = \text{the number of total commodity items corresponding} \]

This index number can interpret items corresponding to given period prices (or quantities) to base period prices (or quantities), which can be derived from the arithmetic mean and weighted by the base period value as follows:

\[
\frac{P_o}{n} = \frac{\sum (P_i/n \cdot V_i) \cdot \overline{V_i}}{\sum V_i} \]

\( (V = \text{value of commodity} \ i) \)

\[
= \frac{\sum (P_i/n \cdot P_{io} \cdot Q_{io})}{\sum P_{io} \cdot Q_{io}} \]

\[ Q_o/n = \frac{\sum (Q_i/o \cdot V_i) \cdot \overline{V_i}}{\sum V_i} \]

\[
= \frac{\sum (Q_i/o \cdot P_{io} \cdot Q_{io})}{\sum P_{io} \cdot Q_{io}} \]

\[
= \frac{\sum (Q_i/o \cdot P_{io})}{\sum Q_{io} \cdot P_{io}} \]

**The Paasche Index Number**

This is the weighted index number which is weighted by given period weights.

\[
\frac{P_o}{n} = \frac{\sum P_{in} \cdot Q_{in}}{\sum P_{io} \cdot Q_{in}} \]

\[ Q_o/n = \frac{\sum Q_{in} \cdot P_{in}}{\sum Q_{io} \cdot P_{in}} \]
This index number can be interpreted as the average ratio of given period prices (or quantities) to base period prices (or quantities) but it is derived from the harmonic mean and weighted by the given period value as follows:

\[
\frac{P_0}{n} = \frac{\sum V_i}{\sum \left( \frac{P_{io}}{P_{in}} \right) V_i}
\]

\[
= \frac{\sum P_i Q_i}{\sum \left( \frac{P_{io}}{P_{in}} \right) Q_i P_i}
\]

\[
= \frac{\sum P_i Q_i}{\sum P_{io} Q_i}
\]

\[
\frac{Q_0}{n} = \frac{\sum V_i}{\sum \left( \frac{Q_{io}}{Q_{in}} \right) V_i}
\]

\[
= \frac{\sum P_i Q_i}{\sum \left( \frac{Q_{io}}{Q_{in}} \right) P_i Q_i}
\]

\[
= \frac{\sum Q_i P_i}{\sum Q_{io} P_i}
\]

**Statistical Relation Between Laspeyres and Paasche Forms**

"The Paasche index of price (and of quantity) will be greater than the Laspeyres index of price when movements of prices and quantities tend to be in the same direction. The economic condition is that the market is dominated by suppliers. Examples are exporters selling on a large international market and farmers selling on a market comprising both home-produced and imported food stuffs. The Laspeyres index of price (and of quantity) will be greater than the Paasche index of price when prices and quantities tend to move in opposite directions. The economic condition is that demand-dominated market where buyers set price, buying less as price rise and more as prices fall. The leading example is the market for consumer goods."³ The way to prove

this can be shown by using a correlation coefficient concept which can be shown as follows:

\[ r = \frac{\text{Covariance of } X \text{ and } Y}{S_x S_y} \]

Covariance of \( X \) and \( Y \) = \( \sum(XY) - \sum(X) \sum(Y) \)

\[ r = \frac{\sum(XY)}{S_x S_y} - \frac{\sum(X) \sum(Y)}{S_x S_y} \]

where \( r \) = correlation between \( X \) and \( Y \)

\( X = \frac{P_n}{P_o} \) (ratio of given period prices to base period prices)

\( Y = \frac{Q_n}{Q_o} \) (ratio of given period quantities to base period quantities)

\( S_x \) = Standard deviation of \( \frac{P_n}{P_o} \)

\( S_y \) = Standard deviation of \( \frac{Q_n}{Q_o} \)

\( \xi(X) = \frac{\sum(Pn/Po)}{\sum V_0} \)

\( \xi(Y) = \frac{\sum Qn/Qo}{\sum V_0} \)

\( \xi(XY) = \frac{\sum Vn/\sum V_0}{\sum Pn\sum Q_0} \)

\( = \frac{\sum Vn/\sum V_0}{\sum Pn\sum Q_0} \)

\( \) = Paasche price index \( \times \) Laspeyres quantities index

Therefore, \( r = \frac{PP_{o/n} QL_{o/n}/S_x S_y - PL_{o/n} QL_{o/n}/S_x S_y}{PP_{o/n} QL_{o/n}/S_x S_y} \)

where \( PP = \) Paasche price index number

\( PL = \) Laspeyres price index number

\( QL = \) Laspeyres quantities index number

\( QP = \) Paasche quantities index number

Therefore, \( r = \frac{PL_{o/n} QL_{o/n} (PP_{o/n}/PL_{o/n} - 1)}{S_x S_y} \)
\[ PP_{o/n}/PL_{o/n} = 1 + \frac{rSxSy}{(PL_{o/n}QL_{o/n})} \]

and \[ PP_{o/n}/PL_{o/n} = QP_{o/n}/QL_{o/n} \]

Therefore, \[ PP_{o/n}/PL_{o/n} = QP_{o/n}/QL_{o/n} \]

\[ = 1 + \frac{rSxSy}{(PL_{o/n}QL_{o/n})} \]

In the final equation, \( Sx, Sy, PL_{o/n}, PP_{o/n}, QL_{o/n}, \) and \( QP_{o/n} \) will always be positive signs. However, \( r \) will be positive when movements of prices and quantities tend to be in the same direction and vice versa. The Paasche index will be greater than the Laspeyres index when \( r > 0 \) and vice versa.

Both Paasche index and Laspeyres index are not good in the statistical sense because they do not satisfy the properties of a good index number in the statistical sense. The properties are time reversal, circularity, and factor-reversal.

Time reversal property: \( P_{o/n} = \frac{1}{P_{n/o}} \) or \( Q_{o/n} = \frac{1}{Q_{n/o}} \)

Circular property: \( P_{o/n}P_{n/t} = P_{o/t} \) or \( Q_{o/n}Q_{n/t} = Q_{o/t} \)

Factor-reversal property: \( P_{o/n}Q_{n/t} = V_{o/n} \)

where \( t = \) Other period

\( V = \) The value index number

The index number that is the geometric mean between the Laspeyres and Paasche forms will satisfy with time reversal property and factor-reversal property. This index number is called Fisher index or "ideal" index.
In the economic sense, the Laspeyres index measures all changes of price (or quantity) forward from base period to current period, while the Paasche index measures them backward from current period to base period.\(^4\)

There are serious limitations from an economic point of view.\(^5\) In binary comparisons, the index for period \(n\) depends only on prices or quantities of the base period price and quantities between the base period and period \(n\) are completely ignored. Economic common sense would suggest that a consumer index in period \(n\) would be influenced by prices before period \(n\) as well as prices in period \(n\). Moreover, in the statistical sense, the binary comparison is inefficient in that it does not make full use of all the data as they unfold over time. According to the above problem, the study has to use the chain index number because this index will make full use of all the data. The chain index number can be applied to Laspeyres index number, Paasche index number, and Fisher index number. So this study will use the chain price (or quantity) index number for calculation of the terms of trade. The process of the chain Laspeyres (or Paasche, or Fisher) price index number which can be derived from the Laspeyres (or Paasche, or Fisher) price index number can be shown as follows:

\[
\begin{align*}
\bar{p}_{75/76} &= p_{75/76} \\
\bar{p}_{75/77} &= \frac{p_{75/76}}{p_{76/77}}
\end{align*}
\]


\(^5\)Ibid., pp. 145-146.
\[ \bar{P}_{75/78} = P_{75/76} P_{76/77} P_{77/78} \]
\[ \bar{P}_{75/79} = P_{75/76} P_{76/77} P_{77/78} P_{78/79} \]
\[ \bar{P}_{75/80} = P_{75/76} P_{76/77} P_{77/78} P_{78/79} P_{79/80} \]
\[ \bar{P}_{75/81} = P_{75/76} P_{76/77} P_{77/78} P_{78/79} P_{79/80} P_{80/81} \]

where \( P \) = the chain Laspeyres (or Paasche, or Fisher) price index.

75 = Year 1975
76 = Year 1976
77 = Year 1977
78 = Year 1978
79 = Year 1979
80 = Year 1980
81 = Year 1981

\( \bar{P} \) = The Laspeyres (or Paasche, or Fisher) price index

This study concerns not only the price index to be calculated, but also the quantity index number. The quantity index will be calculated from price index and value index. This is because the quantity of different commodity items are reported in different units, i.e., the unit codes of different commodities are different. Hence, it is more accurate to find the quantity index from the value index and price index:

\[ \bar{Q}_{75/76} = V_{75/76}/P_{75/76} \]
\[ \bar{Q}_{75/77} = V_{75/77}/P_{75/77} \]
\[ \bar{Q}_{75/78} = V_{75/78}/P_{75/78} \]
\[ \bar{Q}_{75/79} = V_{75/79}/P_{75/79} \]
where $\bar{Q}$ = the chain quantity index number

The chain quantity index derived from the chain Fisher price index is called the chain Fisher quantity index. This is because the chain Fisher index satisfies the factor-reversal property. The chain quantity index derived from the chain Laspeyres (or Paasche) price index is called the chain Paasche (or Laspeyres) quantity index. This is because the chain Laspeyres (or Paasche) index does not satisfy the factor-reversal property. The value index will be equal to the chain Laspeyres (or Paasche) price index multiplied by the chain Paasche (or Laspeyres) quantity index as follows:

Suppose there are three years: 0, 1, 2, and

\[ PP = \text{The chain Paasche price index number} \]
\[ PL = \text{The chain Laspeyres price index number} \]
\[ QP = \text{The chain Paasche quantity index number} \]
\[QL = \text{The chain Laspeyres quantity index number} \]

\[ PP_{0/2} \overline{QL}_{0/2} = \left( \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \right) \left( \frac{\Sigma P_2 Q_2}{\Sigma P_1 Q_2} \right) \left( \frac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0} \right) \]
\[ \left( \frac{\Sigma Q_2 P_1}{\Sigma Q_1 P_1} \right) \]
\[ = \frac{\Sigma P_2 Q_2}{\Sigma P_0 Q_0} \]
\[ = V_{0/2} \]

Therefore, \[ QL = \frac{V_{0/2}}{PP_{0/2}} \]

\[ PL_{0/2} \overline{QP}_{0/2} = \left( \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \right) \left( \frac{\Sigma P_2 Q_1}{\Sigma P_1 Q_1} \right) \left( \frac{\Sigma Q_1 P_1}{\Sigma Q_0 P_1} \right) \left( \frac{\Sigma Q_2 P_2}{\Sigma Q_1 P_2} \right) \]
\[ = \frac{\Sigma Q_2 P_2}{\Sigma P_0 Q_0} = V_{0/2} \]

Therefore, \[ QP_{0/2} = \frac{V_{0/2}}{PL_{0/2}} \]
The terms of trade will be calculated from the price indices and the quantity indices of both export and import side. This calculation is not difficult and can be shown as follows:

\[
N_{o/n} = \frac{\overline{P}_x}{\overline{P}_m} \quad G_{o/n} = \frac{\overline{Q}_m}{\overline{Q}_x} \quad I_{o/n} = \frac{\overline{V}_x}{\overline{P}_m}
\]

where

- \( N \) = The net barter terms of trade
- \( G \) = The gross barter terms of trade
- \( I \) = The income terms of trade
- \( x \) = The export side
- \( m \) = The import side

Error in Empirical Measurement of Terms of Trade

This study uses the data of exports which is collected by the Department of Customs in F.O.B. value and the data of imports which is collected in C.I.F. value. Thus, the movement of the unit value of imports may result from the movement of freight rates. The declining of freight rates over time will upward bias to the estimate situation of the poor countries when they are calculated from the data of themselves, and downward bias when they are calculated from the data of developed countries. When the terms of trade are made from the point of view of poor countries themselves, the terms of trade will not be unfavorable as much as those calculated by the developed countries. Moreover, increases in unit value may result from increases in the quality of innovation of new manufactured products. Thus, international situation of the poor countries may not be so bad as it has been calculated.
CHAPTER IV
EMPIRICAL RESULTS

Thailand's Total Terms of Trade

The exports and imports in this study will be defined by the BTN code from 010000 to 990699, which are diplomatic items, re-imported items, etc. The symbols in this chapter will be defined as follows:

PN = Net barter terms of trade calculated from Paasche indices
LN = Net barter terms of trade calculated from Laspeyres indices
FN = Net barter terms of trade calculated from Fisher indices
PG = Gross barter terms of trade calculated from Paasche indices
LG = Gross barter terms of trade calculated from Laspeyres indices
FG = Gross barter terms of trade calculated from Fisher indices
PI = Income barter terms of trade calculated from Paasche indices
LI = Income barter terms of trade calculated from Laspeyres indices
FI = Income barter terms of trade calculated from Fisher indices

Calculating Thailand's total terms of trade, the commodity items which were used to calculate the terms of trade were 9160 export items and 19962 import items. Although this list of commodities is extensive, it did not cover all the exports and imports of Thailand. Table 1 shows the average coverage of the selected commodity for calculation of Thailand's terms of trade. On the import side, the average coverage was around ninety-four percent in 1975 to 1978, ninety percent in 1979, and around ninety-seven percent in 1980 to 1981. On the export side,

TABLE 1
AVERAGE COVERAGE OF THE SELECTED COMMODITY
(In Percentage)

<table>
<thead>
<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>94.25</td>
<td>94.1</td>
<td>94.58</td>
<td>93.46</td>
<td>90.56</td>
<td>97.22</td>
<td>97.3</td>
</tr>
<tr>
<td></td>
<td>Exports</td>
<td>90.96</td>
<td>97.65</td>
<td>95.81</td>
<td>90.89</td>
<td>88.16</td>
<td>99.52</td>
<td>98.82</td>
</tr>
</tbody>
</table>

Source: The data are calculated from the Annual Statement of the Foreign Trade of Thailand. So do they in any other tables in this study except otherwise specified.

The results in Table 2 and Figure 5 show that during 1975 to 1981 the net barter terms of trade, the gross barter terms of trade, and the income terms of trade deteriorated.

However, the net barter terms of trade is probably most appropriate because Thailand is a small country as we mentioned in Chapter II. During the period of observation, the price of rice, one of the major exports, increased very much; but rice production fell due to the drought in 1976. The government had to slow down rice exports because of the fear of a domestic shortage for local consumption. At the same time, Thailand suffered from rising oil prices. These are probably the main reasons why the total terms of trade moved unfavorably. The baht was devalued from 21.05 baht per dollar to 23.05 baht per dollar in 1980.
There was no visible impact on the total terms of trade, however, it proved successful in trade with the U.S.A. and the EEC. Moreover, changes in commercial policy in 1977 were instituted via an increase in the tariff on luxury imports. Since most luxury items were imported from the European Common Market, the tariff increase had its most important impact on luxury imports from the EEC.

**TABLE 2**

TOTAL TERMS OF TRADE OF THAILAND

<table>
<thead>
<tr>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>PN</td>
<td>100</td>
<td>115.31</td>
<td>96.42</td>
<td>93.27</td>
<td>93.05</td>
<td>93.73</td>
<td>93.39</td>
</tr>
<tr>
<td>LN</td>
<td>100</td>
<td>98.22</td>
<td>73.48</td>
<td>69.99</td>
<td>68.66</td>
<td>67.11</td>
<td>65.07</td>
</tr>
<tr>
<td>FN</td>
<td>100</td>
<td>106.42</td>
<td>84.18</td>
<td>80.80</td>
<td>79.32</td>
<td>79.31</td>
<td>77.96</td>
</tr>
<tr>
<td>PG</td>
<td>100</td>
<td>90.24</td>
<td>71.63</td>
<td>54.83</td>
<td>59.69</td>
<td>57.61</td>
<td>57.03</td>
</tr>
<tr>
<td>LG</td>
<td>100</td>
<td>105.95</td>
<td>93.99</td>
<td>73.07</td>
<td>80.91</td>
<td>80.47</td>
<td>81.85</td>
</tr>
<tr>
<td>FG</td>
<td>100</td>
<td>97.78</td>
<td>82.06</td>
<td>63.29</td>
<td>69.50</td>
<td>68.08</td>
<td>68.22</td>
</tr>
<tr>
<td>PI</td>
<td>100</td>
<td>90.24</td>
<td>71.63</td>
<td>54.83</td>
<td>59.69</td>
<td>57.61</td>
<td>57.03</td>
</tr>
<tr>
<td>LI</td>
<td>100</td>
<td>105.95</td>
<td>93.99</td>
<td>73.07</td>
<td>80.91</td>
<td>80.47</td>
<td>81.85</td>
</tr>
<tr>
<td>FI</td>
<td>100</td>
<td>97.78</td>
<td>82.06</td>
<td>63.29</td>
<td>69.50</td>
<td>68.08</td>
<td>68.32</td>
</tr>
</tbody>
</table>

Source: Calculated from the data.
Imports

Imports have shown a rising trend since 1975, expanding from B 64044 million to B 188686 million in 1981. Of the increased value of the imports in 1981, the percentage shares of various types of imports were as follow: crude oil (12.2 percent) and oil products (seven percent), chemicals (7.5 percent), base metals (thirteen percent), tractors (2.8 percent), fertilizers and pesticides (four percent), chassis and auto body (8.8 percent), and ammunitions (2.8 percent). The total import value in 1982 amounted to 195 percent of total import value in 1975.¹

The following are details in each category.

A. Fuel Oil and Lubricants

The import value of this group amounted to B 32650 million in 1981, an increase of 160 percent from 1975. Crude oil constituted the largest share in this group (seven-nine percent), with the import value of crude oil rising by 127 percent since 1975. The import value of oil products expanded notably as the import value of certain types of oil, e.g., diesel oil and octane for aviation rose on average, while the import value of bunker oil rose by several folds over that of 1976. The reason for the high rate of increase was because domestic demand for energy rose in line with the country's production situation. Since productive capacity of local oil refineries was limited, imports of crude oil and certain types of oil products had to be increased. Moreover,

¹All data from Foreign Trade Statistic of Thailand, Department of Custom of Thailand, Bangkok: Government Printing Office, 1975-1981.
the number of motor vehicles has increased rapidly, resulting in increased traffic congestion. This, in turn, led to increase use of fuel energy.

B. Raw Materials and Intermediate Products

Imports of this group increased steadily since 1975. Raw materials and intermediate products which increased at a high rate, were base metal and chemicals used in iron and corrugated irons sheets and textile fibres. Thai manufacturing depends heavily on imported raw materials. Thus, when expanded, demand for imported raw materials has to be increased also. Details on imports are as follows.

The import value of chemicals rose rapidly every year. The total import value in 1981 was B 14844 million, an increase of 152 percent from 1975. The types of chemicals which showed a high rate of increase were raw materials from polymerization or copolymerization. The import value of these two categories accounted for twenty percent of total import value of chemicals. These two types of raw materials are used in many industries, the most important of which is the plastic industry. The chemical which ranked second in importance was synthetic dye. This was followed by other chemicals which are the important raw material used in synthetic fibre manufacturing, i.e., ethylene glucol, caprolactum and DMT (dimethyl perethalate), the import value of which also rose significantly.

Base metals, such as iron (accounting for seventy-five percent of total imports under this category), aluminum and corrugated iron sheets are used as raw materials in the production of corrugated iron sheets, galvanized iron sheets and in the manufacturing of containers (fruit
can) and auto part and equipment. From 1977, the import value of iron and steel coiled for re-rolling, mostly used in the automobile assembling and electrical appliance industries, rose markedly. Imports of iron scraps used as raw materials in the production of round steels and steel pipes for the construction industry also increased substantially.

In the textile fibres category, raw cotton accounted for over seventy percent of the value of this group of imports. The import value rose by seventy percent from 1975 to B 3189 million in 1981.

The import value of capital goods increased to B 39849 million in 1981 from B 19808 million in 1975, due to the recovery of many small-scale industries, the most important of which were nonelectric machinery, tractors, fertilizers, and pesticides.

Exports

In 1981 exports totaled B 133197 million, a 167 percent increase from B 49799 million in 1975. The value of eight major export items, rice, rubber, maize, tapioca products, which accounted for eighty percent of total export earning in 1975, had decreased to sixty-eight percent of total export value in 1981. Although total export volume rose over the sample period, it was less than the increase in imports.² The following are details for each category.

A. Rice

The rice trading situation was very active by increasing to B 19508 million in 1981 (increased 100 percent from 1975) compared with B 9778 million in 1975. Demand for Thai rice from overseas remained strong, even though from 1976 until now the government has tried to slow down exports because of the fear of a domestic shortage for local consumption, as the export volume was higher than normally and output of paddy in 1976 and 1977 had not been as productive as in the previous years. Measures taken to slow down rice exports on different occasions were the following:

1. Raising the export costs by increasing the rice reserve requirements and raising the premium rate; and
2. Imposing a ceiling on the amount an exporter might sell abroad, a limit of 10,000 tons per transaction.

These measures have been in effect since March 1, 1976.

B. Rubber

Exports increased notably due to an expansion of demand in foreign markets, particularly the United States, where the automobile industry started to recover and production of automobile tires accelerated to replenish the stocks which had been depleted in the 1976 labor strike. Furthermore, rubber exports to other prime customers, such as, Japan and some European countries, also increased. For the all of 1981, exports totaled B 12351 million, an increase of 145 percent over 1975.
C. Maize

In 1981, export value increased only twenty percent from 1975, and during 1976 to 1980 the value went down by 19.9 percent, and increased again in 1981. The maize trading situation was not favorable due to widespread hoarding for speculative purposes among traders with the result that domestic prices trended upward, while the world market price remained at a low level. The Board of Trade negotiated with Japan a cancellation of amounts contracted to be delivered in 1976 to 1977 totaling 16,000 tons. In addition, traditional buyers such as Singapore, Hong Kong, and Malaysia, turned to purchase from the United States and Argentina instead, as their price were cheaper. Since the U. S. maize crop was very large, the price of maize in the world markets dropped to an unusually low level. At the same time, Thailand's maize crop had been severely damaged by the drought, the price of rice bran and broken rice rose substantially and local animal feed manufacturers turned to the use of maize instead. The domestic price of maize, therefore, did not move down in line with the world market price. As a consequence, exporters to Japan and Taiwan under contracts already signed (the 1977 to 1978 selling season) suffered a loss.

D. Tapioca Products

The export of tapioca products were very buoyant, particularly for tapioca pellets exported to European markets which started to expand since the end of 1976. Orders for Thai tapioca pellets from these markets went up as the production of grains used as animal feed was
severely damaged during the 1976 to 1977 crop year. Export value in 1981 was B 14866 million, compared with B 3836 million in 1975. The EEC was still the major market for Thai tapioca pellets as in 1976, whereas Japan and the United States were still the major customers of Thai tapioca flour. On the other hand, Indonesia purchased less of tapioca flour from Thailand, due to the measures taken by the Indonesiaan government to protect local tapioca flour factories through raising the import duty since the end of 1976.

E. Tin

In 1981 tin exports valued at B 11347 million compared with B 3097 million in 1975, or an increase of 266 percent in terms of value. The export value increased because tin prices in other markets continued to rise from the previous year's level, with the result that the International Tin Council had to raise the floor and ceiling prices. Despite this, the prices of tin continued to rise further to a level higher than the ceiling price due to increased demand for both speculative as well as normal utilization purposes. The international tin buffer stock was unable to hold down the tin price because buffer stocks had been depleted.

F. Sugar

In 1981, the value of sugar exports dropped from B 3757 million in 1975 to B 2975 million. World production was in excess of market demand, coupled with the high level of stock holdings, with the result that the price of sugar declined continuously from 1977. During 1977, the United Nations Commission for Trade and Development convened to
-47-

draft a new international sugar agreement, with extensive economic provisions, to replace the previous agreement which was due to expire at the end of 1977. Both the sugar exporting and importing countries met many times to consider the draft agreement until it was finalized in October 1977, to become effective in 1978 for a period of five years. According to this agreement, quotas for each exporting country and the floor and ceiling prices were imposed to be used as guidelines for member countries to follow in different situations, e.g., when to cut down on the export volume, or to reserve more sugar in the stocks when prices were low, or to sell freely when the market price were above the set ceiling price. It was expected that these measures would solve the problems of over supply, declining price trends and imbalance between production and consumption.

G. Textile Products

In 1981 exports amounted to B 7413 million, a rise of forty-six percent from 1975. The export volume of most types of textile products increased. However, prices of some fabrics dropped due to competition, while some fabrics were out of vogue, e.g., cotton jeans. Garment exports decreased in volume but increased in value. As for exports to countries where import quotas on textile products were imposed, on the whole all quotas received had been exhausted. Exports of fabrics to the United States were excess of the quotas received, so that the quotas received for garments exports had to be transferred to cover for the fabrics, as exports of the latter were substantially below the quota. Exports to the EEC were slightly below the quotas. In 1978,
there was a negotiation with the Common Market Countries concerning the import quotas on textile products from Thailand, which included cotton and garments. From this negotiation, Thailand received a slight increase in quotas in almost every types of textile, ranging from 0.5 to 0.6 percent per annum.

H. Other Exports

In 1981, miscellaneous export value totaled B 33077 million, an increase of 44.5 percent over 1975.

Terms of Trade of Thailand and ASEAN

ASEAN is the group of countries in Southeast Asia that forms a free trade area. The members of ASEAN are Malaysia, Indonesia, Singapore the Phillipines, and Thailand. The foreign trade between Thailand and ASEAN is important—especially exports from Thailand to ASEAN. The proportion of trade is shown in Table 3. In the export side, the proportion to total exports was high in 1975 and 1977 (around nineteen percent), and low in 1980 (around sixteen percent). The major export items are rice, rubber, and maize, which cover around fifty to sixty percent of total exports from Thailand to ASEAN. Thus, the movement of price, quantity, and volume of these exports should effect the movement of indices of total exports. On the import side, the major import is oil which covers around fifty percent of total imports from ASEAN.

The result in Table 4 and Figure 6 show that during 1976 to 1981 the net barter terms of trade and the income terms of trade deteriorated.
TABLE 3

PROPORTION OF TRADE BETWEEN THAILAND AND ASEAN TO TOTAL TRADE OF THAILAND (In Percentage)

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</table>

Source: Calculated from the data.

The gross barter term of trade during 1980 to 1981 showed strong improvement.

The price of maize, one of the major exports, moved upward so the ASEAN changed to buy from the U.S.A. which was cheaper. Including the slowdown of rice's export caused Thailand more suffer in trade. In the same time oil's price still kept on increasing, that is why the terms of trade had the unfavorable trend.

Actually, trade between Thailand and ASEAN in theory, should be more beneficial than trade with other non-ASEAN countries due to low internal tariff barriers. However, from the empirical results, Thailand's terms of trade have fallen (with the exception of the gross barter terms of trade). This might be because of the downswing of the business cycle plus the strong rise in oil prices that caused Pm to increase so that the net barter terms of trade (Px/Pm) deteriorated.
### TABLE 4

**TERMS OF TRADE OF THAILAND AND ASEAN**

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</table>

Source: Calculated from the data.
FIGURE 6
TT OF THAILAND AND ASEAN
Terms of Trade of Thailand and Japan

Thailand trades heavily with Japan as shown in Table 5. On the export side the proportion of trade decreased from twenty-six percent to twenty-one percent. The major export items to Japan is primary products and the major import is manufactures.

TABLE 5
PROPORTION OF TRADE BETWEEN THAILAND AND JAPAN TO TOTAL TRADE OF THAILAND (In Percentage)

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Source: Calculated from the data.

The result in Table 6 and Figure 7 had shown that the net barter terms of trade, the gross barter terms of trade, and the income terms of trade between Thailand and Japan deteriorated, except the gross barter terms of trade between 1979 to 1981, and the income terms of trade in 1978.

Thailand lost in trade with Japan because maize (one of the major export to Japan) trading situation was not favorable since the United States maize crop was very large, the price of maize in the world market dropped to an unusually low level. At the same time, Thailand's maize crop had been severely damaged by the drought in 1977. The
domestic price of maize, therefore, did not move down in line with the world market price. As a consequence, exporters to Japan, under contracts already signed (the 1977 to 1978 selling season), suffered loss. However, after baht devaluation in 1980, the terms of trade show an upward trend.

TABLE 6
TERMS OF TRADE OF THAILAND AND JAPAN

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Source: Calculated from the data.
FIGURE 7
TT OF THAILAND AND JAPAN
TT OF THAILAND AND JAPAN
TT OF THAILAND AND JAPAN


□ FN □ LN
□ EN

□ PC □ LC

□ PI □ LI
Terms of Trade of Thailand and the United States

The United States is the second biggest trading partner of Thailand, thus it is also useful to examine the terms of trade of Thailand and the United States. The proportion of trade is shown in Table 7. On the export side, the proportion was constant, around nine percent, and the major export items were tin (cover around seventeen to twenty percent of total export to the U. S.), rubber (around nine to fourteen percent), textile (nine to sixteen percent), and canned pineapple which cover around five percent. On the import side, the proportion was also constant (around thirteen percent). Mostly, the imported goods from the United States have been manufactures.

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Source: Calculated from the data.

The results in Table 8 and Figure 8 show that the net barter terms of trade, the gross barter terms of trade, and the income terms of trade had an upward trend. However, LN and PG had a downward trend.
We gain from trade with the United States since 1977 because tin's price moved upward very much (one of the major export). Including baht devaluation cause export goods from Thailand cheaper and the United States in the open country, so he turn to import more commodities from Thailand. That is why the terms of trade rose during 1980 and 1981.

TABLE 8
TERMS OF TRADE OF THAILAND AND THE U.S.A.

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Source: Calculated from the data.
FIGURE 8
TT OF THAILAND AND THE U.S.A.

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Legend:
- PN
- LN
- EC
- PI
- L1
Terms of Trade of Thailand and EEC

Thailand is concerned with EEC because the proportion of trade to the total trade is high, as shown in Table 9 on the export side, the proportion was increased from thirteen percent in 1975 to twenty-six percent in 1981. The major export items to EEC are tapioca pellets, tin, and textile, which cover around sixty percent of total exports to EEC. On the import side, the proportion was high in 1975 and 1976, and low in 1978. There are no major imports items from EEC, but we can conclude that the imports from EEC are manufactures.

TABLE 9
PROPORTION OF TRADE BETWEEN THAILAND AND EEC TO TOTAL TRADE OF THAILAND (In Percentage)

| Year | Exports | | | | | | | Imports |
|------|---------|------|------|------|------|------|------|
| 1975 | 13.41   | 19.03|   |   |   |   |   |
| 1976 | 15.55   | 14.03|   |   |   |   |   |
| 1977 | 14.85   | 17.03|   |   |   |   |   |
| 1978 | 21.90   | 12.84|   |   |   |   |   |
| 1979 | 22.00   | 14.35|   |   |   |   |   |
| 1980 | 26.95   | 14.59|   |   |   |   |   |
| 1981 | 26.69   | 14.43|   |   |   |   |   |

Source: Calculated from the data.

The result in Table 10 and Figure 9 show that the net barter terms, the gross barter terms of trade had the unfavorable trend, but the income terms of trade had favorable trends.
The major import and export between Thailand and EEC is almost the same as trade with the U.S.A., so trade situation did not quite different. However, the proportion of trade between 1976 and 1981 seems to be decreased. It might because of the change in commercial policy increasing tariff of luxury goods very much in 1977 and most of the luxury goods that Thailand import come from Europe. So as long as they are expensive the volume of import was decreasing. The income terms of trade rose very much because since 1978 both export price and volume were increased all the time until 1981 (Table 9). That is why income terms of trade has an upward trend.

### TABLE 10
TERMS OF TRADE OF THAILAND AND EEC

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Source: Calculated from the data.
CHAPTER V
CONCLUSION

The calculated terms of trade show that Thailand had the losses from international trade, the same as another LDCs which are largely exporters of primary commodities. The conclusion of the argument is that industrialization could forestall the deterioration of the terms of trade. The causes for the deterioration are described as the world's income elasticity of demand for manufactures is substantially higher than the income elasticity of demand for primary products which is fairly low. Moreover, the threat of further substitution of manufacture synthetics for primary commodities tends to depress further the price the LDC exporters of primary commodities can be obtain.

From the calculation, the use of the net barter terms of trade is appropriate when we apply to Thailand because Thailand is a small country as we mentioned in Chapter II. The gross barter and the income terms of trade that was calculated in this study use for comparing the result only.

Thailand's total terms of trade mostly loss that we can explain from the countries which have large share of trade to Thailand, first the ASEAN which major exports are rice, maize and rubber. The price of maize in Thailand moved upward so the buyers changed to buy from the United States which was cheaper. In the same time, Thailand was slowing down the export of rice to protect shortage in domestic consumption. However, Thailand had to import oil that was very highly
priced at that time. These are the reasons that caused Thailand's loss in terms of trade.

Japan, the United States, and EEC have almost the same major import and export items. The major imports are manufactures and the major exports are primary products. Thailand gained in trade from the United States and EEC from 1979 to 1981 because tin's price increased very much and tin is one of the major exports. Another reason is the baht devaluation in 1980 proved successful which is shown in Figures 6, 7 and 8.

However, in the same reason Thailand cannot gain trade from Japan because the price of maize (one of the major exports to Japan) in the world market dropped to an unusually low level, but the domestic price did not move down in line. As a consequence, exporters to Japan, under contracts already signed (the 1977 to 1978 selling season), suffered loss. Somehow, the net barter terms of trade was proven that it is getting better after the baht devaluation.

Because of the loosing in terms of trade, Thailand's government does try to improve it; for example, change in the commercial policy by increasing the tariff of luxury goods. The tariff will raise import price and reduce in import volume; but we can see only trade with EEC that was decreased in import volume (Table 9). The possible reason might be because a lot of luxury goods in Thailand was imported from Europe and the high tariff for luxury goods make import volume decrease. The baht devaluation is one of the policy that the government used. In December of 1980, Thailand devalued baht from 21.05
baht per dollar to 23.05 baht per dollar, it proved successful as we can see in Figures 7, 8, and 9.

In the case of ASEAN, although Thailand devalued baht, it did not help terms of trade because the devaluation makes import price rise and the import goods from ASEAN is oil which is inelastic. That is why Thailand still loss in terms of trade. Another cause that makes Thailand's loss in terms of trade is business cycle. The period time in this study was 1975 to 1981, that was during the downswing business cycle because of oil's price. During the downswing the underdeveloped country's terms of trade show deterioration as we mentioned in Chapter II.

Another finding in this study is economic cooperation in Southeast Asia did not help Thailand to improve terms of trade. It might because each of the member is a small country and Thailand has the cooperation, but it still cannot make up any price. Most of Thailand's exports are agriculture products which are inelastic; no matter which stage of the business cycle, the trade situation does not change very much. Moreover, Thailand lacks an important economic commodity, oil, forcing Thailand to import increasingly expensive oil. That is why the economic cooperation of ASEAN cannot help Thailand improve in terms of trade.

Another reason that can be explained in Thailand's case is that technological change is biased against labor and natural resources and in favor of capital and skills. Technical change must then work against primary production which commonly involves relatively plentiful endowments of labor and natural resources.¹

Among other possible explanations for the alleged deterioration in the terms of trade of Thailand is the extent to which internal as well as international transport cost inevitably creep into the price calculations. The seemingly greater rate of innovations in bulk transport (generally confined to primary products, which Thailand exports) than in general cargo transport (used in Thailand and most LDCs import) may serve as a partial explanation for the alleged deterioration.

The practical application of the indexes of the terms of trade encounters the number of limitations that may distort the results of measurement. Among these limitations are the following.

1. The terms of trade measures reflect almost exclusively trade in commodities. Unilateral transactions and trade in invisibles are accounted for only in the gross barter terms of trade and income terms of trade, and even in these instances only very imperfectly.

2. Since $P_x$ is usually measured at F.O.B. prices (excluding international transport cost) and $P_m$ in C.I.F. prices (including international transport costs), all measures involving prices of imports and exports are subject to an unfortunate asymmetry with respect to transport costs. Thus, the terms of trade may reflect changes in international transport costs rather than real changes in prices received for exports in different countries.

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