Chapter 3

Theoretical Framework and Methodology

Theoretical Framework

The specification and estimation trade equations normally are the perfect substitute model and imperfect substitutes model. To the equation for time-series behavior of the quantities and prices of merchandise imports and exports, and focus explicitly on the role played by income and prices in the determination of these trade variables. The perfect substitutes model of either imports or exports are perfect substitutes for nontrade goods. But the imperfect substitutes model of neither imports nor exports are perfect substitutes for nontrade goods.

The theoretical framework provided in the studies are demand for goods which depend not only on income, but also on prices. An assignment of income is not on current disposable income but on permanent income. Permanent income, the income individuals expect to receive on the basis of their wealth, occupation, and ability, are formed on the basis of past experience and from observations of what individuals earn in similar circumstances.[10]

Importers have to form some idea of the level of consumption they maintained for the rest of their life. However, a rise or fall in importer income will affect the demands for different import goods. As importer income rises, the

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[10] Paul Cook and Colin Kirkpatrick, Macroeconomics for Developing Countries, New York: Harvester Wheatsheaf, 1990, pp. 58-59.

demand for import increases. The concept of elasticity characterizes the relative responsiveness of a given variable to a change in the value of another variable to which it functionally relates. Responsiveness of demand to importer income is measured by the income elasticity of demand. The ability to measuring the proportional change in the quantity demanded resulted from a given proportional change in income, or the percentage change in the quantity demand from 1 percent change in income. The income elasticity of demand is usually positive for most goods because higher importer permanent income usually means increased spending. If the income elasticity equals unity, each 1 percent increase in income will lead to a 1 percent increase in the demand for the goods. Hence importer would continue to spend the same fraction of their income on the goods as before the increase.

Necessities and luxuries goods can be define using the income elasticity of demand concept. If the income elasticity exceeds 1, people will spend a larger fraction of their income on the goods as income rises. Those import goods are luxury products. If the income elasticity less than 1, people will spend a smaller fraction of their income on that goods as income rises. These import goods are necessary products. However, the relationship between permanent income and import demand quantity could be positive or negative. For instance, the relationship for normal goods is positive. As permanent income rise, importer will buy more quantities of these goods. Meanwhile, the relationship for inferior goods is negative. As permanent income rise, importer will buy fewer quantities of those goods.

Devaluation implies an increase in the exchange rate from some value to another. Devaluation policies are considered to be expenditure-switching tools which work on relative prices to switch domestic and foreign expenditures between import goods and nontrade goods. Relative prices are indicated in comparison between import prices and nontrade goods prices. Similarly comparison in this paper are considered among import unit value and consumer price index in each importer countries. If increase in exchange rate from the devaluation in a country can make foreign imports prices decreasing in term of foreign currency, import prices are cheaper when compared with nontrade goods prices in foreign currency. Meanwhile making the ASEAN imports prices increase in terms of each ASEAN currency, ASEAN import prices would be more expensive when comparable with their nontrade goods prices in term of each ASEAN currency. Expenditures are diverted from foreign nontrade goods to import goods from ASEAN while increasing foreign import demand for ASEAN exports, and diverted from import goods from foreigner to ASEAN nontrade goods while decreasing ASEAN demand for import goods from foreigner. Price elasticity demand for imports and exports are indicated by the proportional percent change in the quantity demand from 1 percent change in price. Because of the law of demand, the quantity demand rises when the price falls, and the quantity demand fell when the price rises. Thus the sign of demand will be negative. It is a convention in economics that when calculating the coefficient of the price elasticity of demand, it is essential to drop the negative sign and use the absolute value of the elasticity.[11] The elasticity of demand shows what will

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[11] Roy J. Ruffin and Paul R. Gregory, Principles of Economics 6th ed. the United States of America: Addison-Wesley Educational Publishers, 1997, pp. 96-102.

happen to the total revenue of seller or exporter when price changes along a given demand curve. Along a demand curve, price and quantity demanded move in opposite directions. While a fall in lower total revenue, the resulting rise in quantity demanded rises total revenue. The outcome depends on the extent to which quantity demanded responds to change in prices. The response of total value of exports to price changes depends on the price elasticity of demand. For instance, a relatively small rise in quantity export (import) demanded will not offset the decline in export (import) value caused by a fall in export (import) prices. But a substantial rise in quantity export (import) demanded could offset the export (import) value loss caused by a lower export (import) prices.

Elastic demand occurs when elasticity more than 1, the percentage rise in export (import) quantity demanded is greater than the percentage fall in export (import) prices. Export (import) value increases because the increase in export (import) quantity demanded more than offsets the decrease in export (import) prices. Export (import) price and export (import) value move in opposite directions. In other words, export (import) price change is accompanied by a more than proportionate change in export (import) quantity demand, and export (import) value is greater at lower prices than at higher ones.

Inelastic demand occurs when elasticity less than 1, the percentage rise in export (import) quantity demand is less than the percentage fall in export (import) prices. Export (import) value falls because the decline in export (import) prices is not offset by relatively small rise in export (import) quantity. Export (import) price

and export (import) value move in the same direction. In other words, export (import) price change is accompanied by a less than proportionate change in export (import) quantity demanded, and export (import) value is greater at higher prices.

Unitary elastic demand occurs when elasticity equals to 1, the percentage rise in export (import) quantity demanded equals the percentage fall in export (import) prices. Export (import) value is unchanged because the decline in export (import) price is just offset by the rise in export (import) quantity. In another words, if export (import) price is cut in half, export (import) quantity demanded doubles, and export (import) value is the same regardless of the prices.

In addition, devaluation can approve the trade balance deficit, if it is substitute goods, the cross price elasticity of demand is positive, if not, it is complementary goods, the cross price elasticity of demand is negative.

At steady state, these solution requires market clearing condition when the quantity the sellers wish to supply equals the quantity the purchasers wish to demand. Similarly to nontrade goods consume by household equal to endowments of home goods in ASEAN countries at the equilibrium, the quantity demanded for goods equal to the quantity supplied of goods.

Permanent Income Analysis

Milton Friedman theory was derived from the consumer's choice of consumption pattern in each time frame to create the highest satisfaction within the limitation of the life-time income. This means that the current consumption not only depends on the present income, but also the present value of the expected future income.

The permanent consumption income theory can be explained in three assumptions[12]. Firstly, the income and the current consumption can be factored into two main parts; the permanent and the transitory. At a given time:

$$y = y_p + y_t$$

by y = actual income

y_p = permanent income

y_t = transitory income

Secondly, Friedman stated that permanent income is the amount that the consumer uses for consumption but does not effect the economic stability of the family. However, it will have an effect on the expected future income. Therefore, the permanent income can be considered a long-run concept of income.

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[12] Pranee Tinnakorn, "Aggregate Consumption in the Thai Economy; Minerals in the ASEAN," <u>Thammasat Economic Journal</u> (Sep 1986): 5-79.

Thirdly, the transitory income on the other hand is amount of income which was unanticipated. The number can be positive or negative. The transitory income is one of the factors which shows the difference between the present income and the income in the long-run.

The equation for the permanent income is as follows:

$$(y_p)_t = \sum_{i=0}^{\infty} \lambda^i y_{t-i}$$

or $\quad (y_p)_t = y_t + \lambda y_{t-1} + \lambda^2 y_{t-2}$

This equation is used for estimation for the consumption equation according to the permanent income theory. This equation is used under the assumption that permanent income is related to the historical income (income received in the past).

On the other hand, Lily explored the behavior of household savings in Thailand, she also studied the consumption function and tried an alternative definition of permanent income, which is based on two-year moving average.[13]

$$yp_t = (yd_t + yd_{t-1})/2$$

or $\quad yp_t = 0.5\, yd_t + 0.5\, yd_{t-1}$

by $\quad yp_t = $ the permanent income

$\quad yd_t = $ the actual disposable income

In calculating the permanent income equation stated above, it is suggested that the equal-weight average method should be used by means of

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[13] Kosiyanon Lily, Behavior of Household Savings in Thailand (1974): 22-25.

calculating three periods of the income value; the present period and the previous two periods respectively.

$$yp_t = 0.33\ yd_t + 0.33\ yd_{t-1} + 0.33\ yd_{t-2}$$

In general, economist agrees that the permanent income consumption theory can be explained up to a certain level if only few assumptions are taken into consideration.

Methodology

The model outlined below describes a small open exchange economy populated with identical agents that possess perfect substitute model. These agents have inherited an outstanding stock of internationally traded debt; since there is perfect capital mobility, and the residents in this economy take the world interest rate as given. A nominal devaluation is considered on altering the relative price between traded goods and non-traded goods. The following are specified in two parts:

(i) Developing countries demand for import from industrial countries: Japan and the United States.

(ii) Industrial countries' demand for developing country exports on ASEAN countries export to Japan and the United States.

ASEAN developing countries taken into consideration are Indonesia, Malaysia, Philippines, Singapore, and Thailand

Developing Countries' Import Demand:

The representative consumer maximizes the lifetime utility function of developing countries. We assume for simplicity that the household derives utility in each period according to a Cobb-Douglas utility function.

By h_t = infinitely-lived household consumes a nontraded

m_t = infinitely-lived household consumes an imported goods

q_t = endowments of the home goods

x_t = the export goods which is not domestically consumed.

β = the subject rate of time preference. $\beta > 0$

$$max\ U = \int_{t=0}^{\infty}[\alpha ln(h_t)+(1-\alpha)ln(m_t)]exp(-\beta_t), \tag{1}$$

Next, equation (2) defines the household's flow budget constraint. The total endowment expressed in terms of the home goods is defined as $y_t = q_t + x_t$ $(p^x/p)_t$. This endowment, in turn, is used to service the interest payment on the fixed stock of outstanding debt, which is denominated in terms of the export, with the remaining income used to finance consumption or accumulate the asset.

By $(p^x/p)_t$ = the price of the export relative to the home goods

$(p^m/p)_t$ = the relative price of imports

r_t^* = the world interest rate

A_t = the stock of debt

$$s.t.\dot{A} = q_t + x_t(p^x/p)_t - r_t^*A(p^x/p)_t - h_t - m_t(p^m/p)_t \tag{2}$$

Combining the lifetime utility function with the budget constraint, and introducing the costate variable, μ_t, in Lagant form:

$$Max\ U = \int_{t=0}^{\infty}[\alpha ln(h_t)+(1-\alpha)ln(m_t)]exp(-\beta_t)$$

$$+\mu_t[q_t + x_t(p^x/p)_t - r_t^*A(p^x/p)_t - h_t - m_t(p^m/p)_t] \tag{3}$$

Take first order conditions on equation (3) in order to accept relationships between consumption of the home and imported goods that hold at each point in time on equation (4) which equates the intratemporal marginal rate of substitution between importables and nontradables to the relevant relative price.

$$h_t = [\alpha/(1-\alpha)]m_t(p^m/p)_t \qquad (4)$$

Dynamics place consumption of the importable along the optimal path given by the Euler equation are shown on equation (5) by analogous the equation (4), as it relates the marginal rate of substitution between current and future consumption to the relevant intertemporal price, the world real interest rate.

$$m_t = m_t(r_t^* - \beta) \qquad (5)$$

Industrial Countries' Demand for Developing Country Exports:

The representative consumer maximizes the lifetime utility function of industrial countries consume the developing countries' export.

by h_t^* = infinitely-lived household consumes a nontraded

x_t = infinitely-lived household consumes an imported goods (the imported goods is the export of the developing countries)

q_t = endowments of the home goods

m_t = the export goods (imported by developing countries) which is not domestically consumed.

Households in the industrial countries are assumed to be net lenders, who receive interest income; they can consume or accumulate the asset. The representative consumer problem and solution are summarized by equation (6)-(9),

$$max\ U = \int_{t=0}^{\infty}[\alpha ln(h_t^*) + (1-\alpha)ln(x_t)]exp(-\beta_t) \qquad (6)$$

$$s.t.A = q_t^* + m_t(p^m/p^*)_t + r_t^*A(p^x/p^*)_t - h_t^* - x_t(p^x/p^*)_t \qquad (7)$$

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Where the preference parameters are assumed to be the same as those of households in developing countries as the numeraire, $(p^x/p)_t$ defines the price of the imported goods (which exported by the developing county) to the home goods. The total endowment in terms of the home goods is defined as $y_t^* = q_t + m_t (p^m/p^*)_t$. The first order conditions yield relationships between consumption of the home and imported goods that hold at each point in time:

$$h_t^* = [\alpha/(1-\alpha)]x_t(p^x/p)_t \tag{8}$$

while dynamics are given by the Euler equation:

$$x_t = x_t(r_t^* - \beta) \tag{9}$$

The Steady State:

The dynamics of imports in developing and industrial countries are given by the Euler equations (equations (5) and (9), respectively). However, our primary interest in the analysis that follows is to employ cointegration analysis to examine the "long-run" steady-state relationships that describe import demand. By market clearing conditions for the household consume of home goods equal to the endowment of home goods ($h_t = q_t$ and $h_t^* = q_t^*$). A steady state solution requires that the subjective rate of time preference equal the world rate of interest ($\beta = r^*$); the later ensures that there is no saving in the steady state. Hence, we assume the demand imports of the countries depended on the relative price that especially comparable between import prices and home goods price only. We solve the budget constraints (equation (2) and (9)) to obtain an expression that links imports to their permanent income and price relative to their home goods. Its log-linear versions for developing and industrial countries are as follows:

$$log(x_t) = log\{[m_t p^m{}_t + r^* A p^x{}_t]/p^*{}_t\} - log(p^x/p^*)_t \tag{10}$$

$$log(m_t) = log\{[x_t - r^* A](p^x/p)_t\} - log(p^m/p)_t \tag{11}$$

The nonstochastic version of the "long-run" steady state relationship that describes the behavior of imports, and its termed of cointegrating equation that tested the structural model outlined linking the steady state consumption of the imported goods to permanent income and relative import prices. The representative permanent income and relative prices respond to imports and exports by equation (12) and (13).

$$log(x_t) = logyp_t{}^* - log(p^x/p^*)_t \tag{12}$$

$$log(m_t) = logyp_t - log(p^m/p)_t \tag{13}$$

This simple two-goods setting shows the relevance of import prices and nontraded goods prices. However, because of data limitations, the analysis that follows uses nominal imports as a proxy for consumption of importables, consumer prices as a proxy for the price of nontraded goods, and real GDP as a proxy for the permanent income, respectively. The assumption that underlies estimation is that such measurement errors are stationary processes with well-defined variances. Industrial countries' consumption of developing countries' exports or developing countries' consumption of industrial countries' export similarly depends on permanent income and the relative price of the exportable. The data used are annually and cover the period 1967-1996. The source is the International Financial Statistic. Details of the data and sources are presented in the measurement and data part; the countries included in the sample are

Indonesia, Malaysia, Philippines, Singapore, and Thailand among important trade partner countries; Japan and the United States.

In much of the earlier literature, estimates of the preference parameters were frequently obtained by applying ordinary least squares technique[14] in order to estimate income and price elasticities in ASEAN on exports and imports demand. The specification was often very similar to the export equation (14) and to the import equation (15) in following. These specifications of the demand for imports and exports usually yielded parameters in accordance with the model's priors, coefficient of permanent income entering positively while coefficient of relative prices entered negatively. Most often, the estimates were statistically significant.

This paper have re-examine the role of relative prices in light of these developments and assess if the implied theoretical model is capable of describing the data, we proceed in two steps. In addition, test for cointegration; this tells whether the long-run behavior of import demand is adequately specified. Second, in the next subsection provides reliable estimates the magnitude of permanent income and relative prices have long run affected to export and import demand.

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[14] Damodar N. Gujarati, "Two-Variable Regression Model: the Problem of Estimation," Basic Econometrics 3rd ed. the United States of America: McGraw-Hill, 1995, pp. 52-59.

The cointegration test most early employed in the literature is suggested by Johansen[15] (1988) to test and estimate the magnitude of long run steady state relationship among export and import responding to both permanent income, and relative prices on equation (14) and (15).

It is obtained reliable relationship among permanent income and relative prices affect to trade flows by specifying the nonlinear regression model which were estimated for exports (14) and imports (15) of developing countries as follows.

$$logx_t = \lambda_0 + \lambda_1 logyp_t{}^* + \lambda_2 log\ (p^x/p^*)_t \qquad (14)$$

$$logm_t = \beta_0 + \beta_1 logyp_t + \beta_2 log\ (p^m/p)_t \qquad (15)$$

where

λ_1 and λ_2 defined income and price elasticity demand for ASEAN countries' exports.

If $\lambda_1 = 1$ and $\lambda_2 = -1$, the parameters could be accepting the hypothesis that long run relationship of permanent income and relative prices of the industrial countries affect developing countries' export in the perfect substitute model between nontraded goods and imported goods.

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[15] Soren Johansen, Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models," Econometrica 59 No. 6 (November 1991): 1551-1580.

If $\lambda_1 \neq 1$ and $\lambda_2 \neq -1$, the parameters could be accepting the hypothesis that long run relationship of permanent income and relative prices of the industrial countries affect developing countries' export in the imperfect substitute model between nontraded goods and imported goods.

β_1 and β_2 defined income and price elasticity demand for ASEAN countries' imports.

If $\beta_1 = 1$ and $\beta_2 = -1$, the parameters could be accepting the hypothesis that long run relationship of permanent income and relative prices of the developing countries affect developing countries' imports in the perfect substitute model between nontraded goods and imported goods.

If $\beta_1 \neq 1$ and $\beta_2 \neq -1$, the parameters could be accepting the hypothesis that long run relationship of permanent income and relative prices of the developing countries affect developing countries' imports in the imperfect substitute model between nontraded goods and imported goods.

Measurement and Data

All annually data are cover the period 1967-1996 between ASEAN countries; Indonesia, Malaysia, Philippines, Singapore, and Thailand to Japan, and the United States. Source of the secondary data is collected from International Financial Statistic at Escape Library. On the hypothesis that whether permanent income and relative prices significantly affect to export and import in perfect substitute model in ASEAN countries.

Model Analysis:

$logx_t = \lambda_0 + \lambda_1 logyp_t^* + \lambda_2 log\ (p^x/p^*)_t$

$logm_t = \beta_0 + \beta_1 logyp_t + \beta_2 log\ (p^m/p)_t$

H_0: λ_1 = 1,

     λ_2 = -1

     β_1 = 1,

     β_2 = -1

H_1: λ_1 ≠ 1,

     λ_2 ≠ -1

     β_1 ≠ 1,

     β_2 ≠ -1

Variable definitions are following:

m_t = nominal imports of ASEAN countries from Japan and the United States. (million $u.s.)

x_t = nominal exports of ASEAN countries to Japan and the United States. (million $u.s.)

p^x = export unit values to proxy export prices of ASEAN countries. (1990 price)

p^* = consumer prices indexes to proxy the price of nontraded goods of Japan and the United States. (1990 price)

$(p^x/p^*)_t$ = the relative export prices of ASEAN countries.

p^m = import unit values to proxy import prices of ASEAN countries. (1990 price)

p = consumer prices indexes to proxy the price of nontraded goods of ASEAN countries. (1990 price)

$(p^m/p)_t$ = the relative import prices of ASEAN countries.

yp_t = real gross domestic product to proxy the permanent income of ASEAN countries as following.(million $u.s.)

yp_t^* = real gross domestic product to proxy the permanent income of Japan and the United States.(million $u.s.)