

BALANCE OF PAYMENT CONSTRAINT GROWTH: THE CASE OF SELECTED ASEAN COUNTRIES

Alfiah Hasanah

ABSTRACT

This study provides an empirical evidence of the economic performance of the four ASEAN countries: Indonesia, Malaysia, The Philippines and Thailand based on the application of Thirlwall & Hussain law (1979,1982). In the model developed by Thirlwall and Hussain (1979,1982) the expenditure of a country cannot definitely grow faster than income and the economic performance of a country is constrained by its balance of payment position. So it is therefore argued that over the long run countries will grow at a rate consistent with the equilibrium in their balance of payment. The empirical results of this paper indicates that the economic growth of these four countries is constrained by their balance of payment position particularly the constraint on demand since the evidence shows that there is a close association between the income growth predicted by the Thirlwall & Hussain's Balance of Payment Constraint (BPC) growth model to the actual growth during the 1970-1998 period. The empirical findings also supported the Thirlwall & Hussain's expectation that their extended version of the BPC model will give a closer prediction of the actual growth than that predicted by the BPC simple model developed by Thirlwall (1979).

Keywords : *Balance of Payment, ASEAN, Thirlwall and Hussain, economic growth, BPC model*

I. Introduction

ASEAN represents an eclectic group of market economies in which the external sector plays an important role. Indonesia, Malaysia, Philippines and Thailand are among the founding members of the Association of South East Asian Nations (ASEAN), which was formed at the Bangkok Declaration in 1967.

Given the high degree of economic openness in the region, it is no wonder that the external sector plays a catalyst role in stimulating economic growth. At the same time openness also implies exposure of ASEAN economies to external fluctuations. Thus the economic performance of ASEAN countries is strongly influenced by international market forces.

In as much as the emphasis in this study is on the importance of exports for generating economic growth, these countries as a group have experienced significant growth in real GDP and real export in recent years. This can be seen when we look at the data covering the period between 1980-1990 and 1990-1995 when each country had recorded significant growth in real GDP and real export. For the period between 1980-1990 average GDP growth of the group was 5.0% and between 1990-1995 it was 6.8%. Average export growth of the group for the period between 1980-1990 was 8.5% and between 1990-1995 it jump to 17.7%

The two key questions that economists interested in economic growth raised are why the growth rates differ across countries and why these differences appear to persist for long periods of time.

One of the approaches to the analysis of growth is that of Thirlwall (1979) which is based on the demand side of the economy rather than the supply side. The central idea of this theory is both extremely simple and intuitively appealing. In the long run an economy cannot grow at a rate which generates an ever widening balance of payments deficit. Therefore, the equilibrium growth rate is that which equalizes the growth rate of imports with that of exports.

Thirlwall (1979) proposed a model explaining that rates of economic growth differ between countries because of the differences in balance of payment constraint which is the differences in the income elasticity of import and export. This constraint gives limit to the level of economic growth that could be attained by a country and came to be known as balance of payment constrained growth.

Thirlwall argued that every country will have a growth rate consistent with the balance of payment equilibrium on both the current account and the capital account. If we specify the equilibrium equation and the determinants of export and import demand, we can see that the major factors that are important to the level of economic growth consistent with BOP equilibrium is growth of exports and income elasticity of demand for imports

The extended version of the Balance of Payment Constraint Growth (BPC) model has been modified by Thirlwall and Hussain (1982) to allow for a persistent disequilibrium in the BOP which makes it more relevant to the experience of "developing countries" that often have a continuous current account deficits, financed by capital inflow. In their work Thirlwall and Hussain (1982) argued that the level of economic growth of a country is determined by the rate of growth of export, real capital flow and income elasticity of import.

1. Objectives of the Study

The main purpose of this study is to conduct an empirical study of the long-run rate of economic growth of the four South East Asian countries (Indonesia, Malaysia, Thailand and the Philippines) and determined whether the growth rates are consistent with their equilibrium balance of payment for the period 1970-1998. Specifically this paper will try to examine the applicability of Thirlwall and Hussain's (1982) proposition to the economic experience of these four countries. This study will investigate the empirical validity of the Balance of Payment Constrained Growth model (BPC) in its extended form, which includes exports and real capital flow as determinants of long term economic growth.

In our study we will investigate how well the balance-of-payment constrained growth model (BPC) fits the growth experience of the four countries for the period 1970-1999.

Specifically, the objectives of our study are as follows:

1. To investigate whether the level of economic growth of Indonesia, Malaysia, The Philippines and Thailand are consistent with their balance of payment equilibrium.
2. To compare the balance of payment constraint growth predicted in the extended model as formulated by Thirlwall and Hussain's (1982) to the actual rate of growth of these countries and to identify whether they show evidence(s) that support Thirlwall and Hussain's (1982) proposition.
3. To compare the income growth predicted in the extended version of the BPC model to that predicted by the simple model originally developed by

Thirlwall (1979) and to ascertain whether the extended model give a closer prediction of the actual growth than the simple model.

4. To investigate whether exports and capital inflows have a significant influence on long-term economic growth.
5. To examine the relationship between economic growth and the level of income elasticity of import.

2. Significance of the Study

The four countries that we are investigating (Indonesia, Malaysia, Thailand and the Philippines) are developing countries that rely on export to quicken up their economic growth. Besides export, the import sector (related to consumption or capital goods) also plays an important role in fulfilling their economic objectives.

To clarify the economic growth in the four ASEAN countries it is helpful to ascertain the role of export as an engine of growth. Moreover the growth of export relative to the income elasticity of demand for imports is a good predictor of a country's growth performance and an answer to the growth rate differences between countries.

This paper will contribute to the existing literature on the economic performance of Indonesia, Malaysia, Philippines and Thailand either as a country individual or as a group making up the four largest members of ASEAN with similarities in production and export patterns.

Numerous researchers have tested the Thirlwall (1979) hypothesis for developed and developing countries. However the application of the extended BPC model as formulated by Thirlwall and Hussain's (1982), which was meant for developing countries, has not been tested on a wide scale.

The applicability of Thirlwall and Hussain's (1982) hypothesis has been tested for Indonesia, the Philippines and Thailand for 1961-1985 period, in the case of Malaysia only the Thirlwall's (1979) proposition has been tested. This study is also expected to contribute to the literature in the following ways: first, it uses more recent data and a different sample period to see whether the results are consistent with previous studies, and second, we address the statistical properties of the input data before proceeding with the testing of the hypothesis.

II. Literature Review

The concept of balance-of-payment equilibrium growth rate was originally developed by A.P. Thirlwall (1979, 1982). In his theory, Thirlwall tried to explain the international growth rate differences between countries. He asserted that growth rates differ because the growth of demand differs between countries. The balance of payment condition will presents a constraint to the level of economic growth that can be attained because the same rate of export growth in different countries will not necessarily permit the same rate of growth of output because import requirement associated with growth will differ between countries.

Thirlwall found that the rate of growth of export divided by the income elasticity of demand for import gives a good approximation of the actual growth experiences of major developed countries since 1950 and this rate of growth is known as the BOP constrained growth rate or BPC model for short.

Thirlwall and Hussain (1982) revised the original BPC model to explicitly allow for a persistent disequilibrium in the BOP and made it more applicable to developing countries because these countries are often able to maintain their ever

growing current account deficit with capital inflows and tried to observe the impact of this capital movement on economic growth.

When they applied the extended model or the revised one to developing countries, they found out that the extended model gave a closer prediction of the actual growth than the simple model.

There have been numerous research works aims at testing the validity of Thirlwall's proposition using time series as well as cross section data. The main reason for this interest in this subject is that Thirlwall's hypothesis poses a challenge to the mainstream view that economic growth is supply determined.

III. Methodology & Data

In this study we will apply the extended model of BPC model developed by Thirlwall and Hussain (1982), starting from the initial condition that the current account is in disequilibrium so that the country allows for a capital flow.

The equation of the balance of payment is expressed as:

$$P_d \cdot X + F = P_f \cdot M \cdot E \dots\dots\dots (1)$$

Where:

X = volume of export

P_d = Domestic price of export

F = value of nominal capital flows measured in domestic currency,

F > 0 measures capital inflow

F < 0 measures capital outflow

M = volume of imports

P_f = Foreign price of imports

E = Exchange rate (measured as the domestic prices of foreign currency)

If we take the rate of growth of each variable of our model (by taking it's natural log and take the differential), then:

$$\ln(P_d X + F) = \ln P_f + \ln M + \ln E \dots\dots\dots (2)$$

with total differentiation we obtain:

$$\frac{\partial P_d \cdot X + \partial X \cdot P_d + \partial F}{P_d \cdot X + F} = \frac{\partial P_f}{P_f} + \frac{\partial M}{M} + \frac{\partial E}{E} \dots\dots\dots (3)$$

$$\frac{\partial P_d \cdot X}{(P_d \cdot X + F)} + \frac{\partial X \cdot P_d}{(P_d \cdot X + F)} + \frac{\partial F}{(P_d \cdot X + F)} = \frac{\partial P_f}{P_f} + \frac{\partial M}{M} + \frac{\partial E}{E} \dots\dots (4)$$

$$\frac{(\partial P_d \cdot X + \partial X \cdot P_d)}{(P_d \cdot X + F)} + \frac{\partial F}{(P_d \cdot X + F)} = p_f + m + e \dots\dots\dots (5)$$

Lower case letters represents a rates of growth, where:

p_f = rates of growth of foreign price of import

m = rates of growth of import

e = rates of growth of exchange rate

If we multiply the first term of the numerator on the left hand side of equation (5) by

$\frac{P_d \cdot X}{P_d \cdot X}$ and the second term by $\frac{F}{F}$ then the equation (5) becomes:

$$\frac{P_d \cdot X}{P_d \cdot X} \frac{(\partial P_d \cdot X + \partial X \cdot P_d)}{(P_d \cdot X + F)} + \frac{F}{F} \frac{(\partial F)}{(P_d \cdot X + F)} = p_f + m + e \dots\dots\dots (6)$$

$$\frac{P_d \cdot X \left(\frac{\partial P_d \cdot X}{P_d \cdot X} + \frac{\partial X \cdot P_d}{P_d \cdot X} \right)}{(P_d \cdot X + F)} + \frac{F \left(\frac{\partial F}{F} \right)}{(P_d \cdot X + F)} = p_f + m + e \dots\dots\dots(7)$$

Given that $\frac{\partial P_d}{P_d}$, $\frac{\partial X}{X}$ and $\frac{\partial F}{F}$ are the rates of growth, then

$$\frac{P_d \cdot X (p_d + x)}{(P_d \cdot X + F)} + \frac{F (f)}{(P_d \cdot X + F)} = p_f + m + e \dots\dots\dots(8)$$

Since total receipts consist of export earnings and capital inflows, we have:

$$\frac{P_d X}{P_d X + F} + \frac{F}{P_d X + F} = 1 \dots\dots\dots(9)$$

Assuming that:

$$\frac{P_d X}{P_d X + F} = \theta, \text{ and } \frac{F}{P_d X + F} = 1 - \theta$$

Where:

- θ = share of export to total receipts
- $1-\theta$ = share of capital inflow to total receipts

Then our model becomes:

$$\theta(p_d + x) + (1 - \theta)(f) = p_f + m + e \dots\dots\dots(10)$$

If we assume that the normal multiplicative import and export demand function with constant elasticity are:

$$M = a \left(\frac{PfE}{Pd} \right)^\psi Y^\pi \dots\dots\dots(11)$$

$$X = b \left(\frac{Pd}{PfE} \right)^\eta Z^\epsilon \dots\dots\dots(12)$$

Where:

- a & b = constant
- ψ = price elasticity of demand for imports ($\psi < 0$)
- η = price elasticity of demand for exports ($\eta < 0$)
- π = income elasticity of demand for imports
- ϵ = income elasticity of demand for exports
- Y = domestic income
- Z = level of world income

From equation (11) and (12), taking the rates of change of the variables we have:

$$m = \psi (p_f + e - p_d) + \pi y \dots\dots\dots(13)$$

$$x = \eta (p_d - e - p_f) + \epsilon z \dots\dots\dots(14)$$

Substituting equation (13) and (14) into equation (10), gives the balance of payment constrained growth rate, starting from disequilibrium in the current account as:

$$y_b^* = \frac{(\theta\eta + \psi)(p_d - e - p_f) + (p_d - e - p_f) + \theta\epsilon z + (1 - \theta)(f - p_d)}{\pi} \dots\dots(15)$$

where:

- yb^* = balance of payment constraint growth
- $(\theta\eta + \psi)(p_d - e - p_f)$ = the volume effect of relative price changes on BOP constrained real income growth.
- $(p_d - e - p_f)$ = the terms of trade effect
- $\theta\epsilon z$ = the effect of exogenous changes in income growth abroad
- $(1 - \theta)(f - p_d)$ = the effect of the rate of growth of capital flow.

If relative price measured in a common currency remains unchanged in the long run, so that $p_d = e + p_f$, then equation (15) reduces to :

$$yb^* = \frac{\theta\epsilon z + (1 - \theta)(f - p_d)}{\pi} \dots\dots\dots(16)$$

Since we do not have information about ϵz for all countries, we shall assume that $\epsilon z = x$, then the Thirlwall & Hussain (1979, 1982) law is represented as:

$$yb^* = \frac{\theta x + (1 - \theta)(f - p_d)}{\pi} \dots\dots\dots(17)$$

The equation explains that the balance of payment constrained growth rate of income starting from current account disequilibrium is the weighted sum of growth of export and real capital flows divided by the income elasticity of demand for imports.

Where:

- yb^* = Balance of payment constrained growth of real income
- x = growth of export
- $f - p_d$ = growth of real capital flow
- π = income elasticity of demand for imports
- θ = share of export as proportion to total receipts
- $1 - \theta$ = share of real capital flow as proportion to total receipts

In our study a multi-stage procedure will be used to test the Thirlwall & Hussain (1979,1982) hypothesis:

Firstly, the income elasticity of demand for import (π) is estimated from the conventional import demand function as stated in equation 13.

Where :

$$m = \psi (p_f + e - p_d) + \pi y$$

Following standard practice in empirical studies within the BPC tradition, we express the above equation as:

$$m_t = \beta_0 + \beta_1 y_t + \beta_2 rp_t + e_t \dots\dots\dots(18)$$

Where:

- m_t = growth of real import
- β_1 = income elasticity of demand for import (π)
- y_t = growth of real income
- rp_t = real relative price
- e_t = error term

Secondly, the rate of growth of real income consistent with BOP equilibrium (yb^*) is computed using the law stated in equation 17.

Thirdly, the predicted value of growth (yb^*) is compared to the actual growth rate (y) by applying two test, consisting the t-statistics test and the test of association as will be explained in the econometric technique part.

Fourthly, the growth predicted by the extended model of the BPC model (y_b^*) is compared to the growth predicted by the simple model where $y_b = \alpha/\pi^1$

1. Econometric technique to analyze the data are as follows:

1.1. Stationarity test:

In order to check the long run stability of our data we will test whether the mean and variance of our data is constant over time. A spurious relationship may exist between the explained and the explanatory variables when the mean and variance of our data is not constant, thereby leading to a false conclusion from the estimation. In this study we will apply the Dickey-Fuller test to determine the stochastic stationary process of each variable:

$$X_t = \delta X_{t-1} + u_t \dots\dots\dots(19)$$

X_t = A time series variable

$H_0 : \delta = 1$

$H_1 : \delta \neq 1$

1.2 Cointegration test

The test tries to determine whether there exists any long run co-movement among the variables:

$$Y_t = \alpha_0 + \alpha_1 X_t + u_t \dots\dots\dots(20)$$

Where :

Y_t = the regressand

X_t = vector of explanatory variables

u_t = error term

We shall run the regression above and then save the residuals (u_t), after which we will proceed to perform Engle- Granger test as follows:

$$\Delta u_t = \rho u_{t-1} + \varepsilon_t \dots\dots\dots(21)$$

Δu_t = First difference operator of the estimated residuals from equation (17)

$H_0 : \rho = 0$

$H_1 : \rho \neq 0$

If $\rho = 0$, the variables are not co-integrated so there is no long run equilibrium in their movement. But if : $\rho \neq 0$ or significantly different from zero, then there is long run co-movement among the variables in equation (16).

1.3 Ordinary least square regression method

In order to obtain the level of income elasticity of demand for import (π), we will proceed in our estimation by regressing our demand for import model using the traditional OLS.

1.4 T-Statistics

To support our findings by empirical validity we employ the T- Test with the null hypothesis that there is no difference between the means of the predicted growth (y_b^*) and the actual growth (y) for all years. To perform this test we calculate the predicted growth in each year using one value of the income elasticity of demand

¹The full formulation of the simple model refer to the BPC growth model from Thirlwall (1979)

for import estimated in the import demand model. If there is no difference between the predicted income growth and the actual growth we can say that the predicted income growth is equal to the actual income growth.

1.5 Test of association

In order to give more support to our findings we will investigate them by testing the association between the predicted income growth and the actual income growth. The test employs the OLS method to the two variable following McCombie (1989,1994) and Atesoglu(1993).The proposed test consist of estimating the following regression:

$$yb^*_i = \alpha + \beta y_i + u_i$$

For the law to be statistically relevant, the constant (α) must be equal to zero and the slope (β) must be equal to one.

According to Mc Combie the above OLS method is used merely as a test of association rather than any assumption of causality so that it is purely arbitrary whether to choose actual growth (y) or predicted growth (yb^*) as the regressor. It is known that the predicted growth (yb^*) is calculated using the estimated parameter of income elasticity of import demand variable (π). In this way the value of yb^* will be stochastic since they are derived from prior estimated coefficient (π) which have associated standard errors.

Then Mc Combie (1989, 1994) offered a better procedure by regressing the predicted growth (yb^*) on the actual growth (y) which in the usual error variable context is known as "Inverse Least Square" .

In the case under consideration, if there were no measurement problems in the construction of yb^* , then there would be no reason for preferring either yb^* or y as the regressor.²

2. Data

This study uses annual data from 1970-1998. The data for terms of trade is from Global Finance Website. The data for the other variables come from International Financial Statistics (IMF 2000 Edition)

The details of the data are:

X	= Export of goods and services in domestic currency converted into real export with GDP deflator, 1995=100
M	= Import of goods & services in domestic currency converted into real import with GDP deflator, 1995=100
Y	= Gross Domestic Products converted into real GDP with GDP deflator 1995=100
Rpt	= Relative price, measured as Terms of Trade (ToT) with the formulation: (% change in export price) * export/GDP - (% change in import price) * import / GDP ³
f-pd	= Capital flows, measured as real import minus real export ⁴

² Mc Combie JSL & Thirlwall AP. (1994). Economic Growth and the Balance of Paymnet Constraint . Mc Millan Limited.

³ The formulation from the Global Finance Data

⁴ This formulation followed : Atesoglu H Sonmez.(1993-1994).Export, Capital Flow, Relative Price & Economic Growth in Canada. *Journal of Post Keynesian Economics*.

θ	= Share of export as a proportion to total receipts. Total receipts is the sum of export if export is higher than import Or the sum of exports plus capital inflow if export is less than import.
$1-\theta$	= Share of capital flow as a proportion to total receipts.

IV. Empirical Results

This part of the research paper presents the results of the various econometric technique that have been conducted. The results are presented in accordance with the steps outline in chapter three. The first part discusses the stationarity test employed to check the validity of the data used and the possibility of using co-integration test. In the second part, the OLS estimation to obtain the level of income elasticity of demand for import is reported. The third part discusses the level of income growth predicted by our extended model and the simple model together with the actual growth. The last part discusses the necessary test to check the validity of our findings which consist of the t-statistics and the test of association.

1. Stationarity test

Table 1 below shows the result of the unit root test using both the Dickey Fuller & Phillip Peron integration techniques. All of the variables that used to estimate the level of income elasticity of demand for import are transformed to natural logarithm. One attractive feature of the log model which has made it popular in applied work, is that the slope coefficient of explanatory variables measures the elasticity of dependent variables with respect to the explanatory variables.⁵

To obtain the level of stationarity besides the log level form, we transform the data into first difference or higher order difference and the results are as follows:

Table 1. Results of the stationary test with and without trend

	Indonesia				Malaysia			
	DF		PP		DF		PP	
	Without	With	Without	With	Without	With	Without	With
LM	I(0)"	I(0)	I(0)"	I(0)	I(1)	I(1)	I(1)	I(1)
LGDP	I(1)	I(1)"	I(1)	I(1)	I(2)	I(2)	I(2)	I(2)
LToT	I(0)	I(0)"	I(0)	I(0)	I(1)	I(1)	I(0)	I(0)

	Philippine				Thailand			
	DF		PP		DF		PP	
	Without	With	Without	With	Without	With	Without	With
LM	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)"	I(1)	I(1)
LGDP	I(1)	I(1)"	I(1)	I(1)"	I(2)	I(2)	I(2)	I(2)
LToT	I(1)	I(1)	I(0)	I(0)	I(1)	I(1)"	I(0)	I(0)

Notes: " means Not significant at 10% critical value

I(0) = stationary at log level

I(1) & I(2) = integrated of order 1 and 2

All test covers the sample period 1970-1998

⁵ Gujarati N Damodar, Basic Econometrics, 3Rd Edition, MCGraw-Hill International Edition, pp: 166

As the table shows in each country the import, income & terms of trade variables have different order of integration. For Indonesia import & terms of trade variables are stationary at log level for both DF and PP test. Meanwhile the income variable is stationary at first difference. For Malaysia, the terms of trade variable is stationary at log level by PP test, import variable is integrated of order one and the income variable is integrated of order two. For the Philippines both import and income are integrated of order one but terms of trade is stationary at log level by PP test. And for Thailand terms of trade is stationary at log level according to PP test but import and income variables are integrated of order one and two.

2. Ordinary least square (ols) estimation

Having established that import, income & relative price variables have different orders of integration for every country and therefore it is not appropriate to employ co-integration methodology we proceed to estimate our import demand function using traditional OLS method to obtain the level of income elasticity of import (π). The result of OLS estimation is shown in table 2.

Table 2. Regression result from import demand function for four countries, 1970-1998

	Indonesia	Malaysia	Philippine	Thailand
constant	-3.3156 (-11.82)***	-3.7346 (-10.54)***	-12.11 (-6.687)***	-2.9473 (-2.930)***
Yt	1.2413 (34.58)***	1.4433 (27.70)***	2.2927 (11.28)***	1.1851 (11.37)***
Rpt	0.016 (2.146)**	-0.0335 (-2.406)**	0.0101 (0.527)	-0.0078 (-0.4621)
R²	0.9804	0.9912	0.9253	0.9852
DW	1.9278	1.5289 [^]	1.9889	1.6360
J-B	6.2889	2.4628	7.9768	0.5908
Het	1.797	1.727	5.491	0.842
Reset	0.1787	0.1337	4.031*	0.6299
Chowtest	1.8363	2.1202	2.2005*	1.7633

Notes :

***, ** and * means significant at 1%, 5% and 10%

number in parentheses are the t-statistics

critical value for t-test with df=27 at 1% = 2.771, 5% = 2.052 and 10% = 1.703

critical value for X^2 for Heteroscedasticity test with df=m-1=(3-1)=2 at 5% is 5.99147

Durbin Watson statistics for n=29 and k=2, dl = 1.270 and du = 1.560

[^] = the estimated d value of 1.5289 is in the indecision zone but applying non parametric runs test shows that it lies inside the interval so that the residuals is random with 95% confidence.

For all four countries we observed that all of them passed the normality test thus their statistical inferences such as t and F test will be reliable. The diagnostic test also shows that the results suffer no heteroscedasticity problem. From this we can say that our estimates do not suffer from either underestimation or overestimation of the variances of the regression coefficient so that our estimates of the coefficient is reliable. The Reset and Chow test shows that for the Philippines we have specification problem at the 5 percent confidence and the model fails the structural stability at the 10 percent. The requirement of no correlation between the residuals is also fulfilled because all of the Durbin Watson statistics is higher than the upper limit value. For the case of Malaysia the d-statistics lies in the indecision

zone so that we proceed to non parametric runs test and the result shows that we cannot reject the hypothesis that the residuals are random.

As stated before, the purpose of our estimation of this import demand model is to obtain the level of income elasticity of demand for import (π) or the coefficient of yt . All of the t- statistics for variable income (yt) shows significantly different from zero and all of them have the expected sign. The estimation result for this coefficient also support the hypothesis that income elasticity of demand for import is elastic with a value of more than one for Indonesia, Malaysia and Thailand but more than two for Philippine.

The variable relative price measured by terms of trade is not significant in determining import growth for Philippines and Thailand. The estimation result for Malaysia and Indonesia show that relative price is significant in determining international trade flow although the magnitude is relatively small. For Indonesia terms of trade measured as the export price over the import price is negatively related to import growth while for Malaysia it is positively related to import growth.

These findings are in line with Thirlwall's hypothesis that in the long run relative prices have a quantitatively small role in determining the growth of trade flows between countries. This is the reason behind Thirlwall and Hussain's (1979,1982) formulation that in the long run, growth of income is determined by only growth of export and growth of capital flows divided by the income elasticity of demand for import.

3. Thirlwall & Hussain Law

In order to test the Thirlwall & Hussain's law we continue our estimation by calculating the rate of income growth consistent with balance of payment (yb^*) as suggested by Thirlwall & Hussain using the level of income elasticity of demand for import estimated from the regression.

But before that, from our data we obtain the average level of share of export as percentage of total export and the average share of capital flow as percentage of total export for the four countries over the sample period as shown in table 3.

Table 3. The share of export and capital flow as percentage of total receipts and the level of income elasticity of import for the four countries.

	θ	$1-\theta$	π
<i>Indonesia</i>	0.979	0.021	1.2413
<i>Malaysia</i>	0.981	0.019	1.4433
<i>The Philippines</i>	0.873	0.127	2.2927
<i>Thailand</i>	0.809	0.191	1.1851

Notes : θ is share of export as a proportion to total receipts,

$1-\theta$ is share of capital flow as a proportion to total receipts,

π is income elasticity of demand for import.

The result is average of all the sample period for each country.

From the data shown in table 3, we calculate the level of predicted growth of income (yb^*) as formulated by Thirlwall & Hussain in equation 17 as :

$$yb^* = \frac{\theta x + (1 - \theta)(f - p_d)}{\pi}$$

We also try to compare it with the simple predicted growth model from Thirlwall which is :

$$yb = x/\pi$$

The result is shown in table 4.

Table 4. The actual & predicted average growth rates & their deviations

Country	Actual		Predicted		Deviations	
	x	y	y_b^*	y_b	$y_b^* - y$	$y_b - y$
Indonesia	11.04	6.77	8.72	8.89	1.95	2.12
Malaysia	10.98	7.12	7.60	7.61	0.48	0.49
Philippine	9.00	3.52	3.62	3.92	0.10	0.40
Thailand	12.23	7.16	8.98	10.32	1.82	3.16
Average	10.81	6.14	7.23	7.68	1.08	1.54

Notes:

x = average export growth, y = average GDP growth, y_b^* = balance of payment constraint growth formulated by Thirlwall & Hussain, y_b = simple model of balance of payment constraint growth where $y_b = x/\pi$

All variables are in percent and average of all the sample period from 1970-1998

From table 4 we can see that for the group as a whole the average difference between the actual (y) and predicted growth (y_b^*) growth rate is about one percentage point. If we compare this average to those predicted by the simple model of Thirlwall (y_b) the average deviation is more than 1.5 percentage point. These findings are inline with Thirlwall & Hussain expectation that their extended model will give a closer prediction to the actual income growth than the simple one.

During our sample period The Philippines has the lowest actual income growth compare to the other countries. If we refer to our estimates of income elasticity of demand for import, then the possible answer for this is that the Philippines has the highest income elasticity of demand for import. According to the law formulated in the BPC model, the level of income elasticity of demand for import is negatively related to the predicted income growth. Then our answers is supported when we see that the when we see that the predicted income growth gives a close prediction to the actual growth.

The extended version of Thirlwall's balance-of-payment model is based on the hypothesis that capital flow is significant in determining the income growth in many developing countries. This hypothesis is supported in our study. If we compare the predicted growth it seems that the over prediction in the simple model is large which is three percentage point in Thailand and two percentage point in Indonesia. Incorporating capital flow variable by the extended model had made the prediction become closer. From this we can say that capital flows is important in determining the level of income growth in these four countries.

From our empirical findings we can conclude that when we incorporate the capital flows variable to obtain the predicted growth the prediction moves closer to the actual growth as Thirlwal & Hussain (1979, 1982) expected.

If we analyze the deviations of actual growth from the predicted growth rate by country, we find that Indonesia has the highest deviation of 1.95 percentage point followed by Thailand 1.82 percentage point. The Philippines has the lowest deviation of only 0.10 percentage point while Malaysia has a deviation of 0.48 percentage point.

If we refer to the basic assumption of Thirlwall & Hussain, they assumed that over the long run relative prices measured in common currency remain unchanged leading them to have conclusion that their predicted income growth is only determined by the level of export and capital flow weighted by the income elasticity of demand for import. Any deviation in the predicted growth from the actual growth is due to the invalidity of this assumption. These deviations reflect that there could

be a pure terms of trade effect on real income growth and of any import volume response from relative price changes, relaxing or tightening the BOP constrained growth. If the deviations is significant then we can say that our predicted income growth is not equivalent to the actual. This also means that our assumption is not valid and we will investigate it by apply the t-statistics test and the test of association

So far we can conclude that from the result shown in the table 4, we see that in these four countries the actual growth of income is very similar to that predicted by the Thirlwall & Hussain model.

The hypothesis behind the development of balance of payment constraint growth model is that over the long run countries will grow at a rate consistent with the equilibrium in the BOP. Attempts to grow faster than the rate consistent with the balance of payment means that export cannot pay for import and the economy faces up against a balance of payments constraint on demand.⁶

In the short run, countries can run payments deficits in the current account financed by capital inflow but they cannot finance ever-increasing inflow. Deficits above a certain percentage of GDP may trigger signals in the international financial community that will force a country to adjust. The recommendation then is to lift the constraint by raising the growth of export relative to the income elasticity of imports.

This hypothesis is supported in our study when our empirical results shows that the level of predicted growth as formulated by Thirlwall & Hussain (1979,1982) is very close to the actual growth. These findings mean that the balance of payment constraint growth formulated by Thirlwall & Hussain predict the long run income growth very well in these four countries during the sample period.

3. T-statistics

In order to give support to our findings and empirical validity to the law, we apply the t-statistics tests to our findings. The null hypothesis that the actual and predicted income is equivalent or the difference between the two means is tested. The result for the four countries is shown in table 4 and the test cover all sample period.

Table 5. T-test and P value for the four countries

Country	T-stat	P value
<i>Indonesia</i>	-0.79	0.430
<i>Malaysia</i>	-0.39	0.699
<i>The Philippines</i>	0.07	0.940
<i>Thailand</i>	-1.10	0.263

The result from the t-test shows that for all four countries, the null hypothesis of no difference between the actual and predicted growth is not rejected. We can say that the two means are equal. These findings confirm that the Thirlwall & Hussain hypothesis cannot be rejected in this four countries since there is a close correspondence between actual (y) and predicted growth of income (yb^*). These results also confirm the other studies about the validity of Thirlwall & Hussain's law.

⁶ Thirlwall, A.P. & Hussain, M.N.1982. The Balance of Payment Constraint, Capital Flows and the Growth Rate Differences Between Developing Countries. *Oxford Economic Papers*.34: 498-510

4. Test of association

Since the theory establishes a long run relationship between the balance of payments condition and the growth rate of the economy, it makes no sense to test it year by year but rather using longer period as pointed out by Atesoglu (1993, 1994). Thus we construct the nine years moving average rate of growth of the variables in overlapping period starting from 1971-1979 and ending in 1990-1998 for each country following Atesoglu procedure (1993,1994). The result of the inverse least square must reflect the hypothesis that the constant must be equal to zero and the slope must be equal to unity is shown in table 6.

Table 6. Results of the Test of Association for the four countries.

Country	OLS estimation	t'	R ²
<i>Indonesia</i>	$Yb^* = -5.8689 + 1.6746 y$ (-1.462) (2.736)	0.02	0.105
<i>Malaysia</i>	$Yb^* = -0.4023 + 1.1257 y$ (-0.299) (6.060)	0.67	0.671
<i>The Philippines</i>	$Yb^* = -0.0022 + 1.0530 y$ (0.0037) (6.249)	0.31	0.68
<i>Thailand</i>	$Yb^* = -2.0579 + 1.4741 y$ (-1.013) (5.614)	1.805	0.63

Notes: |t'| is the absolute value of the t-statistics based on the null hypothesis that the slopecoefficient is unity

The regression result dropped one outlier in capital flow data for Thailand and two outlier export data for Indonesia.

Figures in parentheses show the usual t-statistics with the null hypothesis that the estimated value is zero.

From the regression result in the association test we can say that the estimation results in all four countries the estimation results give strong evidence to confirm our earlier findings. If we refer to table 6, the null hypothesis that the slope coefficient is unity can not be rejected in all four countries. This findings can be seen from the |t'| statistics, since they clearly lie in the acceptance area that the value of the slope is equal to unity. The same findings can be seen for the constant. The hypothesis that the constant must be equal to zero also cannot be rejected.

These findings bring us to the conclusion that the Thirlwall & Hussain extended model can be used to predict the long run income growth in this four ASEAN countries and this fact is true when we apply it to the sample period from 1970 to 1998.

V. Conclusion

The argument advanced by Thirlwall & Hussain (1979,1982) that over the long run countries will grow at a rate consistent with the equilibrium in the BOP is supported in our study. Furthermore the formulation of balance of payment constraint modified to explicitly allow for the impact of a persistent disequilibrium in the BOP by incorporating the capital flow is also supported in our study. This finding can be seen from the fact that the income growth predicted by the extended model gave a closer prediction of the actual growth than the simple model.

Our findings shows that the Thirlwall & Hussain's law cannot be rejected in the four ASEAN countries, since there is a close association between predicted growth to the actual growth with the average deviations of only one percentage point. This deviations are less than those predicted by the simple model which is 1.5 percentage point.

The finding also shows that in these developing countries capital flows have played an important role in determining the growth of the economy. Incorporating capital flows variable in our extended model makes the prediction become closer those predicted by the simple model.

The policy implication is that these four countries should continue to follow an outward looking strategy with emphasis on import substitution strategy and export oriented industrialization.

The import substitution strategy can be used to reduce the income elasticity of demand for import but since the consequences of import substitution strategy sometimes is a change in structure of import from consumer goods to capital goods than the better strategy would be to embark export-oriented industrialization. The fundamental importance of export as a component demand is that it is the only component that can provide the foreign exchange to pay for the import content of other component of demand such as consumption, investment and government expenditure.

BIBLIOGRAPHY

- Ansari, M. Hashemzadeh, N&Y Xi. 2000, The chronicle of Economic Growth in Southeast Asian Countries: Does Thirlwall's law Provide an Adequate Explanation?, *Journal of Post Keynesian Economics*, 22(4): 573-588.
- Ariff Mohamed. 1993. The Role of ASEAN in the Uruguay Round, Opportunities and Constraints. *International Center for Economic Growth: Occasional Papers* 37.
- Atesoglu, H Sonnez. 1993-1994. Exports, Capital Flows, Relative Price and Economic Growth in Canada. *Journal of Post Keynesian Economics*, 22(2): 289-297.
- Atesoglu, H Sonnez. 1994. An Explanation of the Slowdown in US Economic Growth. *Applied Economics Letters*. 2: 91-94.
- Atesoglu, H Sonnez. 1994. Balance of Payments Determined Growth in Germany. *Applied Economis Letters*. 1: 89-91.
- Atesoglu, H Sonnez. 1997. Balance of Payments Constrained Growth Model and Implication for the United States. *Journal of Post Keynesian Economics*. 19(3): 327-335.
- Bairam, E. 1998. Balance of Payment, The Harrod Foreign Trade Multiplier and Economic Growth: The European and North American Experienced 1970-1985. *Applied Economics*. December.
- Bairam, E. 1990. The Harrod Foreign Trade Multiplier Revisited. *Applied Economics*. June.

- Bairam, E. and Dempstre, G. 1991. The Harrod Foreign Trade Multiplier and Economic Growth in Asian Countries. *Applied Economic*. November.
- Chiang, Alpha C. 1984. *Fundamental Methods of Mathematical Economics*. 3rd edition: Mc Graw-Hill.
- Gujarati, N. Damodar. 1995. *Basic Econometrics*. 3rd edition: Mc Graw-Hill International.
- Leon Ledesma M.A. 1999. An Application of Thirlwall's Law to the Spanish Economy. *Journal of Post Keynesian Economics*. **21**(3): 431-439.
- Lopez G Julio and Cruz Alberto B. 2000. Thirlwall's Law and Beyond: The Latin American Experience. *Journal of Post Keynesian Economics*. **22**(3): 477-495.
- Mason R. D., Lind D. A. & Marchal W. G. 1999, *Statistical Techniques in Business & Economics*. International Edition: Mc Graw-Hill.
- Maurizio Pugno. 1998. The Stability of Thirlwall's model of Economic Growth and the Balance of Payments Constraints. *Journal of Post Keynesian Economics*. **20**(4): 559-581.
- Mc Combie, J.S.L. 1993. Economic Growth, Trade Interlinkages and the Balance of Payment Constraint. *Journal of Post Keynesian Economics*. **15**(4): 471-505.
- Moreno-Brid C, J and perez E. 1999. Balance of Payment Constrained Growth in Central America: 1950-1996. *Journal of Post Keynesian Economics*. **22**(1): 131-147.
- Moreno-Brid C, J and perez E. 1998-1999. On Capital Flows and the Balance of Payment Constrained Growth Model. *Journal of Post Keynesian Economics*. **21**(2): 283-298.
- Moreno-Brid C, J and perez E. 1999. Mexico's Economic Growth and the Balance of Payment Constrained : A Cointegration Analysis. *International Review of Applied Economics*. **13**(2): 149-159.
- Perraton, J. 1990. The Harrod Trade Multiplier and The developing Countries. 1970-1984 : An Examination of the Thirlwall Hypothesis. *University of Nottingham*.
- Tan, Gerald. 1996. *ASEAN Economic Development and Co-operation*. Times Academic Press.
- Thirlwall, A.P. 1986. *Balance of Payment Theory and the United Kingdom Experience*. 3rd Edition. MacMillan.
- Thirlwall, A.P. 1997. Reflection of the concept Balance of Payment Constrained Growth. *Journal of Post Keynesian Economics*. **19**(3): 377-385.

Thirwall, A.P. 1994. *Growth and Development*, 5th Edition. MacMillan Press Ltd.

Thirwall, A.P. and Nueldin Husain M. 1982. The Balance of Payments Constraint, Capital Flow and Growth Rate Differences Between Developing Countries, *Oxford Economic Papers*. 3: 498-510.

Tongzon, Jose L. 1998. *The Economies of Southeast Asia*. Edward Elgar Publishing limited, UK.

Turner Paul. 1999. The Balance of Payment Constraint and the Post 1973 Slowdown of Economic Growth in the G7 Economies. *International Review of Applied Economics*. 13(1): 41-53.

Siow, Yue Chin & Tan Joseph, L.H. 1996. *ASEAN in the WTO Challenges and Responses*. Institute of Southeast Asia Studies. Singapore.

Stern, 1979. *The Balance of Payment Theory and Economic Policy*. Aldine Publishing Company. New York.

