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Balance of Payments Constrained Growth in Thailand during 1980 – 2010: Empirical Evidences and Long-term Policy Considerations

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ABSTRACT

This paper aims to explore whether the demand-oriented approach is able to explain the Thai economy from the 1980s onwards. In particular, it is going to empirically test whether the Balance of Payments Constrained Growth Model – the so-called Thirlwall's law – can estimate Thai economic growth rates from 1980 to 2010. Not only does the paper prove that Thirlwall's law can explain the Thai economy, but it also shows that the extended Thirlwall's law is better than the original model. The results suggest that international trade is important for the economy because it can relax the balance of payments constraints and hence lead to economic growth. However, engaging in international trade is not equivalent to free trade. Policymakers need to keep in mind that resistance to free trade in order to develop some crucial industries may yield better long-run ability to meet export demand.

Keywords: Thirlwall's Law, Balance of Payments Constrained Growth Model, Thai Economic Growth

JEL Classification: E12, F41, F43

1. Introduction

What is the engine of economic growth for an open economy? Generally, there are two different views with regards to this question. The first view is from the conventional supply-oriented approach which explains that economic growth in a country is a result of the availability of her resources and her capability to efficiently utilize these resources. As long as a country can efficiently produce, there will certainly be demand for her products. This idea is concordant with Say's famous statement "supply creates its own demand". One of the most distinguished economic theories that clearly support this supply-oriented approach in international trade is the theory of comparative advantage. The theory states that a country should only produce goods that she is good at, and she should import products that she is unable to efficiently produce from other countries. In particular, a capital-intensive country should produce and export high-tech manufacturing goods, while a labor-intensive country should produce and export agricultural goods, and accordingly a natural resource-abundant country should produce and export products based on her natural resources. In doing so, a country can obtain cheap products from other countries, while her efficiently-produced products are competitive in the world market. Benefits are hence bestowed to all. This further implies that economic openness leads to even greater benefits for a country because she has a larger market to sell her products and she can access more efficiently-made products from other countries. Efficient utilization of resources and the free market are thus the keys to economic growth in the supply-oriented view.

The other view is from the unconventional demand-oriented approach which explains that a country's growth path is different from those of other countries because she encounters different levels of demand constraints on her path of economic development. A country may be resourceful, but she would not grow rapidly because there is no demand for goods produced from her abundant resources. That is, in contrast to Say, supply does not create its own demand. Furthermore, it is believed that when the demand for a country's product is growing, limited resources would be increased in order for a country to meet demand. A good case in point is the immigration of foreign workers to a rapidly-growing country where domestic workers are not sufficient. This example shows that even though a country may have a limited supply of workers, the labor supply can be relaxed to meet the requirements for economic activities. From this causality, it is demand, not supply, that constrains economic growth. In other words, it is demand that is believed to create its own supply. In an open economy, the great source of demand is from exports, and the dominant constraint determined by demand for exports is the country's balance of payments. Free trade and comparative advantage does not necessarily yield favorable economic outcomes for a country, because her products of comparative advantage may not be needed or simply have low value in the world market. Worse, a country may be losing in global economic affairs if free trade jeopardizes her balance of payments by forcing her to rely too much on foreign products.

In the beginning of the 1980s, Thailand initiated export-oriented strategies, and after that the country has never turned her back to the global market. Since then, the Thai economy has roller-coastered through booms and slumps. This paper aims to empirically test whether or not the demand-oriented approach can explain the Thai economy from the 1980s. To complete this task, I am going to test Thirlwall's Balance of Payments Constrained Growth Model (BPCG model), also known as Thirlwall's law, for the case of Thailand. The following sections are organized as follows: the second section of this paper will explain Thirlwall's law and distinguish the original Thirlwall's law from the extended Thirlwall's law. The third section will detail the methodology for the empirical testing in the fourth section. In the fourth section, I am going to employ some econometric exercises in order to obtain some important empirical results. That is, I am going to test whether Thirlwall's law can explain the economic growth of Thailand. In addition, I will also explore whether the original model or the extended model is better for the case of Thailand. The fifth and final section will conclude the paper.

2. The original and extended Thirlwall's law

Anthony Thirlwall constructed the BPCG model, which later became more generally known as Thirlwall's law, in his 1979 paper. The starting point can be well described from his assertion that "no country can grow faster than that rate consistent with balance of payments equilibrium on current account unless it can finance ever-growing deficits, which in general it cannot" (Thirlwall, 2011). Therefore, he starts his model from the balance of payments equilibrium condition. That is,

$$PX = P_f M \tag{1}$$

where X is the real value of exports and M is the real value of imports, P is the domestic price of exports, and P_f is the price of foreign imports in domestic currency. The general multiplicative function of exports and of imports are respectively

$$X = \left(\frac{P}{P_f}\right)^{\theta} Z^{\varphi} \tag{2}$$

$$M = \left(\frac{P_f}{P}\right)^{\gamma} Y^{\eta} \tag{3}$$

where Y is the real value of domestic income, Z is the real value of global income, θ is the price elasticity of demand for exports, φ is the income elasticity of demand for exports, γ is the price elasticity of demand for imports, and η is the income elasticity of demand for imports. Then I take the rate of change of equation (1), equation (2), and equation (3) and obtain

$$p_d + x = p_f + m \tag{4}$$

$$x = \gamma(p_d - p_f) + \mu z \tag{5}$$

$$m = \theta(p_f - p_d) + \eta y \tag{6}$$

Substituting equation (5) and equation (6) into equation (4) leads to

$$y_B = \frac{(\theta+\gamma+1)(\,p_d - p_f) + \varphi z}{\eta} \tag{7}$$

where y_B is an estimated growth rate. In his paper in 1979, Thirlwall assumed two price-related conditions. The first one is that the sum of the price elasticity of demand for imports and the price elasticity of demand for exports must be equal to 1, so any change in the exchange rate does not change the current account balance. The second price-related condition regards the constant term of trade which implies that relative prices in a common currency must stay constant. From these assumptions, equation (7) can be reduced to

$$y_B = \frac{\varphi z}{\eta} \quad (8)$$

By definition, the product of the income elasticity of demand for imports (φ) and the real growth rate of world income (z) should be equal to the real growth rate of exports (x), so $\varphi z = x$. Hence, equation (8) can be simplified as

$$y_B = \frac{x}{\eta} \quad (9)$$

Equation (9) is the parsimonious growth rule in Thirlwall's paper in 1979. This paper is considered as the birth place of Thirlwall's law, so I would call it the original Thirlwall's law.

Shortly after the formulation of the original law, Thirlwall and Hussain (1982) observed that some developing countries encountered a foreign exchange bottleneck due to slow export growth, but they could grow rapidly while having current account deficits. This was because a large amount of foreign capital flows into those countries to relax their balance of payments constraints. Therefore, they altered the original Thirlwall's law and started their modeling with an expression of the balance of payments disequilibrium.

$$PX + C = P_f M \quad (10)$$

where *C*, if positive (negative), is the nominal value of capital inflows (outflows). Taking the rate of change of equation (10) yields

$$\frac{E}{R}(p_d + x) + \frac{C}{R}c = p_f + m \quad (11)$$

where $\frac{E}{R}$ is a share of exports as a proportion of total foreign receipts, and $\frac{C}{R}$ is a share of capital inflows as a proportion of total foreign receipts. Substituting equation (5) and equation (6) into equation (11) yields

$$y'_B = \frac{\left(\frac{E}{R}\theta+\gamma+1\right)\left(p_d-p_f\right)+\left(\frac{E}{R}(\varphi z)+\frac{C}{R}(c-p_d)\right)}{\eta} \qquad (12)$$

It is important to note that, different from y_B, y'_B is the estimated growth rate which is based on the assumption of balance of payments disequilibrium. Both of the price assumptions in the original Thirlwall's law are applied here as well. Equation (12) can be reduced to

$$y'_B = \frac{\frac{E}{R}(\varphi z)+\frac{C}{R}(c-p_d)}{\eta} \qquad (13)$$

As already explained above about φ, z and x, equation (13) can be reduced to

$$y'_B = \frac{\frac{E}{R}(x)+\frac{C}{R}(c-p_d)}{\eta} \qquad (14)$$

Noticeably, the way to derive equation (14) is very similar to how to get the original Thirlwall's law in equation (9). The difference is only regarding their initial assumptions; equation (9) assumes balance of payments equilibrium while equation (14) allows the disequilibrium of the balance of payments. Since equation (14) is an extended version of equation (9), I would call equation (9) as the extended Thirlwall's law.

3. The Methodology for the Empirical Tests

Since the emergence of the original Thirlwall's law in 1979, there have been a number of empirical works testing whether countries or groups of countries have been constrained by their balance of payments. McCombie (1997) not only reviewed some articles up to 1997 but also explained the evolution of empirical tests of balance-of-payments-constrained growth models. McCombie and Thirlwall (2004) reviewed the empirical tests of the models up to the year 2003. Then, Thirlwall (2011) reviewed empirical studies of models from 2003 onwards. Even though each paper has its own way of applying econometric techniques to handle different sets of data, the majority follow the following three steps to test Thirlwall's law: 1) estimation of the Thai income elasticity of demand for imports, 2) estimation of y_B and y_B', and 3) comparisons of estimated growth rates (y_B and y_B') and the actual real growth rate (y) to conclude whether or not Thirlwall's law is able to explain economic growth.

In the first stage, to estimate the income elasticity of imports, the natural-log function of equation (3) is run to obtain η. Because this is a time series regression, a general problem of time series data is the problem of nonstationary variables in which their mean, or variance, or both of them vary through time, because their current values are determined by previous values. Therefore, behaviors of these nonstationary variables can be understood only under the time of consideration, but the knowledge on these variables cannot be generalized to other time periods. This problem of nonstationarity is also generally known as a unit root problem. A regression of nonstationary variables can cause the phenomenon of spurious regression in which a result could present a relation of unrelated variables. In other words, coefficients of independent variables could be statistically significant and R^2 could be excessively high. To avoid this problem, the unit root test and cointegration test must be applied to check if any variable contains a unit root problem and to avoid spurious regression.

In the second stage, I am going to estimate y_B and y'_B. To do this, I am going to use the income elasticity of imports from the first step, the actual growth rate, and the growth rate of capital flows to estimate y_B and y'_B from equation (9) and equation (14) respectively.

In the third stage, annual growth rate of y_B and y'_B must be econometrically tested with actual growth rate (y) in order to tell whether or not y_B and y'_B are valid to explain y. In this chapter, I follow the econometric test of the balance-of-payments-constrained growth model designed by Bairam (1988) explained by the following equations

$$y = \beta_1 y_B \quad (15)$$

and

$$y = \beta_2 y'_B \quad (16)$$

The coefficients in front of y_B and y'_B are to determine the validity of the original Thirlwall's law and the extended Thirlwall's law in explaining a country's actual growth rate. That is, if $\beta_1$is equal to one, the original Thirlwall's law is valid. Meanwhile, if β_2 is equal to one, the extended Thirlwall's law is valid. Thus, the Wald test by setting null hypotheses $\beta_1 = 1$ and $\beta_2 = 1$ must be tested by using F-value statistics. In order for the original Thirlwall's law and the extended Thirlwall's law to be valid to explain a country's economic growth, β_1 and β_2 must be significant and can be considered equal to one according to the Wald test of the parameter.

In order to tell which predicted growth rate is better at explaining the actual growth rate, I can easily come up with the answer if one of equations of (15) and (16) is significant while the other one is not. However, if both are significant, the better predicted growth rate should be the one that deviates less from actual growth rate. In Thirlwall and Hussain (1982), the method used to tell whether the extended Thirlwall's law is better than the original Thirlwall's law is by calculating the average value of y_B and that of y'_B in a certain interval of time in order to find "average deviation," which is the difference between predicted growth rates and average actual growth rate. This method perhaps is too rough to tell the abilities of both models to predict the actual growth rate because it ignores deviations of both predicted growth rates from the actual growth rate in each year. In other words, it is possible that both of the growth rates may greatly fluctuate around the actual growth rate, but their averages are close to the average of the actual growth rate. To solve this problem, I, following a general formula of standard deviation, specify an alternative statistical reference to evaluate how much y_B and y'_B deviate from actual growth rate. Analogous to the standard deviation, deviation of y_B and that of y'_B from actual growth rate (y) are formulated as follows:

$$d_B = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (y_{Bi} - y_i)^2} \qquad (17)$$

and

$$d'_B = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (y'_{Bi} - y_i)^2} \qquad (18)$$

The lower the value of d_B and d'_B, the better y_B and y'_B respectively can explain actual growth rate, because they deviate less from y. Since it is expected that the extended Thirlwall's law is better than the original Thirlwall's law in explaining actual growth due to its relaxation of the current account in balance, d'_B is expected to be lower than d_B which would mean that y'_B deviates less from the actual growth rate.

4. Empirical Results[1]

4.1. Estimation of the Income Elasticity of Demand for Imports

As this is a time-series regression analysis, the unit root test is a necessary first step to check stationarity of variables and to avoid spurious regression. After M, $\left(\frac{P_f}{P}\right)$, and Y are transformed into their natural logarithm according to equation (3), I employ the with and without trend models of the Augmented Dickey-Fuller test and the Phillips-Perron test to check for stationarity of each variable. The results are presented in Table 1.

Table 1

The Import Function: Unit Root Test

Variables	**Augmented Dickey – Fuller**		**Phillips – Perron**	
	Without Trend	Trend	Without Trend	Trend
lnM	-1.05	-1.38	-1.05	-1.54
d.lnM	-4.49***	-4.50***	-4.43***	-4.42***
lnY	-1.98	-0.78	-1.63	-1.14
d.lnY	-2.98**	-3.13*	2.96**	3.07
$\ln P_f/P$	-2.24	-2.99	-2.22	-3.30*
d. $\ln P_f/P$	-5.85***	-5.72***	-6.12***	-5.92***

*** rejection of the unit root hypothesis at 1% MacKinnon's critical value.
** rejection of the unit root hypothesis at 5% MacKinnon's critical value.
* rejection of the unit root hypothesis at 10% MacKinnon's critical value
The letter d. stands for the first difference of the variable.

[1] See the Appendix for data and explanations of the variables

From Table 1, the only variable that seems to be problematic is l*nY* whose first difference is not stationary when it is tested by the Phillips-Perron test with trend. However, when the Augmented Dickey-Fuller test with trend is applied to test the first difference of l*nY*, the null hypothesis of l*nY* having a unit root problem can be rejected at 10% confidence interval. Hence, the test results are likely to suggest that all variables are stationary at their first differences (integrated of order 1, or I(1)).

Even though all variables are I(1), it is still possible to run a nonspurious regression if all variables are cointegrated and have long-run relationship. In order to find this information, lag length selection criteria and the Johansen-Juselius cointegration test must be conducted. Due to a small number of observations, when the test is applied, a maximum number of lag length is set equal to 2 lags. The results can be seen in Table 2. Lag length selection suggests that one lag is optimal for the cointegration test. Given this optimal lag length, the results of the cointegration test are presented in Table 3.

Table 2

The Import Function: Lag Length Selection

Lag	FPE	AIC	HQIC	SBIC
0	**9.9e-06**	**-3.01**	**-2.97**	**-2.87**
1	**2.7e-08***	**-8.92**	**-8.74***	**-8.35***
2	**2.7e-08**	**-8.94***	**-8.63**	**-7.95**

* indicates the lag length that yields a minimum number for each information criterion.

FPE is the final prediction error, AIC is Akaike's information criterion, HQIC is the Hannan and Quinn information criterion, and SBIC is Schwarz's Bayesian information criterion.

Table 3

The Import Function: Johansen-Juselius Cointegration Test

Rank	Eigenvalue Statistic	Critical Eigenvalue	Trace Statistics	Critical Trace
		Model without Trend		
0	79.91	20.97	94.71	29.68
1	14.73	14.07	14.80*	15.41
2	0.07*	3.76	0.74	3.76
		Model with Trend		
0	29.63	23.78	40.48	34.55
1	10.80*	16.87	10.85*	18.17
2	0.05	3.74	0.05	3.74

* indicates that the null hypothesis cannot be rejected at the 5% significance level

According to the test result, the null hypothesis of no cointegration (Rank = 0) can be rejected at 95% confidence interval by both eigenvalue statistics and trace statistics in both the model with trend and that without trend. These results can be interpreted as all of the variables in the import demand function (equation (3)) are cointegrated, so they have a long-run relationship. The test result generally suggests that I can proceed forward to find only one income elasticity of imports of Thailand throughout the whole time period of 1980 to 2010.

However, merely having the conclusion from the Johansen-Juselius cointegration test may not be sufficient. That is, it is still arguable that the Johansen-Juselius cointegration yields the results of cointegration among variables, because possible structural breaks are not taken into account. As stated earlier, the Thai economy from 1980 to 2010 kept fluctuating between incredibly fast economic growth to severe economic crises, so it is possible that structural breaks occurred and income elasticity of imports changed due to the breaks. If structural breaks were detected, dividing the economy into a certain number of periods would be methodologically better in finding an income elasticity of imports of each period.

To take into account the possible impact of structural breaks, the Gregor-Hansen test, discovered by Gregory and Hansen (1996), to find cointegration of data by taking into consideration the possibility of structural breaks should be applied. The main idea of the test is not only to detect a structural break in a series of a regression but also to test, if a break is detected, whether or not cointegration exists despite the existence of the structural break. The test covers four types of structural breaks: a break in the constant term (the C model), a break in the constant and the trend (the C-T model), the break in the constant and the slope (the C-S model), and the break in the constant, slope, and trend (the C-T-S model).[2] I test all types of the breaks to see whether or not cointegration can be detected and to affirm what is suggested by the Johansen-Juselius cointegration test. The results of the Gregory-Hansen test are presented in Table 4.

Table 4

The Import Function: Gregory-Hansen Cointegration Test with Structural Breaks

Model	**ADF**		**Z_a**		**Z_t**	
	Statistics	Break Year	Statistics	Break Year	Statistics	Break Year
C	-4.43	1988	-4.33	1988	-22.89	1988
C-S	-5.30**	1999	-4.98	1999	-26.71	1999
C-T	-4.49	1987	-4.56	1987	-25.70	1987
C-T-S	-5.94*	1994	-5.94*	1994	-33.44	1994

[2] STATA is very handy, as it can run these four models instantly. It further uses some information criteria to find the best lag length for the calculation of the test statistics in each model.

** rejects the null hypothesis of no cointegration at the 5% significance level.
* rejects the null hypothesis of no cointegration at the 10% significance level.

According to the results, the Gregory-Hansen test with different models yields different break years. That is, the C model suggests that 1988 is a break year, the C-S model suggests 1999, the C-T model comes up with 1987, while the C-T-S model yields that 1994 is a break year. These different results lead to ambiguity when choosing the break year in order to run the regression of equation (3). Furthermore, there is a possibility that even though a structural break may exist, the break does not impact the estimation of equation (3) because all of the variables are cointegrated. These results can be noticed in the C-S model with 5% significant level of ADF test, and the C-T-S model with 10% significant level of ADF and Z_a test. From these results, the best way to calculate the income elasticity of imports is by using the whole time period from 1980 to 2010.

Another important point is that, in order to avoid the problem of autocorrelation, I use the Prais-Winsten regression to run the natural-log function of equation (3). The results can be seen in Table 5.[3]

The main focus of this regression was to determine the income elasticity of demand for imports, the coefficient of variable *lnY*, which is statistically significant at the 1% significant level, and its value is equal to 1.64. The income elasticity of imports is elastic because Thailand is an open

[3] Without using the Prais-Winsten estimation, the regression yields that the coefficient of the variable *lnY* is equal to 1.63, but the Durbin-Watson statistics signals a severe autocorrelation problem. The Prais-Winston estimation is a convenient procedure to solve this problem.

economy for whom international trade is important for its economic growth. Therefore, a percentage change of GDP usually leads to a large change of other international transactions including imports. Furthermore, the Durbin-Watson statistic (DW=1.73) is at an appropriate level to say that the problem of autocorrelation may not present in this regression.

Table 5

The Import Function: Prais-Winsten Regression

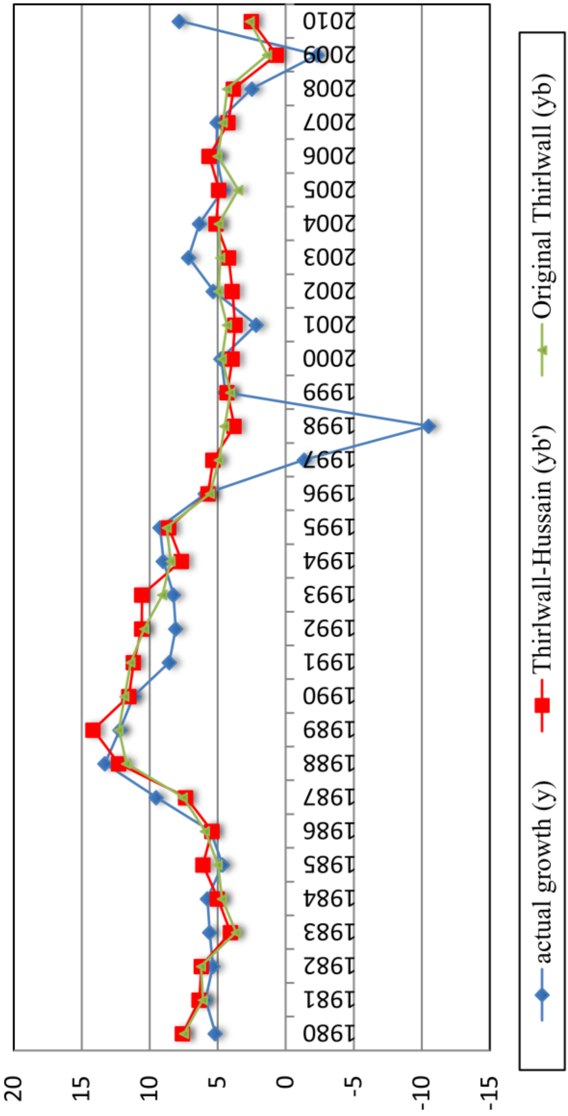
	Coefficient	**Standard Error**	**t**	**P**
Constant	-14.28***	1.48	-9.63	0.00
Income Elasticity	1.64***	0.09	17.5	0.00
Price Elasticity	-0.60*	0.33	-1.85	0.08
Adjusted R^2	0.9963			
DW	1.73			

*** indicates that a coefficient is significant at the 1% significance level.
* indicates that a coefficient is significant at the 10% significance level.

4.2 Estimations of y_B and y_B'

After obtaining η is equal to 1.64, I can proceed to calculate y_B and y_B' from equation (9) and (14), respectively. Comparisons of the actual growth rate (y), the estimated growth rate obtained from the original Thirlwall's law (y_B), and the estimated growth rate obtained from the extended Thirlwall's law (y_B') are presented graphically in Figure 1.

Figure 1
y, y_B, and y'_B: 1980 to 2010



4.3. The Validity of the Thirlwall's Laws

As already explained in the section on methodology, the test of the validity of y_B and that of y'_B in explaining the actual growth rate requires two stages. In the first stage, equation (15) and (16) must be run to get the coefficients β_1 and β_2 by using the whole set of data from 1980 to 2010. In the second stage, the coefficients must be tested whether they are equal to unity; meaning whether or not they can be statistically considered as being equal to the actual growth rate.

To some extent, I suspect that the economic crisis in 1997-98 caused a big change in the Thai economy. To test the ability to explain the Thai economy of y_B and y'_B, together with running the whole series of data from 1980 to 2010, I choose 1998 as a critical year, and run regressions of equation (15) and (16) with restricted time periods: 1980 to 1998 and 1999 to 2010. Table 6 presents the test for the validity of y_B and y'_B in the Thai economy.

Table 6

The Validity of the Original Thirlwall's Law and the Extended Thirlwall's Law

	1980 – 2010		**1980 – 1998**		**1999 – 2010**	
	Coefficients	F-statistics	Coefficients	F-statistics	Coefficients	F-statistics
$\boldsymbol{y_B}$	0.92*** (10.37)	0.58	0.89*** (7.95)	1.66	1.09*** (7.10)	0.35
y'_B	0.90*** (10.63)	1.41	0.86*** (8.21)	1.05	1.13*** (7.44)	0.77

*** indicates that a coefficient is significant at the 1% significance level.

Table 6 represents regressions of equation (15) to get the coefficients of y_B and those of (16) to get the coefficients of y'_B which are separated into three time periods: 1980-2010, 1980-1998, and 1999-2000. The column 'coefficients' show estimated β_1 for y_B and β_2 for y'_B in the first stage of this test. The terms in the parentheses below the coefficients are the t-value statistics of all coefficients. The columns 'F-statistics' show the F-value statistics of the Wald test with the null hypothesis that the coefficients are equal to one. All F-statistics are too low to reject the null hypothesis, so all estimated coefficients are statistically equal to one. As a result, in all cases, y_B and y'_B can explain the actual growth rate of Thailand.

4.4. y_B and y'_B: Which One is Better?

To test which of y_B or y'_B is better at predicting the actual growth rate, I calculate d_B and d'_B from equation (17) and (18) to obtain deviation of y_B and y'_B from y. To be consistent with the above analysis, I still suspect that 1998 is the year that the structural break could occur since it was the worst year of economic downturn. The results can be presented in Table 7.

Table 7

Averages and Deviations of y, y_B, and y'_B

	1980 – 2010		**1980 – 1998**		**1999 - 2010**	
	Average	**d_B,d'_B**	**Average**	**d_B,d'_B**	**Average**	**d_B,d'_B**
Thirlwall – Hussain (y'_B)	6.33	3.34	7.86	3.91	3.92	2.15
Original Thirlwall (y_B)	6.28	3.38	7.65	3.96	4.10	2.19
Actual Growth (y)	5.61		6.38		4.41	

Theoretically, according to Thirlwall (1979), a country that has a current account surplus means that its balance of payments grows faster than its national income, so estimated growth rates should be greater than its actual growth rate. In contrary, estimated growth rates should be smaller than its actual growth rate for a country that suffers from a current account deficit. The results, however, contradict with the theory. During the period 1980 to 1998 when Thailand had current accounts deficits for most of the time, the average values of y_B and y'_B are greater than that of y, while, from 1999 to the present when Thailand mostly had a current account surplus, the average values of y_B and y'_B are smaller than that of y. Following Thirlwall (1979), an explanation for these contradictions could be because of the effects from relative price movements. According to the data on net barter terms of trade index[4], Thailand's terms of trade index had a falling tendency from 1980 to 2001, while the tendency has increased thereafter. Assuming that the Marshall-Lerner condition has held throughout the period of consideration, the falling terms of trade may contribute to too-high values of y_B and y'_B before the crisis erupted, while the increasing terms of trade may lead to a too-low value of y_B and y'_B after the crisis.

In addition, the results reflect something interesting. Since the average value of y'_B is greater than that of y_B prior to the crisis but has been lower after the crisis, this finding suggests that capital flows were likely to favor the balance of payments from 1980 to 1998 while they have jeopardized it since then. This is well matched with the fact that Thailand was one of the major destinations for foreign capital among

[4] The data are available from the database 'World Development Indicator (WDI) and Global Development Finance (GDF)' of the World Bank's World databank.

other emerging countries before the crisis, but its popularity faded afterwards.

Even though the results show that the average value of y is closer to that of y_B relative to y_B' in all time periods, this does not mean that the original Thirlwall's law is better than the extended Thirlwall's law in terms of their ability to predict y because, as explained in the methodology, the average deviations ignore deviations in each year. Since d_B' is smaller than d_B in all periods, this suggests that y_B', compared to y_B, deviates less from y. Therefore, in each year, the extended Thirlwall's law seems to yield a more accurate predicted growth rate in the case of the Thai economy.

5. Conclusion

This paper analyses the development of the Thai economy from the demand-oriented view from 1980 to 2010. It starts from estimating the income elasticity of imports in order to obtain the estimated growth rates derived from the original Thirlwall's law and the extended Thirlwall's law. The econometric results suggest that the estimated growth rates are sufficiently close to the actual growth rates, so both of the Thirlwall's laws are good at explaining the economic growth of Thailand. In addition, the paper also compares the ability to explain the actual growth rates of the original Thirlwall's and the extended Thirlwall's law. My calculations of d_B and d_B' suggest that the extended Thirlwall's law deviates less from the actual growth rate, so it is a better model to explain the Thai economy.

The main conclusion drawn from this econometric exercise is that Thailand has been constrained by her balance of payments, and export demands have been the main engine for the Thai economy. These results imply that international trade is the key factor for expanding the Thai balance-of-payments constraint and hence enhancing economic growth. However, this does not mean that trade liberalization or free trade are the only ways for the expansion of international trade. What is most important for Thai economic development is that the country needs to be able to build long-term export abilities. In addition, it is important to note that the estimated growth rates from both the original and the extended Thirlwall's law depend on the country's income elasticity of imports. Therefore, the country should not rely too much on other countries' products, and she should be able to, up to a certain degree, produce a sufficiently varied number of products to meet domestic demands. Building on this idea, Thailand, in contrast to the ideas of the theory of comparative advantage, should not be specialized in a limited number of products. In particular, she should move away from products whose prices have tendencies to be drop such as rubber or other agricultural products or those that are unsustainable such as natural resources. Policymakers might keep in mind that resistance towards the mainstreaming of free trade in order to develop some crucial industries may yield long-run abilities to better meet export demand.

References

Atesoglu, H.S. (1993-94). Exports, Capital Flows, Relative Prices, and Economic Growth in Canada. *Journal of Post-Keynesian Economics*, 16(2), 289 – 297.

Bairam, E. (1988). Balance of Payments, the Harrod Foreign Trade Multiplier and Economic Growth: The European and North American Experience, 1970 – 85. *Applied Economics*, 20(December), 1635 – 1642.

Doner, R. F. (2009). *The Politics of Uneven Development: Thailand's Economic Growth in Comparative Perspective*. New York, USA: Cambridge University Press.

Dixon, C. (1999). *The Thai Economy: Uneven Development and Internationalisation*. London, UK: Routledge.

Gregory, A. & Hansen, B. (1996). Residual-Based Tests for Cointegration in Models with Regime Shifts. *Journal of Econometrics*, 70, 99-126.

McCombie, J.S.L. (1997). On the Empirics of Balance-of-Payments-Constrained Growth. *Journal of Post-Keynesian Economics*, 19(3), 345 – 375.

McCombie, J. S. L. & Thirlwall A.P. (2004). *Essays on balance of payments constrained growth. Theory and evidence*. London: Routledge

Thirlwall, A. P. (1979). The Balance of Payments Constraint as an Explanation of International Growth Rate Differences. *Banca Nazionale del Lavoro Quaterly Review*, 128, 45-53.

Thirlwall, A. P. (2011). Balance of Payments Constrained Growth Models: History and Overview. *PSL Quarterly Review,* 64(259), 307 – 351.

Thirlwall, A. P. & Hussain, M. N. (1982). The Balance of Payments Constraint, Capital Flows and Growth Rate Differences between Developing Countries. *Oxford Economic Papers, New Series*, 34(3), 498 – 510.

Appendix

Data and Explanations of the Variables

Variables

M = Real Value of Imports; obtained from the variable 'Imports of goods and services (constant 2000 US$)'

$\left(\frac{P_f}{P}\right)$ = Inverse of Terms of Trade; obtained by finding annual inverse of the variable 'Net barter terms of trade index (2000 = 100)'

Y = Real GDP; obtained from the variable 'GDP (constant 2000 US$)

x = Real Growth Rate of Value of Exports; calculated from finding growth rate of five-years moving average of the variable 'Exports of goods and services (constant 2000 US$)'.

c = Real Growth rate of Total Private Capital Inflows = Nominal Growth rate of Total Private Capital Inflows (k); obtained from finding growth rate of five-years moving average of the variable 'Private capital flows, total (BoP, current US$)' – Growth Rate of domestic price level; obtained from the variable 'Inflation, GDP deflator (annual %)'

ω = The ratio of export to total receipts of foreign currency; calculated by finding five-years moving average of the variable 'Exports of goods and services (current US$)' divided by the sum of five-years moving average of the variable 'Exports of goods and services (current US$)' and of five-years moving average of the variable 'Private capital flows, total (BoP, current US$)'

Compilation of Data

Although foreign capital came to Thailand and brought in some advanced technology since the late 1960s (Doner, 2009, p. 187), the amount has always been quite low. In fact, foreign capital only started playing a significant role in determining economic growth in the late 1980s (Dixon, 1999, p. 124-125). Since the model consists mainly of the rate of profit and foreign capital, it is more appropriate to consider the Thai economy during the era that foreign capital started becoming an important factor in order to use the model to explain the economy. Therefore, the analysis in this part tries to prove the validity of the original Thirlwall's law and the extended Thirlwall's law only from 1980 to 2010.

Another crucial point regards the nature of the balance-of-payments-constrained growth models; both the original Thirlwall's law and the extended Thirlwall's law are long-run growth models. In order to find strong empirical support for the model, as done by Atesoglu (1993-94), cyclical movements of all variables used to measure y_B and y_B' should be filtered away. As noted before, the methodology to calculate income elasticity of demand for imports already yields a long-run relationship between growth rate of import and that of GDP; that is, η is already a long-run variable, which can be fitted to the test of both Thirlwall's law. However, from equation (9) and (14), $x, c,$ and ω are annual growth rates which contain some cyclical fluctuations. In order to filter away some cyclical movements of these variables, I calculate the five-year moving average of the level of real and nominal values of export and nominal value of capital flows before calculating $x, c,$ and ω. All data can be retrieved from the database 'World Development Indicator (WDI) and Global Development Finance (GDF)' of the World Bank's World databank.

The data of the variables used to calculate the income elasticity of demand for imports are the annual data from 1980 to 2010. In obtaining $x, c,$ and ω cyclical fluctuations were filtered out by finding the five-year moving average, thus the original data set spans the years 1976 to 2010 in order to calculate $x, c,$ and ω for 1980 to 2010.