ASSESSING THE ROLE OF EXTERNAL DEBT IN ECONOMIC GROWTH OF THE ASEAN-4 COUNTRIES: AN EMPIRICAL STUDY

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Abstract

The Asian Financial Crisis in 1997 witnessed an episode of high accumulation of external debt among the crisis-hit countries, namely Indonesia, Malaysia, Philippines and Thailand. This leads to the issue of the role played by external debt in stimulating the economies of ASEAN-4 countries. This paper tries to examine the role of external debt in the economies of the ASEAN-4 countries. The results demonstrate that external debt plays a role in improving the economic growth of the ASEAN-4 countries. In addition, the accumulation of external debt is positively associated with Indonesia's and Thailand's economic growth up to an optimal level, beyond the optimal level the external debt has inversely contributed to the economy.

Keywords: *External debt, ASEAN-4, economic growth.*

Introduction

As economic integration took place, the reliance on international capital flow became a must for development purposes thus leading to the accumulation of external debt by many developing countries, not excluding the ASEAN-4 countries. In recent decades, a boom in the stock of external debt among the ASEAN-4 countries has caused great concern. Since the inception of the Asian financial crisis of 1997, the role of external debt (which included long-term and short-term debts) in the ASEAN economies has remained unknown. Although the crisis has abated, the fear of the debt burden and the challenge of a sustainable external debt position have underlined the urgency of examining the effect of external debt on the ASEAN-4 countries' economic growth.

Looking back at the post-Asian crisis analysis, external debt has received criticism due to its contribution to the eruption of the crisis (Miyakoshi, 2000; IMF, 1998; WB, 1998; ADB, 1998; Corsetti et al., 1999). A large stock of external debt, particularly the overdependence on short-term capital flows, became one of the causes of the Asian Financial Crisis (Miyakoshi, 2000; IMF, 1998; WB, 1998; ADB, 1998).[1] Meanwhile, overinvestment and excessive external borrowing activities were encouraged by various deep-rooted institutional deficiencies (Corsetti et al., 1999). However, according to Bordo et al. (2010), minimizing foreign currency financing is not a sufficient condition to eliminate financial crises.

The stock of external debt held by the ASEAN countries has increased tremendously since the Asian financial crisis of 1997. As at the end of 2011, Indonesia held the highest external debt stocks with USD231.5 billion, while the Philippines held, relatively, the lowest external debt with USD76 billion.[2] On the other hand, the ratio of external debt as a percentage of Gross National Income (GNI) showed a consistent decrease over the period 1998-2008. This development may indicate that the denominator, of which the GNI has recorded a continuous increase, has thus resulted in a declining pattern of external debt to GNI. Is the external debt helping the ASEAN-4 countries to recover from the crisis and improve their economic growth?

Table 1 presents descriptive statistics on the external debt as the percentage of GNI (Gross National Income) held by ASEAN-4 countries. The descriptive statistics consist of mean, standard deviation, maximum values and minimum values. It shows that there are substantial variations in the external debt held by ASEAN-4 countries. The lowest mean is held by Thailand with 43.706 per cent with a standard deviation of 18.809. In addition, Malaysia shows small variations with the lowest value of a standard deviation of 12.928, which indicates the dispersion from the mean. By the same token, Indonesia's external debt as a percentage of GNI indicates high fluctuation with a minimum value of 25.452 per cent and the maximum value is 168.178 per cent.

Numerous empirical studies have examined the relationship between external debt and economic growth (Chowdhury, 2001; Clements et al., 2003; Mohamed, 2005; Wijeweera et al., 2005; Sen et al., 2007; Choong et al., 2010; Pattillo et al., 2004; Cordella et al., 2005; Imbs and Ranciere, 2005). The majority of these studies conclude that debt

impedes a country's economic growth, while others found positive and negative relationships between external debt and economic growth, thus suggesting a non-linear relationship. Thus, economists are far from being unanimous on the role played by external debt in boosting a country's economic growth.

Table 1

Descriptive Statitics of External Debt as Percentage of GNI By ASEAN-4 Countries

Country	Mean	Standard deviation	Minimum	Maximum
Indonesia	61.541	29.624	25.452	168.178
Malaysia	48.117	12.928	30.771	82.950
Philippines	66.845	14.914	37.416	98.798
Thailand	43.706	18.809	18.960	97.154

In addition, a limited number of recent studies have examined the role of external debt in the ASEAN-4 countries' economic growth (Butts et al., 2012; Assibey-Yeboah and Mohsin, 2012; Choong et al., 2010; Patenio and Tan-Cruz, 2007; Mariano and Villanueva, 2005; Yoshioka, 2003; Aoki and Min, 2002). Butts et al. (2012) conducted an examination of the relationship between short-term external debt and economic growth in Thailand over the period 1970-2003. They revealed that real short-term debt and real GDP are correlated positively and significantly, as well as being co-integrated. In addition, there is indirect Granger-causality from economic growth to short-term external debt for the consumption effects. There is also evidence that economic growth, exchange rate and international reserves are determinants of short-term external debt for Thailand. Assibey-Yeboah and Mohsin (2012) analysed the roles of monetary policy in a developing country that holds external debt. In addition, by using annual data for Thailand, Indonesia, Mexico and Chile, their results show that inflation is negatively correlated with consumption, investment and the stock of foreign debt. Furthermore, high ratios of external debt to GDP in selected Asian countries have contributed to the initiation, propagation and severity of financial and economic crises (Mariano & Villanueva, 2005). On the other hand, Aoki and Min (2002) who conducted an analysis of the crisis-hit Asian countries, agreed that a country should not allow the external debt to accumulate too excessively.

A study conducted by Patenio and Tan-Cruz (2007) in the Philippines over the period 1981-2005 found that economic growth is not greatly affected by external debt-servicing. Furthermore, it was revealed that debt-servicing in the Philippines is not sufficiently high for debt overhang to occur. Meanwhile, Indonesia's external debt position is sustainable (Yoshioka, 2003). Furthermore, export-contributive FDI would ensure the external debt's sustainability. Meanwhile, an empirical study by Choong et al. (2010) suggested that external debt has a negative effect on Malaysia's long-run economic growth. Furthermore, the Granger causality test reveals the existence of short-run causality linkages between external debt and economic growth. Due to small growth in the literature of debt-growth nexus particularly for ASEAN-4 countries, this paper offers evidence and fills the gap in the literature by analysing the real effect of external debt on the ASEAN-4 countries' economic growth.

Therefore, this paper tries to investigate the role played by external debt in the economies of the ASEAN-4 countries. Thus, this paper may provide information on whether the external debt has benefited the economies of the ASEAN countries or has impeded their economic growth. This paper proceeds as follows: In the next section, the paper reviews the background of the external debt position for all the ASEAN-4 countries. Then, the data and methodological considerations are described in section 3. The results estimation is discussed in section 4, and the final section concludes the analysis. The empirical analysis of this paper starts by estimating a standard ordinary least squares test on the standard baseline debt-growth model to establish a reference point. The results are shown in Table 2.

Methodology

This paper examines the role of external debt on the economic growth of the ASEAN-4 countries by employing a standard basic growth model. To establish the effect of external debt on each ASEAN-4 country's economic growth, the analysis will first conduct a standard ordinary least squares test. In addition, this paper follows closely the standard growth literature and may be expressed as follows:

$$Y_t = \beta_0 + X'_t\beta + \varepsilon_t \qquad (1)$$

where Y is the dependent variable, X is k-vector of regressors, and the subscripts $t = 1,....,T$ identify the time dimensions and ε_t is the error term and is assumed to be normally distributed. The growth rate of real

GDP per capita (dependent variable) is a proxy of economic growth while the independent variables, including external debt, population growth, the investment ratio and life expectancy, represent the rates of growth of the factor inputs in the production function which are expected to give a positive effect on the country's economic growth.[3] The positive effect of external debt on economic growth has been highlighted in the dual-gap theory as an external source to support the expected level of growth. In addition to the time series analysis, this paper also provides a panel analysis for a robustness check on the effect of external debt on a country's economic growth.

In the form of panel data model for country i at time t:

$$y_{it} - y_{i,t-1} = (\alpha - 1)y_{it-1} + \beta X_{it} + \eta_i + \varepsilon_{it} \qquad (2)$$

The lag of initial income will capture the convergence effect. This paper employs the fixed and random effects estimators, which have been used to estimate equation (2). The static fixed effect model is:

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it} \qquad I = 1, \dots .N, \quad t = 1\dots T \qquad (3)$$

where α_i is unit-specific characteristic, while ε_{it} is *i.i.d.* A pooled OLS estimator based on the time-demeaned variables is called the fixed effects estimator. Meanwhile, the random effect estimator is a feasible Generalized Least Squares (GLS) estimator where the unobserved effect is assumed to be uncorrelated with all the explanatory variables in each time period. The Hausman test is used to determine the appropriate estimator for the model for each sample: it is either a fixed or random effect estimator. The null hypothesis of the test is there is no correlation between the individual effects and the explanatory variables. This implies that both fixed and random effect estimators are consistent but only the random effect is efficient. The alternative hypothesis explains that the individual effects correlate with the explanatory variables, showing that only the fixed effects estimator is consistent and efficient.

This paper investigates the possibility of nonlinear relationship between external debt and the economic growth of the ASEAN-4 countries by employing the test proposed by Hansen (2000). This method tests the null hypothesis of a linear regression against a threshold regression analysis. In the form of the thresholds model,

$$y_t = \beta_1' x_t + \mu_t \qquad q_t \leq \gamma \qquad (4)$$

$$y_t = \beta_2' x_t + \mu_{ti} \qquad q_t > \gamma \qquad\qquad (5)$$

where q_t is the threshold variable, which is external debt. In addition, the threshold variable could be part of the regressors and it is used to split the sample into two regimes. Equations (4) and (5) can be written in a single equation form as:

$$y_t = \beta' x_t + \theta x_t(\gamma) + \mu_t \qquad\qquad (6)$$

where $d_t = I(q_t \leq \gamma)$, where $I(.)$ denotes the indicator function and sets the variable $x_t(\gamma) = x_t d_t(\gamma)$. Furthermore, $\beta = \beta_2$ and the model allows the regression parameters to differ depending on the value of external debt. Equation (6) allows all the regression parameters to differ between the two regimes. The null hypothesis of linearity against a threshold specification can be expressed as:

$$H_0 : \beta_1 = \beta_2 \qquad\qquad (7)$$

Hansen (2000) developed a threshold model estimator that considers the least squares estimations by providing an asymptotic simulation test of the null of linearity against the alternative of a threshold. Hansen (2000) also proposes an F-test bootstrap (heteroscedasticity-consistent) procedure to test the null of linearity with the p-values computed by a fixed bootstrap method. The independent variables are supposed to be fixed and the dependent variable is generated by a bootstrap from distribution $N(0, \hat{\mu})_i$, where $\hat{\mu}_i$ is the OLS residual from the estimated thresholds model.

Data were collected from various sources for the period 1981-2009 from the World Development Indicator (WDI) and the Global Development Finance (GDF) indicator from the World Bank (WB) database, Penn World Table Version 7 by Alan Heston, Robert Summers and Bettina Aten (2011). Our analysis involved four ASEAN-4 countries covering the period 1981-2009.

Results

The empirical analysis of this paper starts by estimating a standard ordinary least squares test to establish a reference point. Table 2 shows the results of the estimation of a model for each single ASEAN-4 country. The results in columns (1) to (12) show a negative and

significant effect of external debt on the country's economic growth of Indonesia, Malaysia, and Thailand at 5 per cent significance level. The results also show that the lagged term of external debt (for periods t-1) shows a positive effect on economic growth of at least 10 per cent significance level for all ASEAN-4 countries, implying that the positive effect of external debt would have at least a year to be efficiently allocated to investment activity. This would indicate that external borrowing has benefited the ASEAN-4 countries for at least a year before it was absorbed into the country's economic growth. Intuitively, external debt could be considered as one of the tools to accelerate the capital accumulation process. In addition, other explanatory variables such as investment ratio show a positive and significant effect on Malaysia's, Philippines' and Thailand's economic growth. While population growth and life expectancy have a positive impact on Malaysia's (at 5 per cent significance level) and Indonesia's (at 10 per cent significance level) of economic growth respectively. Next, our analysis proceeds with the panel data analysis to grasp the idea of the impact of external debt on the economic growth of ASEAN-4.

Table 3 reveals the results estimation. In line with the theory, the investment rate has a positive impact on the economic growth of the ASEAN-4 countries at the 5 per cent significance level. The results are robust for all estimations as in (1) to (4) for both estimates: fixed and random effects. In addition, the results indicate that external debt has a negative impact on economic growth and is significant at the 5 per cent significance level. With the objective of analysing in detail the role of external debt in the economies of the ASEAN-4 countries, this paper proceeds with the estimation of the debt-growth model by including the lagged term of the external debt. Surprisingly, the results show that the lagged term of external debt (for periods t-1, t-2 and t-3) shows a positive effect on economic growth at the 5 per cent significance level. Intuitively, it could be said that the positive effect of external debt would have least a year to be efficiently allocated to investment activity and absorbed by the economic growth. The results of the Hausman test show that, except in (1), none of the estimates provided any evidence to reject the null hypothesis of no correlation between the individual effects and the explanatory variables. This implies that both the fixed and random effect estimators are consistent but only the random effect is efficient.

Table 2

Country Specific Analysis: The Impact of External Debt on ASEAN-4 Economic Growth

Variable	Indonesia			Malaysia			Philippines			Thailand		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log (initial income)	21.442	22.157	15.171	18.291	-1.553	-7.451	21.910	22.721	24.808	1.292	-5.330	-8.205
	(19.700)	(14.994)	(12.915)	(24.217)	(21.569)	(24.363)	(15.534)	(13.012)**	(13.634)**	(6.809)	(4.957)	(4.886)
Log (life expectancy)	6.693	-5.115	-3.668	-3.179	-0.848	0.734	4.064	-0.236	-2.029	0.967	1.075	1.998
	(3.783)**	(3.735)	(3.463)	(4.227)	(3.917)	(4.450)	(6.860)	(6.187)	(6.444)	(0.538)**	(0.841)	(0.866)*
Population growth	-51.989	-21.053	-13.920	9.973	-4.614	-3.353	17.595	-3.178	-10.256	5.980	0.957	0.599
	(35.100)	(29.383)	(25.790)	(4.196)*	(5.195)	(6.708)	(33.600)	(28.325)	(29.030)	(4.405)	(2.921)	(2.978)
Investment ratio	-0.231	0.321	-0.155	0.086	0.435	0.486	0.267	0.615	0.705	0.258	0.302	0.314
	(0.349)	(0.342)	(0.326)	(0.244)	(0.202)*	(0.340)	(0.397)	(0.331)*	(0.359)**	(0.098)*	(0.062)*	(0.062)*
External debt	-0.146	-0.168	-0.175	-0.275	-0.528	-0.556	-0.002	-0.237	-0.157	-0.124	-0.356	-0.340
	(0.068)*	(0.035)*	(0.024)*	(0.071)*	(0.115)*	(0.111)*	(0.150)	(0.141)	(0.185)	(0.053)*	(0.058)*	(0.072)*
External debt $_{t-1}$		0.070	0.043		0.479	0.550		0.412	0.290		0.272	0.245
		(0.040)**	(0.017)*		(0.136)*	(0.127)*		(0.128)*	(0.201)		(0.063)*	(0.123)**
External debt $_{t-2}$			0.049			-0.050			0.090			0.023
			(0.012)*			(0.086)			(0.124)			(0.071)
Constant	509.973	203.246	149.40	57.848	77.150	12.902	-481.252	-175.378	-61.823	-87.540	-35.931	-78.683
	(360.898)	(308.719)	(270.931)	(92.255)	(97.724)	(112.42)	(605.714)	(524.088)	(527.799)	(55.260)	(56.627)	(58.204)
R-Squared	0.552	0.699	0.851	0.515	0.800	0.809	0.194	0.420	0.432	0.588	0.782	0.819
Adjusted R-squared	0.455	0.612	0.796	0.410	0.739	0.738	0.018	0.255	0.223	0.498	0.720	0.753
F-statistic	5.675	8.112	15.458	4.892	13.715	11.470	1.104	2.538	2.067	6.559	12.555	12.316
Prob (F-stat)	0.03	0.000	0.000	0.003	0.000	0.000	0.386	0.052	0.099	0.000	0.000	0.000

Notes. * and ** denote significance at 5 and 10 per cent significance levels. Numbers in brackets represent the robust standard error. Values in parentheses signify the p-values.

Table 3

Panel Data Analysis: The Impact of External Debt on ASEAN-4 Economic Growth

Variable	(1) FE	(1) RE	(2) FE	(2) RE	(3) FE	(3) RE	(4) FE	(4) RE
Log (initial income)	-2.580	-1.620	-2.280	-1.339	-1.229	-1.111	-1.805	-1.480
	(2.770)	(1.274)	(2.457)	(1.150)	(2.465)*	(1.113)	(2.993)	(1.069)
Log (life expectancy)	70.986	5.296	51.265	0.994	29.909	-6.443	26.080	-3.923
	(24.371)*	(11.429)	(20.509)*	(11.053)	(22.008)	(8.981)	(23.756)	(8.926)
Population growth	3.197	0.071	1.828	0.1222	1.597	0.236	1.337	0.313
	(2.096)	(0.591)	(2.113)	(0.490)	(2.355)	(0.454)	(2.743)	(0.460)
Investment ratio	0.244	0.166	0.307	0.238	-0.325	0.272	0.324	0.292
	(0.057)*	(0.042)*	(0.049)*	(0.043)*	(0.049)*	(0.036)*	(0.049)*	(0.042)*
External debt	-0.108	-0.097	-0.212	-0.215	-0.215	-0.217	-0.218	-0.220
	(0.0183)*	(0.027)*	(0.019)*	(0.036)*	(0.016)*	(0.036)*	(0.017)*	(0.037)*
External debt $_{t-1}$			0.143	0.152	0.094	0.091	0.096	0.095
			(0.028)*	(0.036)*	(0.018)*	(0.028)*	(0.019)*	(0.029)*
External debt $_{t-2}$					0.065	0.074	0.011	0.044
					(0.020)*	(0.018)*	(0.013)*	(0.013)*
External debt $_{t-3}$							0.028	0.037
							(0.016)**	(0.015)*
Constant	-282.43	-5.602	-203.12	6.155	-122.44	33.333	-101.380	25.259
	(98.811)*	(41.226)	(84.287)*	(40.361)	(98.827)	(31.327)	(110.503)	(31.814)
R-Squared	0.396	0.305	0.523	0.463	0.572	0.532	0.587	0.554
F-statistic	8.757	202.13	12.420	249.83	12.971	352.21	11.871	423.82
Prob (F-stat)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	18.50[0.002]*		9.68[0.139]		4.79[0.686]		1.51[0.992]	

Notes. * and ** denote significance at 5 and 10 per cent significance levels. Numbers in brackets represent the robust standard error. Values in parentheses signify p-values. FE and RE represent fixed effect estimates and random effect estimates respectively.

In addition, this paper tries to investigate the possibility of a non-linear relationship between external debt and a country's economic growth. The results, as shown in Table 4, indicate the possibility of support for the existence of an inverted-U-shaped relationship between debt stock and growth. The inverted-U relationship explains that an increase in debt stock has a positive effect on economic growth until it achieves its optimal level (up to a certain level). Beyond the threshold level, an increase in the stock of indebtedness is associated with a negative effect on economic growth. The negative effect may be related to situations where the debt is not being efficiently allocated to investment and the possibility that too much debt-holding may squeeze the investment through debt repayments. The results show that the external debt ^2 variable is significant, suggesting evidence of a possible inverted-U-shaped relationship with the debt-growth model. On the other hand, the Hausman statistic shows evidence to reject the null hypothesis, suggesting that the fixed effects estimator is efficient.

Table 4

The Debt-Laffer Curve

Variable	FE	RE
Log (initial income)	-2.618 (2.197)	-1.106 (1.278)
Log (life expectancy)	66.047 (19.378)*	2.639 (10.474)
Population growth	2.522 (1.938)	-0.439 (0.575)
Investment ratio	0.223 (0.054)*	0.164 (0.043)*
External debt	0.028 (0.057)	0.051 (0.049)*
External debt^2	-0.000 (0.000)*	-0.001 (0.000)*
Constant	-263.66 (80.123)*	-2.185 (37.414)
R-Squared	0.432	0.350
Adjusted R-Squared	0.383	
Log likelihood	-311.654	
F-statistic	8.942	318.45
Prob (F-stat)	0.000	0.000
Hausman test	17.79 [0.003]	

Notes. * and ** denote significance at 5 and 10 per cent significance levels. Numbers in brackets represent the robust standard error. Values in parentheses signify p-values.

Results of the threshold regression of the debt-growth estimates are shown in Table 5. The bootstrap p-value could reject the null of no threshold effect in Indonesia, Malaysia and Thailand. In addition, the estimated threshold levels are about 74.13 (for Indonesia), 61.00 (for Malaysia) and 32.08 (for Thailand) under the null of a no threshold effect and are strongly rejected, at least at a 5 per cent significance level. In particular, for Indonesia and Thailand, when the external debt is below the threshold estimates, the effect of debt on the country's growth is found to be positive and significant. However, beyond the threshold level, the effect of external debt on the country's growth is negative and significant at the 5 per cent significance level. This could be due to the possibility that the threshold estimates are the turning point, which indicates the existence of the debt-Laffer curve or inverted-U relationship between external debt and economic growth. On the other hand, below the threshold estimates the effect of external debt on Malaysia's economic growth is insignificant. Beyond that level, Malaysia is found to be enjoying a positive effect on growth from external debt. Thus, an increase in external debt to GNI above the threshold level leads to higher additional growth for Malaysia's economy.

Table 5

Results of Threshold Regression: External Debt as a Threshold Variable between External Debt and Economic Growth

	Indonesia $qi \leq 74.13$	Malaysia $qi \leq 61.00$	Philippines $qi \leq 49.95$	Thailand $qi \leq 32.08$
External debt	0.034 (0.011)*	0.004 (0.076)	1.060 (0.202)*	0.248 (0.104)*
Intercept	2.624 (1.736)*	4.555 (3.553)	-41.080 (8.597)*	-2.745 (3.073)
	$q_i > 74.13$	$q_i > 61.00$	$q_i > 49.95$	$q_i > 32.08$
External debt	-0.254 (0.011)*	0.465 (0.196)*	-0.117 (0.082)*	-0.212 (0.058)*
Intercept	27.125 (1.595)*	-37.514 (13.312)	8.900 (5.484)	14.920 (2.802)*
F-test statistics	54.058	61.005	8.603	19.304
Bootstrap p-value	0.000	0.030	0.329	0.021
Threshold estimates	74.13	61.00	49.95	32.08

Notes. * and ** denote significance at 5 and 10 per cent significance levels. The null hypothesis is no threshold effect.

Conclusion

The findings of this paper are twofold. First, external debt has a role in boosting the economic growth of the ASEAN-4 countries. In addition, it is found that at least one year must elapse before the benefits of external debt have an impact on a country's economic growth. This highlights the process of borrowing, before it is efficiently allocated to investment, as well as economic growth. Second, there is a non-linear relationship between external debt and economic growth in Indonesia, Malaysia and Thailand. In addition, the non-linear relationship between external debt and economic growth in Indonesia and Thailand may explain the debt-Laffer curve, where the external debt may initially benefit the economy. However, above a certain level, an increase in external debt will harm the economy, as there is a notion that too much debt-holding squeezes investment and, to a lesser extent, economic growth. There are avenues for future research where the effect of other factors such as institutional quality in complementing the role played by external debt on the country's economic growth. With the notion of no-one-size fits, the study could be conducted for longer periods for each ASEAN-4 country.

End Notes

[1] The Asian financial crisis has coalesced into two main hypotheses on the causes of the crisis: panic attack by investors and structural policy distortion in the fundamental economic conditions (Wade, 1998).

[2] From the maturity structure, except Thailand, all ASEAN-4 countries hold long-term external debt more than their short-term external debt.

[3] The effects of population growth are still debatable with the Malthus diminishing return to the labour theory leading to the negative effect on a country's economic growth. On the other hand, based on the neo-classical growth model, population growth would benefit the economy due to the fact that population growth is associated with technological advancement, to a lesser extent, economic growth.

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