

AEC-2015: Anticipated Economic Shock

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ABSTRACT

The objective of this research is to provide a method to determine the magnitude and impact of risk from the AEC-2015. The interdisciplinary tools used included econometrics, population ecology and statistics. The research issue is the magnitude and impact of risk from the AEC-2015, and its potential effect on family business and SME. Macroeconomic data from 2003 to 2014 was drawn from the World Economic Outlook 2013 published by the IMF. Comparative data came from the Office of the National Social and Economic Development Board (NSEDDB) of Thailand for 2013. The dependent variable (Y) was defined as risk. The independent variable (X) included the GDP growth rates, savings rate, total investment, current account balance, and government revenue and expense. Series of Anderson-Darling test show that past intra-regional growth rates were randomly distributed and no country exhibited growth beyond the bound of $x^* + 2S$. The upper bound expected growth are also within normal range $\mu + 2\sigma < 13.00\%$. The carrying capacity for the ASEAN region is 1.60 with the growth multiplier of -0.14 from a Weibull regression $Y = 1.60 - 0.14X$. The risk of shock assessment was determined by discrete probability. The range of probability of members countries to benefit from AEC-2015 is $U_i = 0.34$; group risk is $\rho = 1 - U = 1 - 0.34 = 0.66$. Exogenous shock factor against family business and SME in member countries is $dD = -0.23$. The intended contributions of this research is to lay a ground work for future research on the issue of shock at micro level from macro policy changes, such as regional economic integration. Secondly, the proposed methods of measurement in this research may have practical value to stakeholders in preparation for the New Economy: AEC-2015.

Keywords: AEC-2015, impact analysis, economic shock, risk measurement

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1.0 INTRODUCTION

The year 2015 is set as the target year for the implementation of the ASEAN Economic Community, an attempt by the ASEAN 10 countries to have an economic integration. The purpose of this paper is to assess the anticipated economic shock that will come from that integration. Thailand is used as a proxy country to lead the analysis.

ASEAN has ten member countries. These ten countries are: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. These countries have traditionally categorized themselves into two groups on the basis of economic development. Group 1 consists of the original founding members: Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand. Group 2 consists of Cambodia, Laos, Myanmar and Vietnam. Group 1 is more industrialized and more developed than Group 2. With the anticipated economic integration in 2015, this developmental distinction will be eliminated. Under the AEC's mandate, all ten countries will be seen and treated as one community; a common market. We hypothesized that comes 2015, some countries in this new common market will experience economic shock due to adjustment and the erupt change of market condition. The effect of this shock may linger for many years before the countries could make adjustment.

2.0 LITERATURE REVIEW

ASEAN member countries are over optimistic about the AEC. This overconfidence may create optimism bias. Optimism bias may result from the desired result, cognitive mechanism, information and overall mood (Shepperd, 2002). Optimism bias in AEC-2015 may cause stake holders to overlook the risk associated with market integration.

Human judgment is generally optimistic due to overconfidence and optimism (Kahneman and Tversky, 1979). Overconfidence and optimism generally leads to overlooking the effect of risk. Kahneman and Tversky suggest that the solution is using reference class in order to obtain an objective assessment of the event. Objective assessment may be accomplished through reference class forecast method (Flyvbjerg, 2006). Merrow and Yarossi argue that the reference class employed historical data as the basis for the current assessment (Merrow and Yarossi, 1990, pp. H.6. 1-7). This paper uses the GDP growth rate between 2004 and 2013 of ASEAN-10 as a reference class in order to establish the probable outcome for Thailand's 14 industries in the non-agricultural sector.

Risk is defined as the effect of uncertainty on objectives. ISO 31000 (2009)/ISO Guide 73: 2002. Some researchers define risk to include both potential loss and gain if such possibility is a variation from reasonable expectation (Damodaran, 2003, p. 15). The purpose of this paper is to provide a tool to determine the risk and magnitude of economic shock from the AEC-2015. Thailand's 14 industries in the non-agricultural sector are used to demonstrate risk exposure and economic shock from the AEC.

3.0 DATA AND METHODOLOGY

Macroeconomic data from 2003 to 2014 was drawn from the World Economic Outlook 2013 published by the IMF. Comparative data came from the Office of the National Social and Economic Development Board (NSEDDB) of Thailand for 2013. The observation series is comprised of GDP growth rate for ASEAN and annual growth rate for Thailand's 14 industries.

The analytical tool used for determining system reliability of the ASEAN economy was accomplished by Weibull distribution analysis (Weibull, 1939). The Weibull test is a tool to predict failure. This paper interprets this "failure" as risk. A summary of the Weibull statistics is tabulated in Table 1.

Table 1: Weibull Statistics for ASEAN's Regional Economy

Country	β	η	CDF	PDF
Brunei	2.20	1.42	0.59	0.64
Cambodia	-3.95	4.87	0.58	-0.07
Indonesia	111.14	4.17	0.63	0.00
Laos	-76.66	5.14	0.63	0.00
Malaysia	-8.55	3.70	0.62	-0.16
Myanmar	-2.77	4.67	0.55	-0.05
Philippines	-8.93	3.66	0.62	-0.11

Singapore	-2.78	3.58	0.57	-0.09
Thailand	-2.79	2.09	0.54	-0.09
Vietnam	-5.61	4.30	0.60	-0.06

The value for eta (η) is the critical growth rate below which the economy will experience recession. Using the GDP growth rate from 2004 to 2013, the regional average critical value is $\bar{\eta} = 3.76$ with a standard deviation of $S_{\eta} = \pm 1.20$. From these values, the predicted critical eta for ASEAN-10 is $\mu_{\eta} = 3.14$ and the expected standard deviation of $\sigma_{\eta} = 1.19$. For 0.95 confidence interval, the upper range for regional critical point is $\mu_{\eta} + 2\sigma_{\eta} = 3.14 + 2(1.19) = 5.52$. This means that if the growth rate for ASEAN is below 5.52, there is a risk of regional recession. The Weibull linear equation for Thailand's 14 industries is given by $Y_{Thai} = 2.38 + 0.63X$ and for ASEAN $Y_{ASEAN} = 1.60 - 0.14X$.

14.0 THAILAND IN ASEAN CONTEXT

Among Thailand's 14 industries, two industries are identified as competitive for showing growth rate that exceeds 2 units of standard deviation. These two industries are tourism and financial intermediaries. Among the ASEAN-10, the threshold growth level is $\mu + 2\sigma = 13.00$ while Thailand's domestic threshold is $\bar{X} + 2S = 11.70$. No country in ASEAN has experienced nor expected to have GDP growth exceeding 13.00. On the basis of GDP, Thailand also could not overcome this threshold. However, Thailand's two star industries exceed the region's threshold for statistical significance level. This finding confirms that there are two industries that may gain from the AEC-2015. The remaining 12 industries do not meet the threshold of competitiveness in the region and may be exposed to risk. For family business and SME in Thailand, this finding has deeper implication about their impending status in the new market after 2015. Family business and SMEs are found in the 12 non-competitive industries. (OSMEP, 2011, chap. 6).

4.1 The ASEAN Expected Growth Threshold

The expected growth for the new market after AEC-2015 is $\mu_{ASEAN} = 2.601$ with standard deviation of $\sigma = 5.20$; the threshold is $\mu + 2\sigma = 13.00$. The regional threshold is used as a reference point to determine the standard score for each industry and its corresponding probability distribution. Thailand's non-agricultural sector growth rate is used as the observation X_i , the regional threshold is used as the reference value \bar{X} and S is the standard deviation of the annual growth rate among 14 industries. Standard score for the 14 industries may be calculated by:

$$Z_i = \frac{X_i - \bar{X}}{S} \quad (1)$$

The percentage probability is simply $F(Z)$ which may be read from the Z-table. The risk exposure is determined by $1 - F(Z)$. This paper defines risk exposure as 0.70; under this standard only two industries (hotel and financial intermediaries) are exempt from exposure. Twelve industries are exposed. The 14 industries include: 1. Public administration and defense; 2. Private households with employed persons; 3. Education; 4. Wholesale and retail trade, repair of vehicles; 5. Health and social work; 6. Construction; 7. Manufacturing; 8. Other community, social and personal service activities; 9. Mining (including fuel); 10. Transport, storage and communications; 11. Electricity, gas and water supply; 12. Real estate, renting and business activities; 13. *Financial intermediation*; and 14. *Hotels and restaurants*.

The cut off point for the threshold is $\mu + 2\sigma = 0.95$ and the reference point for risk exposure is $\mu + \sigma = 0.68$ or about 70%. According to this standard, tourism and financial intermediaries have risk exposure of 39% and 37.1% respectively. The remaining 12 industries have risk exposure inside of $\mu + \sigma = 0.68$.

Between 70 – 100%, risk is divided into three tiers: high risk (Tier 1: > 90%), medium risk (Tier 2: 80 – 89%) and low risk (Tier 3: 70 – 79%). In Thailand, three industries belong to Tier 1 (high risk); these industries include: public administration and defense, private household with employed person. Education belongs to Tier 2 risk. This is a threat because education in Thailand is considered a service industry. (Louangrath, 2013, p. 40-54). The sluggish growth in education industry exposes the industry to risk in the regional market. Lastly, the wholesale and retail trade is identified as Tier 3 risk. Altogether, there are three industries that are at risk of being uncompetitive by Thailand's own domestic standard. These industries are private household with employed person, education, and whole sale and retail trade.

4.2 Defining Economic Shock from the AEC-2015

Shock is defined as the probability of exposure to risk greater than 70%. The rationale for using 70% as the cut off point comes from the fact that 68% of the value lies within one standard deviation about the mean. Therefore, a risk exposure of 70% or greater is consider an economic shock. Assume that shock is the category of interest. Among the 14-dustries, only two would be unexposed to shock; the remaining 12 industries are exposed.

The magnitude of the shock could also be estimated by using Kahne-Taversky's equation of the prospect theory. The prospect theory is given by:

$$U = \sum_{i=1}^n w(p_i)v(x_i) \quad (2)$$

where w is the weight of the probability of the outcome; x_i is the potential outcome of the event; p_i is the probability of the outcome; v is the function that gives the outcome; and U is the expected utility. The Kahneman-Tversky equation (Prospect Theory) expresses the expected utility of an event.

From the prospect theory equation, shock and the magnitude of shock may be defined. Shock is determined by:

$$\Delta\Sigma = U_{Thai} - U_{ASEAN} \quad (3)$$

The following conditions applied: (i) if $\Delta\Sigma < 0$, there is a shock; (ii) if $\Delta\Sigma = 0$, there is no shock; and (iii) $\Delta\Sigma > 0$, the domestic economy out performs the regional market.

4.3 Regional Risk Assessment

The weight of the 14 industries is distributed evenly at $w = 1/n = 1/14 = 0.0714$. The function v used for this calculation is $v = Z$ where $Z = (X_i - \bar{X})/S$ and x_i is the individual growth rate for each industry. With the parameters defined, the expected utility under the prospect theory may now be determined. Recall that $U = w(p_i)v(x_i)$; The numerical tabulation of U is given in Table 2.

Table 2: Expected Utility under Kahneman-Tversky prospect Theory for AEC

ID	w^*	p_i	v	X_i	U_i
1	0.37	0.15	0.84	7.32	0.35
2	0.01	0.14	0.66	6.98	0.01
3	0.02	0.16	0.95	7.54	0.02

4	0.01	0.15	0.76	7.18	0.01
5	0.08	0.03	-0.85	4.17	-0.01
6	0.003	0.00	-2.16	1.73	-0.00
7	0.02	0.15	0.80	7.24	0.02
8	0.44	0.06	-0.45	4.91	-0.05
9	0.04	0.07	-0.32	5.17	-0.00
10	0.01	0.08	-0.24	5.32	-0.00

ID: (1) Brunei, (2) Cambodia, (3) Indonesia, (4) Laos, (5) Malaysia, (6) Myanmar, (7) Philippines, (8) Singapore, (9) Thailand and (10) Vietnam. *The weight of for each country is calculated on a *pro rata* basis using each country's per capita GDP as the base.

The value of U is the sum of U_i . In this case, the total prospect of the expected utility for the ASEAN region from the AEC market integration is $\Sigma U_i = 0.34$. Therefore, the prospect of the regional risk is $\rho = 1 - U = 1 - 0.34 = 0.66$. This factor must be applied to the countries that are at risk for potential shock. From Table 2, there are 5 countries showing negative prospect; these countries include Malaysia, Myanmar, Singapore, Thailand and Vietnam.

4.4 Domestic Risk Assessment for Thailand

Thailand's 14 industries are weighted according to their growth rate. The determination for the expected utility value under the prospect theory equation was carried out in the same fashion as in Table 2. The total value for u_i is 0.10. Under this approach, 6 industries had been identified for having positive u_i and 8 industries show negative u_i values.

By using equation (2), the potential shock or gain for Thailand may be determined as: $\Delta\Sigma = U_{Thai} - U_{ASEAN}$ or $0.10 - 0.34 = -0.23$. Since the number is negative, the shock factor is 0.23. This number may be used to multiply by the expected GDP for the year 2015. According to the IMF's World Economic Outlook, the forecasted GDP growth rates for Thailand are: 4.60% (2015), 4.80% (Y2016) and 5.00% (Y2017) or an average of 4.60%. This anticipated growth may be adjusted by the shock factor of -0.23; thus, the adjustment would be:

$$\Delta Y_{Thai} = GDP_{2015} - GDP_{2015}(\Delta\Sigma)\rho \quad (4)$$

The calculation shows: $\Delta Y_{Thai} = 0.035$ or the GDP will be adjusted downward to 3.50% from 4.60%.

For the 14 industries in Thailand, the shock effect may also be determined. Assume that the growth rate for Y2013 is used as a base-year, the effect may be summarized thus:

$$\Delta Y_{x_i} = \sum_{i=1}^n (x_i - x_i(\Delta\Sigma)\rho) \quad (5)$$

where x_i is the individual industry annual growth rate and $\Delta\Sigma$ is the shock factor which had been determined to be $\Delta\Sigma = -0.23$ and $\rho = 0.66$. The adjusted value is $\Delta Thai_{x_i} = 0.0676$ or 6.76% with a standard deviation of $S = \pm 0.0335$. The adjusted expected growth for the 14 industries is $\mu = 5.29$ with standard deviation of $\sigma = 3.33$. The new threshold for Thailand's non-agricultural sector growth is $\mu + 2\sigma = 5.29 + 6.66 = 11.95$ while the regional threshold is 13.00. A shock factor of -0.23 has expose all 14 industries to risk. The two star industries also had their growth rate adjusted downward to 11.96 (tourism) and 12.29 (financial intermediaries). Thailand is at risk of losing its growth momentum from the potential shock of -0.23 from the AEC. For family-owned

businesses and SME, the optimism of AEC-2015 should be reassessed. All stakeholders must be apprised that AEC-2015 presents some risk to the local industries.

5.0 CONCLUSION

This paper provides a practical method for regional and domestic risk analysis. Thailand's 14 industries in the non-agricultural sector had been used as a subject of analysis in the context of the ASEAN's 10 countries economic growth patterns. Using GDP growth rate from 2003 to 2013 as the reference class, it has been found that no country in the ASEAN shows any significant growth beyond $\mu + 2\sigma$. Thailand's 14 industries have 2 star industries showing growth rates exceeding $\mu + 2\sigma$. However, after adjusted for potential shock of -0.23, all 14 industries will fail to meet the regional threshold growth rate of 13.00. These findings may serve as a constructive appraisal for Thailand in maintaining its competitive position in the AEC and to compete effectively in the AEC after 2015.

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