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Evaluating Economic Resilience from Economic Stability Perspective: The ASEAN – 5 Countries Cases

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Abstract: The purpose of this paper is to measure the resiliency of the ASEAN – 5 countries from economic stability perspective. Based on engineering economic resilience and the business cycle of conventional Keynesian theory, economic resilience can be perceived into two dimensions which are shock amplification and shock persistent. Shock of amplification pertain the size of economic deviation from equilibrium due to shocks. A low resilience country tends to associate with high shock amplification. Meanwhile, shock persistent is duration of economic deviation from equilibrium. A prolonged shock persistent cause a country to be less resilient. By using seemingly unrelated regression for 1981 – 2014 period, this study found that Malaysia is the highest shock amplification among the ASEAN – 5 which is followed by Thailand and Singapore. In contrast, Indonesia and the Philippines are the lowest shock amplification. In term of size of shock persistent, the result revealed that Singapore is the highest whereas, the size of shock persistent in Malaysia and Indonesia are the lowest among the ASEAN – 5 countries.
Keywords: Economic Stability, Shock Amplification, Shock Persistent.

INTRODUCTION

The five largest economies in Southeast Asia or the ASEAN-5 namely, Malaysia, Indonesia, Singapore, Thailand and Philippines are not only tied together by multiple threads of history and culture but also increasingly linked by business networks, trade relationships, migration, and shared resources.

The ASEAN's formation purpose is to pursue an ambitious form of economic integration as a tool for achieving broader prosperity and greater global competitiveness. This region is appeared to capture a large share of global trade flow as it deeply inter-connected with huge volumes of goods, services, and capital moving across borders. Moreover, a huge amount of export demand and foreign direct investment (FDI) have been received from other regions where caused the ASEAN market to be continuously growing. In this respect, external factors seem to be a challenging issue that alter economic performance in the ASEAN-5. The prior economic shocks at global scale such as, the 19971-73 World Oil Crisis, Commodity Crisis in early of 1980s, Asian Economic Crisis (AFC) in 1997 and Global Financial Crisis (GFC) in 2008 have led economic growth in the region to be sharply declined and it took a particular duration for the region to recover from the crisis.

These economic shocks could deviate the economy from the equilibrium path. To be resilient, the economy must return to equilibrium or steady state and eventually, achieve economic stability. According to Debrun and Kapoor [1] and Fatàs and Mihov [2], the deviation of economy due to shock can be manifested by output fluctuation from potential output in the business cycle. In this regard, Figure 1 exhibits output fluctuation trend of the ASEAN – 5 countries, South Asia, G – 7 group (advanced countries) and East Asia. As can be seen in the Figure 1, output fluctuation is measured by output gap to potential output (%) where potential output is represented by the zero value at y – axis. Negative output gap to potential output indicates the region is thrown off from potential output or equilibrium path where the region experiences economic recession.

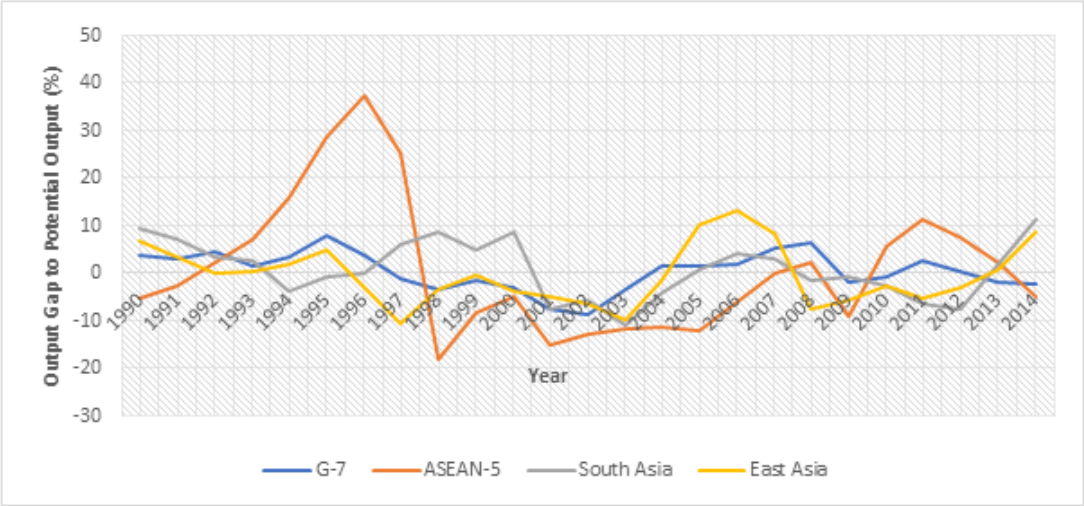

Fig-1: Output Gap to Potential Output in the ASEAN-5, G-7, East Asia and Central Asia, 1990-2014
Note: Output gap and potential output are estimated by Hodrick – Prescott (HP) filter procedure.

As shown in Figure 1.1, the ASEAN – 5 region has recorded a negative output gap to potential output during AFC (1998 – 1999). This means that AFC has caused the ASEAN – 5 region to deviate below than potential output where the deviation was larger than East Asia, South Asia, and Advanced Countries, G – 7. Furthermore, the region did not quickly attain to potential output after AFC (2000–2006). It was caused by global uncertainty factors such as terrorist attack on 11th September 2001, respiratory syndrome (SARS), war in Afghanistan and Iraq that weakened investment climate, discouraged private investment to the region and prolonged aggregate output below the potential output [3, 4]. Thus, this scenario implies that the ASEAN – 5 countries were less resilient compared to other regions during AFC and after AFC periods.

During GFC (2008–2009), the ASEAN–5 regions endured a negative output gap to potential output which was larger than other regions. Unlike AFC, this region managed to contain adverse shock as aggregate output quickly return to potential output. However, at post– GFC period (2011– 2015), the region posed a downward output gap to potential output trend. This period demonstrated an increasingly global economy risks such as the economic slowdown in major industrial country and the falling of commodity price. These risks have contributed to the sluggishness of export growth and investment level, decreased aggregate below than potential output and undermined the resiliency of ASEAN – 5 countries [5].

Based on AFC and GFC shocks, the ASEAN–5 countries not only experienced a larger economic deviation from potential output but they also faced a more persistent economic deviation compared to other countries. In the context of ASEAN–5, there are considerably very few and limited study which specifically aimed at empirically examining economic resilience from economic stability perspective in term of shock amplification and shock persistent. Thus, this study intent to fulfil the gap by measuring the size of shock amplification and shock persistent of the ASEAN – 5 countries.

LITERATURES REVIEW

The term of resilience is originated from Latin root “resilire” which means to leap back or to rebound back [6]. The term resilience has been adopted in several fields namely, psychology, archaeology and physic. In economic field, economic resilience is popularized by Holling [7] and Pimm [8]. They defined economic resilience as the stability of an economy system to be near equilibriums or steady states against shock. In this definition, the stability of economy system is explained by resistance to disturbance and speed to return to pre – existing equilibrium. This definition is known as engineering economic resilience (EER). The EER theory pertains the stability of an economy to be around equilibrium and steady state. In this respect, shocks may deviate an economy from its trajectory. However, the economy will be returned back to its underlying trajectory via policy setting formulated by local institutions [9, 10].

The economic trajectory in EER theory is assumed to be an equilibrium state where a regional economy would stay at the trajectory when shock is absent. The trajectory is related with structure of relationship among macroeconomic variables that persists over a long period of time. Martin and Sunley [11] and Dawley, Pike and Tomaney [12] argued that economic trajectory relates to path dependence notion. The path dependence pertains a region that becomes

continually "locked into" a particular structures and pathway of development through the operation of self – reinforcing mechanism.

Based on EER definition, economic resilience can be pronounced into economic stability perspective in the business cycle theory. The phenomena of economic instability or economic deviation from equilibrium due to shock can be explained by output fluctuation around natural rate in business cycle. There are two components that explain economic deviation namely, natural rate and output fluctuations. Natural rate pertains long – run level of production goods and services when labor, capital and available technology are at full employment level in an economy [13-15]. It is also known as potential output or long run aggregate supply (LRAS) that reflects a stable trajectory in economy, as stated in EER definition. Meanwhile, output fluctuations in business cycle are typically caused by demand–side shocks that temporarily move an economy away from natural rate level whereas, the supply–side factors such as capital stock, labor force and technology are assumed to be independent to output fluctuation and only determine the level of natural rate [16-19].

Economic resilience from economic stability perspective can be viewed in two dimensions namely, shock amplification and shock persistent. Firstly, the shock amplification reflects the size of aggregate output divergence from the equilibrium path [20]. Shocks in the components of AD might deviate and amplify aggregate output from potential output in the business cycle. In this regard, a low resilient economy tends to experience a large output fluctuation [21-23]. Secondly, shock persistence dimension pertains the duration of output fluctuation. Fatás [24] and Duval *et al*. [25] argued that a high shock persistent reflects a prolonged output fluctuation in business cycle. It delays aggregate output adjustment toward potential output thereby, resulting the economy to be less resilient. From Keynesian view, shock persistence is determined by the rigidity of wage and price levels. In this view, wage and price levels do not adjust easily or quickly with changes in supply and demand. Thereby, it contributes to the persistency of shocks that delay the adjustment of aggerates output and employment toward potential output in short–run [26].

At macroeconomic level, empirical studies on economic resilience are still limited. These empirical studies of economic resilience generally focused on building the measurement for economic resilience and assessing resiliency of a country or region to shock. For instances, economic resilience indices have been developed by Briguglio, Farrugia and Vella [27], Guillaumont [28] and Piccinino and Briguglio [29] in order to measure regional economic resilience. Meanwhile, Han and Goetz [30] assessed economic resilience by perceiving economic resilience into employment drop stage and employment rebound stage in the United State regions. Similarly, Bhattacharya and Dasgupta [31] and Eraydin [32] investigated the resiliency of least developed countries in term of output losses during economic shock. On other hand, Fingleton, Garretson and Martin [33] examined the recovery from shock that reflects the convergence of employment growth to potential employment growth rate at post – recession in the United Kingdom regions. Meanwhile, Caro [34] investigated economic resilience in term of the changing of employment growth to multiple equilibrium in Italian regions. In term of economic stability, Duval *et al*. [21] explored economic resilience in term of cyclical fluctuations in OECD countries. In this study, economic resilience consists of two dimensions namely the effect of shock that causes output fluctuation at potential output and, the subsequent persistent of shock that prolongs output fluctuations. This concept of economic resilience in this study that captures divergence of output from potential output due to shock is appeared to be consistent with EER theory.

METHODOLOGY

This study utilizes secondary panel analysis in order to measure size of shock amplification and shock persistent. The sample of the study includes the ASEAN – 5 countries namely, Malaysia, Singapore, Thailand, the Philippines and Indonesia for the 1981 – 2014 period. Economic resilience is measured by two dimensions which are shock amplification and shock persistent. Shock amplification dimension is derived based on the study of Duval *et al*. (2007) where the composition of output gap is given as Equation [1].

[1] $GAP_{it} = \lambda_t + \gamma + (\gamma_i - \gamma) + \varepsilon_{it}$

where i and t are country and time suffixes, respectively. GAP_t represents output gap, λ_t is time fixed effect, γ_i is individual country fixed effect, γ is common country fixed effect and ε_{it} is error term. The λ_t coefficient captures an undefined set of shocks that are common to all countries at particular time period. Specifically, the common component is $\lambda_t + \gamma$ and the individual country component is $(\gamma_i - \gamma) + \varepsilon_{it}$. Duval *et al*. [25] explains γ_i as country – specific reaction to common shocks, λ_t which can be translated to country – specific shock amplification. γ_i is also known as time – invariant country – specific coefficient. According to Hill, Griffiths and Lim [35], time – invariant country – specific coefficient is referred to individual country heterogeneity which can be captured by intercept coefficient in out gap model.

Meanwhile, Dutt and Ros [36] and Duval *et al*. [21] argued that output gap can be persistent overtime. In this regard, the persistent of output gap actually reflects the shock persistent in the business cycle. This shock persistent is relied upon the ρ – order autoregressive process, AR (ρ) of output gap. For instances, first – order autoregressive, AR (1) process of output gap represents the regression of output gap due to one – lagged year output gap which can be written as Equation [2].

[2] $GAP_{it} = \beta_1 GAP_{it-1} + \varepsilon_{it}$

where GAP_{it-1} is output gap lagged one year and the coefficient of β_1 in Equation [2] captures shock persistent. The size of shock persistent is measured by using cumulative impulse response (CIR) formula based on Dias and Marquez [37] which is given in Equation [3].

[3] $CIR = \frac{1}{1-\beta_1}$

By considering other important determinants of output gap, the model of this study can be constructed based on Galí [38], Debrun Pisani-Ferry and Sapir [39], Debrun and Kapoor [40], Fatima and Uma [41], Fatàs and Mihov [42] and Eller, Fidrmuc and Fungáčová [43] which is shown in Equation [4].

[4] $LGAP_{it} = \gamma_i + \beta_1 LOG_{it-1} + \beta_2 LGSZ_{it} + \beta_3 LINT_{it} + \beta_4 LCRDT_{it} + \beta_5 LOPN_{it} + \varepsilon_{it}$

where $LGAP_{it}$ is the log of (Gross Domestic Product) GDP gap to potential GDP ratio, $LGAP_{it-1}$ is the log of GDP gap to potential GDP ratio lagged one year, $LGSZ_{it}$ is the log of government expenditure to GDP ratio, $LINT_{it}$ is the log of lending rate (%) and $LCRDT_{it}$ is the log of total domestic credit to GDP ratio. In this study, GDP gap to potential GDP ratio is obtained by using Hodrick – Prescott (HP) Filter with smoothing parameter is 100.

Seemingly unrelated regression (SUR) is used to estimate the model in Equation [4]. This is appropriate for long time period in panel analysis. The advantage of this method is that it allows all coefficients to be vary for each country in separate equations. Moreover, it assumes that error term of country *k* is correlated with error term of country *j* which is given in Equation [5].

[5] $\text{cov}(\varepsilon_{k,t}, \varepsilon_{j,t}) = \sigma_{k,j} \quad \sigma_{k,j} \neq 0$

The possible explanation for this correlation that is common shock such as AFC and GFC that hit one ASEAN country would also affected another country as they are closely tied together through ASEAN Free Trade Formation (AFTA). Thus, this effect will be captured by correlation between $\varepsilon_{k,t}$ and $\varepsilon_{j,t}$. This estimation is followed by equality test of Wald test. This test verifies the assumption of the coefficient for each variable are not equal across countries in SUR estimation.

DISCUSSION OF RESULTS

The result of SUR estimation is presented in Table 1. The SUR estimation indicates that all intercept, *C* for all the ASEAN – 5 countries and *LGAPt -1* are statistically significant at five and 10 percent significant level. In this respect, size of shock amplification is captured by the coefficient of intercepts. Meanwhile, the coefficients of *LGAPt -1* are used to calculated size of shock persistent based on Equation [3]. The sizes of shock amplification and shock persistent are shown in Table 3.

The value of adjusted R^2 is 0.86. It implies that explanatory variables within SUR models explain 82 percent of variation in the *LGAP* of the ASEAN – 5 countries for period 1980–2014. Meanwhile, the values of probability of *F*–statistics indicate that there is a strong evidence of the joint statistical influence between the variables in model at five percent significant. In addition, the equality test of Wald test in Table 2 suggests that coefficients for each variable are not equal across countries corresponding with the probability value of χ^2 and F – statistic that are less than five percent. Thus, SUR estimation is more appropriated to be applied compared to OLS.

Based on Table 3, there are different sizes of shock amplification and shock persistent for each ASEAN–5 countries. The ranking of shock amplification from the highest resilience to the lowest resilience are the Philippines, Indonesia, Singapore, Thailand and Malaysia. For shock persistent dimension, the most resilience to the least resilience can be arranged as – Indonesia, Malaysia, Thailand, the Philippines and Singapore.

Country	Variable	Coefficient	Standard Error	*t* – stat	*p* – value
Malaysia	*C*	5.421	1.823	2.973	0.00*
	LGAPt -1	0.393	0.108	3.638	0.00*
	LGSZ	-2.382	0.819	-2.905	0.00*
	LCRDT	-0.746	0.421	-1.769	0.07**
	LOPN	0.196	0.077	2.543	0.01*
	LRATE	0.244	0.253	0.965	0.33
Singapore	*C*	2.793	1.204	2.319	0.02*
	LGAPt -1	0.757	0.104	3.654	0.00*
	LGSZ	-0.481	0.210	-2.283	0.02*
	LCRDT	-0.900	0.509	-1.767	0.07**
	LOPN	0.525	0.256	2.050	0.05**
	LRATE	-0.09	0.467	-1.993	0.84
Thailand	*C*	4.958	1.244	3.982	0.00*
	LGAPt -1	0.564	0.117	4.787	0.00*
	LGSZ	-2.846	0.889	-3.201	0.00*
	LCRDT	-0.092	0.509	-0.252	0.80
	LOPN	0.179	0.084	2.131	0.03*
	LRATE	-0.629	0.368	-1.706	0.07**
Philippines	*C*	0.923	0.449	2.057	0.05**
	LGAPt -1	0.597	0.154	3.864	0.00*
	LGSZ	0.752	0.572	1.314	0.19
	LCRDT	0.363	0.326	1.114	0.26
	LOPN	0.098	0.111	0.876	0.38
	LRATE	-0.059	0.030	-1.943	0.06**
Indonesia	*C*	2.149	0.773	2.778	0.00*
	LGAPt -1	0.272	0.107	2.538	0.01*
	LGSZ	-0.929	0.507	-1.832	0.06**
	LCRDT	0.295	0.185	1.590	0.11
	LOPN	0.182	0.098	1.853	0.06**
	LRATE	-0.370	0.209	-1.765	0.07**

Among ASEAN–5 countries, Malaysia and Thailand are among the lowest ranking of shock amplification which implies that an external shock is likely to exacerbate more aggregate output from potential output compared to other countries. The large size of shock amplification in these countries is due to their high trade intensity on economy. A declining of export growth causes a great impact on aggregate output downfall which contributes high shock amplification [44, 45]. Moreover, the high size of shock amplification in Thailand also is explained by the internal factors such political unrest, drought and heavy flood that undermine business confidence and investment climate and exacerbate the effect of external shock [46, 47].

Shock amplification of Singapore is below than average shock amplification despite; this country is highest economic openness among the ASEAN–5 countries. Singapore is appeared to has a strong macroeconomic stability that is subject to low inflation rate and unemployment rate over years. These conditions would not impose a high risk on the economy which in turn, economic shock would not exacerbate aggregate output very much from potential output [48]. The sizes of shock amplification in the Philippines and Indonesia are smaller than other countries. These countries typically have a low degree of economic openness compared to other countries which makes them are less exposed to external shocks. Thus, external shock would contribute a less negative effect on GDP growth[49, 50].

Table-1: SUR Estimation Results, 1981 – 2014

Diagnostic Test		**Value**
R – squared		0.86
Adjusted *R* – squared		0.82
Prob (*F* – statistics)		0.00*

Note: * and ** indicate rejection of the null hypothesis at 5% and 10%, respectively

Table-2: The Result of Wald Test on SUR Estimation

Test Statistic	Value	df	Prob.
F - statistic	334.66	(30, 126)	0.00*
χ^2	34.80	30	0.00*

Note: * indicates rejection of the null hypothesis at 5%

Table-3: Size of Shock Amplification and Size of Shock Persistent in the ASEAN–5 countries

	Economic Resilience Dimension			
Country	Shock Amplification	Ranking	Shock Persistent	Ranking
Malaysia	5.421	5	1.647	2
Singapore	2.793	3	4.115	5
Thailand	4.958	4	2.293	3
Philippines	0.923	1	2.481	4
Indonesia	2.149	2	1.373	1
Average	*3.248*		*2.381*	

From the size of shock persistent perspective, Singapore is the lowest resilient among the ASEAN–5 countries. As a small and highly open economy, external shock such as weakened demand in global market could prolonged the downfall of export demand for externally dependent sectors in Singapore which in turn, causes a high shock persistent in this country [51]. Also, the size of shock persistent in Thailand is appeared to be relatively higher than other countries. This country faced several episodes of political unrest and military coup where these shocks are likely to hinder government function overtime and increase uncertainties in investment climate. Large investment projects can be delayed due to these uncertainties which in turn, prolonged output fluctuation in business cycle [52, 53]. The size of shock persistent of the Philippines is not much different with Thailand. Shock persistent in the Philippines is due to a lack of sustained periods of improvement in the key growth determinant such as human capital and physical capital development and financial and technological factors [54]. It is difficult for this country to stabilize economy during economic crisis as the key growth determinant are absent. Thus, this factor increases the persistent of shock in this country.

In contrast, Malaysia has a low size of shock persistent. Although external shocks could persistently slow economic growth in this country but, robust in domestic demand such as private consumption seems to offset external shocks quickly to pre–shock level which makes the external shocks are less persistent [55]. Moreover, Nina and Tuladhar [56] argued this country has sizeable government expenditure to GDP that serves to smooth domestic demand which insures the economy against the falling of external demand and shortened external shock. Indonesia is the lowest size of shock persistent among the ASEAN–5 countries. Since private consumption to GDP ratio in Indonesia is among the highest in the ASEAN–5 countries, a robust private consumption in domestic demand helps to quickly offset the effect of export downfall [57]. In addition, Sangsubhan and Basri [58] argued that export structure of Indonesia concentrates on natural resource and related products which the export demand of these products is inelastic. A shock in export demand causes declining of export price rather than export volume. Therefore, the external shock causes a short–lived the contraction of export growth since export volume does not fall too much. This contributes a small size of shock persistent.

POLICY IMPLICATION AND CONCLUSION

To sum up, the degree of resiliency is different for each the ASEAN–5 countries. The countries with high economic openness such as Malaysia, Thailand and Singapore tend to pose a high shock amplification. Whereas, the sizes of shock persistent in the ASEAN–5 countries are subjected to several issues such exposure to persistent external shock, political instability and lack of key growth determinants. Several measures can be taken by these countries into their consideration

These countries need to reduce vulnerable factors that can undermine the resiliency of these countries. Such highly depend on external market, external shocks would more significantly amplify the economy from the equilibrium and in turn, cause the countries to be less resilient. In this regard, the formation of ASEAN Free Trade Formation (AFTA) is suitable platform to avoid vulnerable factors from other regions. Through removing trade barrier within the ASEAN region, this formation could reduce trade dependence on other regions and promote more trade as well as investment flows within ASEAN region. By strengthening this formation, it would leave this region less vulnerable to external shocks.

Vulnerability also comes from internal factors. Political turmoil for instance, should be avoided in order to maintain business confidence and investment climate. Country should practice more democracy in administration which allows smooth government transition without civil unrest and riot. By having political stability, it not only ensures

government to function properly but, it promotes investor confidence, attracts more foreign direct investment which offsets the downfall of aggregate output during economic shock.

Furthermore, economic resilience can be strengthened by pursuing active macroeconomic policies. Fiscal policy and monetary policy can be utilized to influence AD and aggregate output and bring back to potential output. Therefore, a good coordination between fiscal policy and monetary policy which aims to reduce output volatility would smooth the process to achieve economic stability.

Moreover, macroeconomic policy should focus on keys determinant growth in order to promote a quick economic stability. These keys such as improving physical capital, human capital, infrastructures and technological factors can promote fixed capital formation and attract more foreign direct investment that lead to reduce the persistent of investment downfall during economic shock.

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