Internet User and Economic Selected Southeast Asia Nations: A Panel Data Analysis

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ABSTRACT

There has been an increasing interest among academicians about the relationship between the internet user and economic growth. The adoption of the internet creates an effective platform of business trade that provides expediency and convenience in doing business globally and thus results in tremendous dependency on technology to expand business locally and internationally. Hence, the use of the internet plays a crucial role in the economic development of a country and undoubtedly, to a certain extent, affects the economic growth of a nation. This paper aims to examine the relationship between the internet user and economic growth in seven selected Southeast Asia countries. Panel Autoregressive Distributed Lag (ARDL) (PMG) model is employed in examining the relationship between the internet user and economic growth from the year 1997 to 2013. Consistent with the endogenous growth theory proposed by Romer (1986), this study reveals that internet user and trade positively and significantly affect the economic growth in selected Southeast Asia countries. The increase in the use of internet thus is philanthropic to the users and can lead to faster economic growth. Internet improves the standard of living of an individual.

1. Introduction

The advent of modern information technology results in global changes on the means of marketing products and services, conducting and concluding business transactions on a worldwide scale of a borderless world which renders internet to become the fastest growing technology, selections and strategic way in enhancing and expanding business around the world. Adoption of the internet creates an effective platform for bourgeoning business trade in the provision of expediency and effectiveness in doing business globally. It thus results in tremendous dependency on this technology to expand the business

nationally and internationally. An internet user is a person who is connected to the internet by any form of technological devices. Hence, the use of the internet by the internet user plays an imperative role in the

economic*development of a country and undoubtedly to a certain extent affect the economic growth of the nation (Choi & Yi, 2009; Jin & Jin, 2014; Salahuddin & Gow, 2016; Sassi & Goaied, 2013).

This paper will examine the relationship between the internet user and economic growth in seven selected Southeast Asia countries[1]Emphasis is made in the region of Southeast Asia due to several reasons. First, according to statistic evidence in Google and Temasek Report 2017, internet business is approximately $50 billion in the year 2017. It has been forecasted to increase about four times the figure in the year 2025, which is approximately $200 billion. Second, Southeast Asia is an active growing region for internet with approximately 330 million active internet consumers which makes Southeast Asia the third-largest market of internet users worldwide. Third, Global Digital Report 2019 states that, in terms of internet usage per day, consumers in Southeast Asia spent about 3.6 hours per day (on mobile) as compared to average US consumers of only two hours per day. Shortly, services related to mobile-based in Southeast Asia will bloom and eventually enhance global investment.

Per Jorgense, Ho and Stiroh (2008), corporations that have been leveraging on the internet as a source of information changing and distribution demonstrating increased productivity. According to Kenny (2003), technology and economic growth may be detrimental to the impact of the internet in developing countries. Since different economists define technology differently, there is an issue as to whether technology is affecting the quality of life in the long-term. Thus, it is worthy of examining the relationship between the internet user and economic growth among Southeast Asia countries.

The most prominent contributing factor to the usage of internet in Southeast Asia is limited access to the internet among existing and potential users. Consistently, a study conducted by West (2015) proved that it had been an issue in developing countries of internet access and its connectivity.

Based on the issues highlighted above, we can say that in general, the relationship between the internet user and economic growth is still unclear and warrants further investigation. Therefore, this paper emphasises the examination of the relationship between the internet user and economic growth in seven selected Southeast Asia countries since less empirical evidence on the impact of internet use on economic growth has been explored in this settings. Furthermore, the internet remains a new platform for businesses to conduct transactions in these selected countries. Therefore it is crucial to examine the influence of internet user on economic growth. The primary motivation of this paper is to examine the relationship between the internet user and economic growth in seven selected Southeast Asia countries. This paper is structured into six sections, section one is the introduction, and section two discusses the underlying theory. Section three reviews the related literature. Next, section four discusses the data and the proposed empirical method. Section five provides empirical findings of the study, while the last section concludes the paper.

2.   Underlying Theory

Theories applicable in examining the relationship between the internet user and economic growth are Endogenous Growth Theory and Diffusion of Innovations theory. It is commonly known to the world that the internet is a primary source of information and ideas hub and is useful for the retrieval of information as an input. The usefulness of internet has contributed to the development of economic growth as well as

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assisting in the innovation processes according to Endogenous Growth theory (Aghion & Howitt 1998; Lucas, 1988; Romer 1986, 1994). According to the theory, the internet has brought a new world to modern communication networks and henceforth facilitates its growth. Overall, it is apparent that the internet has contributed to the rapid dissemination of ideas and information, thus contributes to the growth of macroeconomic through increased competition and development of new products, processes and business models. Growth in the economy can be facilitated through a medium that provides dissemination of information at a lower cost. Also, the abundance of knowledge, especially in a way that is organised across corporations and regions around the globe, may contribute significantly to economic growth.

Rogers introduces the diffusion of Innovations theory in 1995. This theory elucidates in details on how, why and at what rate the new ideas and technology spread. He argues that diffusion is the process where innovation is associated through specific channels over time between the social society members. Unlike invention, innovation is making something into existence (Vuarin & Rodriguez, 1994). These innovations greatly benefit users through internet banking and online business shopping. These innovations of technology as well as assist internet user in conducting the business more conveniently, effortlessly and efficiently. Internet is a new technology that assists people in conducting their business efficiently either locally or internationally. Therefore, this technology is beneficial to the users in terms of cost-effectiveness and timeliness in the buying and selling activities which only happens with a touch of their fingertips on the devices, for instance, the computer and mobile telecommunication equipment without entering the physical stores (Mokhtar, Yusoff, Asmuni & Fauzi, 2020).

3.   Review of the Related Literature

Area of study in regards to the internet is rising considering this new technology (internet) creates an edge in terms of expediting business transactions activities more efficiently than the previous traditional business practices and thus contributes to the growth of the economy of a country. This new emerging technology inspired researchers to investigate the implication of using the internet and the economy of a country. Recent empirical findings on the relationship between the internet user and economic growth are discussed in this section. Interestingly, several previous empirical pieces of evidence reveal that internet improves economic growth of a country (Choi & Yi, 2009; Jin & Jin, 2014; Salahuddin & Gow, 2016; Sassi & Goaied, 2013).

The relationship between internet usage and economic development has been studied in several countries such as South Africa, MENA countries[2] and 36 high-income countries (Choi & Yi, 2009; Jin & Jin, 2014; Salahuddin & Gow, 2016; Sassi & Goaied, 2013). Although the researchers utilise different method (Autoregressive Distributed Lag, Generalised Method of Moments and correlation coefficient) and sample countries yet, the studies report similar finding with internet user positively related to economic growth. Moreover, Noh and Yoo (2008) and Elgin (2013) study on the impact of internet user and economic growth on multi countries in Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam. The same method of fixed effects is utilised; however, the authors reported mixed results. A study conducted by Noh and Yoo (2008) proves that the internet affects economic growth negatively in countries where high-income inequality is prominent, indicating accessibility of internet-only among the rich.

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[2] MENA: Middle East and North Africa

Based on the review of related literature, there are mixed findings on the relationship between the internet user and economic growth. However, previous researchers study the relationship between variables of interest this current study intends to investigate (internet user and economic growth) by combining Southeast Asia countries with other developing and developed countries such as New Zealand, Japan and Australia. Besides that, the authors report their results as a group rather than a single country analysis.

Also, previous empirical studies that examine on the relationship between the internet user and economic growth used single theory namely Endogenous Growth theory (Choi & Yi, 2009; Czernich, Flack, Kretschmer & Woessmann, 2011). Meanwhile, this study utilised another theory, namely Diffusions of Innovation theory in proving the relationship between the internet user and economic growth.

From above past studies, we can argue that advent and rapid growth of the internet demonstrate substantial implications or effect on the economy. Evidence of past studies strongly supports the positive effect of the internet on economic growth. Therefore, in improving the whole level of internet development, users, enterprises and government must pay more attention to this new technology in accelerating number of internet users. Likewise, the internet plays an essential role in boosting the economy, specifically through trading. Running businesses through physical stores may be unnecessary in the future, as there will be a shift from the traditional version of a physical store to online store. Hence a well-designed web is essential in reaching potential customers in future. The cost of running businesses through the internet is evidently less and hence allows for higher profit margins, thus enhancing the economic growth of the country (Delawari, 2019).

4.   Data and Empirical Method

This paper utilises Panel Autoregressive Distributed Lag (ARDL) model in examining the relationship between the internet user and economic growth in seven selected Southeast Asia countries. Given the inconsistency problem in estimating traditional panel models, Pesaran, Shin and Smith (1999) propose pooled mean group (PMG) model or panel autoregressive distributed lag (PARDL) to overcome the limitation. The authors claim that the PMG model is superior as compared to static panel models. PMG model allows for heterogeneity of the intercept, short-run coefficients and the error variance while imposing a cross-country homogeneity restrictions only on the long-run coefficients irrespective of whether the included series are I(0), I(1) or of mixed order integration. Besides, PMG is estimated using a maximum likelihood (ML) estimator where the error correction term (ECT) is expected to be negative and statistically significant if the model exhibits an expected return to long-run equilibrium. The PMG model relies on a combination of pooling and averaging of coefficients. Similarly, the model is estimated using long panel data (T>N) (T= period of study); N= number of selected countries) However, not suitable for data that cross-section is more than time. However, the primary interest of PMG model estimation is the speed of adjustment (error correction term) and the coefficient of long-run estimates. The period of study is seventeen years ranging from the year 1997 to 2013. The regression model for this study is presented as follows:

$$GDP_{it} = \alpha + \beta_1 ITU_{it} + \beta_2 EMP_{it} + \beta_3 ENG_{it} + \beta_4 TRD_{it} + \varepsilon_{it} \qquad (1)$$

Where GDP_{it} is the logarithm of gross domestic product per capita, ITU_{it} is individuals using the internet, EMP_{it} is employment, ENG_{it} is energy, TRD_{it} is trade consists of import and export. Finally, ε_{it} is an error term. All data are in natural log (ln). The dependent variable is economic growth which is measured using GDP per capita, and independent variables are individuals using the internet, employment, energy and trade are collected from the World Bank Database (2019).

Table 1. Summary of the definition of variables

Variables	Measurement	Sources	Expected Outcome
GDP	GDP per capita (current US$)	World Bank database	+
ITU	Individuals using the internet (% of the population)	World Bank database	+
EMP	Employers, total (% of total employment)	World Bank database	+
ENG	Energy use (kg of oil equivalent per capita)	World Bank database	+
TRD	Trade (% of GDP)	World Bank database	+

Table 1 displays the expected outcome of this study. The relationship among the dependent variable (economic growth) and independent variables (internet user, employment, energy and trade) are expected to be positive and significant.

5.   Empirical Findings

Table 2 exhibits a summary of descriptive statistics for the dependent variable (economic growth) and independent variables (individuals using the internet, employment, energy and trade).

Table 2. Descriptive Analysis

	Obs	Minimum	Maximum	Mean	Standard Deviation
	119	2.5398	4.7812	3.6216	.6268
GDP (USD billion)		2.8534	4.5074		.6381
		3.1256	4.0404		.2022
	119	.0040	80.9021	24.7016	22.8419
Internet User (%)		5.4477	54.1487		17.9915
		-15.9755	61.4904		15.5547
	119	.0540	9.6760	3.3593	1.5695
Employment (%)		1.2616	5.4370		1.2486
		.8644	9.8011		1.0563
	119	45.5121	441.6038	152.7297	100.6723
Trade (%)		59.0271	375.4756		106.0021
		91.1390	218.8579		20.5442
	119	2.5072	3.9925	3.1952	.4566
Energy (kg)		2.6633	3.8825		.4859
		3.0241	3.3516		.0663

Based on Table 2, statistics for economic growth are 2.54 (minimum), 4.75(maximum), 3.62 (mean) and .63 (standard deviation). Furthermore, the mean value for the internet user is 24.70, while the standard deviation is 22.84.

Table 3. Correlation Analysis

	GDP per capita	Internet User	Employment	Trade	Energy
GDP per capita	1.0000				
Internet User	0.7622	1.0000			
Employment	0.5523	0.5380	1.0000		
Trade	0.5874	0.6364	0.4697	1.0000	
Energy	0.9410	0.6338	0.3901	0.5175	1.0000

Based on Table 3, internet user, employment, trade and energy have a positive correlation with economic growth. Besides, energy has the strongest positive correlation with economic growth followed by the internet user, trade and employment. Besides that, multicollinearity test is executed to check any existence of a problem that may lead to misspecification of the regression model.

Table 4. Multicollinearity Test

Variables	VIF
Internet User	2.35
Trade	1.81
Energy	1.74
Employment	1.47

Based on Table 4, there are no multicollinearity problems as the results reveal that all variables have the values of VIF (Variance Inflation Factor) lower than 10.

Table 5. The result from Panel Autoregressive Distributed Lag (ARDL) estimation.

Variables	Coefficient	t-stat	p-value
ITU	0.0135***	8.07	0.0000
EMP	-0.0045	- 0.32	0.7469
TRD	0.0026***	3.66	0.0004
ENG	0.1809	0.25	0.4633
ECT	-0.2391	-2.22	0.0289

Note: ***significant at 1% level. The dependent variable is economic growth which is measured using GDP per capita.

Table 5 indicates the result from panel Autoregressive Distributed Lag (ARDL) of long-run estimation. The result reveals that the number of internet user has a positive and significant influence with GDP per capita at 1% level of significance. Since higher GDP per capita signals higher economic growth; hence, the findings state that the number of internet user enhances economic growth. Since the internet contributes to the dissemination of knowledge across countries, the more the usage of internet, the higher the impact on

economic growth will be, and vice versa (Choi & Yi, 2009). This result is also in line with prior studies (Choi & Yi, 2009; Jin & Jin, 2014; Salahuddin & Gow, 2016; Sassi & Goaied, 2013).

The result indicates that a positive and significant effect of trade on economic growth at 1% significance level. This finding is consistent with prior works of literature (Hassan, Sanchez & Yu, 2011; Keho, 2017). Trading stimulates competition among businesses in the economy. Eventually, it leads to the rapid development of economic growth through broader market accessibility, enhancement of investment and innovation in research and development (Hassan, Sanchez & Yu, 2011).

In summary, this paper divulges that internet users and trade are essential elements in ensuring the development of economic growth in seven selected Southeast Asia countries. Meanwhile, employment and energy are not crucial in affecting economic growth.

6.   Conclusions

The empirical results specify that internet user and trade have a significant and positive effect on economic growth in seven selected countries in Southeast Asia. The results strongly support that internet user and trade positively influence the economic growth of countries (Salahuddin & Gow, 2016; Keho, 2017). Improving the whole level of internet development requires the commitment of various parties, especially users, the enterprises and government, to make it successful. The worldwide acceptance of this new information technology makes internet indubitable. It requires exceptional attention by promoting and encouraging its use, particularly amongst individual users and the enterprises to improve the standard of living and for the betterment of daily activities of the countries. Provision of adequate training on technology professional helps in accelerating the number of internet users as well as promoting economic growth through trading activities. Increase in the use of internet thus is philanthropic to the users in selected Southeast Asia countries and could lead to faster economic growth.

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