Asessing the Role of Internet Development on Entrepreneurial Activity

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Abstract. This study investigated the impact of internet development, including internet usage, fixed broadband subscriptions, and secure internet servers, on entrepreneurial activity, proxied by Global Entrepreneurship Index (GEI). This study, which covered 109 countries from 2015 to 2019, used the fixed panel regression method. The result showed that internet usage and secure internet servers have significant negative effects on the GEI. In the case of the economic classifications, the internet variables have a significant negative effect on the global entrepreneurship index in emerging and developing economies. However, in the case of advanced economies, internet variables have no significant effect on GEI. The effect of digitalization through internet technology must be considered for policymakers to manage the entrepreneurial ecosystems. The integration between entrepreneurship and internet could maintain the higher technological development to increase the higher output.

Keywords: Business Analytics · Economic Factors · Global Entrepreneurship Index · Internet

1 Introduction

Entrepreneurship is regarded as one of the most important economic driving forces that accelerates any country's economic growth [1, 2]. The difficulty of promoting economic success through the growth of output and affects both developed and emerging countries. Entrepreneurship can be a solution for reached the higher output of the economy due to primary thing cause the economic development [3–5]. The condition of entrepreneurship could be considered as the quality of economic development due to important input for country economies [6]. Entrepreneurship penetrates all element of economic growth; it not only stimulates growth by bringing new combinations, but also by providing small changes that have an influence over time [7]. Therefore, entrepreneurship became a vital indicator in all of countries for gain the potential economic growth. The development of entrepreneurship recently utilized the technology to promote more output. As the rapid development currently, internet could become the main technology for accelerated the entrepreneurship. The quality of work as a driver of innovation in start-up.

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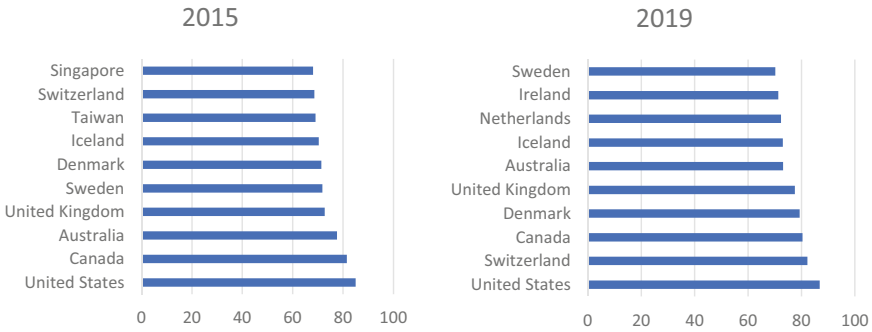

Fig. 1. The Top 10th Countries with Higher Global Entrepreneurship Index (GEI), 2015 and 2019 Source: Global Entrepreneurship Development Institute, [23].

business and offer implications for useful policies aimed at enhancing entrepreneurship performance [8]. Internet plays an important role for entrepreneurship activities through gain more information and financing access [9]. There are several literatures addressed the relationship of ICT and entrepreneurship [10–12]. Supports openness to increase conditions for entrepreneurship in case of Sub-Saharan Africa [13]. Based on previous research, internet could implicate the higher entrepreneurship as the main input for business output.

Economic variables could be considered as the factors affecting the entrepreneurship condition of the country, addressed recently by several scholars [14–18] There are several economic variables have been observed to affected the entrepreneurship, namely Gross Domestic Product (GDP), Gross Domestic Product per Capita (GDPC) and Foreign Direct Investment (FDI). It is found that these variables are significant on entrepreneurship.

However, the exploration to more economic variables must be considered. Labour condition can be a other economic variables that affect on entrepreneurship due to demand and supply of labour by firms. The economic freedom index could be considered for the improvement of entrepreneurship due to assessment of the economic condition from institutional governance and regulation [19]. Therefore, this index must be important for entrepreneur in global world. According the Fig. 1, there are top 10 countries with higher performance in global entrepreneurship index. There are several changes from the position from 2015 to 2019 and the involvement of new country in 2019. United States is the country with the highest global entrepreneurship index with 85 and 87, respectively. However, there is a significant change in other countries below United States. It is implicated for what determines the global entrepreneurship index in global world. Coincide with the higher internet development, the purpose of this research to examine the effect of internet development on entrepreneurial activity, indicated by Global Entrepreneurship Index (GEI). We also added several economic factors that could influence on entrepreneurial activity. Furthermore, we extended our research by investigating this effect into two economy classifications: Advanced Economies and Emerging and Developing Economies.

2 Materials and Method

The panel regression was applied through three estimation, namely ordinary least squares (OLS), random effect model (REM), and fixed effect model (FEM). This approach is relevant to examine the impact of internet development on global entrepreneurship index, classified into country composition of WEO groups. However, the correlation matrix was initially performed to check for multicollinearity, and the regression value has to be less than 0.8 or 0.9 [20, 21]. After estimating the three model of regressions, we subsequently used the Chow test (FEM or OLS) and Hausmann tests (FEM or REM) to choose the best model for explaining the determinants. Based on the research objectives, we applied the panel regression model by reviewing the several literatures. The simple equation of panel regression was formulated as follows:

$$GEI_{it} = F(X_{it}) \tag{1}$$

Where GEI_{it} is a global entrepreneurship index in country i and year t. X_{it} is the explanatory variable, including all factors that affected the GEI. We developed the conceptual into several explanatory variables. The extended equation of panel regression in this study can be written as follows:

$$\begin{aligned} \text{Log}(GEI)_{it} = {} & \beta 0 + \beta 1\text{Log}(GDP)_{it} + \beta 2\text{Log}(GDPC)_{it} + \beta 3FDI_{it} \\ & + \beta 4\text{Log}(LAB)_{it} + \beta 5\text{Log}(EFI)_{it} + \beta 6\text{Log}(INT)_{it} \\ & + \beta 7\text{Log}(FBS)_{it} + \beta 8\text{Log}(SEC)_{it} + \epsilon_{it} \end{aligned}$$

Where GEI is the global entrepreneurship index in country i and period t, GDP is the gross domestic products in country i and period t, GDPC is the gross domestic products per capita, FDI is the foreign direct investment in country i and period t, LAB is the labour participation in country i and period t, EFI is the economic freedom index in country i and period t, INT is the internet usage in country i and period t, FBS is the fixed broadband subscription in country i and period t, SEC is the secure internet server in country i and period t and ε is residual term.

The dataset of this study compiled from Global Entrepreneurship Development Institute, Heritage Foundation and World Development Indicator (WDI) [22]. The analysis was based on yearly data from a cross section of 109 countries with period from 2015 until 2019. It is due to all of data in explanatory variables are not completed for several countries. The specific description about the variables, source and expected sign are summarized in Table 1. Additionally, we also extended our research by identifying the effect of internet development on global entrepreneurship index with country composition of World Economic Outlook (WEO) groups.

3 Results and Discussion

Table 2 shows the summary statistics of the data. The mean, median, maximum, minimum, standard deviation (Std Dev) and observation (N) of all dependent and independent variables in the whole sample were plotted. Based on Table 3, the correlation value

Table 1. The Description of Variables

Variables	Unit	Source	Expected Sign
Global Entrepreneurship Index	Index	Global Entrepreneurship Development Institute, via Knoema	
Gross Domestic Product (GDP)	Constant 2015 US$	World Development Indicator (WDI) [22]	+
Gross Domestic Product per Capita (GDPC)	Constant 2015 US$	World Development Indicator (WDI)	+
Foreign Direct Investment (FDI)	% of GDP	World Development Indicator (WDI)	+
Labour Participation (LAB)	-	World Development Indicator (WDI)	+
Economic Freedom Index (EFI)	Index	Heritage Foundation, via Knoema	+
Internet Usage (INT)	% of population	World Development Indicator (WDI)	+
Fixed Broadband Subscription (FBS)	-	World Development Indicator (WDI)	+
Secure Internet Servers (SEC)	-	World Development Indicator (WDI)	+

Table 2. Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	N
GEI	3.503	3.500	4.464	2.171	0.524	545
GDP	25.576	25.449	30.625	21.850	1.813	545
GDPC	9.047	9.118	11.558	5.629	1.384	545
FDI	4.272	2.444	145.953	-40.291	11.754	545
LAB	15.752	15.512	20.500	12.214	1.576	545
EFI	4.144	4.146	4.502	3.733	0.151	545
INT	3.930	4.220	4.602	0.693	0.712	545
FBS	14.120	14.190	19.258	8.783	2.056	545
SEC	8.939	8.933	17.522	1.609	3.101	545

Table 3. Correlation Matrix

	GDP	GDPC	FDI	LAB	EFI	INT	FBS	SEC
GDP	1.000							
GDPC	0.526	1.000						
FDI	-0.066	0.090	1.000					
LAB	0.724	-0.199	-0.132	1.000				
EFI	0.307	0.717	0.143	-0.208	1.000			
INT	0.448	0.871	0.051	-0.185	0.579	1.000		
FBS	0.883	0.467	-0.041	0.639	0.201	0.496	1.000	
SEC	0.810	0.664	-0.004	0.407	0.511	0.627	0.748	1.000

between variables less than 0.9. It is indicated that the all of variables in the model can employs the panel regression.

The panel regression was applied to investigated the impact of internet variables on global entrepreneurship index. According on Table 4, we found that the fixed effect model was used to estimate the impact of internet on global entrepreneurship index from Hausman test at significant in 1%. There is a positive effect from GDP on global entrepreneurship index. However, GDP per capita and labour participation have a negative impact. In internet variables, we found that the negative effect of internet usage and secure internet servers on global entrepreneurship index.

There is no effect of fixed broadband subscription as the internet infrastructure. This model has 0.967 R-Square, indicating these variables could explained the model approximately 96,7%. The rest of value (3.3%) is the other variables beside model.

We extended our analysis into two economic classifications in Table 5. The fixed effect model was also applied based on the Hausman test at a significance of 1%. In advanced economies, GDP has a positive effect and significance on the global entrepreneurship index. Otherwise, GDPC and FDI are negative and significant. Surprisingly, all internet variables could not affect the global entrepreneurship index in advanced economies. Differing from this result, GDP and FDI are positive and significant in emerging and developing economies. However, labor participation is negative and significant. The internet variables, including internet usage and secure internet servers, are negative and significant on the global entrepreneurship index. Both models, including advanced economies and emerging and developing economies, have a higher R-Square value with 0.933 and 0.938, respectively.

From the panel regression result, we found that there are several factors could affect on global entrepreneurship index. There is a significant and positive effect from GDP, meaning that the growth of GDP in 1% could increase global entrepreneurship index in 1.37%. It is similar with the previous results in numerous studies [14, 17]. The higher GDP means this country have a higher output, implicating the potential for doing the entrepreneurship due to availability of cheaper goods and higher demand. However, GPDC as the representation of income per people is negatively significant. The higher GDPC could decreased the entrepreneurial activity due to entrepreneurship also being

Table 4. Panel Regression (All Countries)

Variables	CEM	FEM	REM
C	-2.495*** (-5.780)	-2.173 (-0.396)	-2.060*** (-3.724)
GDP	-0.008 (-0.140)	1.372*** (3.078)	-0.009 (-0.102)
GDPC	0.286*** (5.105)	-1.024** (-2.341)	0.415*** (4.735)
FDI	-0.001 (-1.456)	-0.001 (-1.083)	-0.001 (-1.156)
LAB	0.001 (0.016)	-1.241*** (-3.755)	-0.011 (-0.122)
EFI	0.814*** (8.585)	0.216 (1.276)	0.617*** (5.236)
INT	-0.065** (-2.205)	-0.426*** (-8.213)	-0.292*** (-9.631)
FBS	0.033*** (0.033)	0.029 (0.897)	0.077*** (5.241)
SEC	0.002 (0.374)	-0.024*** (-3.323)	-0.029*** (-5.534)
F-Statistics	346.51***	107.67***	115.46***
R-Squared	0.838	0.967	0.633
Chow-Test		865.059***	-
Hausman-Test		-	112.205***
N	545	545	545

Notes: ***, **, and * = significant at 1%, 5% and 10%

the alternative solution for survival [24]. It is means that the higher income affected on lower tendency to create business. Labour participation also negative and significant on global entrepreneurship index. It is due to higher labour can affected on entrepreneur to hire more employment and minimize the technological usage, implicating the higher cost for firms.

The effect of internet variables is negative and significant on global entrepreneurship index through internet usage and secure internet servers. The result means that the increased of internet usage and secure internet servers in 1% could decrease the global entrepreneurship index with 0.43% and -0.02%, respectively. The internet usage and secure internet servers are relatively similar, resulting the negative effect. The internet development could decrease the entrepreneurial activity through the tight competition and entrepreneur's discretion. Mostly countries in emerging and developing economies have a lower condition of internet technology than advanced economies due to lack of energy supply and infrastructure [25]. It is also aligned with panel regression result in

Table 5. Panel Regression (Economies Classifications)

Variables	Advanced Economies	Emerging and Developing Economies				
	CEM	FEM	REM	CEM	FEM	REM
C	-2.161*** (-2.940)	-22.541*** (-2.710)	-1.907* (-1.853)	-2.812*** (-5.154)	2.912 (0.426)	-2.475*** (-3.471)
GDP	0.093 (0.779)	1.420** (2.040)	0.156 (0.807)	-0.035 (-0.528)	1.020* (1.865)	-0.007 (-0.066)
GDPC	0.094 (0.733)	-1.922** (-2.608)	0.047 (0.234)	0.278*** (4.387)	-0.702 (-1.332)	0.389*** (3.824)
FDI	-0.002*** (-2.682)	-0.001*** (-2.689)	-0.001*** (-3.262)	0.005** (2.362)	0.003** (2.411)	0.004*** (2.856)
LAB	-0.083 (-0.666)	0.408 (0.532)	-0.135 (-0.666)	0.051 (0.774)	-1.211*** (-3.210)	0.009 (0.086)
EFI	0.516*** (3.364)	0.085 (0.256)	0.536** (2.551)	0.828*** (7.200)	0.220 (1.131)	0.632*** (4.511)
INT	0.379** (2.249)	0.274 (1.310)	0.248 (1.481)	-0.005 (-0.143)	-0.336*** (-5.174)	-0.244*** (-6.546)
FBS	0.005 (0.202)	0.08193 (1.340)	0.016 (0.438)	0.042*** (3.385)	0.035 (0.927)	0.085*** (4.975)
SEC	0.007 (0.688)	-0.008 (-0.752)	-0.018*** (-2.638)	-0.020** (-2.488)	-0.039*** (-4.171)	-0.047*** (-6.542)
F-Statistics	28.678***	43.246***	7.098***	111.88***	53.58***	49.91***
R-Squared	0.595	0.933	0.267	0.707	0.938	0.518
Chow-Test	-	297.04***	-	-	587.713***	-
Hausman-Test	-	-	40.475***	-	-	77.909***
N	165	165	165	380	380	380

Notes: ***, **, and * = significant at 1%, 5% and 10%

two economic classifications, we found that the internet variables only affected on global entrepreneurship index with negative sign in emerging and developing economies. The higher internet adoption in the country could create a new competition for entrepreneur, growing as the opportunity or threat for certain business [26]. Internet can reduce the barrier of trade, indicating the entrepreneurship can expand in overseas countries with higher potential to gain revenue. It could influence on global entrepreneurship index in the country. The development of internet recently competes with the entrepreneurship due to easier to doing a business. Therefore, the integration of entrepreneurship and internet can be a solution for maintaining the technological development. On the other hand, the internet application in agricultural sector generally improves their performance

in countries, categorized as emerging and developing economies [27]. Due to practical application, internet could be considered to improve output by combining with internet technology.

4 Conclusion

This study objectives to analyse the impact of internet development on entrepreneurial activity in global world. This analysis including the 109 countries in global with period 2015 until 2019. The result revealed that the negative impact of internet variables, including the internet usage and secure internet servers on global entrepreneurship index. Otherwise, GDP has a positive impact. In our extended analysis, we also found that the internet usage and secure internet servers are negative in case of emerging and developing economies. Therefore, the policymaker must maintain the internet development into stable growth for keep the higher entrepreneurship ecosystem. The higher of internet development could became the threat for entrepreneur, especially in the creation of tight competition. Authorities should instead concentrate on finding ways to balance technical advancement with internet-based business. Policymakers in emerging and developing economies must take it into consideration. There are some limitations in this research such as the involvement of countries and period of this study are restricted. Moreover, the further research could explore other variables could proxied for entrepreneurial activity or other analysis to gain a new insight about the impact of internet on entrepreneurship.

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