EFFECT OF INTELLECTUAL PROPERTY RIGHTS (IPRS) AND ABSORPTIVE CAPACITY ON RESEARCH & DEVELOPMENT (R&D): EMPIRICAL EVIDENCES IN DEVELOPING ECONOMIES

Asuantri Mohamad
Yasmin Bani

ABSTRACT

This study investigates the impact of IPRs protection and absorptive capacity on research and development (R&D) expenditure in developing economies. Utilizing panel data from 2009-2014 for a sample of 41 developing countries and applying the System-GMM estimator, we reached important conclusions. The estimated results show that IPRs protection has a positive and significant impact on R&D, however, absorptive capacity does not have a significant impact on R&D when estimated separately. The effect changes when we consider the interaction of the both variables, such that there exists a negative relationship between the interaction variables. This indicates that stronger level in IPRs protection hinders R&D efforts in the country with an inadequate level of absorptive capacity. The results also imply that both appropriate levels of IPRs protection and adequate level of absorptive capacity are necessary to increase R&D activities in the host developing countries.

Keywords: Intellectual Property Rights (IPRs), absorptive capacity, R&D, System-GMM, developing countries.

1. INTRODUCTION

Intellectual Property Rights (IPRs) are the rights that protect the owner of any inventions, designs and other related creations from any unauthorised use either economically or uneconomically by other parties. The World Trade Organization (WTO) has taken the steps to harmonize the protection of IPRs through the introduction of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) in 1994, gradually balances the protection of the IPRs between developed and developing countries. IPRs protection is defined in several forms such as patents, copyrights, trademarks as well as trade secrets. Thus, the main purpose of IPRs is as a mechanism to protect the invention from being imitated by others. As the rightful and exclusive holder of the IPRs, it is common for the owner to limit the usage of the invention for certain purposes. However, the usage of the rights also could be extended through negotiation and more often than not, followed by payment to the IPRs owner such as legal licensing as practiced by the developed to the developing countries. Consequently, TRIPS will act to mediate if there is any dispute on any unauthorised use of the rights in local or international arena. Basically, TRIPS is responsible to standardize the IPRs protection, enforcement and dispute settlement in relation to the IPRs protection among the WTO member countries.

Even though the treatment of IPRs protection has a potential to be slightly different among countries, there is a standard treatment for IPRs protection among the WTO member countries. Technology gap and difference level of IPRs protection between developed and developing countries have resulted in different need whether to innovate or to imitate. Consequently, developed countries are capable to innovate whereas developing countries tend to imitate and most of the innovation created by the developing countries imitated from the technology created by the developed countries (Helpman, 1993). As a result, the IPRs protection in developed countries is relatively higher than the developing countries.

A high technology invention by developed countries can be transferred to developing countries in several ways, such as through FDI inflows that benefits through spillovers channels such as reverse engineering, skilled worker mobility as well as through importing or exporting of goods (Cheung & Lin, 2004). Consequently, developing countries that imitate the technology from developed countries through these channels would enhance their imitative ability and innovative ability. The process of technology diffusion may also depend on the ability of the countries in absorbing the technology for developing countries namely absorptive capacity. According to Cohen & Levinthal (1990), the absorptive capacity is the capability in absorbing, assimilating and transforming new knowledge into innovation. An adequate level of absorptive capacity of the country will facilitate in exploiting the spillovers effect efficiently.

The technology diffusion from developed countries would be limited due to the lower level of absorptive capacity in the recipient countries. Also, the range of absorptive capacity in the firms depends on its current level and would be enhanced by learning process and investment efforts such as research and development (R&D) activities. The differences in the country's level of absorptive capacity demonstrate different approaches in identifying the new knowledge, exploiting, and transforming the knowledge into innovation. The higher the absorptive capacity of a country, the greater its innovation would be, as the country depends on these capabilities to create greater innovation from technologies absorbed. Similarly, Rueda Maurer (2017) and Shamsub (2014) pointed out that, while some countries receive the same technology, yet they may not that successful in transforming these factors and exploiting them into greater innovation. Therefore, an adequate level of absorptive capacity plays a vital role in absorbing and assimilating new knowledge, as well as transforming new technology into a great innovation (Cohen and Levinthal, 1990; Shamsub, 2014; Girma, 2005; Blalock & Gertler, 2009).

In today's economy, R&D investment is a crucial factor to achieve a higher technological innovation, and play a vital role in performing as input to accelerate technology in the country namely as an output. The more fund allocated to R&D, the more technology can be developed in the country, and thus, leads to increase economic growth. Product innovation would involve a high amount of R&D investment and depends on the nature of the product. In the condition of the innovation is competent and product inventions are having a good quality, it would give a great return and every single cost that's involved in R&D expenses would be reimbursed thus make a profit to the company. In addition to this, high quality of innovation with special features will reduce the possibility of the competitor to imitate the product, and thus benefits innovator by making more profit as well as leads to monopoly power which allows the innovator to sustain more profit in the long term (see for example, Smeets & De Vaal, 2016).

The IPRs protection would protect innovation and at the same time would maximize the monopoly power and extend the profit generated from the innovation by innovators (Grossman & Helpman, 1991). Consequently, IPRs protection is also one of the effective ways that considered by innovator to prevent imitation activities in the market. Thus, the innovator would be able to recover the R&D cost and generate a profit if the product can be commercialized in the market. However, due to stronger protection of IPRs, the imitator or follower would undertake their own R&D to catch up with frontier technology and normally, they are able to catch up the technology frontier after the patent has been expired (Acemoglu & Akcigit, 2012).

In this paper, we perceive how the level of IPRs protection is important to influence the R&D effort in developing countries by considering the conditional effect of absorptive capacity. Thus, the marginal increase in absorptive capacity might not give an impact on R&D, if the IPRs protection in the country is low. Increase in absorptive capacity in the condition of low level of IPRs protection would lead to increase imitation activities rather than focusing on innovative R&D that would lead to innovation (Bravo-Ortega, 2012). However, if IPRs protection is sufficient enough and augmented with adequate levels of absorptive capacity, this combination would lead to increase in R&D and would transform it into a great innovation. Consequently, this study utilized the indirect nexus between IPRs protection and absorptive capacity on R&D by using interaction term. We focused on developing countries as a sample data on the basis of our concern that developing countries would accumulate of human capital but not leads to foster innovative R&D. This evidenced by most of innovation by developing countries were imitated from developed countries and relatively low of IPRs protection in developing countries compared to developed countries. This has led to higher imitation rate and high counterfeiting activities in many developing countries, and thus these countries would not able to attain higher innovative R&D.

Essentially, as most of the innovation in developing countries comes from imitation of developed countries' products, inappropriate level of IPRs protection with higher imitative abilities would restrain an innovative R&D that helps to foster economic growth in developing countries. On the contrary, as the main concern of the stronger of IPRs would decrease imitative ability, and thus decreases the R&D efforts in developing countries, however, under the stronger IPRs protection there is possibly rises innovative R&D (Chen & Puttitanun, 2005). Furthermore, balanced IPRs protection is seen would facilitate imitation activities from developed countries' products and at the same time providing a better platform for developing countries in developing their domestic innovative R&D.

In recent years, there was an increase trend of R&D expenditure as well as technological innovation in developing countries (World Bank, 2016). Theoretically, if there is an increase in allocation in R&D expenditure as inputs, the expected output would be an improvement in technological innovation. Therefore, parallel with the increasing of the protection of IPRs in developing countries after year 2005, it may lead to innovative R&D as argued by Malva & Santarelli (2016). The authors argued that, firm in the country with stronger IPRs protection tends to invest more in appropriate R&D. In addition to this, adequate level of absorptive capability would provide a better platform to absorb and transform from R&D to innovation as argued by Martínez-Senra et al. (2015). The authors concluded that, different level of absorptive capacity and IPRs protection reveal different results in innovation, which at low levels of IPRs protection, firm with a high level of absorptive capability would do better in innovation. However, firms with low absorptive capacity are still able to enhance R&D to innovation in the condition of strong IPRs protection.

Nevertheless, there is a limited research that investigates the conditioning effect of absorptive capacity on R&D expenditures through IPRs protection. The dearth of evidence on the relationship motivates us to further investigate whether IPRs protection and absorptive capacity can accelerate innovative R&D in the host country. There is a study that investigates the relationship between IPRs protection and R&D efforts as done by Varsakelis (2001) and Malva & Santarelli (2016), however, these studies only clarify the direct nexus between IPRs protection on R&D without considering absorptive capacity in their study. Notably, we fill the research gap by extending the previous studies to combine these two factors and examine whether the level of IPRs protection augmented with absorptive capability is significant in stimulating R&D effort that leads to transform R&D into a great innovation. Our objective is twofold; first, we analyse the direct effect of IPRs protection and absorptive capacity on R&D. In addition to that, we also examine the joint impact of the two factors and analyse the indirect effect of IPRs protection on R&D through absorptive capacity.

Our results show that, IPRs protection has a positive impact on R&D while the effect of absorptive capacity is insignificant in developing countries. When we consider the interaction between the two variables, IPRs protection is positive and significant while the interaction term shows that IPRs protection impart the effect on R&D in developing economies subject to an adequate level of absorptive capacity in these countries. The rest of the study is as follows: section 2 briefly presents related literature while section 3 reports the empirical model, data and estimation strategy. Section 4 presents the estimated results and discussions, while the last section concludes this study with some policy implications.

2. LITERATURE REVIEW

According to Helpman (1993), stronger IPRs protection in the developed countries is said to reduce the imitative ability in the developing countries given that the imitation cost will be relatively higher with the increased IPRs protection. Consequently, when the IPRs protection is stronger, the imitation rate in the developing countries becomes limited; and thus, the developed countries will benefit more than the developed countries in this case. Helpman (1993) further asserted that stronger of IPRs protection in the developed countries would deter the developing countries from copying the developed countries' technology. The developed countries, then would be able to maintain monopoly power. However, most of the knowledge is categorized as public goods and the latter would be able to imitate the innovation from the former after the patent has been expired or through other channels of technology diffusion such as FDI inflows. On the other hand, Cohen & Levinthal (1990) emphasized on an important role of absorptive capacity in recognises, assimilates and transforms the knowledge into innovation as discussed in the introduction section, and thus contributes to R&D efforts in the country.

As IPRs protection directly influences level of R&D that determines the technological level in the countries, absorptive capacity also would contribute to the speedy R&D effort. Consequently, we adopted the approach that IPRs protection would give a significant effect on R&D effort through the role of absorptive capacity as model initiated by Grünfeld (2006). Model by Grünfeld (2006) relates between absorptive capacity's concepts in the firms to determine their R&D level. In this international duopoly model, foreign company would prefer FDI or exporting by considering the level of IPRs protection in domestic firms and the author consider both ways spillovers in term of cost reduction of R&D and R&D spillovers. However, the model by Ghosh & Ishikawa (2010) considers only one-way spillover which consider the spillover of the North to the South. The authors initiated that the absorptive capacity is more effective under FDI as a channel spillover, and they focused more on the location of FDI preferred by the North as well as the investment of the South in its absorptive capacity.

Some of the empirical study coincides with the arguments that IPRs protection benefits both developed and developing countries due to stronger IPRs protection would increase incentives in developed countries to invest in R&D expenditure (Kanwar, 2007; Bravo-Ortega, 2012; Malva & Santarelli, 2016). Consequently, developed countries feel more secure with the stronger IPRs protection and this not only benefits developed countries, but also developing countries as an increase in IPRs protection promote FDI inflow and legal licensing in developing countries (Yang & Maskus, 2009). FDI inflows and legal licensing between developed and developing countries would also increase the technology inflows into the developing countries. However, another study concurred the opposite view which explained that increase in IPRs protection, especially in developing countries would reduce the innovative ability and society welfare (Helpman, 1993). The theory explained that the IPRs protection only benefits developed countries and has a possibility to harm developing countries (Helpman, 1993). The authors argued that IPRs protection limits the imitation activities, increases a burden as the price offered to consume relatively high and limits the customer product choice which reduces society welfare. Furthermore, decreases the imitation and innovation activities from developed to developing countries, thus decreases the R&D effort and technology inflows into developing countries. Helpman (1993) relates this issue with the monopoly power affected from stronger of IPRs protection in developed countries would increase in labour demand thus increases the labour wages in developed countries. Consequently, continuously increase in labour wages would deteriorate the profit from innovation, thus reduces the R&D effort in developing countries.

The R&D activities implemented by the firms may involve several processes to achieve high innovation in technology. Furthermore, R&D is considered as an investment and categorised as an intangible asset that can be transformed into innovation, and thus has a possibility to be imitated by unauthorised parties. Essentially, R&D itself has spillover effect that contributes to the innovation activities. According to Fan et al. (2013), by using several regions in China as a sample data in their study, level of IPRs protection matters for the country in making decision whether to innovate or to imitate the technology. The authors used R&D data as a dependent variable to enlighten the relationship between the strengthening of IPRs on R&D. The authors found that, the increase in IPRs protection restrains R&D spillovers and in the countries with high protection of IPRs, the spillover effect from R&D is relatively less compared with the countries with low IPRs protection. Furthermore, stronger IPRs protection leads firms to intensively investing in R&D which increases in their imitative ability.

There is limited study that examines the relationship between absorptive capacities with R&D in indirect nexus. However, in the direct nexus it has been suggested that absorptive capacity is significant to give a positive impact on R&D expenditure (Kwark & Shyn, 2006). According to Kwark & Shyn (2006), the impact of R&D spillovers from host countries to recipient countries and human capital as a proxy for absorptive capacity are important factors that enhance the technology through R&D effort. Additionally, R&D effort plays an important role in enhancing the technological innovation in the sample country. A number of studies (see for example, Alvarez & Marin, 2013; Wang & Kafouros, 2009) have found that R&D activity is a catalyst for innovative industries; as the higher R&D expenditures allocated by the industry, the more benefit will be generated by the industry. This emphasised that, greater R&D activities promote better adoption of new knowledge and innovation in the creation of new product (Hsu, Lien, & Chen, 2015).

According to Lau & Lo (2015) whom used Hong Kong as sample country found that, in order to improve innovation performance, the firm must a step ahead in enhancing their absorptive capacity. Thus, the authors concluded that, improvement in absorptive capacity is important to enhance the country's capacity in exploitation of technology, assimilate and transforming the technology into innovation. According to Lai et al. (2006), more absorptive capacity is required to adapt more invention in developing country. The authors concluded that, based on the study, which used China as a sample country, from the year 1996 until 2002, reaffirmed that technology spill over in China is influenced by human capital level which shows the absorptive capacity of the host country. The study by Teixeira & Fortuna (2010) reveals that the country that own technology absorption capacity shows the higher figure as an evidence of highly educated of human capital would effectively adapt the technology from foreign country. The authors used the data from 1960 to 2001 from Portugal and concluded that human capital and domestic R&D are as a key for technological absorptive capacity for Portuguese.

3. DATA, MODEL AND METHODOLOGY

Our empirical model is the extension of the existing model from the studies from Connolly (2003) and Kanwar (2007). Still, our model is different since we have not only analysed the direct impact of IPRs protection on R&D expenditures, but we also examine the joint impact of IPRs protection and absorptive capacity on R&D expenditure. We employ panel data from 41 developing countries from the year 2009 to 2014. These specific countries are selected based on availability of the R&D expenditure data.
The model function is illustrated as follows:

RD = f (IPR, AC, FDI, OPEN, GDP) (1)
RD = f (IPR, AC, IPR*AC, FDI, OPEN, GDP) (2)

The first expression explains the R&D expenditure (RD) as a function of intellectual property rights (IPR) protection, absorptive capacity (AC), net inflows of FDI (FDI), trade openness (OPEN) and economic growth (GDP). While in the second function, we include the interaction term between IPRs protection and absorptive capacity. The interaction term is included to account for the spillover effects of absorptive capacity on IPRs protection in an influence R&D effort in developing countries.

Our proposed model is as follows:

$$LRD_{it} = \beta_{0i} + \beta_1 LRD_{it-1} + \beta_2 LIPR_{it} + \beta_3 LAC_{it} + \beta_4 LFDI_{it} + \beta_5 LOPEN_{it} + \beta_6 LGDP_{it} + u_{it} + \varepsilon_{it} \quad (3)$$

$$LRD_{it} = \beta_{0i} + \beta_1 LRD_{it-1} + \beta_2 LIPR_{it} + \beta_3 LAC_{it} + \beta_4 LIPR_{it} * LAC_{it} + \beta_5 LFDI_{it} + \beta_6 LOPEN_{it} + \beta_7 LGDP_{it} + u_{it} + \varepsilon_{it} \quad (4)$$

i = 1, 2, 3,….i ; t = 1, 2, 3,….., t

Where LRD_{it} stands for the R&D expenditures of country i at time t, βs are the parameter to be estimated, u_{it} is the country specific effect and ε_{it} is the error term. To investigate the concerned effect, in equation (3), the coefficient of $\beta 2$ will explain how the IPRs protection directly affects the R&D expenditure in selected developing economies while in equation (4), $\beta 4$ will explain how absorptive capacity influences the R&D through IPRs protection. Interaction term between IPRs protection and absorptive capacity is included in the equation (4) to examine the indirect effect of absorptive capacity on IPRs protection in influencing R&D.

The dependent variable in this study is utilised from data of R&D expenditure as percentage of GDP (LRD) as a proxy to measure the R&D level in the countries. International Property Rights Index IPRI is being used to measure IPRs protection (LIPR) and human capital index based on years of schooling and returns to education are being used as a proxy of absorptive capacity (LAC). The FDI inflows (LFDI) are measured as net inflow of foreign direct investment as percentage of GDP. In addition to that, we use GDP per capita (LGDP) as a proxy of economic growth (constant 2010 US dollar) to account for different stages of economic development. Trade openness (LOPEN) is measured by using trade as a percentage of GDP as a proxy of trade. Human capital index based on years of schooling and returns to education is being used as a proxy of absorptive capacity (LAC) and the data is obtained from Penn World Table data (version 9.0). In addition, the data for IPRI is used as a proxy for IPRs protection and obtained from the International Property Rights Index (2017) that developed by the Property Right Alliance 2017. Others macroeconomic data are obtained from World Development Indicator (WDI) and all variables are in the log form.

The independent variables used in this study are based on the relevance of the variables in giving the impact on R&D such as IPRs protection which expected to influence the R&D effort since IPRs protection is one of the factors that control technology level in the countries. Additionally, absorptive capacity is considered as one of the important variable that influences R&D due to its influence over R&D effort in the countries. In this study, we also account the important impact of FDI inflows in enhancing the R&D in the country as FDI inflows would promote technology diffusion that leads to higher R&D expenditure. GDP per capita is also taken as a consideration in our list of independent variables as the higher of economic growth, the higher allocation for R&D investment. Furthermore, trade openness is being observed as an independent variable as openness in trade would stimulate more effort to increase R&D activities.

This equation is a linear dynamic panel model as introduced by Arellano & Bond (1991) and several problems especially unobserved country-specific heterogeneity and endogeneity can be tackled easily. The model contains the lagged dependent variable as illustrated by LRD_{it-1} which is correlated with error term and leads to dynamic panel bias. The use of panel ordinary least squares (OLS) and fixed and random effect estimators are not appropriate if inclusion of the lagged dependent variable which involved with endogeneity issue. This is because we use IPRs protection as independent variable and developing countries as the sample data in this study. Thus, as in developed countries IPRs protection is used to protect innovation but in developing countries IPRs protection exists due to comply the trade agreement hence gives a possibilities of endogeneity problem in our estimation. However, the System-GMM proposed by Arellano & Bover (1995), and developed by Blundell & Bond (1998) introduces moment condition if we compare with the first difference estimator.

The particular panel estimators have two advantages. First, it controls the unobserved country specific effects that usually included in the error term in cross-sectional regression, and thus leads to create a bias coefficient as the error term may correlate with explanatory variables. Second, the panel estimators control the possibility of endogeneity issue for independent variables as causality may run between IPRs protection and R&D as an increase in IPRs leads to increase R&D. On the other hand, reverse causality may arise between R&D and IPRs protection, which common measure input as a R&D whereas output as patent and at the same time patent is categorised as one of the IPRs form. Consequently, causality and endogeneity are concerned in this study which may lead to loss of dynamic in the panel data framework as well as may lead to simultaneity bias. Based on our model, System-GMM is the best estimator as it uses first different transformation which eliminates country-specific effects, endogeneity and other misspecification issues. Thus, by estimating System-GMM for dynamic panel data and utilising of sample period of 2009-2014, IPRs protection, R&D, lagged R&D and interaction variables are treated as endogenous in this model.

4. EMPIRICAL RESULT

Table 1 presents the results for both Model 1 and Model 2.[1] In Model 1, IPRs protection is positive and statistically significant at the 5% level. However, absorptive capacity does not have a significant impact on R&D. There is a positive impact of FDI inflows on R&D at the 1% level of significance. In addition, trade openness is negative and significant at 5% significance level. The estimated results imply that a 1% increase in IPRs protection and FDI inflows increases R&D by 2.317% and 0.226% respectively in the sample countries. Meanwhile, R&D decreases by 0.795% as a result of 1% increase in trade openness.

The results are consistent with existing empirical literatures such as (see: Malva & Santarelli, 2016; Kanwar, 2007) which concluded that there is a positive nexus between IPRs protection and R&D. It can be argued that increasing IPRs protection will lead to increase in R&D since IPRs protection, ensuring the returns on R&D, and thus promoting R&D activities..

The results provided by model 2 are illustrating the further investigation of the issue where we consider the interaction term between IPRs protection and absorptive capacity as shown in column 2. The estimated results show that there is a negative and significant effect of the interaction term between IPRs protection and absorptive capacity on R&D. The absorptive capacity is not significant when analysed separately, but the effect may be indirect through the interaction with IPRs protection. This implies that low level of absorptive capacity is negatively affecting the favourable impact of IPRs protection on R&D. This result is consistent with Hurmelinna-Laukkanen & Blomqvist (2007) that investigate the nexus between IPRs protection, absorptive capacity and R&D. Additionally, too high of IPRs protection reduces R&D with insufficient levels of absorptive capacity in host countries. Overall, it signifies that the appropriate coexistence of IPRs protection and absorptive capacity is necessary in achieving optimum R&D in developing countries. The IPRs protection on the other hand, is positive and significant at 5% and implies that, a 1 % increase in IPRs protection will lead to increase in R&D by 2.317% in its direct effect and will decrease by 2.398% through its interaction with absorptive capacity.

It is necessary to check whether the estimated results, are carried out with the correct estimator. The result for AR (2), Hansen tests confirmed that there are no autocorrelation and invalidity of instruments. According to Arellano & Bond (1991), from Table 1, we found that there is no evidence of misspecification in our model due to probability value is more than 10% significance. The Hansen test also points out that the instruments are valid.

Table 1: IPRs protection and absorptive capacity estimations for 41 developing economies - System GMM

Variables	Model 1	Model 2
L.RD	0.807***	0.903***
	(0.175)	(0.158)
LIPR	2.317**	3.775**
	(1.001)	(1.442)
LAC	1.178	4.023*
	(1.404)	(2.152)
LIPR_LAC	-	-2.398**
		(1.119)
LFDI	0.226***	0.108***
	(0.077)	(0.027)
LOPEN	-0.795**	-0.308**
	(0.303)	(0.120)
LGDP	0.120	0.098
	(0.243)	(0.218)
Constant	-4.058	-7.260
	(2.233)	(1.535)
AR(1) P-value	0.041	0.168

[1] We have already run fixed effect and random effect and the results are in accordance with System-GMM but not reported here and are available upon request.

AR(2) P-value	0.113	0.241
Hansen test (p-value)	0.373	0.426
Diff in Hansen (P-value)	0.061	0.214
No of countries	41	41
No of observations	169	169
Number of instruments	28	40

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Time dummies are included, but are not reported due to space constraint.

5. CONCLUSION

Stronger in IPRs protection and the observation of significant increase in R&D expenditure in developing economies motivates us to examine on these trends. The objective of this study is to analyse whether stronger in IPRs protection in developing countries and absorptive capacity have a significant direct and indirect impact on R&D. Consequently, through interaction term between IPRs protection and absorptive capacity, we examine the spillover effect of absorptive capacity with its impact on IPRS protection in influencing R&D. The results reveal that IPRs protection gives a positive effect on R&D as concluded by Varsakelis (2001), however, absorptive capacity has unfavourable and even insignificant impact on R&D when considering its individual impact. Furthermore, when we consider their interaction, it yields a negative and significant impact on R&D. Thus, it can be derived that, the impact of stronger IPRs protection with low level of absorptive capacity tends to reduce investment in R&D. Nonetheless, the control variables are also significant with expected signs.

We draw some important conclusions from our empirical findings. Firstly, the IPRs protection leads to increase in R&D in the developing economies as proved by the study done by Malva & Santarelli (2016). However, the negative coefficient of the interaction term between IPRs protection and absorptive capacity can be concluded that stronger in IPRs protection restrain R&D in the country with inadequate levels of absorptive capacity. These findings support the evidence that stronger IPRs protection with inadequate levels of absorptive capacity in these countries hinder the imitation activities and reduce the investment in R&D. In addition, FDI inflows contribute positively to the R&D that empirically proved by Erdal & Göçer (2015). On the other hand, it is observed that GDP growth is not significant in determining the level of R&D while trade openness is negatively significant for the sample countries. Furthermore, the results imply that both appropriate levels of IPRs protection and adequate level absorptive capacity are necessary to increase R&D activities in the host developing countries. Further study is needed to encounter the impact of absorptive capacity on R&D conditioned by other factors.

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Asuantri Mohamad
Universiti Putra Malaysia
43400 Serdang, Selangor, Malaysia
Email: asuantri@gmail.com

Yasmin Bani
Department of Economics, Faculty of Economics and Management
Universiti Putra Malaysia
43400 Serdang, Selangor, Malaysia
Email: nor_yasmin@upm.edu.my