

# Tax Perceived as Barrier to Innovation

Khairunnisa Abd Samad, Nur Hayati Abd Rahman, Saiyidi Mat Roni, Nur Hazwani Mohamad Roseli, Ahmad Fadhly Arham

**Abstract:** *In spurring high level of economic development, tax as one of the fiscal policy instruments is vital in generating more revenues for the government. However, higher tax revenues mean the people and companies have to pay more out of their income thus create austerity in productivity. The present study examines the correlation between tax and newly invented products or services among firms in Malaysia. The study employs binomial logit model by using the World Bank data of 919 firms in 2015. The result shows that the correlation estimate between tax and innovation is weak, but the controlling variables such as residency, firm size and region strengthened the coefficients between the variables. There is a high concentration of residence firms not to invent new product or service when they perceived the tax as obstacle to their current operations. This study also finds a significant role of firm size on this phenomenon whereby small firms are hardly involve in innovation activities as compared to medium firms. The study thereby offers a new insight for policy formulation to consider the innovation activities in future planning.*

**Index Terms:** Tax, Innovation, Binomial Logit Model, World Bank..

## I. INTRODUCTION

The effect of taxes on innovation is one of the crucial enquiries in economic development particularly on the formulation and revision of tax policy [1], [2]. Hence, more opportunities can be brought into for the purpose of developing and enhancing the economic growth. However, higher tax revenues mean the people and companies have to pay more out of their income thus, creating austerity in productivity. The crucial issue debated was the trade-off between austerity and future growth. For instance, International Monetary Fund (IMF) asked Greece not to cause any more austerity to her people, which was the issue of the Greek disposition to raise tax revenues to cover the losses made in 2010 (see IMF, 2013, 2017). This view is consistent with Laffer curve model. Enormous studies confirmed that both zero tax and hundred percent tax imposed cause no revenue for the countries (study in OECD countries, Brill & Hassett, 2007; in Russia, Papp & Takáts, 2008; in EU countries Hondroyiannis & Papaoikonomou, 2015). Indirectly, the changes of tax have effects on firm cash flow and cause financial constraint for investment and innovation activities.

**Revised Manuscript Received on June 10, 2019.**

**Khairunnisa AbdSamad**, Faculty Business & Management, UniversitiTeknologi MARA, Melaka, Malaysia.

**Saiyidi Mat Roni**, School of Business and Law, Edith Cowan University, Australia.

**NurHayatiAbdRahman**, Faculty Business & Management, UniversitiTeknologi MARA, Melaka, Malaysia.

**NurHazwaniMohamadRoseli**, Faculty Business & Management, UniversitiTeknologi MARA, Melaka, Malaysia.

**Ahmad FadhlyArham**, Faculty Business & Management, UniversitiTeknologi MARA, Melaka, Malaysia.

Parallel to this, the implementation of Good and Services Tax (GST) Act 2014 in Malaysia had caught attention from various background advocating that the GST can lead to high compliance cost and time consumption for documentation [8]. In the innovation landscape, during the implementation, the total patent applications for residents dropped by 6 percent in 2014 and only 3 percent increased for non-residents as compared to 2015. It is unfortunate to observe that Malaysia residents record a very low patent applications growth as compared to non-residents at 1,272 and 6,455 respectively in 2015. This is in spite of the resident patent applications increase by 90 percent since the global crisis 2008, with foreign firms recorded at 280 percent increase. Meanwhile, the total patent granted in 2015 for residents is 344 and non-residents are 2,533.

From the literature, we find that a great deal of valuable research have focused on tax effect on innovation in advanced countries (see review e.g. in OECD, Vartia, 2008; in Norway, Cappelen, Raknerud, & Rybalka, 2012; in European Union, Belen, Gonzalez, Diaz, & Wilby, 2012; in Turkey, Sakar, 2015; in Argentina, Crespi, Giuliodori, Giuliodori, & Rodriguez, 2016). In contrast, studies examined the tax effect on innovation for an emerging economies, particularly in Malaysia is hardly found. Hence, this study aims to examine the effect of tax on the innovation in Malaysia.

## II. LITERATURE REVIEW

This paper is grounded on a theoretical framework developed by Hall and Jorgenson [14]. In this setting, the seminal paper discussed the adverse effect of tax on investment. Hall and Jorgenson explain the firm's innovation is slower when tax hikes. This is due to financial constraints to spur innovation projects. The investment and financing business projects spark more innovation activities among the firms in terms of capital good investment. Though the tax may not directly impact the innovation, the limited cash flow as a result of a higher tax can prompt firms to re-prioritise the use of available fund. This in turn, shifts funds away from research and development, investment activities and incentive to expand the innovative or creative ideas.

within a slight contrast to this view, some empirical studies show there is favorable effect of tax changes on firm investment. Most of studies focus on the effect between tax changes and investment incentives, i.e. the equipment investment and investment decisions. At firm level data, Cummins, Hassett, and Hubbard found that major tax reforms enacted in United States has positive impact on the effect on firms' equipment investment [15]. They also stated that the tax rates reform



favoring the production of equipment investment caused the increase in the investment rate in 1962, 1971, 1981, and 1986. However, tax increase can also has an adverse effect on the investment. Faridy, Freudenberg, Sarker and Copp demonstrated in a recent study that found tax distorts investment decisions [8]. The study conducted in Bangladesh shows that the Value Added Tax has a negative effect on the investment activities among the small and medium enterprises. Also, the VAT has a negative side in terms of psychological and corruption costs.

Recent empirical studies also highlighted that higher tax can be a major drawback to firm's innovation. Mukherjee, Singh, and Žaldokas study on US data, found that tax significantly reduce innovator's incentives and discourage risk-taking [16]. They also discussed the major drawbacks tax increment may hinder the firm hire innovative personnel since to train the new worker requires longer of span time to acquire new knowledge, skill and capacity to innovate. So, the firm is facing difficulties in innovation activities as well as to accommodate with the tax changes. Meanwhile, the study of Cappelen, Raknerud and Rybalkaexamine the effect of tax based incentives on the innovating and patenting in Norwegian firms, where projects that received tax credits encouraged more development of new products for the firm [10]. On the other spectrum, Gonzalez, Diaz and Wilby show that the effect of tax incentive under European Union policy however, was observed to create a system for promoting innovation in a building sector [11].

From another angle, the literature also suggest that tax policy, not the tax increase, can play an important role in inducing the innovation activities, especially in terms of research and development. Crespi, Giuliadori, Giuliadori and Rodriguez (REF YEAR) show that tax policy has been effective in increasing firms' innovation efforts such as private investment in research, development and innovation [13]. Using the National Innovation Survey collected by the Argentina National Institute of Statistics and Censuses, they also found that the tax changes is effective in increasing the firms' innovation efforts but has weak impact on the capital goods expenditures.

In the Malaysian context, Usher [ref num.] stated that the method for effective investment have not been identified clearly in less developed countries [17]. The study was conducted in late 1970s. However, now Malaysia has been known as developing nation and many studies has shown that tax has significant effect on the investment performance. There are abundance of studies proved that tax policy plays important role in Malaysian investment specifically foreign direct investment (FDI). For instance, Ang examine the effect the factors of FDI using Malaysia data for a period of 1960 to 2005. The findings suggest that higher corporate tax rate and ringgit appreciation have negative effect on FDI inflows [18]. In addition, another study confirms that the corporate tax has long run effect on FDI based on the ARDL estimation for time span of 1970 to 2008 [19].

FDI provides rooms for Malaysia to acquire knowledge transfer across the countries and create space for innovation development. Evidence from national innovation surveys in Malaysia suggests that the direct financial grants and tax policy has significant effect on the Malaysian firm [20]. Lee and Chew-Ging also emphasized that tax incentives are more

beneficial on the large firms while the small and medium enterprises are motivated in innovation activities with import duty exemptions. Wonglimpiyarat compares Thailand and Malaysia by exploring the main government programmes in financing innovations. He found that the government incentives i.e. tax incentives and tax policy for investment can motivate the institutions to promote industrial technological capabilities [21]. Furthermore, a study in 11 countries by Mani posited that financial instruments such as tax incentives and research grants have great impact to stimulate investments in R&D in the enterprise sector [22].

Given the plethora of literature supporting the notional effects of tax and innovation, few studies focus on the direct impact of tax and innovation. This study therefore, posits that there is a probability that tax hinders the innovations among firms in Malaysia.

### III. METHODOLOGY

Based on the underlying model of Hall and Jorgenson [14], tax has an adverse effect on innovation. The imposition of tax will distort the firm ability to grow through a more restricted access to necessary funds. This study investigates the effect of tax on the innovation and invention activities by Malaysian firms.

This study used the Survey on Enterprise compiled by the World Bank for the year 2015 with total of 919 firms in Malaysia responded to this survey. We measured invention of new products or services with a binomial scale. In this scale value 1 was assigned to firms that introduced any new or significantly improved existing products or offering new services in the last three years. Value 2 was assigned to firms that had no such activities. We also measured respondents' evaluation of tax rate in relation to firms' operation on a five-point Likert scale with 0 being no obstacle, and 4 as severely affecting the operations. The data also contains information on the firm's size, types of industry, and regions.

The focus of this study is to investigate the tax perception among the firm in innovating the new products or services. For our estimation we use a binomial logit model because this model allows us to compute the conditional probabilities of firm innovating new product or service depending on tax obstacles while controlling for residency, type of industry, firm size and the region. A logistic regression is used as it has an advantage over the Ordinary Least Square (OLS) estimation in a presence of a binomial variable [23]. SPSS software was used to conduct the logistic regression. The regression model also controls for differences in demographic characteristics of citizenship, industry, size, and region. The model of estimation is as follow.

$$I_i = \beta_0 + \beta_1 Tax_i + \beta_2 DResidency_i + \beta_3 Industry_i + \beta_4 Size_i + \beta_5 Region_i$$

Where,

$I_i$  = the probability of innovating new products or services.

Tax = tax as an obstacle against innovations.

Residency = firm's residency status.

Industry = the main industry the firms operate.

Size = the firm size based on number of employees. The World Bank categorized the



size of firms based on the number of employees into small (0 to 5 employees, medium (20 to 99 employees) and large firm (more than 100 employees).

Region = the region in which the firms operate. These are Central region which includes Selangor, Negeri Sembilan Federal Territory of Putrajaya, Kuala Lumpur and Labuan. Northern region that covers Perlis, Kedah, Penang and Perak. Southern region comprises of Melaka and Johor. Kelantan, Terengganu and Pahang are included in East Coast region, while Sabah and Sarawak classified under East Malaysia.

Given the significant effect of tax and innovation, the study focus includes tax perception as one of the main variables. The study also considers control variables such as size, residency, industry and region. For firm size, as in previous studies include the firm's size as important determinant [10][13]. As the large corporation may not be affected by the tax changes albeit the small firm has lower sales revenue. Since FDI plays an important role in Malaysian context, so it is important to highlight the either local or foreign companies play the significant role in innovation activities. For regional, the infrastructures in central region are more accessible and facilitate the expansion and innovation development among the companies.

**RESULTS AND POLICY IMPLICATIONS**

The distribution of respondents is presented in Table 1. There are only 10 percent of the firms in the sample have invented new products or services in last three years. The table also shows that there is a high frequency of firms reported that tax is a modest obstacle in their operation. Small firms were also observed to have no innovation activities during the period. It is also observed that only 9.18% reported that they engaged in innovation while 14.81% of non-resident firms reported they had innovations during the same period.

**Table 1: Respondents distribution**

Innovation	Tax obstacle					Size			Residency		Total	Percentage
	No	M	Mo	M	Ve	S	Me	L	N	R		
Yes	20	41	23	7	4	20	31	44	2	67	95	10%
No	15	22	309	10	35	33	264	22	1	66	82	90%
	2	7	1		6		4		6	3	4	

Tota	17	26	332	10	39	35	295	26	1	73	91	100
	1	2	8		8		6		8	8	0	9%
											9	

The results of the binomial logit model are presented in Table 2. Given the base rates of the two reaction options (824/919 = 89.7 percent) did not invent any new product or services, so the probability with the current tax viewed as obstacles for the firm is not to have innovation activities related to product or service is high. From the correlation estimates, there is a weak positive correlation between the tax obstacle and innovation. In this study settings, it means the higher the tax obstacle is viewed by the firms, the higher the firms' propensity not to innovate. While this correlation is statically significant, the observation is weakly correlated.

**Table 2: Logit estimates of probability of innovation**

Dependent variable (innovation)	Coeff	SEs	Sig	Exp (B)
Tax correlation	0.074		0.024**	
Tax	0.334	0.124	0.007***	1.397
Resident	-0.569	0.272	0.036**	0.566
<i>Industry</i>				
Manufacturing	0.332	0.301	0.27	1.394
Retail	0.128	0.407	0.753	1.137
<i>Size</i>				
Small	-0.968	0.298	0.001***	0.38
Medium	-0.443	0.26	0.089*	0.642
<i>Region</i>				
Central	2.358	0.645	0.000***	10.567
Southern	1.963	0.643	0.002***	7.117
Northern	1.94	0.641	0.002***	6.961
East coast	1.453	0.691	0.036**	4.276
Constant	-3.287	1.979	0.097*	0.037
-2 Log likelihood	559.104			
Cox & Snell R Square	0.055			
Nagelkerke R Square	0.113			
Number of observations	919			

**Note:**

\* indicates statistically significant difference at alpha level of 0.1.

\*\* indicates statistically significant difference at alpha level of 0.05.

\*\*\* indicates statistically significant difference at alpha level of 0.01.

Table 2 demonstrates the logistic regression model with all four independent variables. Tax perception has significantly positive correlation in innovating the new product and services. Indeed, the positive sign from the logistic estimation indicates that the tax is perceived as obstacles to the firm to innovate new products and services. As shown in the table, the central region has the highest statistical coefficient followed by the southern region. Firms situated in central region are dominant in terms of their



parameter estimates to disengage from innovation activities when the tax obstacle is high. The firm situated in central region increases the odd of likely to innovate new products increases by 9.567 times. The negative sign of residents indicated the resident firms are less likely to innovate new products or services by 43.4 percent compared to the non-resident when the tax obstacle is perceived high about 56.6 percent. In terms of firm size, small firms are less likely to invent as compared to medium firms by a factor of 0.38. . On the other hand, the coefficients of the types of industry are not significant at the 0.05 level in the model. The *NagelkerkeR<sup>2</sup>* shows that roughly 11.3% of variations in innovation are accounted for by the explanatory variables in the model. Although the value is relatively small, the model accommodates the objective of the study by underlining the important tax and demographic effects.

The analysis highlights that firm perceive the tax acts as obstacles in innovation. Thus, the tax incentives and any tax policy implication should be formulated accordingly to motivate the innovation development. The findings consistent with the study by Wonglimpiyarat that proved the government incentives i.e. tax incentives and tax policy for investment can motivate the institutions to promote industrial technological capabilities[21]. This study also shows that small firms are the least to innovate. This is not surprising as these firms are largely young and have limited access to finance [20]. This result is consistent with the findings of Hall and Lerner [24] where small and young firms have financial constraints due to informational asymmetries and adverse selection favouring large corporations. The analysis also suggests that the tax incentives may offer benefits to companies. However, large companies benefitted the most from these incentives. This is partly because the tax policy in Malaysia favours the companies that attract FDIs. [20]. From the evidence and the supporting existing studies, we believe that there is a need for a tax policy review to look into the plights of the small firms to help this class of business to be more innovative and productive. For example, small firms are reported to be importing more products from China. Thus, selective import duty exemption is can benefit these firms [25].

Regardless of the nature of firm, tax significantly affects the innovation activities among resident firms. This is a stark contrast to foreign firms[26]. The foreign investors are more inclined to the innovation regardless the tax changes. This is partly due to the Malaysia economic stability and the government incentives to attract more FDI [18]. In light of this finding, policies on tax should also address the needs of the local firms.

When the data is observed by geographical areas, our study also indicates that firms in central region are more likely not to innovate as tax obstacles increases, compared to those operate in East Malaysia. The trend is followed by Southern, Northern and East Coast regions. This **result** suggests that, while the central region has the highest concentration of firms, this region is also more sensitive to the changes in tax that are perceived as constraining their cash flows. One possible explanation for this observation is that the central region is a competitive area to operate where people (labour) are highly mobile and firms are generally cost-conscious.

The result also indicates that the negative effect of tax obstacles on firm innovations is similar across all industries. We observe that industry types do not exhibit any statistical significance on innovations.

### IV. CONCLUSION

This study aims to examine the tax effects on innovation among Malaysian firms. The results indicate tax plays a significant role in innovation engagements for these firms. Although tax obstacle is weakly correlated with firm innovation activities, we find that firm residency status, region and size are correlated. There is also a high probability of resident firm not to invent new products or services when they perceived the tax as an obstacle to their current operations. We also discover that small firms hardly involve in innovation activities compared to medium-sized firms. Although we find that the region in which the firms operate also impacts their innovations, we do not find any evidence to suggest that industry type is relevant.

This study uses cross sectional data that observations were made at a single point of time. Given the young firms mature over time, and the well-established firms grow stronger (or weaker), it would be interesting to observe if the trends found in this study resonate over time. Therefore, we suggest that future study to look into time series data to examine if the tax effect perpetuates over time.

### ACKNOWLEDGMENT

This research work is supported by the Fundamental Research Grant Scheme 600-RMI/FRGS 5/3 (0032/2016) granted by Ministry of Higher Education of Malaysia and UiTM Melaka.

### REFERENCES

- [1] D. Stoilova, "Tax structure and economic growth: Evidence from the European Union," *Contaduria y Adm.*, vol. 62, no. 3, pp. 1041–1057, 2017.
- [2] R. V. Adkisson and M. Mohammed, "Tax structure and state economic growth during the great recession," *Soc. Sci. J.*, vol. 51, no. 1, pp. 79–89, 2014.
- [3] IMF, "Greece: Selected issues," *IMF Ctry. Rep.*, vol. 13, no. 155, 2013.
- [4] IMF, "Selected issues," *IMF Ctry. Rep. No.*, vol. 17, no. 41, 2017.
- [5] A. Brill and K. a. Hassett, "Revenue-maximizing corporate income taxes: the Laffer Curve in OECD countries," *Am. Enterp. Institute, Work. Pap.*, pp. 1–19, 2007.
- [6] T. K. Papp and E. Takáts, "Tax Rate Cuts and Tax Compliance: The Laffer Curve Revisited," *IMF Work. Pap.*, vol. 08, no. 7, p. 1, 2008.
- [7] G. Hondroyiannis and D. Papaioikonomou, "When does it pay to tax? Evidence from state-dependent fiscal multipliers in the euro area," *Econ. Model.*, vol. 48, pp. 116–128, 2015.
- [8] N. Faridy, B. Freudenberg, T. Sarker, and R. Copp, "The hidden compliance cost of VAT: An exploration of psychological and corruption costs of VAT in a developing country," *eJournal Tax Res.*, vol. 14, no. 1, 2016.
- [9] L. Vartia, "How do Taxes Affect Investment and Productivity?: An Industry-Level Analysis of OECD Countries," *OECD Econ. Dep. Work. Pap.*, vol. 656, p. OECD Publishing, 2008.
- [10] Å. Cappelen, A. Raknerud, and M. Rybalka, "The effects of R&D tax credits on patenting and innovations," *Res. Policy*, vol. 41, no. 2, pp. 334–345, 2012.
- [11] A. B. R. G. Lez, J. J. V. D'áz, and M. R. Wilby, "Dedicated tax/subsidy scheme for reducing emissions by promoting innovation in buildings: The EcoTax," *Energy Policy*, vol. 51, pp. 417–424, 2012.
- [12] A. Y. Sakar, "Innovation for a New Tax Incentive: Patent Box Regime Turkey and the EU Application," *Procedia - Soc.*



- Behav. Sci.*, vol. 195, pp. 544–553, 2015.
- [13] G. Crespi, D. Giuliadori, R. Giuliadori, and A. Rodriguez, “The effectiveness of tax incentives for R&D+i in developing countries: The case of Argentina,” *Res. Policy*, vol. 45, no. 10, pp. 2023–2035, 2016.
- [14] R. Hall and D. Jorgenson, “Tax policy and investment behavior,” *The American Economic Review*, vol. 57, no. 3, pp. 391–414, 1967.
- [15] J. G. Cummins, K. A. Hassett, and R. G. Hubbard, “Have Tax Reforms Affected Investment?,” *Tax Policy Econ.*, vol. 9, no. January, pp. 131–150, 1995.
- [16] A. Mukherjee, M. Singh, and A. Žaldokas, “Do corporate taxes hinder innovation?,” *J. financ. econ.*, vol. 124, no. 1, pp. 195–221, 2017.
- [17] D. Usher, “The economics of tax incentives to encourage investment in less developed countries,” *J. Dev. Econ.*, vol. 4, no. 2, pp. 119–148, Jun. 1977.
- [18] J. B. Ang, “Determinants of foreign direct investment in Malaysia,” *J. Policy Model.*, vol. 30, no. 1, pp. 185–189, Jan. 2008.
- [19] Z. Yusof, N. Shahrudin, and N. Mohd Satar, “Determinants of Foreign Direct Investment in Malaysia: What Matters Most?,” 2010.
- [20] C. Lee and L. Chew-Ging, “Special Feature: Innovation and Technology Financing Encouraging innovation in Malaysia Appropriate sources of finance.”
- [21] J. Wonglimpiyarat, “Government programmes in financing innovations: Comparative innovation system cases of Malaysia and Thailand,” *Technol. Soc.*, vol. 33, no. 1–2, pp. 156–164, Feb. 2011.
- [22] S. Mani, “Some of the authors of this publication are also working on these related projects: sectoral systems of innovation View project Sunil Mani Centre for Development Studies Government, innovation and technology policy: an international comparative analysis,” *Int. J. Technol. Glob.*, vol. 1, no. 1, pp. 29–44, 2004.
- [23] S. Menard, “Applied logistic regression analysis,” 1995.
- [24] B. Hall and J. Lerner, *The financing of R&D and innovation*, vol. 1, no. 1 C. Elsevier B.V., 2010.
- [25] M. B. Yusoff, “MALAYSIAN BILATERAL TRADE RELATIONS AND ECONOMIC GROWTH 1.”
- [26] C. Azémar and A. Delios, “Tax competition and FDI: The special case of developing countries,” *J. Jpn. Int. Econ.*, vol. 22, no. 1, pp. 85–108, 2008.