A Quantile Regression Analysis of Absorptive Capacity in the Malaysian Manufacturing Industry

Norhanishah Mohamad Yunus[a]
Universiti Sains Malaysia

Norehan Abdullah[b]
Universiti Utara Malaysia

Abstract: Using a set of absorptive capacity proxies, we present new empirical findings on the role of absorptive capacity in assimilating the technology effects from the presence of multinational corporations (MNCs) in the Malaysian manufacturing industry. We applied a quantile regression estimator to explicitly gauge the level of absorptive capacity among workers by their levels of education at different quantiles of the conditional FDI distribution during the period of 2000–2018. We conclude that the medium-high technology industries benefit more from FDI if the workers' absorptive capacity level reaches at least the median quantile. Based on the findings of this study, we suggest that educational digitisation efforts in enhancing quality human capital should be intensified, by equipping them with the latest knowledge and skills, which in turn requires cooperation between universities, public technical and vocational education and training (TVET) institutions as well as MNCs.

Keywords: Technology effects, foreign direct investment, human capital, absorptive capacity, quantile regression
JEL classification: F20, F35, F61, J24, C21, L6

1. Introduction

The importance of highly skilled and knowledgeable labour in mastering both digital and infrastructure-based technology has been identified as one of the determinants that can enable Malaysia's ascent to high-income economy status as early as 2024. In realising this, the role of multinational corporations (MNCs) is clearly seen in the literature as one of the most practical and efficient way to improve industrial development via the exploitation of advanced technology and improvement in workers' skill (Ismail, 2001; Narula & Dunning, 2000). However, the literature clearly shows that a country's ability to acquire a certain quality of technology overflow is indeed reliant

[a] School of Distance Education, Universiti Sains Malaysia, 11800, USM Pulau Pinang, Malaysia. Email: norhanishah@usm.my (Corresponding author)
[b] School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia, 06010, UUM Sintok, Kedah Darul Aman, Malaysia. Email: norehan@uum.edu.my

Article Info: *Received* 12 February 2022; *Revised* 31 May 2022; *Accepted* 31 May 2022
https://doi.org/10.22452/MJES.vol59no1.8

on consistently high-skilled human capital in the industry to ensure that the benefits of various forms of technology overflow brought in by MNCs to local firms are not diminished (Anwar & Nguyen, 2010; Girma et al., 2001; Girma & Görg, 2005).

In Malaysia, the problem of low labour absorption capacity is seen as one of the factors hindering Malaysian firms from assimilating superior technologies from MNCs. Tertiary education graduates are still seen as unable to meet market industry needs, leading to criticism of the quality and type of graduates produced by institutions of higher learning (IHL) (Ismail, 2012; Yunus, 2020). This raises the question of whether the level of skill and the mastery of technology among the highly educated workforce is so low that it prevents them from adapting to existing technologies that have already been transferred by MNCs, especially in the electrical and electronics (E&E) sector. This situation may limit the E&E sector's capability towards high value-added areas such as development and design and thus, potentially driving FDIs towards low technology, where it is commensurate with the current activities of local firms (MIDA, 2020). The issue of employees' absorptive capacity deserves attention in Malaysia's medium-high technology industry since the sector continues to receive capital investment based on increased FDI inflows, but firms remain focused on back-end productions (Ismail, 2001; MIDA, 2020; Yunus & Hamid, 2017; Yunus & Masron, 2020).

Although this concern is quite relevant, yet the extent to which the level of capability of highly educated employees can adapt technological knowledge brought by MNCs into local firms is not specifically measured. A worker's high absorptive capacity with FDI technologies is necessary for firms to acquire and adapt technological knowledge efficiently from both external and internal sources, which ultimately enhances their innovative capabilities and delivers greater productivity (Lopez-Garcia & Montero, 2012). Acknowledging this, we seek to provide evidence on the role of human capital as an agent of absorptive capacity. Through specific measurements, we set to gauge the level of employees' absorptive capacity to assimilate technological overflows from FDI, hence paying particular attention to the policy of human capital development (Cleeve et al., 2015; Slaughter, 2002).

We make the econometric analysis distinct by developing a new human capital model according to the level of academic credentials. Our study borders on innovation as we evaluate workers' absorptive capacity and FDI spillovers by academic credential at different quantiles of the FDI distribution conditions. Such calculations permit us to state something about the trend of FDI inflows based on the level of absorptive capacity in the host country. For industry stakeholders, this study can serve as a screening tool in the selection of quality graduates, as assessing the ability of employees to adapt to foreign technologies is a signal of higher productivity in the manufacturing industry.

The remainder of the paper is organised as follows. Section 2 reviews literature related to the proxies used to represent absorptive capacity, as well as past empirical studies on absorptive capacity and FDI spillovers. In Section 3, we discuss the data and variables. Section 4 then outlines the research methodology. Section 5 discusses the analysis of the results. Finally, Section 6 presents the conclusion and suggestions for policy implications.

2. Literature Review

The concept of absorptive capacity in FDI studies points to the existence of a significant relationship between FDI spillovers and the ability of the recipient countries to assimilate FDI overflows. Past studies assessing a firm's ability to absorb both spillovers of technology and knowledge mostly employed proxies such as technology gaps, trade openness, imports and financial development. Following this trend, Findlay (1978) argued that greater benefits would be received by a domestic economy if the technology gap is large between the "giver" and "receiver" countries of the technology. Although Glass and Saggi (1998) initially agreed with Findlay, their study proved otherwise, i.e., the larger the technology gap, the lower the technology transferred by FDI in the future due to the absence of basic networks and infrastructure as well as human capital.

Findlay's argument is used in the majority of current studies that applied the technology gap as their main proxy to investigate the effects of FDI on host countries, despite a relatively heavy focus on the productivity of firms. For instance, Girma and Görg (2005) defined absorptive capacity as a technology gap in terms of productivity differentials between foreign and domestic firms. They reported that there was a minimum absorptive capacity threshold below which the magnitudes of productivity spillovers were non-existent or even negative. Imbriani et al. (2014) measured absorptive capacity using three different proxies, namely the size of the technology gap between foreign-owned and domestic-owned firms as well as the size and regional distribution for the firm. They found technology gaps and firm size to be significant for FDI spillover effects.

Nazeer et al. (2021) investigated the relationship between technology transfer, technological capability and firm performance by employing the mediating effect of absorptive capacity that involved 503 samples from textile and clothing firms in Pakistan. They found that absorptive capacity positively and significantly mediated the relationship between technology transfer, technological capabilities and firm performance. Lower absorptive capacity hindered firms from upgrading their technological capabilities. Although the technology gap proxy was also used to represent total factor productivity (TFP), they concluded that TFP would not be the best proxy for absorptive capacity. Other researchers, including Castellani and Zanfei (2003), Flôres et al. (2007), and Jabbour and Mucchielli (2007), similarly reported that technological strength, in both foreign and domestic firms, determined the effectiveness of inward investment from FDI.

Chen et al. (2001) employed seemingly unrelated regression (SUR) to analyse FDI spillovers from contagion and spillovers from foreign firm competition over local firms in China. This study showed that the presence of FDI has benefited the Chinese economy, but the spillovers are not evenly distributed across firms and industries. Spills from contagion tend to exhibit an inverse U-shaped pattern with respect to the level of foreign presence at the industry level, while spills from competition are more linear. Industries with high absorption capacity and/or high efficiency are best equipped to take advantage of the overflow of foreign-owned firms. However, the effect of these productivity spillovers from FDI also depends on the skills of the

workers and they suggest further studies to measure the level of the absorptive capacity of workers to assimilate the technological overflow from FDI. A similar opinion was also suggested by Lai et al. (2005), who argued that local learning capacity represented by human resource quality proxies is a key determinant of local firms' ability to absorb FDI spillovers.

Nonetheless, the studies that specifically investigate the role of human capital as a proxy of absorptive capacity in FDI spillovers, however, are still scarce, particularly at the sectoral and industry levels. There is limited research on the extent to which the knowledge and skills an individual acquires during the learning process can be translated and adapted into firm-level processes and routines (Khordagui & Saleh, 2016). The lack of studies on the measurement of individual absorptive capacity at various levels may be due to the limited attention given to the adhesion of technical knowledge in the early stages of the study and the existence of disputes regarding the exact proxy for measuring absorptive capacity in the context of human capital and FDI studies (Szulanski, 1996; Von Hippel, 1994).

In one such study, Khordagui and Saleh (2016) explored the role of human capital as a factor of absorptive capacity for emerging and Middle Eastern economies at the sectoral level rather than aggregating FDI between 1990 and 2009. Using panel data analysis on 30 countries, they concluded that despite the belief that FDI could promote economic growth and knowledge transfer, the empirical evidence was inconclusive. Khordagui and Saleh thus reiterated not debating whether FDI spillover effects exist, but whether the prerequisites for such an effect exist. These prerequisites reflect the notion of absorptive capacity, where a country's ability to absorb the benefits offered by FDI varies by sector.

Vu (2018) attempted to measure the absorptive capacity of skilled workers according to educational attainment, hypothesising that employees' absorptive capacity is determined by their level of education. Unavailable data – the wage of workers – was replaced with the human capital proxy. The author employed the firm's persistent efficiency as a proxy to estimate domestic and foreign firms' absorptive capacity in Vietnamese manufacturing firms. The study specifically focused on beverage and tobacco-product industries from 2007 to 2015. Utilising the single-stage maximum likelihood method, Vu (2018) discovered that domestic firms related to the tobacco product sub-sector provided the best absorptive capacity, while the manufacturers of the beverage subsector displayed the worst. The study also found that in the Vietnamese manufacturing sector, foreign firms had better absorptive capacity than domestic firms. The difference in the absorptive capacity between domestic and foreign groups might pose a risk to Vietnam's economy. The study's correlation analysis confirmed a positive correlation between absorptive capacity and firm's age, size, technology level and worker skills.

Lopez-Garcia and Montero (2012) investigated the role of human capital in assimilating knowledge spillovers as the determining factor for Spanish firms' decision to innovate. Data was obtained from the 'Central de Balances' database during the period of 2003–2007, specifically focusing on manufacturing and services firms. The study confirmed a positive relationship between overflow and a company's innovative behaviour by employing the estimator proposed by Wooldridge (2005) for dynamic random effects discrete choice models. This applied to knowledge generated in the

same industry and region as well as by the public sector. Moreover, the benefits of this spillover were greater for firms with strong absorptive capacity. This was generated through the firm's R&D capability, along with factors such as the quality of the workforce, the share of temporary employment and the amount of allocation spent on training. They also emphasised that other characteristics of the firms observed, such as size, sales growth, export behaviour, sector capital intensity or financial structure variables, were also relevant determinants of the possibility of innovation.

Studies on absorptive capacity in Malaysia are still limited. Only recently a study by Yunus (2020) explored the role of human capital, measured via educational qualifications, in encouraging inward FDI. The study found a negative association between workers who are degree holders and inward FDI in the E&E, machinery and equipment as well as chemical industries due to their perceived level of absorptive capacity. The study provided an initial glimpse into the problem of the low labour absorptive capacity of FDI technology, which leads to a mismatch between labour skills and firm demand. It did not, however, measure and further assess the extent to which the perceived low level of labour's absorptive capacity can be measured by something of value.

3. Data and Variable Descriptions

3.1 Data and Scope of the Study

Data for the variables used in this study were collected from the Department of Statistics Malaysia (DOSM) and the Malaysian Industry and Development Authority (MIDA) based on manufacturing surveys from 2010 to 2018, taking into account a balanced panel at the 2-digit aggregate level for all selected variables. Our study selected only four medium-high-technology industries at the aggregate level, namely E&E, machinery and equipment, chemical and transport equipment industries. These industries were chosen given that they have received a substantial influx of FDI compared to other industries in the manufacturing sector from the 1990s to the current date (Ismail, 2001). Statistics on total FDI investments approved in 2020 clearly show that these industries remain the main focus of investment, with total investments of RM13.6 billion (E&E), RM4.6 billion (chemicals and chemical products sector) and RM4.8 billion (machinery and equipment). To date, these industries have been among the most important agendas listed in the 12th Malaysia Plan (12MP) in an effort to further encourage FDI inflows as one of the means to help industry players, particularly for the E&E industry to adopt advanced technologies to produce more sophisticated products and in turn contribute to increased productivity and growth (MIDA, 2020).

3.2 Definitions of Variables

We measured FDI spillovers via FDI inflows as the dependent variable in our study, defined by the number of FDI companies channelling technology effects into a firm (Bwalya, 2006; Yunus & Masron, 2020). For independent variables, we emphasised human capital as our main interest proxy of absorptive capacity, based on the availability of data compiled by DOSM, which classifies employees according to their certificate of academic qualification into three categories – namely degree and above, diploma and

Malaysian Certificate of Education (MCE)/Malaysian Certificate of Education Vocational (MCEV), and below education. We considered measuring workers based on their level of education since it best fit our study's purpose. Previous studies have classified workers based on job types at the firm-level data (see Yunus et al., 2015).

Debates regarding the absorptive capacity of degree-holding workers, particularly in assimilating high technology from foreign investors in the Malaysian high-technology industries are ongoing (Yunus et al., 2015; Yunus, 2020, 2021). The Malaysian labour market remains favourable to semi-skilled workers with an increasing demand for workers with MCE/V qualifications (Yunus et al., 2015). Given the lack of studies that empirically discussed the role and ability level of non-degree workers as one of the attraction policies in increasing FDI inflows (Cleeve et al., 2015; Yunus, 2020), we thus included non-degree workers in the model estimation.

The model also includes a set of control variables that have been found to be associated with FDI inflows, namely, R&D investment (*RDEXP*), information, communication and technology investment (*ICT*), direct domestic investment from local investors (*DDI*) and firm size (*FS*).

4. Research Methodology

4.1 The Estimation Model

The combination of basic models by Girma and Görg (2005) and Yunus (2020) were employed to analyse the proxies of absorptive capacity in determining FDI inflows from 2000 to 2018 in the manufacturing industry. The estimation of absorptive capacity was computed following Girma and Görg's (2005) model. Our model, however, differs in two aspects; we treated the number of foreign firms as FDI inflow, as our dependent variable and bridged the gaps by including the human capital variable according to educational qualifications in the model estimation.

Technology spillover effects in this study are represented by the number of foreign firms (*FDI*) as a proxy because the number of potential source firms is important for both technology and knowledge spillovers as outlined in the evolutionary theory (Blomström et al., 1994; Blomström & Kokko, 1998). The technology spillovers via inward FDI stocks or FDI inflows are measured using the following formula:[1]

$$\ln FDI_{it} = \sum_{i}^{N} FDI_{it} \ln\left(\frac{1}{FDI_{it}}\right) \tag{1}$$

where *FDI* is the number of foreign firms towards industry *i* as a percentage of the total number of foreign firms in a two-digit industry sector in a year, *t*.

Compared to local firms, foreign MNEs are often assumed to have a greater spillover, thus inducing a higher level of workers' absorption and labour productivity. We, therefore, extended Girma and Görg's (2005) absorptive capacity model to measure workers' absorptive capacity (*ABC*) to capture the technology effects brought by the foreign company's presence from equation (1). We measured the workers'

[1] The terms "FDI inflows" and "inward FDI stocks" will be used interchangeably in this study.

level of absorptive capacity by interacting FDI with three separate levels of academic qualifications: (i) degree and above (*ABC*_Degree), (ii) diploma (*ABC*_Diploma) and (iii) Malaysian Certificate of Education/Vocational (*ABC*_MCE/V) using the following formula:

$$ABC\_\text{Degree}_{i,t} = Degree * (FDI_{i,t} / MaxFDI_{i,t} (FDI_{i,t-1}) \quad (2)$$

$$ABC\_\text{Diploma}_{i,t} = Diploma * (FDI_{i,t} / MaxFDI_{i,t} (FDI_{i,t-1}) \quad (3)$$

$$ABC\_\text{MCE/V}_{i,t} = MCE/V * (FDI_{i,t} / MaxFDI_{i,t} (FDI_{i,t-1}) \quad (4)$$

where *MaxFDI* is the highest number of foreign firms capturing two-digit sectors (industry leaders) that are present in the sector in a specific year.

To accommodate the possible existence of non-linearity of FDI effects in the above three equations, we extended the parameter capturing the degree of absorptive capacity by adding the squared terms for each education level. The quadratic specification is more flexible as it allows the level of FDI-induced spillover effects to be either positive or negative depending on the coefficient values of the absorptive capacity level, hence enabling us to characterise technological spillovers as a non-linear process (Girma et al., 2001; Girma & Görg, 2005). The positive level of absorptive capacity indicates the suitability of foreign technology brought in by foreign companies to the Malaysian manufacturing sector.

Hence, we combined both absorptive capacity model, *ABC*, by educational attainment and their quadratic effects with other control variables hypothesised to influence the volume of FDI inflows, X_{it}, namely R&D investment (*RDEXP*), ICT investment (*ICT*), direct domestic investor (*DDI*), and firm size (*FS*) in one equation as follows:

$$\begin{aligned}\ln FDI_{it} = {} & B_1 \ln FDI_{i,t-1} + B_2 ABC\_\text{Degree}_{it} + B_3 ABC\_\text{Diploma}_{it} + B_4 ABC\_\text{MCE/V}_{it} + \\ & B_5 ABC\_\text{Degree Squared}_{it} + B_6 ABC\_\text{Diploma Squared}_{it} + \\ & B_7 ABC\_\text{MCE/V Squared}_{it} + B_8 \ln X_{it} + \mu_{it}\end{aligned} \quad (5)$$

In our study, we consider estimating the FDI inflows model separately according to workers' academic credentials as presented in equations (6), (7) and (8) to overcome the existence of high multicollinearity between the educational variables used in this study.

$$\ln FDI_{it} = B_1 \ln FDI_{i,t-1} + B_2 ABC\_\text{Degree}_{it} + B_3 ABC\_\text{Degree Squared}_{it} + B_4 \ln X_{it} + \mu_{it} \quad (6)$$

$$\ln FDI_{it} = B_1 \ln FDI_{i,t-1} + B_2 ABC\_\text{Diploma}_{it} + B_3 ABC\_\text{Diploma Squared}_{it} + B_4 \ln X_{it} + \mu_{it} \quad (7)$$

$$\ln FDI_{it} = B_1 \ln FDI_{i,t-1} + B_2 ABC\_\text{MCE/V}_{it} + B_3 ABC\_\text{MCE/V Squared}_{it} + B_4 \ln X_{it} + \mu_{it} \quad (8)$$

4.2 The Estimation Model for Quantile Regression Estimator

We employed a quantile regression (QR) analysis to measure the level of workers' absorptive capacity together with other factors that influence FDI inflows. QR models minimise the absolute values of weighted residuals, as opposed to minimising the sum of squared errors in ordinary least squares (OLS) method (Koenker & Machado, 1999). Furthermore, the QR estimator can provide a more robust and efficient alternative to OLS when the error term is non-normal (Buchinsky, 1998). As we utilise industry-level data, QR allows us to address persistent heterogeneity across firms (Falaris, 2008;

Girma et al., 2001). QR can be applied in studies involving productive characteristics of workers such as the level of education (Falaris, 2008). In our study, QR has also allowed us to investigate whether workers' absorptive capacity, measured based on their level of education, had different effects on FDI inflows at different points of the conditional inward FDI distributions.

In this study, we considered regression estimates at five different quantiles, namely the 10th, 25th, 50th (median), 75th, and 90th percentiles of the FDI spillovers distribution. The use of an absorptive capacity proxy in the set of regressors implies that even within a particular conditional quantile, the response of FDI spillovers will vary according to the level of workers' absorptive capacity in the industry.

From equations (6), (7) and (8), we expanded the model by Koenker and Bassett (1978) to estimate the model separately according to the employees' educational qualifications using the quantile regression estimator as follows:

$$FDI_{it} = V'_{it}B_{\theta} + \mu_{\theta i}\,; Quant_{\theta}(FDI_{it} / V_{it}) = V'_{it}B_{\theta} \tag{9}$$

where V' is the regressors set of workers' absorptive capacity and other control variables, B_{θ} is the slope coefficient quantifying the level of absorptive capacity proxies on FDI inflows at quantile θ, $Quant_{\theta}(FDI_{it} / V_{it})$ is conditional quantile of FDI inflows, μ is the error term.

The QR estimator involves minimisation of sample size, $1/n$, and it also minimises the weighted absolute values of the residuals using all the available data (Buchinsky, 1998; Koenker & Bassett, 1978) as presented in equation (10) with the θth quantile regression solving $0 < \theta < 1$.

$$\text{Min}\frac{1}{n}\left\{\sum_{i,t:FDI \geq V'B}\theta\left|FDI_{it} - V'_{it}B\right| + \sum_{i,t:FDI<V'B}(1-\theta)\left|FDI_{it} - V'_{it}B\right|\right\} \tag{10}$$

where $FDI \geq V'B$ and $FDI < V'B$ are indicator functions, which describes a positive and a negative value of residuals contingent on the value of θ.

As one quantile continues to increase θ from 0 to 1, one can detect the entire conditional distribution of FDI, which is conditional on the regressors set of absorptive capacity. This technique gives a weight of θ to positive residuals and (1–θ) to negative residuals rather than squaring all errors.

5. Result and Discussion

The results will be presented in two parts. Subsection 5.1 will present the correlations of all the variables. Subsection 5.2 will detail the QR-estimated results based on the absorptive capacity effects on FDI inflows at five different quantiles.

5.1 Correlation Analysis

Before we estimate the quantile regression model, correlations of the variables used as proxies for absorptive capacity were conducted (Vu, 2018). As shown in Table 1, most of the correlation coefficients do not exceed 0.8 except for employees' absorptive capacity by educational attainment and their quadratic effects. There was a high multicollinearity

Table 1. Correlation matrix analysis in the medium-high-technology industry, 2000-2018

Variables	*FDI*	FDI_{it-1}	*ABC_* Degree	*ABC_* Diploma	*ABC_* MCE/V	*ABC_* Degree squared	*ABC_* Diploma squared	ABC_ MCE/V squared	*RDEXP*	*ICT*	*DDI*	*FS*
FDI	1.000											
FDI_{it-1}	1.000	1.000										
*ABC*_Degree	0.295	0.213	1.000									
*ABC*_Diploma	0.098	0.095	0.942	1.000								
*ABC*_MCE/V	0.156	0.157	-0.604	-0.749	1.000							
*ABC*_Degree squared	0.213	0.211	0.890	0.749	-0.608	1.000						
*ABC*_Diploma squared	0.096	0.094	0.748	0.880	-0.752	0.749	1.000					
*ABC*_MCE/V squared	0.155	0.156	-0.605	-0.750	0.860	-0.608	-0.752	1.000				
RDEXP	0.497	0.499	0.029	0.219	0.296	0.297	-0.222	0.295	1.000			
ICT	0.335	0.337	0.072	0.048	0.032	0.071	0.046	0.033	0.056	1.000		
DDI	0.642	0.642	0.441	0.234	0.091	0.440	0.233	0.091	0.489	0.062	1.000	
FS	0.579	0.479	0.046	0.144	0.069	0.044	0.142	0.070	0.071	0.257	0.057	1.000

Notes: This paper presents the correlation coefficients for all variables in equation (5) where *FDI* is FDI stock. FDI_{it-1} is lagged FDI stock. *ABC_* Degree is absorptive capacity of employees with degree qualifications. *ABC*_Diploma is absorptive capacity of employees with diploma qualifications. *ABC*_MCE/V is employees' absorptive capacity with Malaysian Certificate of Education/Vocational qualifications. *ABC*_Degree squared denotes the quadratic effects of workers with degrees. *ABC*_Diploma squared denotes the quadratic effects of workers with diploma. *ABC*_MCE/V squared denotes the quadratic effects of workers with Malaysian Certificate of Education/Vocational qualifications. *RDEXP* is R&D investment. *ICT* is communication and technology investment, *DDI* is direct domestic investment from local investors and *FS* denotes firm size. All variables are transformed into natural log.

between the absorptive capacity of degree- and diploma-holding workers of 0.942, due to firms requiring different skillsets (i.e., ICT skills and soft skills) which are considered "complementary" for the firm to assimilate technology effects from various MNCs operating in the host-industry. Because of the high correlations appearing among the educational attainments, the FDI inflows model was estimated in three separate equations (6), (7) and (8).

5.2 Quantile Regression Analyses

In line with our main purpose to measure the capability of human capital as the main agent of absorptive capacity for FDI distribution in the medium-high-technology industries, five different quantiles were estimated, namely the 10th, 25th, 50th (median), 75th, and 90th. The estimation begins with the absorptive capacity of workers with degree qualifications, followed by diploma and MCE/MCEV qualifications.

The QR results in Table 2 clearly showed that the role of degree-holding workers in absorbing foreign technology was higher at the 50th quantile of the conditional FDI distribution with a coefficient value of 0.446. This implies that degree-holding workers were capable of assimilating and exploiting technological knowledge from FDI and thus increasing 44.6% of FDI inflows into their medium-high-technology industries. This is a positive initial indication that there is an improvement in degree-holding workers' skills through the "learning effect". This finding is also consistent with the evolutionary theory and previous empirical studies, which assumes highly educated workers integrate better with foreign and local partners to access higher level useful technology and knowledge (Awang et al., 2009; Blomström & Kokko, 1998; Blomström et al., 1994). They thus drive higher FDI inflows than those with lower educational qualifications. Furthermore, employers in high-technology industries are more likely to invest in training related to technical knowledge to bridge the wide technological gap between domestic and foreign technologies. This enables workers with degree qualifications to take advantage of a new round of technological change as required by MNCs and apply it in the production and development of new products in domestic firms (Ismail, 2001; Yunus, 2020).

However, we found the level of absorptive capacity of degree-holding workers decreased by 19.5% (from the median quantile to 75th quantile) and slightly diminished by 2.23% between the 75th quantile and 90th of the conditional FDI distribution. Similarly, at the 75th and 90th quantiles, the quadratic effect coefficient demonstrated a significant negative association with FDI inflows.

The diminishing trend supported by our study is the existence of a non-linear relationship between the quadratic effects of workers with degrees and FDI spillovers. Our result indicates that the levels and the skill absorptive capacity of degree-holding employees to absorb the productivity spillovers of FDI will begin to fall when absorptive capacity exceeds the turning point (median quantile) and to some extent becomes a negative value at a very high level of foreign dominance (Girma & Görg, 2005). The findings of this study are supported by Chudnovsky et al. (2004), who showed that domestic firms with low levels of absorption capacity were more likely to capture negative or lower spillover effects.

Table 2. Quantile regression results for employees' absorptive capacity with degree qualifications in the medium-high-technology industry, 2000-2018

Dependant variable: FDI stock	10th quantile	25th quantile	Median	75th quantile	90th quantile
lagged FDI stock (FDI_{it-1})	0.069*	0.113*	0.028***	0.013*	0.023**
	(0.003)	(0.075)	(0.089)	(0.047)	(0.085)
*ABC*_Degree	0.390***	0.439**	0.446***	0.359***	0.351**
	(0.003)	(0.003)	(0.003)	(0.103)	(0.021)
*ABC*_Degree squared	0.296***	0.019**	0.107***	-0.112***	-0.088**
	(0.042)	(0.003)	(0.073)	(0.039)	(0.090)
RDEXP	0.259***	0.174***	0.062*	-0.005	-0.032*
	(0.044)	(0.071)	(0.089)	(0.047)	(0.001)
ICT	0.260***	0.201**	0.309***	0.233***	0.299*
	(0.028)	(0.092)	(0.108)	(0.057)	(0.134)
DDI	0.140***	-0.236***	-0.261*	-0.109*	-0.101
	(0.011)	(0.011)	(0.114)	(0.011)	(0.001)
FS	0.223***	0.239***	0.247**	0.263***	0.255***
	(0.002)	(0.012)	(0.003)	(0.074)	(0.082)
Constant	5.048***	2.704***	5.563***	4.824***	6.206*
	(0.037)	(0.015)	(0.007)	(0.044)	(0.039)
Pseudo R^2	0.847	0.788	0.814	0.773	0.786

Notes: This table presents the quantile regression results for equation (6) where the dependent variable is FDI stock, and the total number of observations is 76. *ABC*_Degree is absorptive capacity of employees with degree qualifications. *ABC*_Degree squared denotes the quadratic effects of workers with degrees. *RDEXP* is R&D investment. *ICT* is communication and technology investment, *DDI* is direct domestic investment from local investors and *FS* denotes firm size. Entries in parentheses are robust standard errors and all variables are transformed into natural log. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively.

The non-linear relationship appearing at the higher quantile of FDI distribution in our study also implies increased competition among investors to enter into local firms and the different levels of technology each investor brings is a factor, which also leads to large skill and technology gaps between local firms and MNCs. This in turn is a barrier for local labour to absorb and assimilate various technologies with existing skills.

Our result suggests that there are conditions where workers with degrees still have a lower absorptive capacity, thus preventing them from applying and adapting to the ever-changing and high-skill-based technologies in medium-high-technology industries. This finding echoes previous studies citing that although most industries rely on the supply of skilled manpower from tertiary institutions, most graduates do not receive the latest skill information due to the perceived lack of interaction between these institutions and the manufacturing sector. Degree holders are generally more proficient in aspects of industry theory but slightly incompetent when it involves skills (Yunus, 2020; Yusof, 2011).

For diploma workers, our results in Table 3 revealed that the level of absorptive capacity exploiting foreign technology is highest at the 25th quantile, showing a tremendous increase of 23.3% between the 10th quantile and the 25th quantile. However,

Table 3. Quantile regression results for employees' absorptive capacity with diploma qualifications in the medium-high-technology industry, 2000-2018

Dependant variable: FDI stock	10th quantile	25th quantile	Median	75th quantile	90th quantile
lagged FDI stock (FDI_{it-1})	0.059*	0.097*	0.077*	0.196**	0.177*
	(0.036)	(0.003)	(0.004)	(0.003)	(0.002)
*ABC*_Diploma	0.103***	0.127**	0.101**	0.109	0.059
	(0.081)	(0.054)	(0.068)	(0.096)	(0.072)
*ABC*_Diploma squared	-0.071***	-0.063**	-0.060**	-0.067	-0.027
	(0.024)	(0.027)	(0.032)	(0.048)	(0.036)
RDEXP	0.013*	-0.022*	-0.037***	-0.027*	-0.022**
	(0.041)	(0.007)	(0.009)	(0.014)	(0.001)
ICT	0.263**	0.029	0.017**	-0.026	-0.055**
	(0.049)	(0.011)	(0.014)	(0.002)	(0.011)
DDI	0.069***	0.035**	0.086	-0.039*	-0.066***
	(0.060)	(0.064)	(0.012)	(0.011)	(0.013)
FS	0.166**	0.155*	0.214**	0.256***	0.252***
	(0.022)	(0.023)	(0.029)	(0.033)	(0.002)
Constant	4.757***	4.652**	4.252***	4.941*	4.103***
	(0.026)	(0.029)	(0.026)	(0.091)	(0.028)
Pseudo R^2	0.885	0.768	0.795	0.762	0.816

Notes: This table presents the quantile regression results for equation (7), where the dependent variable is FDI stock and the total number of observations is 76. *ABC*_Diploma is absorptive capacity of employees with diploma qualifications. *ABC*_Diploma squared denotes the quadratic effects of workers with diploma. *RDEXP* is R&D investment, *ICT* is communication and technology investment, *DDI* is direct domestic investment from local investors and *FS* denotes firm size. Entries in parentheses are robust standard errors and all variables are transformed into natural log. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively.

we found the level of absorptive capacity diminished from the median quantile onwards and is insignificant at the 75th and 90th quantiles.

This indicates that there is a growing irrelevance pertaining to the skills associated with diploma holders, as the industry is adapting to rapidly evolving technologies that will fundamentally change the scope and nature of the work itself.

For the quadratic relationship between absorptive capacity of diploma workers, and inward FDI stocks, a consistently negative correlation was evident along the quantiles, which points to skills and educational mismatch, specifically in engaging with rapid changes in the labour market. Hence, diploma workers who fail to adapt their existing skills to emerging technologies, such as artificial intelligence, will find themselves in a skill-deficient situation (Yunus, 2017, 2021).

Nonetheless, based on this fact our study assumes that the process of absorptive capacity by diploma-holding workers for advanced technologies from FDI at the higher quantile in this study will occur gradually, leading to a non-linear relationship. This is because FDI also transfers technological knowledge to improve labour skills in the human capital development process in recipient countries via gradual processes, such

as described in the endogenous model of FDI (Lucas Jr., 1988). The presence of non-linearity shown in the case of diploma-holders is highly influenced by the concept of signals. Thus, we suggest a systematic recruitment system should be established to hire productive employees and not emphasise qualification certificates as a "signal of productivity" (Yunus, 2017).

Next, we divert our attention to the estimation results for employees' absorptive capacity with MCE/V qualifications as shown in Table 4. Our results for absorptive capacity of secondary-educated workers and their quadratic effect, *ABC*_MCE/V squared revealed a relatively similar and insignificant negative relationship with FDI inflows. Thus, medium-high-technology industries will receive a reduction in FDI inflows from the lowest quantile to the 50th quantile due to the diminishing labour absorption levels. This could be attributed to the redistribution of internal labour due to a high demand for highly skilled and experienced labour, which is considered to have better absorption capacity. Previous studies support that low-skilled labour would therefore be relocated to subsectors where productivity is lower, befitting their capacity to access the overflow of low value-added FDI technologies (Ismail, 2001; Yunus & Masron, 2020).

Table 4. Quantile regression results for employees' absorptive capacity with Malaysian Certificate of Education/Vocational qualifications in the medium-high-technology industry, 2000-2018

Dependant variable: FDI stock	10th quantile	25th quantile	Median	75th quantile	90th quantile
lagged FDI stock (FDI_{it-1})	0.092***	0.097***	0.097***	0.098***	0.829***
	(0.015)	(0.002)	(0.019)	(0.003)	(0.004)
*ABC*_MCE/V	-0.048	-0.025	-0.023	0.172**	0.198*
	(0.159)	(0.023)	(0.256)	(0.003)	(0.177)
*ABC*_MCE/V squared	-0.022	-0.013	-0.029	0.155*	0.161*
	(0.093)	(0.102)	(0.128)	(0.058)	(0.038)
RDEXP	0.013***	-0.016*	0.037***	-0.018	-0.099
	(0.005)	(0.054)	(0.009)	(0.013)	(0.001)
ICT	0.022**	0.029	0.097	-0.038	-0.048*
	(0.008)	(0.011)	(0.011)	(0.012)	(0.025)
DDI	0.012***	0.027**	0.026*	-0.039*	-0.061***
	(0.007)	(0.011)	(0.012)	(0.011)	(0.013)
FS	0.168***	0.184*	0.244**	0.277***	0.257***
	(0.014)	(0.002)	(0.018)	(0.033)	(0.004)
Constant	5.508***	5.752**	5.103***	4.083*	4.456*
	(0.015)	(0.029)	(0.020)	(0.091)	(0.144)
Pseudo R^2	0.823	0.814	0.756	0.761	0.834

Notes: This table presents the quantile regression results for equation (8), where the dependent variable is FDI stock and the total number of observations is 76. *ABC*_MCE/V is employees' absorptive capacity with Malaysian Certificate of Education/Vocational qualifications. *ABC*_MCE/V squared denotes the quadratic effects of workers with Malaysian Certificate of Education /Vocational qualifications. *RDEXP* is R&D investment, *ICT* is communication and technology investment, *DDI* is direct domestic investment from local investors and *FS* denotes firm size. Entries in parentheses are robust standard errors and all variables are transformed into natural log. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively.

A skill-level-based labour structure contributes to higher firm productivity and competitiveness, due to increased employee job satisfaction (Böckerman et al., 2011; Yunus & Wahob, 2019). Similarly, our study showed that the absorptive capacity of employees with secondary qualifications was positive and significant at both higher quantiles. These results imply that, when the ability of employees with MCE/V qualifications to capture FDI technology increased by 1% at the 75th and 90th quantiles, FDI spillovers increased by more than 15.0%.

Lastly, turning to the control variables, the results in Table 2, Table 3 and Table 4 showed that technological progress variables demonstrated a similar pattern, reaching positive and significant effects in levels of absorptive capacity from the bottom quantile up until the median quantile of conditional FDI distribution. These variables include R&D investment, direct domestic investment from local investors and ICT investment. Our results also suggested an upward trend in ICT investment, which drives the exploitation of external knowledge. Meanwhile, R&D activities and continuous effort by domestic investors help firms invigorate innovation activities and leverage knowledge and technology from FDI.

However, the absorptive capacity of domestic investments from R&D, ICT and private investments all showed a similar trend, switching to a negative coefficient at the 75th quantile of the conditional FDI distribution up to 95th quantile in three different models by employees' educational qualifications. The negative relationship between domestic investments and FDI has been reported in situations where domestic firms choose to increase their investment, thus causing foreign companies to reduce their investment in the firms. These results highlight that the impact of domestic investments on FDI inflows is still inconclusive, where results could differ depending on the measurement techniques and proxies used to measure domestic investments (Kathuria, 2008; Lautier & Moreaub, 2012).

For R&D investment, we can conclude that the technology gap between multinational and Malaysian medium-high-technology is wide. Kokko et al. (1996) similarly hypothesised that domestic firms can only benefit if they can accelerate the process of exploiting the advanced technological spillovers from the MNCs. This finding should motivate the government to increase R&D investment in order to raise the technical capability and profitability of domestic firms, resulting in a high capital return for FDI.

The results of our study indicate that firm size is a significant variable across all conditional quantiles specifications. The absorptive capacity of firm size reached its highest at the 75th quantile level, hence reflecting the potential of inward FDI into medium-high-technology industries increasing by more than 25.0%. Previous studies suggested that foreign investment incurs sunk costs at an early stage and technology investment from MNCs in large firms is considered more profitable as large firms have better credit access, larger equity share and technological strength in producing large scale and more efficient products (Ahuja & Katila, 2001; Zou et al., 2018). As more industries begin to integrate via emerging technologies such as artificial intelligence, medium-high-technology industries are more likely to employ highly skilled workers. These workers generally possess a better absorptive capacity in exploiting foreign technologies and thus will encourage more FDI towards the firms (Acemoglu & Restrepo, 2018).

6. Conclusion and Policy Implication

Our study stands among other pioneering studies that perform econometric analysis by explicitly measuring the level of absorptive capacity at different quantile levels in medium-high-technology industries. We intend to make additional contributions to absorptive capacity literature by developing a human capital model according to the level of workers' academic credentials.

Based on the quantile regression estimator, we emphasise three notable findings in medium-high-technology industries. First, the absorptive capacity of degree-holding workers in capturing technology effects will potentially upsurge FDI inflows around 44.0% at the median quantiles. Second, the absorptive capacity of diploma-holding workers stays at the 25th quantile of conditional FDI distribution. This implies that the technical and generic skills possessed by these diploma-qualified employees sit below the median level of absorptive capacity in exploiting foreign FDI technology in the industry, possibly an indication of their contribution to the firm's productivity. Third, workers with an MCE/MCEV education level demonstrates a slightly higher level of absorptive capacity at the 75th and 95th quantiles, increasing FDI spillovers by more than 15.0%.

Our results also draw attention to the negative relationship found at the higher quantile as a sign of non-linearity between the absorptive capacity of both degree- and diploma-holding employees' and the distribution of FDI spillovers. These results suggest that although the presence of FDI is expected to increase knowledge and skills upgrades and create higher demand for skilled workers, the overflow of FDI technology for human capital development is a non-linear process. Thus, it can show any sign depending on the efficiency of human capital and nature of FDI activity. In our case, the negative signs demonstrated are likely due to the low level of labour absorptive capacity in assimilating the technology spillovers brought in by FDI.

Based on the issues mentioned, which also proves that the level of human capital efficiency is the first condition to enhance the absorption process of FDI advanced technology, we first recommend that human capital development training be handed over to MNCs. Financial incentives such as tax breaks should be offered to help them cover training costs. Due to the lack of opportunities, MNCs should be allowed to collaborate with international chambers from other countries to determine the skill level of the workforce available (Michie, 2001).

Secondly, to enable graduates to be familiar with rapid technological change implementable via educational digitisation, our study suggests that institutions of higher learning not only need to involve industries when formulating new curricula, but regular meetings with industry representatives also need to be held. This would serve as an initial preparation to obtain the latest information regarding digital and soft skills (i.e., critical thinking) to be considered for the curriculum even before formal accreditation if necessary, assuming informal approval and validation by the industry is granted.

Thirdly, technical and vocational education training institutions (TVETs) should work with institutions of higher learning for cross-learning (by having lecturers from each to be loaned to each other) and the sharing of technical knowledge and R&D experience commercialisation, application of discoveries and R&D products should also be encouraged.

Lastly, it is important to note that different results can be due to the presence of heterogeneity in the data sources, sample selection and methodological approaches or estimation techniques. At the firm level in particular, the techniques used to detect externalities from inward FDI, such as the openness to FDI when developing countries' FDI policies are quite diverse. The presence of heterogeneity in data at the firm level is even more binding when the analysis is conducted. This has even led to recommendations discouraging researchers from using microdata for cross-country or firm studies.

References

Acemoglu, D., & Restrepo, P. (2018). The race between man and machine: Implications of technology for growth, factor shares, and employment. *American Economic Review, 108*(6), 1488–1542. https://doi.org/10.1257/aer.20160696

Ahuja, G., & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study. *Strategic Management Journal, 22*(3), 197–220. https://doi.org/10.1002/smj.157

Anwar, S., & Nguyen, L.P. (2010). Absorptive capacity, foreign direct investment-linked spillovers and economic growth in Vietnam. *Asian Business & Management, 9*(4), 553–570. https://doi.org/10.1057/abm.2010.28

Awang, A.H., Hussain, M.Y., & Abdul Malek, J. (2009). Promoting knowledge transfer in science and technology: A case study of Technology Park Malaysia (TPM). *Croatian Economic Survey, 11*(1), 95–113.

Böckerman, P., Ilmakunnas, P., & Johansson, E. (2011). Job security and employee well-being: Evidence from matched survey and register data. *Labour Economics, 18*(4), 547–554. https://doi.org/10.1016/j.labeco.2010.12.011

Blomström, M., & Kokko, A. (1998). Multinational corporations and spillovers. *Journal of Economic Surveys, 12*(3), 247–277. https://doi.org/10.1111/1467-6419.00056

Blomström, M., Kokko, A., & Zejan, M. (1994). Host country competition, labor skills, and technology transfer by multinationals. *Review of World Economics, 130*, 521–533. https://doi.org/10.1007/BF02707611

Buchinsky, M. (1998). Recent advances in quantile regression models: A practical guideline for empirical research. *Journal of Human Resources, 33*(1), 88–126. https://doi.org/10.2307/146316

Bwalya, S.M. (2006). Foreign direct investment and technology spillovers: Evidence from panel data analysis of manufacturing firms in Zambia. *Journal of Development Economics, 81*(2), 514–526. https://doi.org/10.1016/j.jdeveco.2005.06.011

Castellani, D., & Zanfei, A. (2003). Technology gaps, absorptive capacity and the impact of inward investments on productivity of European firms. *Economics of Innovation and New Technology, 12*(6), 555–576. https://doi.org/10.1080/714933761

Chen, T., Kokko, A., & Tingvall, P.G. (2011). FDI and spillovers in China: Non-linearity and absorptive capacity. *Journal of Chinese Economic and Business Studies, 9*(1), 1–22. https://doi.org/10.1080/14765284.2011.542882

Chudnovsky, D., López, A., & Rossi, G. (2008). Foreign direct investment spillovers and the absorptive capabilities of domestic firms in the Argentine manufacturing sector (1992–2001). *Journal of Development Studies, 44*(5), 645–677. https://doi.org/10.1080/00220380802009159

Cleeve, E.A., Debrah, Y., & Yiheyis, Z. (2015). Human capital and FDI inflow: An assessment of the African case. *World Development, 74*, 1–14. https://doi.org/10.1016/j.worlddev.2015.04.003

Falaris, E.M. (2008). A quantile regression analysis of wages in Panama. *Review of Development Economics, 12*(3), 498–514. https://doi.org/10.1111/j.1467-9361.2008.00442.x

Findlay, R. (1978). Relative backwardness, direct foreign investment, and the transfer of technology: A simple dynamic model. *Quarterly Journal of Economics, 92*(1), 1–16. https://doi.org/10.2307/1885996

Flôres, R.G., Fontoura, M.P., & Santos, R.G. (2007). Foreign direct investment spillovers in Portugal: Additional lessons from a country study. *European Journal of Development Research, 19*, 372–390. https://doi.org/10.1080/09578810701507126

Girma, S., Greenaway, D., & Wakelin, K. (2001). Who benefits from foreign direct investment in the UK? *Scottish Journal of Political Economy, 48*(2), 119–133. https://doi.org/10.1111/1467-9485.00189

Girma, S., & Görg, H. (2005). *Foreign direct Investment, spillovers and absorptive capacity: Evidence from quantile regressions* (Bundesbank Series 1 Discussion Paper No. 2005,13). https://doi.org/10.2139/ssrn.2785099

Glass, A.J., & Saggi, K. (1998). International technology transfer and the technology gap. *Journal of Development Economics, 55*(2), 369–398. https://doi.org/10.1016/S0304-3878(98)00041-8

Imbriani, C., Pittiglio, R., Reganati, F., & Sica, E. (2014). How much do technological gap, firm size, and regional characteristics matter for the absorptive capacity of Italian enterprises? *International Advances in Economic Research, 20*, 57–72. https://doi.org/10.1007/s11294-013-9439-7

Ismail, M.H. (2012). Study on employability of graduates in Malaysia: A survey of employer perspectives. *Prosiding PERKEM VII, Vol. 2*, pp. 906–913.

Ismail, M.N. (2001). *Foreign direct investments and development: The Malaysian electronics sector* (Working Paper 2001: 4, Chr. Michelsen Institute, Norway). https://www.cmi.no/publications/file/881-foreign-direct-investments-and-development.pdf

Jabbour, L., & Mucchielli, J.L. (2007). Technology transfer through vertical linkages: the case of the Spanish manufacturing industry. *Journal of Applied Economics, 10*(1), 115–136. https://doi.org/10.1080/15140326.2007.12040484

Kathuria, V. (2008). The impact of FDI inflows on R&D investment by medium-and high-tech firms in India in the post-reform period. *Transnational Corporations, 17*(2), 45–66.

Koenker, R., & Bassett, G. (1978). Regression quantiles. *Econometrica, 46*(1), 33–50. https://doi.org/10.2307/1913643

Koenker, R., & Machado, J.A.F. (1999). Goodness of fit and related inference processes for quantile regression. *Journal of the American Statistical Association, 94*(448), 1296–1310. https://doi.org/10.1080/01621459.1999.10473882

Khordagui, N., & Saleh, G. (2016). Absorptive capacity factors that mediate foreign direct investment spillovers: A sector-level analysis from emerging economies. *International Journal of Business and Globalisation, 16*(2), 188–201.

Kokko, A., Tansini, R., & Zejan, M.C. (1996). Local technological capability and productivity spillovers from FDI in the Uruguayan manufacturing sector. *Journal of Development Studies, 32*(4), 602–611. https://doi.org/10.1080/00220389608422430

Lai, M.Y., Bao, Q., Peng, S.J., & Zhang, X. (2005). Foreign direct investment and technology spillover: A theoretical explanation of absorptive capability. *Economic Research Journal, 8*, 95–105.

Lautier, M., & Moreaub, F. (2012). Domestic investment and FDI in developing countries: The missing link. *Journal of Economic Development, 37*(3), 1–23.

Lopez-Garcia, P., & Montero, J.M. (2012). Spillovers and absorptive capacity in the decision to innovate of Spanish firms: The role of human capital. *Economics of Innovation and New Technology, 21*(7), 589–612. https://doi.org/10.1080/10438599.2011.606170

Lucas Jr., R.E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Michie, J. (2001). *The impact of foreign direct investment on human capital enhancement in developing countries* (Report for the Organization for Economic Co-operation and Development). https://www.oecd.org/dev/2731643.pdf

MIDA. (2020). *MIDA annual report: Investment performance 2020*. Malaysia Investment Development Authority, Kuala Lumpur. https://www.mida.gov.my/wp-content/uploads/2021/03/MIDA-IPR-2020_FINAL_March4.pdf

Narula, R., & Dunning, J.H. (2000). Industrial development, globalization and multinational enterprises: New realities for developing countries. *Oxford Development Studies, 28*(2), 141–167. https://doi.org/10.1080/713688313

Nazeer, N., Rasiah, R., & Furuoka, F. (2021). Technology transfer, technological capability, absorptive capacity and firm performance: An investigation of the textile and clothing firms in Pakistan. *Malaysian Journal of Economic Studies, 58*(1), 99–124. https://doi.org/10.22452/MJES.vol58no1.6

Slaughter, M.J. (2002). *Does inward foreign direct investment contribute to skill upgrading in developing countries?* (SCEPA working paper series, 2002-08). Schwartz Center for Economic Policy Analysis (SCEPA), The New School. http://www.economicpolicyresearch.org/scepa/publications/workingpapers/2002/cepa200208.pdf

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal, 17*(S2), 27–43. https://doi.org/10.1002/smj.4250171105

Von Hippel, E. (1994). "Sticky information" and the locus of problem solving: Implications for innovation. *Management Science, 40*(4), 429–439. https://doi.org/10.1287/mnsc.40.4.429

Vu, H.D. (2018). Firm's absorptive capacity: The case of Vietnamese manufacturing firms. *Review of Economic Perspectives, 18*(3), 301–325. https://doi.org/10.2478/revecp-2018-0015

Wooldridge, J.M. (2005). Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics, 20*(1), 39–54. https://doi.org/10.1002/jae.770

Yunus, N.M. (2017). Sheepskin effects in the returns to higher education: New evidence for Malaysia. *Asian Academy of Management Journal, 22*(1), 151–182. https://doi.org/10.21315/aamj2017.22.1.7

Yunus, N.M. (2020). Determinants of foreign direct investment: An analysis on policy variables in the Malaysian manufacturing industry. *International Journal of Asian Social Science, 10*(12), 746–760. https://doi.org/10.18488/journal.1.2020.1012.746.760

Yunus, N.M. (2021). Labour productivity spillovers from foreign direct investment: Evidence from Malaysian industry level panel data by labour skills composition. *Malaysian Journal of Social Sciences and Humanities (MJSSH), 6*(6), 247–258. https://doi.org/10.47405/mjssh.v6i6.813

Yunus, N.M., & Hamid, F.S. (2017). Changing returns to education in the Malaysian electric & electronic sector, 2002-2007. *International Journal of Economic Research, 14*(Number 16 Part 2), 295–308.

Yunus, N.M., & Masron, T.A. (2020). Spillover effects of inward foreign direct investment on labour productivity: An analysis on skill composition in manufacturing industry. *International Journal of Asian Social Science, 10*(10), 593–611. https://doi.org/10.18488/journal.1.2020.1010.593.611

Yunus, N.M., & Wahob, N.A. (2019). Returns from self-employment in Malaysia. *Revista Publicando, 5*(18), 60–74.

Yunus, N.M., Said, R., & Azman-Saini, W.N.W. (2015). Spillover effects of FDI and trade on demand for skilled labour in Malaysian manufacturing industries. *Asian Academy of Management Journal, 20*(2), 1–27.

Yusof, N. (2011). Pelaburan langsung asing dan pembangunan industri barangan elektrik dan elektronik di Negeri Pulau Pinang, 1970–2007. *Kemanusiaan, 18*(2), 43–74.

Zou, T., Ertug, G., & George, G. (2018). The capacity to innovate: A meta-analysis of absorptive capacity. *Innovation, 20*(2), 87–121. https://doi.org/10.1080/14479338.2018.1428105