FOREIGN OWNERSHIP AND OPENNESS IN THE MALAYSIAN FOOD PROCESSING INDUSTRY: IMPACT ON PRODUCTIVITY GROWTH

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Abstract

Food processing industry plays an important role in the Malaysian economy. The industry contributes about 10% to the total manufacturing output. This study aims to investigate the impacts of foreign ownership and openness to productivity growth in the Malaysian Food Processing Industry (FPI). A non parametric approach Data Envelopment Analysis (DEA) was employed to examine the total factor productivity growth. We employ five-digit panel data for the period of 2000-2006. The data was tested for stationary using Augmented Dickey Fuller (ADF) unit root test, and Hausman specification test to obtain the more appropriate model. Fixed effect model is the best model for estimation factor affecting total factor productivity growth in the small and medium enterprises (SMEs) and the large scale enterprises (LSEs). The Malaysian FPI was experiencing with negative total factor productivity growth (-1.3%) in the SMEs and positive (7.3%) in the LSEs during 2001 to 2006. The results also suggest that foreign ownership is positively affecting total factor productivity growth both in the SMEs and the LSEs but not significant. However, openness is positively influencing the productivity growth in the SMEs and significant at five percent confidence level in the LSEs.

Keywords: *Food processing industry, data envelopment analysis, foreign ownership, openness and Malaysia*

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1. Introduction

Globalization forms more open economic environment. In an open economy, development of a nation much depends on capital inflow and export-import activity. Malaysia is one of the open economic nations, which currently stands as the 18th largest exporter country in the world. To boost economic growth, Malaysian government encourages participation of foreign and private investor by practicing pro-business policies. Such policies are including the certainty of regulation, provide the public infrastructure and offer incentives for investors. The Malaysian government is also attracting Foreign Direct Investment (FDI) actively. It benefits in terms of human resource development, technology transfer and access to markets.

In the regional area, more open economic is implementing in the ASEAN Free Trade Agreement (AFTA). The agreement's goal is to reduce tariffs and non tariff barrier, to form the region as a basis of production and as a market for more than 540 million inhabitants. Through a Common Effective Preferential Tariff (CEP), import tariff will be reduced 0 - 5% effective in 2015 for Indonesia, Malaysia, Philippines, Singapore and Thailand. Especially Brunei Darussalam, the scheme was effective since 2010. This challenges all ASEAN members to get benefits through a larger market and cheaper raw material for manufacturing sector.

In Malaysia, Food Processing Industry (FPI) is one of the manufacturing sector benefits for the larger consumers in the region. It may be easier even for small domestic firms to sell the products to foreign market. However, the Malaysian FPI has to compete with other foreign producers, which have the same entry chance to the

market. Such condition pushes the organization to allocate resources efficiently and choice specialization in terms of comparative advantage. The better performance's firms will remain to exist, while the poor performance firm will exit from the market. Therefore, improvement the FPI's performance in this country is crucial efforts to produce competitive products.

In neoclassical economic theory, moving toward global orientation and reducing government control on economic activity is believed as a source of better performance for manufacturing sector. Increase access to foreign markets may affect firms' productivity. The effects could be obtained through several channels such as increased competitiveness, larger market shares and technological spillovers. However, the direction of these effects, whether it is positive or negative depends on the market structure and the type of trade instruments applied. To study the trade liberalization and its impact on productive performance some variables such as foreign investment, foreign ownership, openness trade index has documented in the existing literatures. The consecutive paper presents literature review in section 2, methodology in section 3, result and discussion in section 4, and lastly conclusion in section 5.

2. Literature review

Productivity is crucial for an organization no matter it is a profit or a non profit organization. There are two main types of productivity; namely partial productivity and total productivity (Heshmati, 2003; Hoque and Falk, 2000). Partial productivity is a simple measurement, but it does not figure the productivity of all inputs. In contrast,

total productivity assesses the entire inputs to the total output in the production process. It explains how output changes due to the changes of all inputs (Mady, 1992). Solow (1957) pioneered measuring total factor productivity growth (TFPG) as a geometric mean index. The index is calculated in the growth equation and known as the residual approach, whereby the contribution of physical and non physical input will determine the value of productivity. Number of dependent variables in the production function will influence the value of residual (Jajri, 2007).

In the productivity theory, sources of TFP growth are possible from; (i) domestic source, and (ii) international source. Domestic source associated with innovation, meanwhile the international source associated with the ability of a nation or a firm to absorb technological progress from the leading nation. Factors influence productivity growth has been studied widely in the management operation research. The factors such as R&D (see: Cameron et al., 2005; Liao et al., 2009 and Bronzini and Piselli, 2009); openness (Alcala and Ciccone, 2004; Amity and Konings, 2007); ownership (Margono and Sharma, 2006; Benfratello, 2006; George et al., 2005; Jungnickle, 2004) and FDI (see: Bellack, 2004; Helpman, 2006; Hubert and Pain, 2001 and Ang, 2008) have well documented.

Conventionally, it is believed that firms with foreign equity tend to be more productive and efficient. This could be due to the firm specific tangible assets such as skilled labor, new technology, and product innovation, or the intangible asset embodied in the foreign share such as management system, marketing channel and networking. Girma and Gorg (2002) found that foreign-owned firms have higher levels of productivity than domestic owned firms. Establishment's outsourcing

intensity is positively related to its productivity, which is more distinctly appearing in the foreign owned company.

Kee (2005) shows that the presences of foreign equity in Bangladesh garment industry are on average 20 percent more productive than domestic firms. However, it is a statistically significant indicates that the domestic firms may advantage the spillover effects from the FDI firms. For every 10 percent increase in FDI firm productivity, the domestic firms led to improve the productivity by 1.4 percent.

Current economic development has highlighted the positive effects of openness and FDI. International trade and foreign investment affect the economic growth through increase income per worker and proportion of total trade share in GDP (Frankel & Romer, 1999). In almost empirical works, openness is measured as value imports plus exports relative to nominal GDP (Sun et al., 1999; Anderson, 2001; Acala and Ciccone, 2004; Shiu and Hesmati, 2006 and Ang, 2008). More open economy has found raising the industry's average productivity but gives higher entry and exit frequency, mainly for small plants due to the natural selection. The less efficient firm will out from industry because of unable to compete with other efficient firms (Anderson, 2001).

There are many studies evidence that open economy countries are more productive than that of not open economy countries. Lejour et al. (2009) noted that one percent increase in the share of trade in GDP raises the level of income about 0.9 to 3 percent. Openness in terms of trade and investment from overseas benefits the domestic economy, but it is sometimes not clear, which factors affecting and how more openness leads in the economic performance. Edward (1997) found a positive

relationship between openness and TFP growth, and more open economic countries have indeed experienced a swifter productivity growth.

Micro studies have generally revealed a positive relationship between higher exports and productivity growth. Nevertheless, Harisson (1994) noted the correlation between import and productivity growth is often negative. This asymmetry is likely to be due to two factors; (i) countries tend to export goods in which they have a comparative advantage and tend to import goods in which they do not, (ii) the nature of productivity growth; productivity growth tends to be higher when output is growing, and falls during recessions or low-growth periods. Hence, if greater import penetration is accompanied by a contraction of domestic industry, it is not surprising that productivity growth also falls.

3. Methodology

3.1 Malmquist productivity index

To measure productivity growth of the Malaysian FPI, we employed non parametric approach Data Envelopment Analysis (DEA), based on the Malmquist productivity index. Malmquist productivity index estimates TFP growth from the changes of two distance function within two periods of time. Simplify the concept of Malmquist productivity index can be described in the Figure 1.

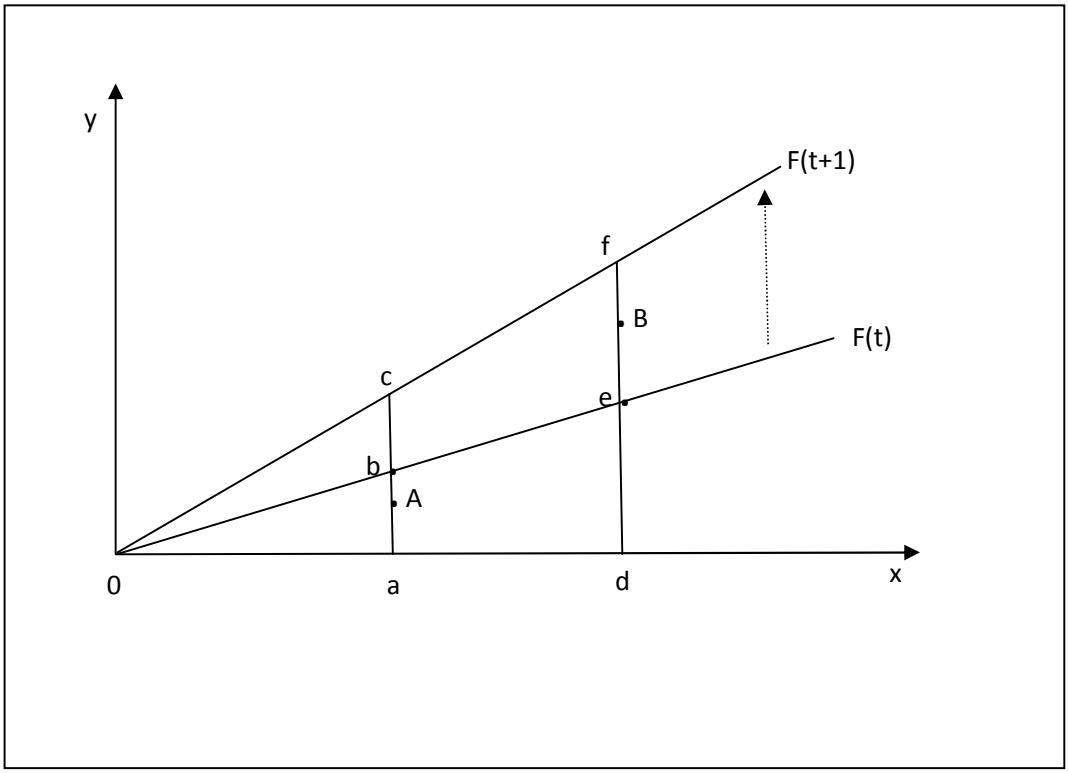

Figure 1. Concept of Distance Function in the Malmquist Index

Suppose a firm is operating at the point A, producing *y* outputs by employing *x* inputs in the period of *t*, A = (x^t, y^t), with possibility production function F(t). Then the firm forward the production to point B in the period *t*+1, B = (x^{t+1}, y^{t+1}) with possibility production function F(t+1). Shifting of the production from A to B within the two periods provides four distance functions; D^t (A) = aA/ab, D^{t+1}(A) = aA/ac, D^t (B) = dB/de and D^{t+1} (B) = dB/df, then we obtain:

$$MI^{t+1}(A,B) = \frac{dB/df}{aA/ab}\left[\frac{aB/de}{dB/df}\frac{aA/ab}{aA/ac}\right]^{1/2} = \frac{dB/df}{aA/ab}\left[\frac{df}{de}\frac{ac}{ab}\right]^{1/2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

From this equation, it can be seen that the efficiency term captures the change in the distance from the frontier function in t and t+1, and the technological growth related to the geometric mean of the vertical movement of the frontier function from the two periods of time (Fare et al., 1994).

Malmquist productivity index (MI^t) for the period *t* is given by:

$$MI^t\left(y^{t+1}, y^t, x^{t+1}, x^t\right) = \frac{D_i^t\left(y^{t+1}, x^{t+1}\right)}{D_i^t\left(y^t, x^t\right)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

The Malmquist productivity index (M^{t+1}) for period t+1 similarly can be formulated as:

$$MI^{t+1}\left(y^{t+1}, y^t, x^{t+1}, x^t\right) = \frac{D_i^{t+1}\left(y^{t+1}, x^{t+1}\right)}{D_i^{t+1}\left(y^t, x^t\right)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Since equation (2) and (3) relies completely on the constant return to scale assumption, thus the Malmquist index based on output-oriented and input oriented will be the same. Hence, these equations can be rewritten as:

$$MI\ \left(y^{t+1}, y^{t}, x^{t+1}, x^{t}\right) = [\,MI^{t}\left(y^{t+1}, y^{t}, x^{t+1}, x^{t}\right) x MI^{t+1}(y^{t+1}, y^{t}, x^{t+1}, x^{t})\,]^{1/2} =$$

$$\underbrace{\frac{D_c^{t+1}\left(y^{t+1}, x^{t+1}\right)}{D_c^{t}\left(y^{t}, x^{t}\right)}}_{\text{TE}} \left[\underbrace{\frac{D_c^{t}(y^{t+1}, x^{t+1})}{D_c{}^{t+1}(y^{t+1}, x^{t+1})} x \frac{D_c^{t}(y^{t}, x^{t})}{D_c^{t+1}(y^{t}, x^{t})}}_{\text{TP}} \right]^{1/2} \quad \text{.....} \quad (4)$$

Technical Efficiency (TE) is the catching-up firms to the production frontier, while the Technical Progress (TP) is the moving forward of the frontier itself on CRS technology. If the assumption subject to Variable Return to Scale (VRS) technology, then the Malmquist index can decompose TFP growth into two components namely technical efficiency change (EFCH) and technological change (TECH). Then the EFCH can be decomposed to scale efficiency change (SECH) and pure efficiency change (PECH). The improvement of productivity over the period occurs if the geometric mean is greater than one and decreasing if the value less than one.

3.2 Fixed Effect Model

In panel data analysis, the terms of fixed effects or random effects are related to how the particular coefficients in a model are treated as a fixed or as a random value. Fixed effects model controls the omitted variables that are differing between cases but constant over time. Changes in the variables over time can be used to estimate the effects of the independent variables on dependent variable. Fixed effect model is

applicable to both random and non-random samples; however, the random effect models are usually appropriate only to random samples.

If the focus is addressed on a specific set of N firms, then fixed effect model is a suitable specification. In this case, unobservable individual specific effect (μ_i) is assumed to be a fixed parameter and remainder disturbance stochastic (v_{it}) are independent and identically distributed, iid ($0,\sigma_v^2$). Following Hausman (1978) and Baltagi (2000), the simple panel equation expressed as:

$$y_{it} = \alpha + X'_{it}\beta + u_{it} + v_{it} \quad \text{………………………………………………………...} \quad (5)$$

divided by *t* to get:

$$\bar{y}_i = \alpha + \beta \bar{x}_i + \mu_i + \bar{v}_i \quad \text{………………………………………………………..} \quad (6)$$

Subtracting these two equations and averaging all observations then:

$$\bar{y}_{..} = \alpha + \beta \bar{x}_{..} + \bar{v}_{..} \quad \text{……………………………………………………..} \quad (7)$$

Equation (7) is known as fixed effect least square. Testing the fixed effect one can use hypotheses (using F test):

H_0: $\mu_1 = \mu_2 = \ldots\ldots. = \mu_{N-1} = 0$

H_1: $\mu_1 \neq \mu_2 \neq \ldots\ldots. \neq \mu_{N-1} \neq 0$

3.3 Random Effect Model

Random effect model is a suitable specification if we draw, i = N individual from a large population. Since the inference made out of a large population, using fixed effect cause loss the degree of freedom. Loss of the degree of freedom due to many parameters in the fixed effect can be overwhelmed if the μ_i is assumed random. Random effect ignorance the disturbance terms when the dummy variables present, and it is also called as the error component model (ECM).

Gujarati (2009) defines a random effects model as:

$$y_{it} = \beta_{1i} + \beta_2 X_{it} + .. + \beta_n X_{it} + u_{it} \quad \text{……………………………………………...…} \quad (8)$$

where β_{1i} is assumed as a random variable with a mean value of β_1. Then the intercept for each i can be expressed:

$$\beta_{1i} = \beta_1 + \varepsilon_i \quad \text{…………………………………………………...……...….} \quad (9)$$

where ε_i is a random error with zero mean and variance σ_ε^2. If the composite error w_{it} = $\varepsilon_i + u_{it}$, and each individual reflected in the error term ε_i then the equation 4.31 become:

$$y_{it} = \beta_1 + \beta_2 X_{it} + .. + \beta_n X_{it} + \varepsilon_i + u_{it}$$

$$= \beta_1 + \beta_2 X_{it} + .. + \beta_n X_{it} + w_{it} \quad \text{……………………..…………………………} \quad (10)$$

The composite error w_{it} is not correlated with any of the independent variables in the model, but since ε_i stands as a component of w_{it} indirectly it has a correlation indeed and makes the result is inconsistent. Therefore, it is important to select a fixed effect or random effect model for the unbiased, but consistent results. It depends on the assumption and the likely correlation among the individual, error components, and explanatory variables. If no correlation between the error and explanatory variables, random effect model is suitable, and fixed effects vice versa. However, such correlation should be tested. The common test is Hausman test, which tests the significance of an estimator versus an alternative estimator.

3.4 Data and Variables

We obtained five-digit data from the Department of Statistics (DoS), Malaysia. The FPI is in the code of 151 up to 155 under MSIC (Malaysian Standard Industrial Classification). The MSIC has been improved since 2000 following the standard international classification issued by FAO. Therefore, data is consistently available from 2000 to 2006. It is unpublished data of output and input of the Malaysian FPI. In this analysis output is defined as the total value added generated by each sub industry, and input is number of employee, wage, asset, material and energy, budget for R&D.

From the existing literature, we have identified endogenous and exogenous variables affecting the TFPG in the food industry. We apply in the present study; budget for research and development (R&D), foreign direct investment in food industry (FDI), population growth (POP), openness index (OPEN) and foreign ownership (FOWE). R&D is the total amount allocated for research and development, FDI is the total

amount invested in the food manufacturing industry by the foreign investors. Population growth is obtained from the World Bank database, while foreign ownership in the Malaysian FPI is from DoS. Openness is measured in terms share of total trade volume to GDP (Sun et al., 1999; Ang, 2008; Anderson, 2001; Shiu and Hesmati, 2006).

We included FDI in the model because foreign investors always own a share in the business established (joint venture or fully foreign owned firms). Openness influences domestic TFP through a larger trade volume for a host country, for example, the higher import volume of some inputs and by exporting of the final products.

Our specification model to find the factor affecting the productivity growth is as follows:

$$\ln TFPG_{it} = \alpha + \beta_1 \ln OPEN_{it} + \beta_2 \ln FDI_{it} + \beta_3 \ln RND_{it} + \beta_4 \ln POP_{it} + \beta_5 \ln FOWE_{it} + U_{it} \quad \text{………} (11)$$

4. Result and Discussion

4.1 Total Factor Productivity Growth of the SMEs

Total factor productivity growth (TFPG) defines the change of ratio inputs to the output in production during the period *t* to the period of *t+1.* A decision making unit (DMU) has positive TFPG if the index is greater than unity and negative if the index

is less than unity. If the industry shows low productivity growth, it indicates no reducing inefficiency of production or there is no moving forward of the frontier production during the period of observation. Meanwhile high productivity growth means the organization is operating on the right tract to catch their goal. Summary of Malmquist index of the SMEs in the Malaysian food processing industry are shown in Table 1.

Table 1. Summary of Malmquist Index of SMEs in the Malaysian Food Processing Industry, 2000-2006

Year	EFCH	TECH	PECH	SECH	TFPG
2001	1.212	0.895	0.968	1.252	1.085
2002	0.999	0.833	1.031	0.969	0.832
2003	0.766	1.549	0.933	0.821	1.186
2004	1.189	0.784	1.025	1.160	0.931
2005	1.097	1.169	1.057	1.038	1.282
2006	0.896	0.805	0.959	0.935	0.722
Mean	1.013	0.973	0.994	1.019	**0.987**

Source: Calculated data using DEA method

There is a fluctuating of TFPG during the period of observation. Positive TFPG is found in the year of 2001, 2003 and 2005, with the highest growth at 28.2%. Average of TFPG is 0.987 per annum means that the SMEs of Malaysian FPI have negative growth of 1.3% during the period of observation. The main contributor to the negative growth is the TECH -2.7%. Technological change associates with the

ability of a firm to move forward the frontier of production function. In other words, a full efficient firm can improve their productivity growth by moving forward the frontier itself. In DEA concept, the possibility production function is a virtual function formed by a best practice weighted against all the data. It is related to the technology management in production process, for instance, automation, the skill of the labor, on time process and products innovation. Trend of TFPG of the SMEs in Malaysian FPI within the period of 2001-2006 can be observed at Figure 2 below.

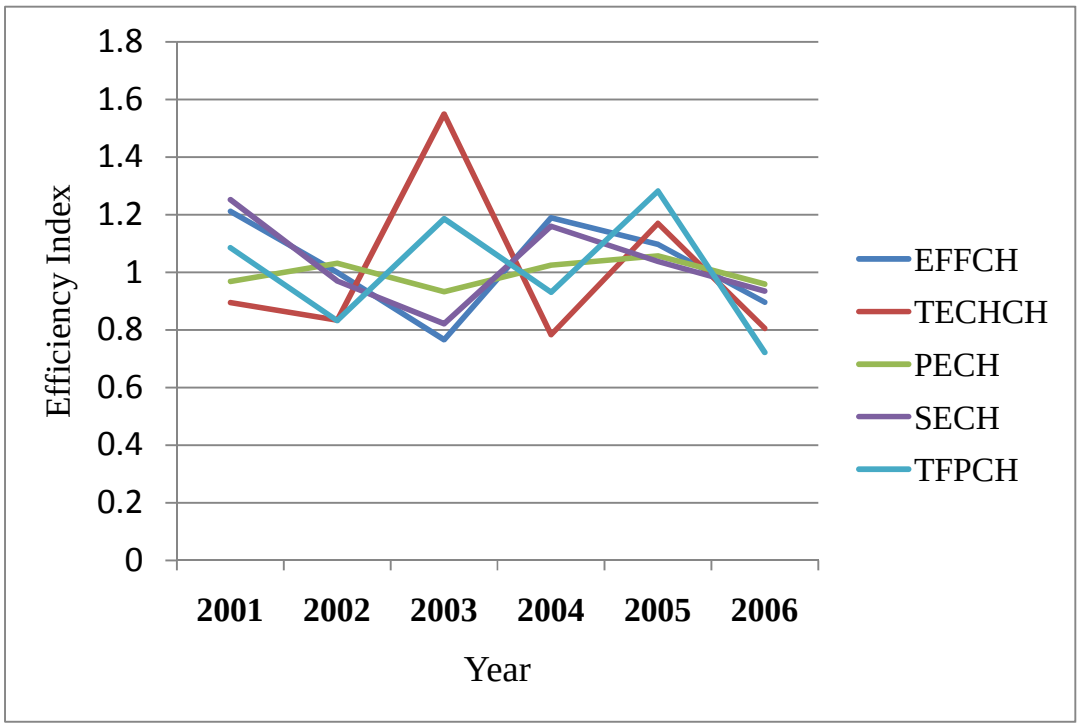

Figure 2. Trend of Total Factor Productivity Growth and the Components of SMs in the Malaysian Food Processing Industry, 2001-2006

During the period of 2001 up to 2006 productivity growth and its component shows a decline figure. A positive growth appears in 2001, but negative growth in 2002, and a sharp declining was found from 2005 to 2006. Especially TECH, it was more fluctuating and in contrast to the PECH which was less varying over time. Mostly, the value of PECH is unity or close to unity, means that there is no significant change of PECH over the year. This phenomenon implies that growth of the SMEs in the Malaysian FPI much influenced by the best practice (catching up) to the production frontier rather than shifting of the frontier. In practice, the shifting of the production frontier is generated by employing new technology such as new machinery, modern IT equipment and automation of the production line.

Table 2 shows the summary of Malmquist index of the SMEs Malaysian FPI, during 2000-2006, by sub industry. Sixteen industries experience with positive TFP growth at the range of 3.6% to 34.4%. Five sub industries that have positive TFP growth are the processing of poultry and poultry products, crude palm oil, refined palm oil, noodle and ice. EFCH is the main contributor as much as 32.1%, which tell that the industry is operating in the peer of production frontier. Component of the EFCH comes from PECH of 31.8% and SECH of 0.3%.

Table 2. Productivity Growth of SMEs in the Malaysian Food Processing Industry, 2000-2006 by Sub Industry

No.	Sub Industry	EFCH	TECH	PECH	SECH	TFPCH
1	POULT	1.321	1.017	1.318	1.003	1.344
2	MEAT	1.154	0.793	1.000	1.154	0.915
3	FISH	0.973	1.072	0.979	0.994	1.044
4	PINAP	0.961	0.858	0.849	1.132	0.825
5	FRVGT	0.994	0.929	0.967	1.028	0.923
6	CCNT	1.153	1.005	1.000	1.153	1.160
7	PALMO	1.603	0.770	1.000	1.603	1.234
8	RFPLM	1.000	1.220	1.000	1.000	1.220
9	KERNO	1.000	0.796	1.000	1.000	0.796
10	OOTVG	0.911	1.016	1.000	0.911	0.926
11	ICECR	0.992	0.922	1.000	0.992	0.915
12	MILK	0.884	0.926	0.995	0.889	0.819
13	RICEM	1.016	1.129	1.000	1.016	1.148
14	FLOUR	1.000	0.847	1.000	1.000	0.847
15	OTFLO	0.970	0.924	0.866	1.119	0.895
16	GLUC	0.768	1.039	1.051	0.731	0.798
17	STARCH	0.831	0.897	1.000	0.831	0.745
18	FEEDS	1.000	1.158	1.000	1.000	1.158
19	BISCU	1.038	1.064	1.000	1.038	1.104
20	BREAD	0.959	1.022	0.961	0.998	0.981
21	SUGAR	1.023	0.972	1.000	1.023	0.994
22	COCO	1.146	0.866	1.000	1.146	0.992
23	CHOCO	0.984	1.052	1.000	0.984	1.036
24	NOODL	1.013	1.196	1.000	1.013	1.212
25	ICE	1.042	1.161	1.000	1.042	1.210
26	COFFE	0.911	1.020	1.000	0.911	0.930
27	TEA	0.870	0.750	1.000	0.870	0.653
28	SPICE	1.057	1.018	1.000	1.057	1.077
29	PNUT	0.938	1.138	1.000	0.938	1.067
30	SAUCE	1.042	0.857	0.886	1.175	0.892
31	SNACK	1.008	1.195	1.000	1.008	1.205
32	OTHER	1.000	0.845	1.000	1.000	0.845
33	ALCHO	1.000	0.957	1.000	1.000	0.957
34	SOFTD	1.000	1.055	1.000	1.000	1.055
35	MIWATR	1.213	0.877	1.000	1.213	1.064
	MEAN	1.013	0.973	0.994	1.019	**0.987**

Source: Calculated data using DEA method. The value is geometric mean.

Meanwhile, 19 sub industries show negative growth varying from -34.7% to -0.6%. The sub industries that have the lowest negative growth are found in the manufacturing of tea, manufacturing of sago and tapioca starch, manufacturing of syrup, glucose and maltose, manufacturing of milk products and canning of pine apple. The main contributor of the declining growth was the TECH.

The SMEs in Malaysian FPI have limited R&D and innovation. It is only 55% of the SMEs from the total surveyed firm that undertook R&D activities and from this portion, as much as 59.4% concentrated on process improvement, 44% focused on new product development, and 21.9% emphasized on innovation and technology. Improvement of the small food firm's performance is important to help them remain in the market. Support to the firms, for instance, in terms of research on product development, innovation of the production process and new technology are a common development program even in the developed countries.

4.2 Total Factor Productivity Growth in the LSEs

TFPG of Large Scale Enterprises (LSEs) in the Malaysian FPI is presented in Table 3. Different to the SMEs, the LSEs's Mamlquist index was found greater than unity; it means that the LSEs have positive TFPG. Average TFPG of the LSEs in the Malaysian FPI during the period of 2001-2006, is 7.3%, which is contributed by EFCH 4.2% and TECH 3.1%. This indicates that the industry is operating closer to the frontier and moving forward the frontier as well. The movement of the frontier

occurs if the industry can produce larger output than the previous year by using same level of inputs.

Table 3. Total Factor Productivity Growth of LSEs in the Malaysian Food Processing Industry, 2001-2006

YEAR	EFCH	TECH	PECH	SECH	TFPCH
2001	0.876	0.863	0.981	0.893	0.756
2002	1.196	1.196	1.080	1.107	1.430
2003	1.001	1.173	0.938	1.067	1.174
2004	0.802	1.590	0.997	0.804	1.274
2005	1.314	0.590	1.030	1.275	0.775
2006	1.151	1.056	1.043	1.103	1.215
MEAN	**1.042**	**1.031**	**1.012**	**1.030**	**1.073**

Source: Calculated data using DEA method

Positive growth is recorded by TFPG (17 industries), EFCH (18 industries), and TECH (13 industries). Particularly, in the PECH, mostly the industries (19 industries) have no growth (the index is equal to or close to zero). PECH is measured by weighting against production function in VRS and the production function CRS. Therefore, growth of PECH is the impact of management efficiency. Trend of TFPG in LSEs of Malaysian FPI is presented in the Figure 3.

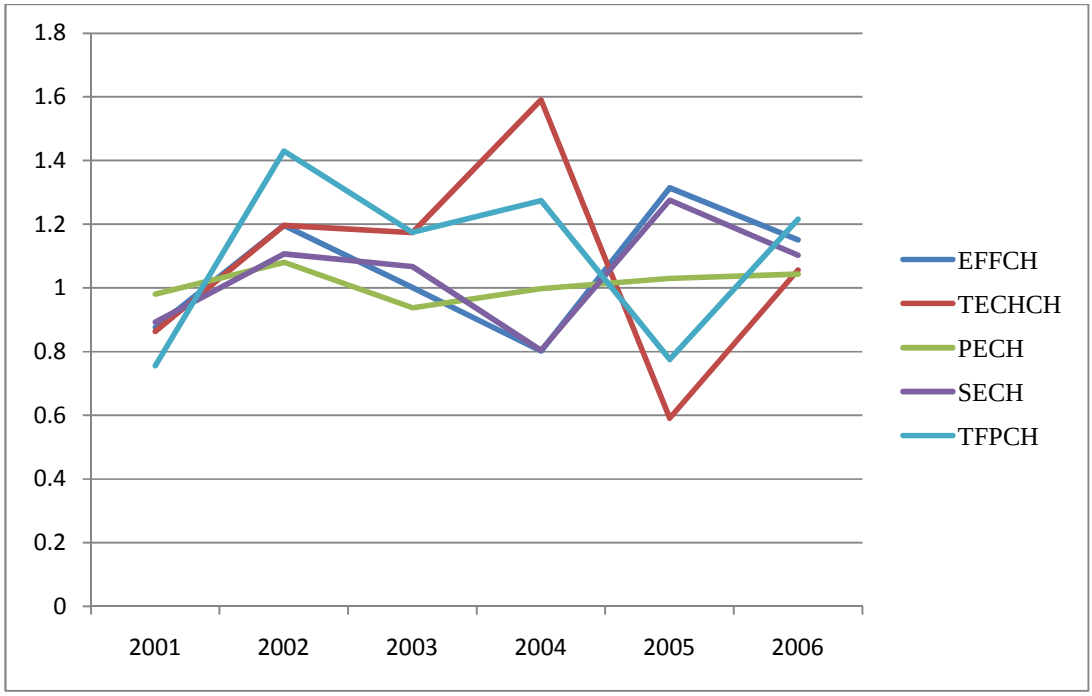

Figure 3. Total Factor Productivity Growth of LSEs in the Malaysian Food Processing Industry, 2001-2006

From the figures, TFPG and the components show a fluctuation trend but overall increase from 2001 to 2006. EFCH is negative in 2001, and then grow up to be positive in 2006 with average 4.2% per annum. The similar trend is shown by other components, with average 3.1%, 1.2%, 3.0% and 7.3% for TECH, PECH, SECH and TFPG respectively.

Table 4. Productivity Growth of LSEs in the Malaysian Food Processing Industry, 2001-2006 by Sub Industry

INDUSTRY	EFCH	TECH	PECH	SECH	TFPCH
POULT	0.986	0.705	1.000	0.986	0.695
MEAT	1.475	1.000	1.000	1.475	1.475
FISH	1.036	0.967	1.000	1.036	1.002
PINAP	0.679	1.401	1.000	0.679	0.951
FRVGT	1.024	1.162	1.000	1.024	1.189
PALMO	1.000	0.914	1.000	1.000	0.914
RFPLM	1.000	0.956	1.000	1.000	0.956
KERNO	1.047	1.335	1.042	1.005	1.397
OOTVG	1.238	1.273	1.158	1.069	1.576
ICECR	1.058	1.028	1.000	1.058	1.087
MILK	1.000	1.101	1.000	1.000	1.101
FLOUR	1.076	1.158	1.059	1.017	1.246
FEEDS	0.892	1.164	1.064	0.839	1.038
BISCU	1.059	1.012	0.990	1.070	1.072
BREAD	1.113	0.944	0.887	1.255	1.051
SUGAR	1.000	1.031	1.000	1.000	1.031
COCO	1.118	1.061	1.109	1.008	1.187
CHOCO	1.008	0.846	1.000	1.008	0.852
NOODL	1.215	0.985	1.000	1.215	1.197
COFFE	1.087	0.888	1.000	1.087	0.966
SPICE	1.029	0.919	1.000	1.029	0.946
SAUCE	1.033	0.999	1.000	1.033	1.032
SNACK	1.115	0.794	1.000	1.115	0.885
OTHER	1.103	0.797	1.000	1.103	0.879
ALCHO	1.000	1.848	1.000	1.000	1.848
SOFTD	1.103	0.846	1.000	1.103	0.933
MIWATR	0.838	1.288	1.000	0.838	1.079
MEAN	**1.042**	**1.031**	**1.01**	**1.03**	**1.073**

Source: Calculated data using DEA method.

TFPG and the components by sub industries are presented in Table 4. There 23 sub industries have positive EFCH as the main contribution to TFPG varying from 0.8% up to 47.5%. While TECH is found positive in 14 sub industries with the lowest is in the manufacturing of biscuit and the largest in the manufacturing of alcohol (84.8%). Meanwhile the TFPG is found positively in 17 sub industries varying from 0.2% up to 84.0%.

There are 17 sub industries in the LSEs have positive TFP growth varying from 0.2% to 84.8% and 10 industries have negative growth at a rate varied from -30.5% to -3.4%. The higher TFPG was shown by the manufacturing of alcohol, manufacturing of oil and fat from other vegetables, meat, palm kernel oil and flour. In contrast the lower is found the sub industries of processing and preserving poultry and poultry products and manufacturing of chocolate. This result is interesting because Malaysia is self sufficiency for poultry products (the 3rd largest producer in Asia Pacific) and the fourth largest producer of chocolate in the world. Therefore, these two industries need special attention from all stake holders to understand what the real problem on the ground.

For the SMEs there are six sub industries grouped as higher growth (TFPG greater than 20%), : processing and preserving poultry, crude palm oil, refined palm oil, ice, noodle and snack. Crude palm oil and refined palm oil are potential for income earning through export, while poultry, ice, noodle and snack play an important role to supply domestic market and export market as well. By using the same grouping

manner, there are five sub industries, which are categorized as high TFPG in the LSEs; manufacturing of alcohol, manufacturing of oil from other vegetables, processing and preserving of meat, manufacturing of kernel palm oil and manufacturing of flour. During the period of observation these five industries experience with remarkable TFPG. Sub industry processing and preserving meat may be stands as import substitution since Malaysia is a net importer of meat products. By developing this industry may help reducing the dependent this country on imported meat.

4.3 Determinants

Hausman test hints at the best model for both SMEs and LSEs regression is fixed effect model. ADF unit root test suggests the data is stationary. Table 5 presents summary determinants of TFPG in the Malaysian food industry.

Tabel 5. Summay of Fixed Effects Regression for Determinants of Productivity Growth in the Malaysian Food Processing Industry, 2001-2006

	SMEs				LSEs			
	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|
OPEN	1.047	0.779	1.340	0.181	1.258	0.549	2.290	0.024
FOWE	0.046	0.052	0.890	0.372	0.257	0.180	1.430	0.154
RND	0.040	0.036	1.110	0.271	0.040	0.036	1.110	0.271
FDI	-0.106	0.094	-1.120	0.262	0.427	0.120	3.570	0.001
POP	2.596	0.175	14.840	0.000	0.776	0.275	2.820	0.005
CONS	-27.280	1.985	-13.800	0.000	-14.050	3.109	-4.520	0.000

For SMEs: F test that all u_i=0: F(34, 170) = 4.43 Prob > F = 0.0000
R^2 = 0.8261, total observations: 210.

For LSEs: F test that all u_i=0: F(27, 129) = 0.66 Prob > F = 0.8920
R^2 : 0.6332, total observation: 162.

We found that openness is positively affecting the TFPG in the Malaysian FPI. It is significant at 5 percent level in the LSEs, but is not significant in the SMEs. One percent higher the openness index (ratio of total export and import to GDP) will increase TFPG in the LSEs as much as 1.258 percent. This finding reveals that the SMEs, which is mostly selling their products to the domestic market was deteriorated by the more open economic system. For consumers, introducing foreign products gives the benefit through more varying goods and price, but for producers especially small firms the importing goods fuels the competition.

Foreign ownership and R&D are also positively affecting TFPG, but it is not significant even at 10 percent confidence level. In the model, foreign ownership put as a dummy, given score one for industry that exist foreign owner and zero otherwise. In many literatures study about foreign ownership, the proportion share of the foreign ownership is determined. However, in the present study data of the percentage of a share is not available, so that the variable was considered as a dummy.

FDI is positively affecting TFPG and significant at one percent in the LSEs (with coefficient 0.427), but negatively and not significant in the SMEs. In the literature FDI is noted positively influence productivity by technology spillover, hiring more skilled labor, new product innovation, etc. In our result the negative correlation between FDI and TFPG in the SMEs may occur because of the foreign investors' usually forming large scale firms and sells the products in the domestic market also. This will fuel the competition level among producers of the similar products, mainly the SMEs. Therefore, it is possible that FDI has negative impacts to TFPG in the SMEs. However, in the long run FDI would raise the average productivity of the

industry because it forces the less productive firms to exit as the consequence of selection of the higher competitive market. Differently, the population growth is found as a factor boosting the TFPG in SMEs and LSEs, which is significant at one percent confidence level.

5. Conclusion

This study investigates the impact of openness and foreign ownership on the TFPG in the Malaysian FPI. During the period of 2001 until 2006, the SMEs of Malaysia FPI have negative TFPG as much as -1.3% mainly deteriorated by TECH. Meanwhile the LSEs have positive TFPG of 7.3% mainly contributed by EFCH 4.2% and TECH 3.1%.

There is a different impact of the explanatory variables to the total factor productivity growth between SMEs and LSEs. Foreign ownership and R&D are endogenous variables, while openness, FDI and population growth are exogenous variables tested in the model. In the SMEs openness and foreign ownership are positively affecting the TFPG but not significant. Negative relationship is shown by FDI but not significant even in 10 percent confidence level. In the LSEs, openness and foreign ownership have a positive relationship, but only the openness is significant (5%). Population growth is positive, determinant and significant at one percent. Consider the SMEs are facing lack of modern technology and products innovation; the government should support to improve their performance. The popular policy to help SMEs is providing new technology, special scheme of capital loan, promotion and market information.

The limitation of this study is unavailability data about percentage share of foreign ownership of each firm. It would have benefits to use firm level data. In the future research, by highlighting on result of the present study, impact of foreign ownership and openness on the productivity of Malaysian FPI can be more specified.

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Apendix 1. Hausman Test specification of SMEs

	(b)	(B)	(b-B)	
	Fixed	Random	Diff.	S.E.
RND	0.3685	0.2043	0.1642	0.0388
FDI	-0.1062	-0.1347	0.0285	
POP	2.5957	2.8482	-0.2526	0.0738
OPEN	1.0474	1.2265	-0.1791	
FOWE	0.0464	0.05	-0.0036	

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 8.95
Prob > χ^2 = 0.1111
(V_b-V_B is not positive definite)

Apendix 2. Hausman Test specification of SMEs

	(b)	(B)	(b-B)	
	Fixed	Random	Diff	S.E.
RND	0.0403	0.028	0.0123	0.0187
FDI	0.4267	0.4128	0.014	0.0686
POP	0.7762	0.7632	0.013	0.1119
OPEN	1.2578	1.2885	-0.0307	0.3122
FOWE	0.2573	0.2177	0.0396	0.091

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 4.60
Prob > χ^2 = 0.4668
(V_b-V_B is not positive definite)