Chapter 8

The Exporting and Productivity Nexus: Does Firm Size Matter?

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CHAPTER 8

The Exporting and Productivity Nexus: Does Firm Size Matter?

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The main purpose of this study is to examine whether the relationship between exporting and productivity differs across firm size in the Malaysian manufacturing sector. A firm-level panel data from the Study on Knowledge Content in Economic Sectors in Malaysia (MyKE) is used in the study. Overall, it is found that exporters are more productive than non-exporters. This productivity gap becomes less important as firms become larger. There is evidence that the selection process for exporting is binding only for small firms. Policies to encourage small firms to export need to focus on enhancement of human capital and foreign ownership.

Keywords: Globalization, Firm Size, Exporting, Productivity

JEL Classification: L60, O30, F14

1. Introduction

Firm-level heterogeneity has been an important feature of recent theories and empirical work in international trade.[1] This heterogeneity can take many forms such as - in terms of both characteristics (e.g. employment size, revenues, R\&D expenditure and exporting status) and performance (e.g. profitability, productivity and innovation). A key area of focus within this research literature is the positive relationship between exporting and productivity (Greenaway and Keller, 2007).

Firm size is an important dimension in the linkage between exporting and productivity for a number of reasons. First, large firms are often considered to have higher level of productivity than smaller sized firms. Second, given that exporting is often associated with high-level productivity, this suggests that larger firms have a higher tendency to export their products compared to smaller firms. This has significant policy implications especially given the importance of small and medium-sized enterprises (SMEs) in most economies.

The issue of how firm size might matter in the relationship between exporting and productivity is particularly important for countries that have a large proportion of SMEs and rely heavily on exporting as a driver of industrialization and economic growth. Malaysia is such a country. About 98.5 percent of the 78,000 firms in the country are SMEs (SME Annual Report 2012). These firms contribute towards 59 percent of total employment in the country. Despite this, SMEs contribution to total manufactured exports is only 30 percent. This state of affairs raises important questions about firm size, exporting and productivity.

To explore these issues, this paper seeks to examine whether the relationship between exporting and productivity differs across firms of different sizes. Findings from the study will contribute to existing body of empirical literature on the linkage between exporting and productivity. There has been relatively few studies on this topic from developing countries. It is also hoped that this study will strengthen evidence-based policy making in this area.

[1] For surveys of these literatures, see Harrison et al. (2011), Redding (2011) and Bernard et al (2012).

The outline of the paper is as follows. Section 2 provides a review of the relevant literature. Methodological issues are discussed in Section 3. The empirical results are presented and discussed in Section 4. Policy implications are drawn in Section 5. Section 6 concludes.

2. Literature Review

The relationship between exporting and productivity is a key focus of the heterogeneous firm literature in international trade.[2] It was primarily motivated by earlier empirical evidence on exporters being more productive than non-exporters (Redding, 2011). Two distinct hypotheses have been articulated in the literature. Both differs in terms of the direction of causality between exporting and productivity.

In the `self-selection hypothesis' (SS Hypothesis), the causality runs from productivity to exporting in which firms with high ex-ante productivity choose to export because of the high sunk cost incurred in exporting. The theoretical support for this hypothesis can be found in the seminal paper by Melitz (2003) in which only the most productive firms export whilst less productive firms either supply only to domestic markets or exit the market. In contrast, the `learning by exporting hypothesis' (LE Hypothesis) proposes that firms gain higher ex-post productivity after exporting. This is due to a number of factors such new knowledge and expertise from buyers (innovation), scale economies and exposure to competition (reduction of ex-inefficiency). The earlier empirical literature have mostly found evidence in support of the self-selection hypothesis (see surveys by Greenaway and Kneller, 2007 and Wagner, 2007). However, more recent studies such as De Loecker (2013), De Loecker (2013) and Manjon et al (2013) with improved modelling of the productivity process have provided some evidence supporting the learning by exporting hypothesis.

Whilst the debate on the direction of causality between exporting and productivity continues, there has been increasing interest in the role of firm size. Firm size has traditionally be assigned as a control variable in the literature. Most studies have found

[2] The seminal contributions in the literature include Melitz (2003), Bernard et al (2003) and Helpman et al (2004).

exporters to be are larger in size than non-exporters (Wagner, 2007). This raises important questions about the sources of productivity gains related to exporting and more specifically, whether such sources are related to firm size. Internal sources of productivity growth include managerial talent, quality of factor inputs, IT, R&D, learning-by-doing and innovation (Syverson, 2011). Small and large firms could differ in terms of access to these sources of productivity growth (Leung et al, 2008). External factors such as regulations and access to financing could also be responsible for productivity differentials between small and large firms (Tybout, 2000).

One key study that has attempted to examine whether the learning by exporting and self-selection effects are affected by firm size is Mez-Castillejo et al (2010). In the study, the authors found that self-selection effects are only binding on small firms whilst learning by exporting effects are relevant to both small and large firms.

Finally, in the more recent literature, the role of firm size in trade has been analyzed by examining how trade affects firm size distribution. For example, di Giovanni et al (2011) has showed that the distribution of exporting firms has a lower power law exponent compared to non-exporting firms. The theoretical explanation for this result is that more productive firms are able to sell their products beyond the domestic markets (i.e. abroad). In addition, once a firm starts exporting to a given market, it is easier to export to other markets. In other papers, firm size distributions have important implications for welfare effects and volatility associated with trade (di Giovanni and Levchenko, 2012 and 2013).

3. Methodology

3.1. Theoretical Considerations

How might one think of a theoretical framework for analyzing the relationship between firm size, exporting and productivity? The self-selection hypothesis and learning by exporting hypothesis suggests that there are two distinct views on the relationship between exporting and productivity.

The theoretical argument for the self-selection hypothesis can be found in Melitz (2003) in which inter-firm productivity differentials amongst an otherwise ex ante identical potential entrant firms are generated via random draws from a given probability density function. Subsequent works have often adopted the Pareto distribution for productivity which has the following form:[3]

$$G_\theta(\theta) = 1 - \left(\frac{\theta_{min}}{\theta}\right)^z \quad , \text{ for } \theta \geq \theta_{min} > 0 \text{ and } z > 1$$

Note that there is no direct relationship between productivity and firm size at this stage of the modelling exercise. This size-productivity relationship is only establish via a selection process in which less productive firms exit the market whilst more productive ones continue to grow (size increase).[4] Thus, over time, more productive firms tend to be larger (Melitz, 2003, p.1700.).

The relationship between exporting and productivity is then established by characterizing exporting as an activity that incurs fixed cost. This implies that only firms with (higher) productivity exceeding a given threshold θ^* will be able to export. As productivity is positively related to firm size, larger firms are more likely to be exporters compared to smaller firms. From the perspective of firm size distribution, this implies that trade is associated with lower power law exponent due to its greater impact on large firms (di Giovanni, 2011).

These effects are attenuated by trade liberalization which increases the number of potential trading partners and reduces the fixed and variable costs of trading (Melitz, 2003). In so far as productivity is positively related to firm size, trade liberalization will have greater impact on larger firms. Thus, trade liberalization is likely to bring about changes in the distribution of productivity and firm size.

Unlike the self-selection hypothesis, the theoretical arguments used to support the learning by exporting hypothesis has mainly focused on endogenizing the evolution of

[3] See Helpman et al (2010) and di Giovanni et al (2011).

[4] A stationary equilibrium for productivity distribution is obtained in this model when two conditions are met, namely a zero-cutoff profit condition and a free entry condition.

productivity.[5] This is clearer in De Loecker (2011)'s comparison between an exogenous and endogenous models for the evolution of productivity (w):

$$w_{it} = g_1(w_{it}) + \xi_{it+1} \qquad \text{(Exogeneous)}$$

$$w_{it} = g_2(w_{it}, \mathbf{E}_{it}) + \xi_{it+1} \qquad \text{(Endogenous)}$$

where ξ is productivity shock and $\mathbf{E}$ is export experience.

Thus, the learning by exporting effects can be better estimated by taking into account productivity gains arising partly from exporting. Furthermore, this suggests the need to control for selection effects when estimating the learning by exporting effects (Mez-Castillejo et al, 2010).

The theoretical considerations in the literature suggest that it might be useful to begin with an analysis of the empirical distribution of firm size and productivity. This can be undertaken visually via density plots and more formally by using stochastic dominance tests. This can then be followed by testing the self-selection hypothesis and the learning by exporting hypothesis.

3.2. Empirical Models and Specifications

(a) Firm Size and Productivity Distributions

The starting point in analyzing exporting and productivity is an analysis of how firm size and productivity are distributed. This can be undertaken by examining the plots for probability density functions for both variables. This is undertaken using a non-parametric approach implemented with a kernel density smoother (Cabral and Mata, 2003, p.1076). Changes in the distribution of firm size and productivity can be discerned by comparing the density plots for year 2002 and 2006.

[5] The exogeneity of productivity change can come from assuming a fixed productivity distribution and a fixed productivity threshold for exporting. It would be interesting to see estimations of productivity thresholds for exporting.

Aside from visual examination, more formal test can be undertaken to examine the nature of the distributions. The Shapiro-Wilk test is used to test whether the size and performance variables are normally or lognormally distributed.

Another approach that has been used to study the relationship between firm size and trade involves the estimation of the power exponent (ξ_{LR}) from firm size distribution. A simple method involves regressing the natural log of ($\text{Rank}_i - 1/2$):

$$ln(\text{Rank}_i - 1/2) = \text{Constant} + \xi_{LR} lnS_i + \varepsilon_i$$

Theory suggests that the exponent of the power law is lower for exporting firms compared to non-exporting firms (di Giovanni, 2011). The Gini coefficient is also used to examine changes in the inequality of firm size and productivity distribution.

(b) Productivity Differentials by Firm Size

Stochastic dominance tests such as the Kolgomorov-Smirnov (KS) test can be used to test for productivity differences between three sets of firms belonging to different size class (small, medium and large) for 2002 and 2006. This is done by comparing the productivity distribution functions for the firms (F_t, G_t):

$$F_t(y_t) \text{ vs } G_t(y_t) \ , \ t = 2002, 2006$$

Comparing the test results for two separate period will help ascertain whether the productivity gap between small, medium and large firms have diverged over time. In addition, the KS test is applied to exporters and non-exporters. The size classification can be further broken down by exporting and non-exporting status to examine whether firm size and productivity is related to exporting.

(c) Self-Selection and Firm Size

The Kolgomorov-Smirnov test can also be used to test the self-selection hypothesis. As theorized by Melitz (2003), the productivity of export starters exceed the productivity

threshold for exporting θ^* for small, medium and large firms. In contrast, non-exporters's productivity will be less than θ^*

Thus, one approach of testing the hypothesis is by comparing at the productivity levels at t-1 for firms that started to export at time t ($\theta_{t-1}^{exp_t=1}$) with the productivity of non-exporters at t-1 ($\theta_{t-1}^{exp_t=0}$). If the hypothesis holds, then:

$$F_{t-1}(\theta^{exp_t=1}) > G_{t-1}(\theta^{exp_t=0})$$

This can be directly tested using the K-S test. The test can also be applied for three class of firm sizes to see if firm size matters in the self-selection to exporting.

(d) Learning by Exporting and Firm Size

The learning by exporting hypothesis can be tested using matching techniques. Matching techniques entail the selection of a control group from non-exporters with similar characteristics to export starters in the pre-export entry period. The impact of exporting on productivity growth for firm i which started exporting in period t can be expressed as:[6]

$$\Delta y_{i(t-1)+s}^{1} - \Delta y_{i(t-1)+s}^{0}$$

where $\Delta y_{i(t-1)+s}^{1}$ is productivity growth for export starter and $\Delta y_{i(t-1)+s}^{0}$ productivity growth for non-exporter. The average effect can then be expressed as:

$$E(\Delta y_{i(t-1)+s}^{1} \mid D_{it}=1) - E(\Delta y_{i(t-1)+s}^{0} \mid D_{it}=1)$$

where $D_{it} \in \{0,1\}$ is an indicator for non-exporter and exporter.

[6] This follows from the exposition in Manjon et al (2013).

As $\Delta y^{0}_{i(t-1)+s}$ for an export starter is not observable, the above expression has to be revised by incorporating a counterfactual for the term and a distribution of observable variables (*X*) that affects productivity growth and exporting:

$$E(\Delta y^{1}_{i(t-1)+s} \mid X_{it-1}, D_{it-1} = 1) - E(\Delta y^{0}_{i(t-1)+s} \mid X_{it-1}, D_{it} = 0)$$

The set of variables in *X* includes firm size, foreign ownership, computer utlization, R&D investments, government support, average MFN tariff and industry effects. The use of the above expression is premised upon the assumption that condition on *X*, firms are randomly exposed to exporting. The matching procedure entails two steps. First, a logit model is used to estimate the probability of starting to export:

$$P(D_{it} = 1) = F(X_{it-1})$$

This procedure provides the propensity scores that are used to: (i) match the non-exporters and export starters, and (ii) compare the productivity growth of similar export starters and non-exporters.

3.3 Data Source and Definitions

(a) Data Source

This study employs manufacturing survey data from the Economic Planning Unit's *Malaysian Knowledge Content Survey* (MKCS). The data covers two years period, namely 2002 and 2006. The 2002 MKCS and 2006 MKCS contain 1,118 firms and 1,148 firms, respectively. A balanced panel can be constructed for 753 firms. In datasets, information on exporting status is available in percentage of total revenues derived from export. The R&D variable is a dummy variable constructed from R&D expenditure in the datasets. Two sources of government assistance is included, namely, (i) support for research, commercialization and technology acquisition (Govt Research), and (ii) support for finance, accounting and taxation taking the form of advice and referral (Govt Finance). Other variables used in the propensity score matching includes

natural log of the number of computers used, firm size (natural log of number of employees), foreign ownership dummy variable (proxied by foreign head office), percent of employee with degree and average MFN tariff (trade liberalization).

(b) Firm Size Definitions

Firm size is classified into four categories based on the official definition used in Malaysia. They are as follows for the manufacturing sector:

- Micro - Annual sales turnover of less than RM250,000(USD83,300) or full time employees less than 5
- Small - Annual sales turnover from RM250,000 (USD83,300) to less than RM10 mil (USD3.3 mil) or full time employees from 5 to less than 50
- Medium - Annual sales turnover from RM10 mil (USD3.3 mil) to less than RM25 mil (USD8.3 mil) or full time employees between 51 and 150
- Large - Annual sales turnover exceeding RM25 mil (USD8.3 mil) or full time employees exceeding 150

Firm size is defined in terms of the total number of employees. Based on the above definitions, small and medium enterprises (SMEs) are firms with total employees not exceeding 150 employees.

4. Emperical Results

4.1. Summary Statistics

A brief summary statistics of the unbalanced and balanced datasets used in this study is presented in **Table 1**. Overall, there are significant variations in firm size (measured in terms of number of full time employees). The mean firm size in MKCS2002 and MKCS2006 fall into the category of large firm based on the Malaysian official definition i.e. more than 150 employees. In the datasets, SMEs account for 70 percent of total firms. This is below the national average of about 98 percent indicating that the balanced sample contain more large firms compared to the firm population.

Table 1: Basic Descriptive Statistics

Unbalanced Data				
Size (employees)	**Mean**	**Std. Dev.**	**Min.**	**Max.**
MKCS2002	202,00	400,00	3,00	6086,00
MKCS2006	230,00	567,00	2,00	9879,00
Size Category	**Small**	**Medium**	**Large**	**Total**
MKCS2002	332,00	441	345	1118
(%)	(29.7)	(39.5)	(30.8)	(100.0)
MKCS2006	389	410	349	1148
(%)	(33.9)	(35.7)	(30.4)	(100.0)
Exporting Status	**Exporter**	**%**	**Non-Exporter**	**%**
MKCS2002	846	75.7	272	24.3
MKCS2006	646	56.3	502	43.7
R&D Activity	**Yes**	**%**	**Non-Exporter**	**%**
MKCS2002	295	26.4	823	73.6
MKCS2006	336	29.3	812	70.7
Balanced Data				
Size (employees)	**Mean**	**Std. Dev.**	**Min.**	**Max.**
MKCS2002	232	442	3,00	6086,00
MKCS2006	263	561	2,00	8471
Size Category	**Small**	**Medium**	**Large**	**Total**
MKCS2002	172	315	266	753
(%)	(22.9)	(41.8)	(35.3)	(100.0)
MKCS2006	189	285	279	753
(%)	(25.0)	(37.9)	(37.1)	(100.0)
Exporting Status	**Exporter**	**%**	**Non-Exporter**	**%**
MKCS2002	586	77.8	167	22.2
MKCS2006	463	61.5	290	38.5
R&D Activity	**Yes**	**%**	**Non-Exporter**	**%**
MKCS2002	225	29.9	528	70.1
MKCS2006	242	32.2	511	67.8

Source: MKCS2002 & MKCS2006, Economic Planning Unit.

The sampling bias can also be detected in terms of the percentage of firms in the datasets that are exporting. About 75 percent of the firms in MKCS2002 are exporters. The incidence of exporting in the MKCS2006 sample is lower at 56 percent. In the 2005 Census, the proportion of firms exporting are much lower, i.e. between 16 percent to 49 percent. This indicates that both datasets contain a higher proportion of exporters

compared to the national average. The proportion of firms undertaking R\&D activities is lower at around 30 percent in both datasets.

Recall that the number of observations in the unbalanced datasets is 1,118 for MKCS2002 and 1,148 for MKCS2006. The balanced dataset has 753 observations. Thus, the balance datasets are about 33 percent smaller than the unbalanced datasets. Despite this reduction in sample size, the characteristics of balance datasets are similar to that of the larger unbalanced datasets. The incidence of exporting and R\&D is slightly higher in the balanced datasets compared to the unbalanced datasets.

4.2. Firm Size and Productivity Distributions

The density plot for firm size (number of employees) for unbalanced data is presented in **Figure 1**. Both plots suggest that the distribution of firm size for 2002 and 2006 is non-Gaussian. The mass of the density function is skewed more towards the left compared to the normal distribution indicating a very high proportion of the firms are smaller-sized firms. This is clearer in the lognormal plot for firm size distribution (**Figure 2**). The lower tail of the density functions is higher than what one would expect for the Gaussian distribution. The opposite holds for the upper tail of the distribution. The non-Gaussian nature of the firm size distribution is confirmed from the results from the Shapiro-Wilks test. These results are consistent with the general empirical findings on firm size distribution, namely they are skewed (Axtell, 2001) as well as the assumptions made in the theoretical literature (Helpman et al, 2004).

Figure 1: Firm Size Distribution (Unbalance), 2002 & 2006

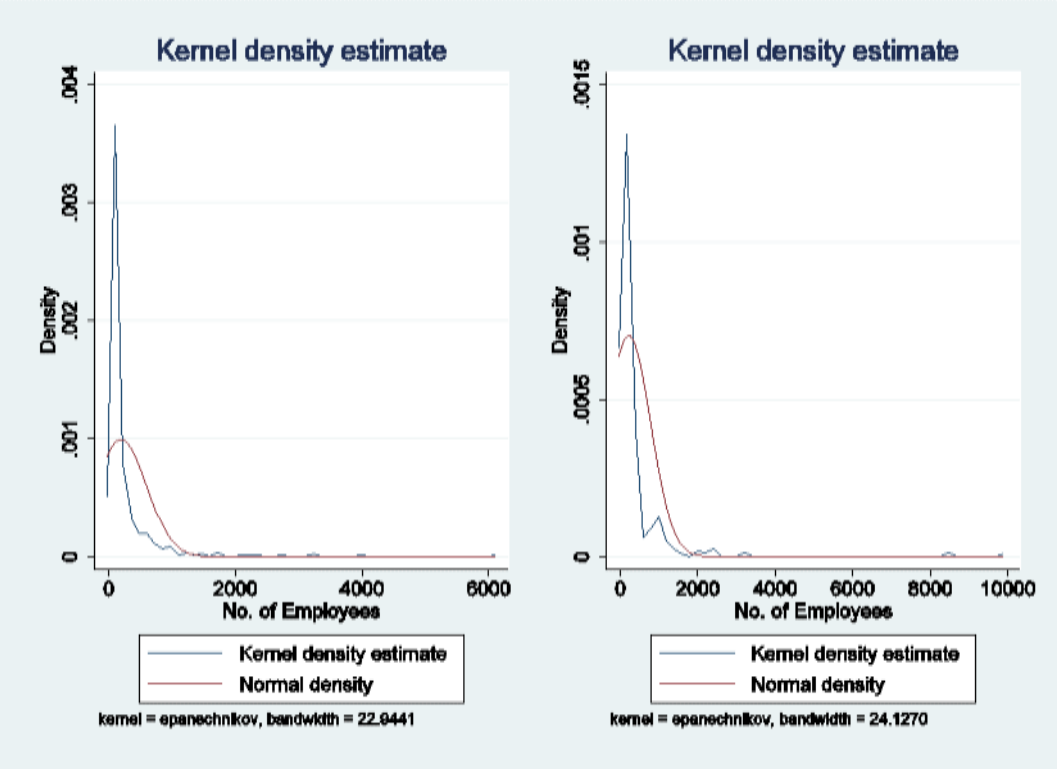
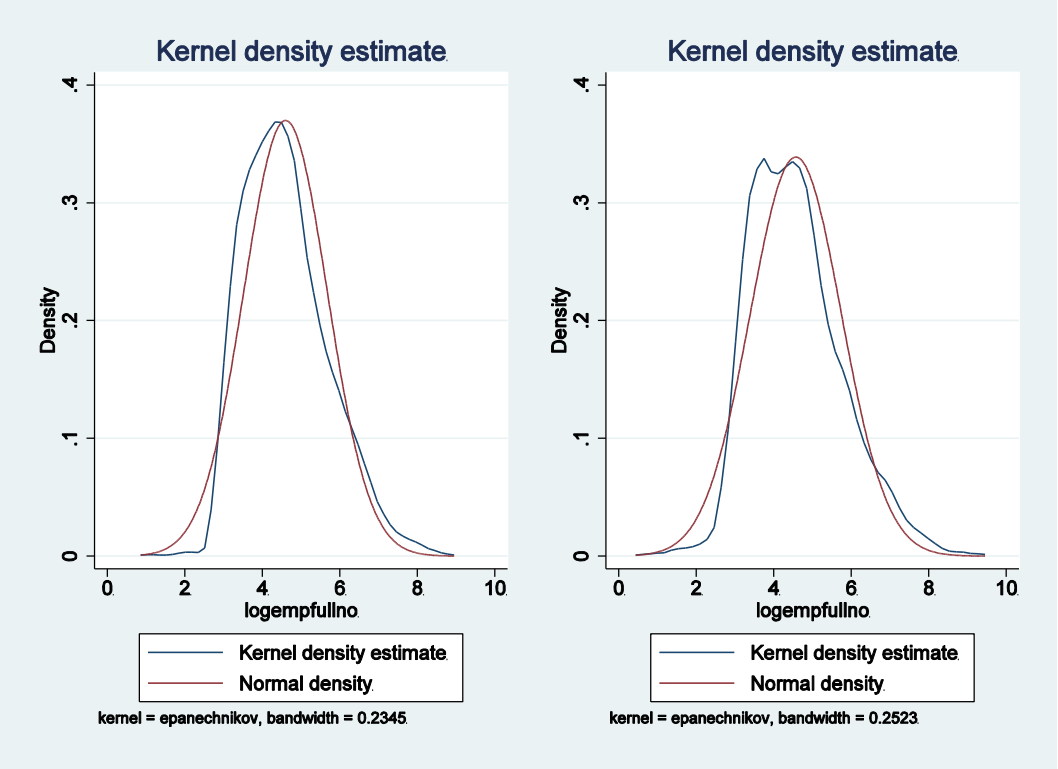
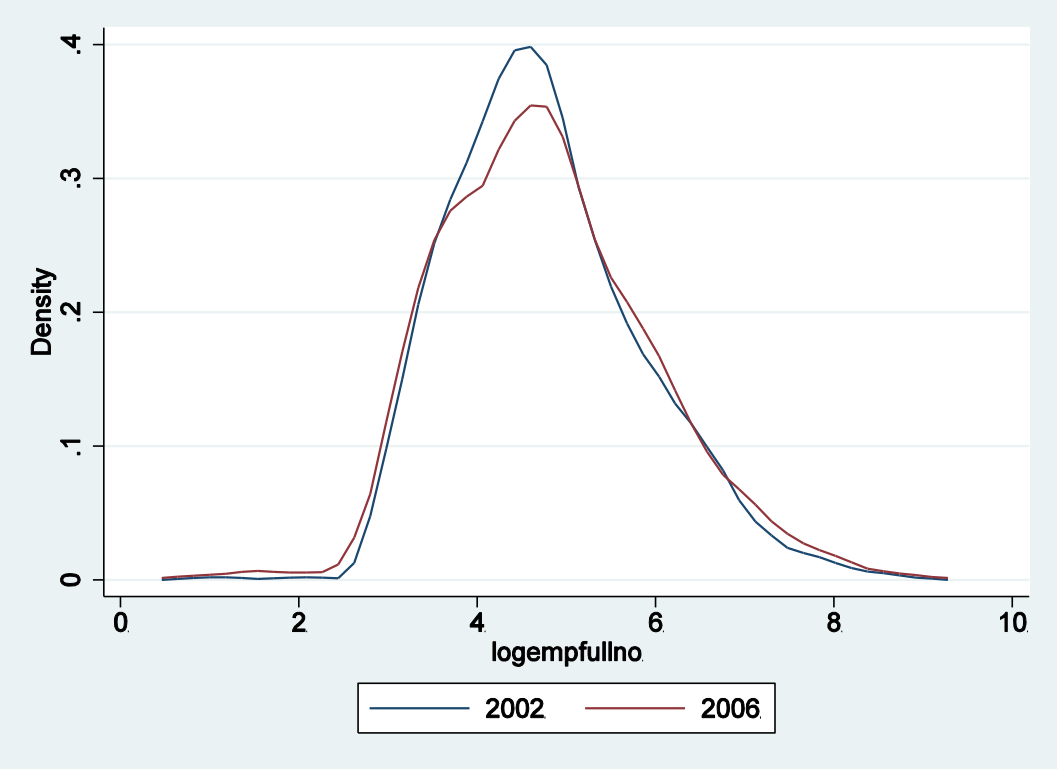


Figure 2: Firm Size Distribution (Lognormal, Unbalanced), 2002 & 2006



The lognormal density plots for firm size distribution for years 2002 and 2006 two years using balanced datasets are presented in **Figure 3**. It would appear that the density plot for 2006 is slightly 'flatter' compare to that obtained for 2002 - suggesting a greater dispersion of firm size. As the lower and upper tails of the distribution for 2006 is higher than that of 2002 - it suggests greater inequality in firm size distribution. This is supported by a slight increase in the Gini coefficient for firm size from 0.614 in 2002 to 0.648 in 2006.

Figure 3: Firm Size Distribution (Balanced), 2002 & 2006



Comparing the productivity distribution for 2002 and 2006 indicates that there is an overall increase in the productivity of firms over the 2002-2006 period (**Figure 4**). More interestingly, whilst almost all exporting firms experienced an increase in productivity (**Figure 5**), the same cannot be said for non-exporters (**Figure 6**). Productivity gains are largest at higher levels of productivity for exporters and non-exporters - suggesting that larger firms might be experiencing larger productivity gains.

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Figure 4: Productivity Distribution (Balanced), 2002 & 2006

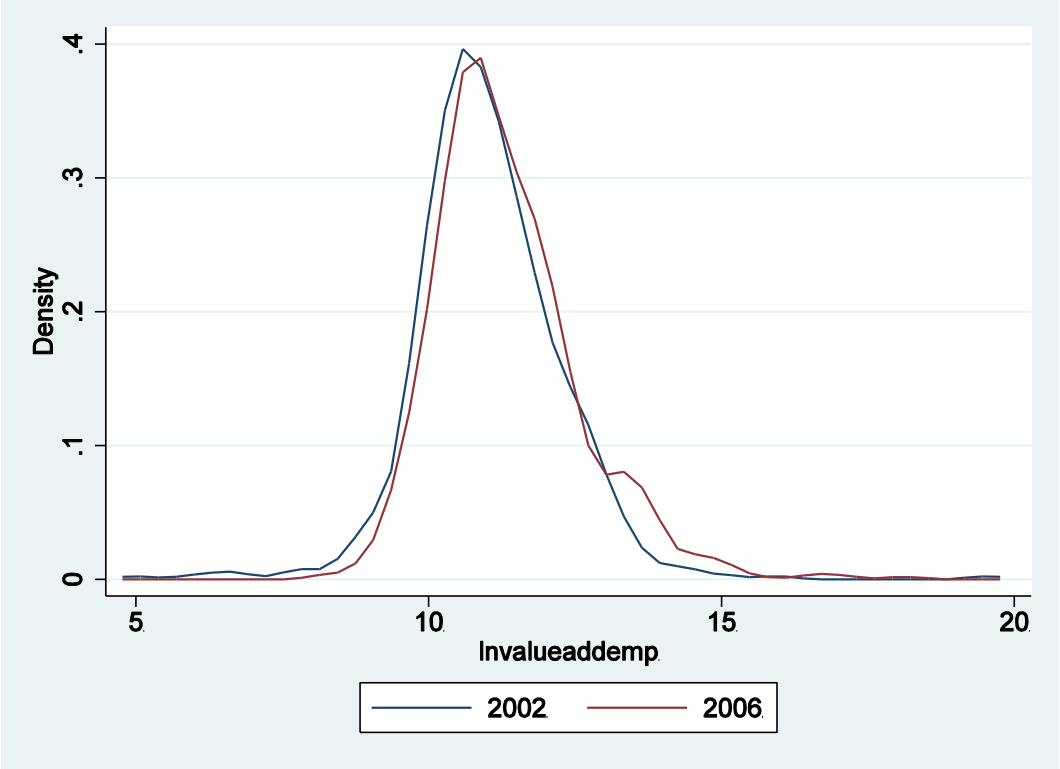


Figure 5: Exporters Productivity Distribution (Balanced), 2002 & 2006

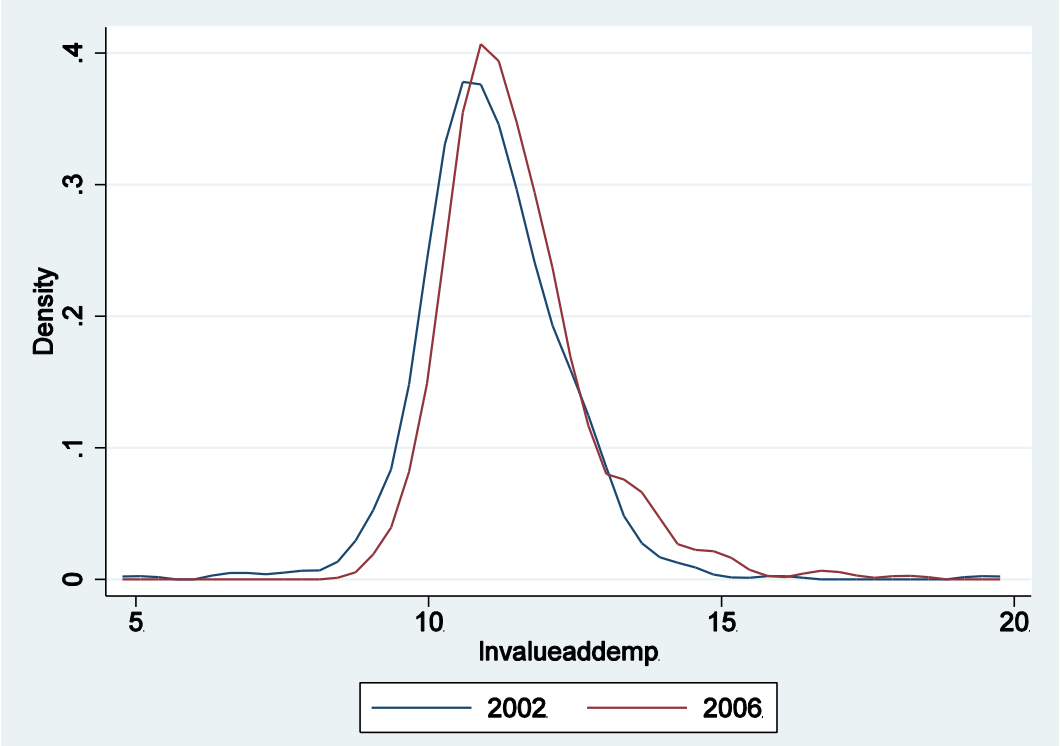
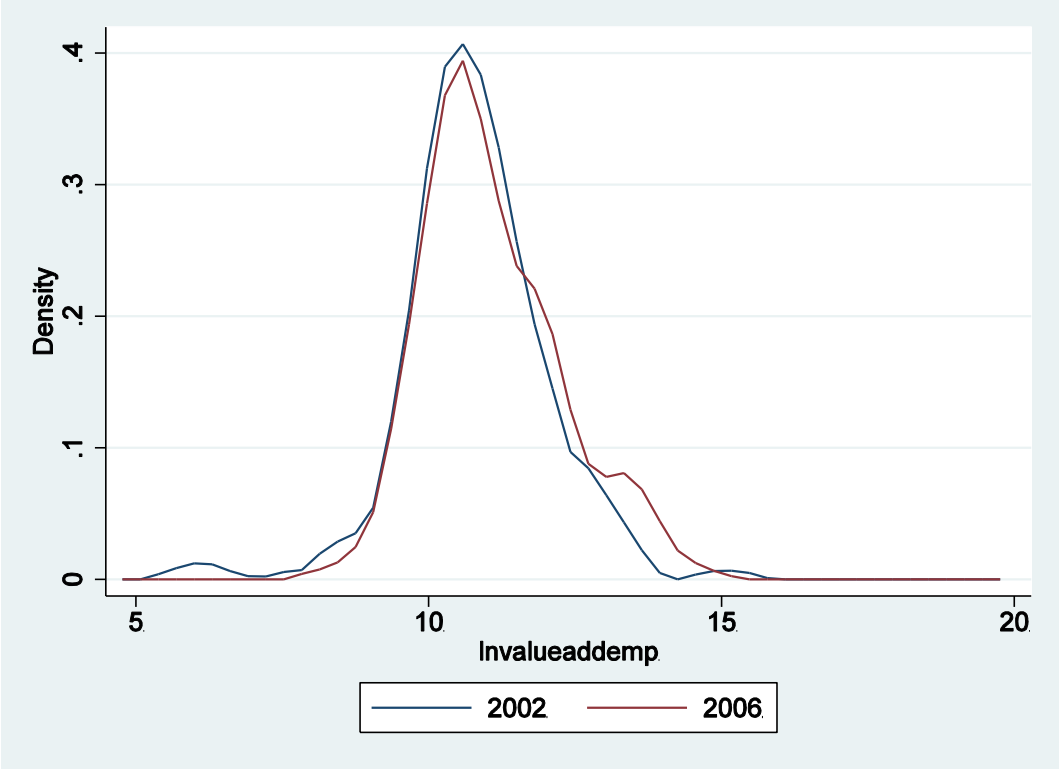


Figure 6: Non-Exporters Productivity Distribution (Balanced), 2002 & 2006



4.3. Productivity Differentials by Firm Size

Results from the Kolgomorov-Smirnov tests indicates that, in general, there is transitivity in productivity across different firm size: large firms have higher productivity than medium-sized firms, which in turn have higher productivity levels than small firms (**Table 2**). The exception is the difference in productivity of medium and large firms for year 2002. The productivity gap between these different categories of firm size have decline when we compare the 2002 and 2006 datasets.

Table 2: Differences in Productivity Between Small, Medium and Large Firms

MKCS2002, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Small	0,2553	0,088	
Medium	-0,0577	0,883	
Combined K-S	0,1572	0,176	0,122
MKCS2006, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Small	0,1313	0,001	
Medium	-0,0024	0,998	
Combined K-S	0,1313	0,002	0,002
MKCS2002, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Medium	0,1062	0,504	
Large	-0,0511	0,853	
Combined K-S	0,1062	0,883	0,84
MKCS2006, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Medium	0,091	0,044	
Large	-0,0362	0,61	
Combined K-S	0,091	0,088	0,075

Source: Author's computation.

As expected, exporters have higher productivity than non-exporters. This result is more robust for the 2006 dataset (**Table 3**). The productivity gap between non-exporters and exporters seem to have decline when we compare the results from 2002 and 2006.

Table 3: Differences in Productivity Between Non-Exporters and Exporters

MKCS2002, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,2149	0,145	
Exporter	-0,0543	0,884	
Combined K-S	0,2149	0,288	0,213
MKCS2006, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,1592	0,000	
Exporter	-0,0062	0,979	
Combined K-S	0,1592	0,000	0,000

Source: Author's computation.

Table 4 provides a summary of the KS test for differences in productivity within samples of small, medium and large-sized firms. Within each category of firm-size, the productivity gaps between exporters and non-exporters are less significant. However, comparing the productivity gap across firm size, it appears that the productivity gap between exporters and non-exporters become less important as firm size increases.

Table 4: Differences in Productivity Between Non-Exporters and Exporters

MKCS2002			
Small Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,2667	0,357	
Exporter	-0,1238	0,801	
Combined K-S	0,2667	0,682	0,573
Medium Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,3049	0,251	
Exporter	-0,1473	0,724	
Combined K-S	0,3049	0,493	0,364
Large Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,2887	0,723	
Exporter	-0,2324	0,810	
Combined K-S	0,2887	0,997	0,990
MKCS2006			
Small Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,2229	0,000	
Exporter	-0,0076	0,990	
Combined K-S	0,2229	0,000	0,000
Medium Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,0997	0,140	
Exporter	-0,0566	0,530	
Combined K-S	0,0997	0,279	0,240
Large Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,0935	0,347	
Exporter	-0,0492	0,746	
Combined K-S	0,0935	0,665	0,608

Source: Author's computation.

4.4. Self-Selection and Firm Size

Comparing the stochastic dominance tests for productivity between export starters (in 2006) and non-exporters across different firm sizes yield some interesting results (**Table 5**). For all firms, export starters generally have higher productivity levels compared to non-exporters (prior to exporting). Even though the productivity gap between export starters and non-exporters are larger for large firms compared to small firms, the statistical significance becomes weaker as firm size increases. This suggests that the role of productivity in self-selection is greater for small firms compared to large firms. This finding is consistent with Mes-Castillejo et al (2010) which also found that self-selection effects are only binding on small firms.

Table 5: Differences in Productivity Between Export Starters and Non-Exporters

All Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,1612	0,000	
Exporter	-0,0031	0,994	
Combined K-S	0,1612	0,000	0,000
Small Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,224	0,000	
Exporter	-0,0076	0,990	
Combined K-S	0,224	0,000	0,000
Medium Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,1036	0,000	
Exporter	-0,055	0,539	
Combined K-S	0,1036	0,223	0,189
Large Firms, Value Added per Worker			
Smaller Group	**D**	**P-Value**	**Corrected**
Non-Exporter	0,0976	0,308	
Exporter	-0,00534	0,703	
Combined K-S	0,0976	0,598	0,539

Source: Author's computation.

One possible explanation for this observation is that small firms that are exporting may focus on selling products that are less sophisticated markets (Mes-Castillejo et al, 2010) . There is some indirect evidence for this in the sample of firms in this study (**Table 6**). Smaller firms tend to focus on domestic markets (within state and national).

In addition, small exporting firms tend to focus more on ASEAN+3 markets rather that outside ASEAN+3 markets (possibly more advanced markets in EU and the United States).

Table 6: Main Market Destinations for Firms

Main Market	Frequency	Percent	Cummulative
All Firms			
Within state	264	35,1	35,1
National	232	30,8	65,9
ASEAN + 3	119	15,8	81,7
International	138	18,3	100,0
Total	753	100,0	
Large Firms			
Within state	56	21,1	21,1
National	84	31,6	52,6
ASEAN + 3	48	18,0	70,7
International	78	29,3	100,0
Total	266	100,0	
Medium Firms			
Within state	126	40,0	40,0
National	95	30,2	70,2
ASEAN + 3	50	15,9	86,0
International	44	14,0	100,0
Total	315	100,0	
Small Firms			
Within state	81	47,4	47,4
National	53	31,0	78,4
ASEAN + 3	21	12,3	90,6
International	16	9,4	100,0
Total	171	100,0	

Source: Author's computation.

4.5. Learning by Exporting and Firm Size

Results from all three matching estimators were consistent (**Table 7**). Overall, the differences in productivity growth between exporters and non-exporters were not significant for large firms but were weakly significant for medium-sized firms. The number of observations for small-sized firms were insufficient to apply propensity score matching. This result differs slightly from evidence from the existence literature which has found the learning by exporting to be relevant for firm of different size categories. The difference in result could be due to the fact that the effects of exporting on

productivity growth in this study is only estimated four years after firms started exporting. Additional evidence on annual productivity growth may be required to examine the dynamics of productivity growth after firms start to export.

Table 7: Productivity Growth for Export Starters

Sample Neighbor	Treated	Controls	Difference	S.E.	T-stat	Untreated	Treated	Obs.
All Firms								
ATT	0,305485	0,324006	-0,01852	0,176939	-0,1	209	373	582
Large								
ATT	0,327929	0,321177	0,006753	0,20889	0,03	136	326	462
Medium								
ATT	0,298447	-0,24962	0,548071	0,353619	1,55	67	35	102
Small								
ATT	.	.	.	.	.	.	.	.
Kernel								
All Firms								
ATT	0,305485	0,316825	-0,01134	0,137164	-0,08	209	373	582
Large								
ATT	0,340984	0,365516	-0,02453	0,17203	-0,14	136	326	462
Medium								
ATT	0,342088	-0,04845	0,390542	0,305772	1,28	67	35	102
Small								
ATT	.	.	.	.	.	.	.	.
Radius								
All Firms								
ATT	0,305485	0,205587	0,099898	0,064824	1,54	209	373	582
Large								
ATT	0,327929	0,298253	0,029676	0,067641	0,44	136	326	462
Medium								
ATT	0,298447	0,07474	0,223707	0,213651	1,05	67	35	102
Small								
ATT	.	.	.	.	.	.	.	.

Source: Author's computation.

5. Policy Implications

The productivity differentials between exporters and non-exporters suggest that Malaysia should continue to promote export oriented industrialization to achieve higher productivity-driven growth. Given that productivity differentials are particularly significant for SMEs than for large firms, industrial policies should continue to have a firm-size dimension. Different incentives and support services are likely to be needed for SMEs and large firms given the differences in importance of productivity differentials between exporters and non-exporters.

The evidence from this study also suggests that policies that enhance productivity are likely to be important to encourage small firms to start exporting. These include policies that enhance human capital.[7] Foreign participation in SMEs might be another important area of focus given the linkage between export destinations and productivity. More efforts are likely to be needed to provide support for foreign participation in SMEs to encourage them to start exporting.

6. Conclusions

Firm size and productivity distributions are found to be both skewed indicating that inequality is a common feature in the manufacturing sector. In terms of firm size, large firms have higher productivity than medium-sized firms, which in turn have higher productivity levels than small firms.

Productivity growth has been widespread across the board for exporters compared to non-exporters. Overall, exporters are more productive than non-exporters - a finding that is consistent with existing evidence in the literature. However, The productivity gap between non-exporters and exporters have declined during the 2002-2006 period. Furthermore, the productivity gap between exporters and non-exporters tends to decline with firm size - implying that the relationship between productivity and exporting is

[7] For example, independent variable such as percentage of employee with degrees is statistically significant in regressions involving labour productivity for small-sized export starters.

likely to be stronger for small firms compared to large firms. This is consistent with the finding that the selection effects are binding only for small sized firms. There is some evidence of learning by exporting effects for medium sized firms but there is insufficient data to examine whether such effects apply to small sized firms as well.

The policy implications from this study suggest that efforts should be targeted towards enhancing productivity to encourage firms to start exporting. This is particularly relevant for small firms. Such policies include enhancement of human capital in small firms. Foreign ownership in such firms are also likely to be an important area of focus.

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