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Are Non-Exporters Locked out of Foreign Markets because of Low Productivity?: Evidence from New Zealand Agriculture and Forestry

Kris Iyer
Ministry of Economic Development, Government of New Zealand

Philip Andrew Stevens
Ministry of Economic Development, Government of New Zealand

Darran Austin
Ministry of Agriculture and Forestry, Government of New Zealand

Abstract

Self-selection of productive firms to exporting suggests that non-exporters are less productive and locked out of international markets due to low productivity. Using a panel dataset of 88,752 New Zealand agriculture and forestry sector firms over the period 2000-07, this paper measures the productivity of exporters and non-exporters separately. The paper finds that exporters are, on average, twice as productive as non-exporters. Across both exporters and non-exporters, we report a mixed rate of productivity growth: negative until the median and positive beyond. Exporters record a higher negative growth rate relative to non-exporters (below the median) and also a higher positive growth rate (beyond the median). Analysis of the productivity distribution in quantiles suggests that the sub-set of non-exporters who have productivity levels similar to that of exporters is large. For this sub-set of firms, it would be erroneous to conclude that the export propensity decision is determined by low productivity.

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1. Introduction

It has been observed that exporters are more productive than non-exporters. This causal linkage between exporting and productivity is mired in debate and the available empirical evidence is ambiguous. On the one hand, it is argued that the causality runs from exporting to productivity, i.e., firms learn by exporting (Grossman and Helpman 1991). On the other, it is contended that the causality runs from productivity to exporting, i.e., productive firms self-select to exporting (e.g. Bernard and Jensen 1999). While both arguments have theoretical underpinnings, recent empirical studies appear to favour the second (Wagner 2007). The self-selection hypothesis is based on theoretical models which argue that potential foreign markets have different conditions that determine the threshold level of productivity for export entry, effectively locking out the less productive firms from international markets (Bernard et al. 2003, Melitz 2003). This paper argues that there may be a sub-set of non-exporters who are just as productive as exporters, and the size of this sub-set might be large. Not focusing on the real reason underlying the export propensity decision of such productive non-exporters may well represent a lost internationalising opportunity. Furthermore, to the extent learning by exporting occurs, high productive non-exporters might find their competitive edge erode over time.

Focusing on firms in New Zealand (NZ) agriculture and forestry, the paper examines whether there are non-exporters with productivity comparable to exporters and gauges the size of this sub-set of firms. The study's orientation towards primary products businesses is attributed to two reasons. First, although more than 80 percent of NZ exports are accounted for by firms in the manufacturing sector, nearly two-thirds of the merchandise exports are based on food, fibre and forestry products (Iyer 2010). In other words, exporters from the agriculture and forestry sectors dominate the exporting landscape in NZ. Second, NZ's agricultural and forestry sectors, more than in the case of any other comparable country, depend heavily on export markets.[1] For the purposes of this paper, agriculture includes agricultural and horticultural production and processing and associated service industries. Likewise, forestry includes forestry production and processing and related servicing industries. See Appendix 1 for details on sector groupings.

The wider definition of the agriculture and forestry sectors provides a sample of 88,752[2] firms over the period 2000-07 for analysis. 1,323 firms have an exporting history. The data is drawn from the prototype Longitudinal Business Database (LBD) which is built primarily around government administered data collections.[3]

Firm productivity is measured as the residual of the regression of value added on capital and labour. The potential correlation between the residual and factor inputs has re-surfaced as an

[1] For example, nearly 90 percent of all pastoral production is exported. The situation is even more pronounced with regard to dairy production, with more than 95 percent of produce being exported.

[2] Following Statistics NZ's confidentiality protocols, counts are random rounded throughout the paper.

[3] The LBD contains data mainly for financial years 2000 to 2007 from a number of sources including the Annual Enterprise Survey (AES), Goods and Services Tax (GST), Business Activity Indicator (smoothed GST returns), income tax returns (IR10 and IR4), Customs records and some other surveys such as business operations survey, energy use survey, business finance survey etc. The spine of the LBD is the Longitudinal Business Frame which contains demographical information pertaining to firms. For more details on the LBD, see Fabling et al., (2008) and Statistics NZ (2007).

important issue in recent econometric literature (e.g., Javorcik 2004; Lin et al., 2009). If a part of productivity shocks are realised by firms during the year, the demand for factor inputs is likely to be affected. Not correcting for this correlation may result in biased estimates of productivity. In this paper, we use the Levinsohn and Petrin (2003) procedure to correct for the bias. Further, rather than focusing on one moment of the productivity distribution (say, the mean), this paper evaluates productivity and its growth rate for exporters and non-exporters across the productivity distribution. i.e., at different quantiles. The productivity statistics of exporters and non-exporters are compared to investigate if non-exporters are necessarily low productive firms.

The rest of the paper is organised as follows. The next section briefly reviews the literature on exporting and productivity. Section 3 presents the productivity model and, discusses the data and summary statistics. The results are presented in Section 4. Section 5 concludes.

2. Literature Review

Research on the linkages between exports and productivity has traditionally relied on aggregated macro-level data. Improved availability of unit record data and an understanding of the importance of disaggregated analyses have resulted in several studies examining the relationship between the two variables at the firm-level. In these studies, it is commonly found that exporting firms outperform non-exporters in productivity; this has been referred to in the literature as the productivity premium associated with exporting. Two alternative theories explain the correlation between exporting and productivity.

The first is called 'learning by exporting'. This suggests that exporters learn by exposure to international best practice and that the knowledge spillovers accruing to exporters in the international market place are significant (Grossman and Helpman 1991). It has also been suggested that customer requirements of quality and possible transmission of technology from the customer to the exporter also leads to increased productivity for the latter. Early evidence, especially at the aggregated level, was strongly supportive of this theory (e.g, Marin 1992; Henriques and Sadorsky 1996). Some firm-level analyses have also found evidence that exporting enhances productivity. For example, Clerides at al. (1998), applying data from firms based in Colombia, Morocco and Mexico find that productivity levels determined export volumes. Similar evidence was uncovered in De Loecker (2007) for Slovenian firms and Van Biesebroeck (2005) for firms in sub-saharan Africa. Greenaway and Kneller (2004), using data from the UK, match new exporters to non-exporters with otherwise similar characteristics. They uncover evidence of a one-off productivity increase in the first year after export entry. The effect is also found to increase with export intensity of the firm, i.e., firms which export a greater proportion of their sales secure a larger and longer-lasting productivity premium.

The alternative theory is that productive firms self-select to exporting. The theoretical foundation for the self-selection hypothesis is formalized in Melitz (2003) and Bernard et al. (2003). The Melitz model derives that in the presence of fixed costs associated with exporting, only the more productive firms will venture into exporting. In the absence of fixed costs, this model predicts that all firms will participate in the exports market. Bernard et al. (2003), on the other hand, observe that potential export markets have different conditions that determine the threshold level of productivity for export entry in each market. They predict that productive firms are more likely to enter export markets. This prediction is confirmed in

both Helpman et al. (2008) and Yoshino (2008). Empirical evidence in favour of the self-selection hypothesis has been recorded in Bernard and Jensen (1999) for the USA and Aw et al. (2000) for manufacturing firms in Korea and Taiwan. Wagner (2007) provides an excellent survey of studies evaluating the self-selection hypothesis.

There is also limited evidence of a bi-directional causal relationship. For example, in a study of manufacturing firms in Canada, Baldwin and Gu (2004) find that both learning by exporting and self-selection effects contribute to exporters outperforming non-exporters in productivity. The ambiguity in the empirical evidence suggests that it is premature to assume causality in one particular direction.

In the NZ context, there is evidence that that productive firms self-select to exporting (Fabling et al. 2008; Fabling and Sanderson 2009). However, a number of other factors remain to be accounted for, such as the composition of exports and destination market factors. We submit that there is no evidence in the NZ context to suggest that all non-exporters are necessarily low productive and are locked out of the foreign market for this reason. In essence, the theoretical underpinning of the self-selection hypothesis is being questioned. To assume that low productivity is the predominant/only factor underlying the export propensity decision on non-exporters would result in ignoring of other potential reasons which might explain why some firms do not venture into exporting.

3. Empirical Model and Data

3.1 The model

Equation (1) specifies the productivity regression model.

$$\ln(MFP_{it}) = \ln(Y_{it}) - \hat{\theta}_k \ln(K_{it}) - \hat{\theta}_l \ln(L_{it}) \quad (1)$$

where MFP_{it} is the multi-factor productivity of firm i at time t, Y_{it} is the value added of firm i at time t, and θ_k and θ_l are the estimated coefficients of capital (K) and labour (L). The production function includes three dummy variables distinguishing between firms categorised under the ANZSIC 1996 agriculture, manufacturing and wholesale divisions.[4]

Computing MFP via the (1) suffers from an endogeneity bias. At least a part of the MFP will be observed by the firm early enough to influence the factor input decision. Econometrically, this means that the regressor and the error term are correlated, i.e., the OLS estimates biased. This issue has often been overlooked by empirical economists. The earlier approaches to address endogeneity included using instrumental variables (IVs) and fixed effects. With IVs, it is difficult to find instruments that are well motivated in theory. With regard to the fixed effects approach, the simultaneity problem is addressed by removing any relationship between firm fixed effects and inputs. However, the fixed effects approach has not been successful in practice for at least three reasons. First, the estimated coefficients of

[4] The Australian and New Zealand Standard Industrial Classification (ANZSIC) is used for the collection, compilation and publication of statistics relating to industry. It is closely based on the international classification ISIC, and has a structure comprising categories at four levels, namely Divisions (the broadest level), Subdivisions (2 digit), Groups (3 digit) and Classes (4 digit). ANZSIC96 denotes the 1996 edition of the classification.

capital obtained tend to be implausibly low. Second, in the presence of measurement errors in inputs, the bias introduced by this approach is severe (even more than the OLS). Third, the approach assumes productivity to be time-invariant.

More recently, the Olley and Pakes (1992) (OP) semi-parametric estimation procedure has been applied to resolve the endogeneity bias. In the OP procedure, a production function is defined with two error components, one representing a white noise and another representing a firm specific productivity shock. The procedure models firm level investment as a function of the productivity shock and other state variables. Assuming that the investment function is invertible, the OP procedure is able to define a functional form for estimating productivity that corrects for endogeneity.[5] To arrive at equilibrium values OP also made the explicit assumption that productivity follows a first order Markov process. Their estimation involves a semi-parametric component for productivity using third or fourth order polynomials. However, the OP procedure is practicable only for datasets that have investment data and for firms that undertake non-zero investment. In this study, we do not have investment data.

Levinsohn and Petrin (2003) (LP) suggest an alternative approach where intermediate inputs, rather than investment, are used as proxy for the unobservable productivity shock. Intermediate inputs do not form part of the state variables that determine the firm's relative position in the market. This makes them very good proxy variables. Moreover, there is one significant theoretical merit to the LP approach relative to OP: intermediate inputs provide a better proxy for productivity shock than investment since they are likely to respond more quickly to productivity shocks. Also, from a practical standpoint, the sample for this study has data in intermediate inputs, that is, purchases (but not investment), which leads to the modelling of MFP using the LP procedure.[6]

3.2 Data and Summary Statistics

The data for the study comes from a variety of sources within the prototype Longitudinal Business Database (LBD). The LBD contains data mainly for financial years 2000 to 2007 from a number of sources including the Annual Enterprise Survey (AES), Goods and Services Tax (GST), Business Activity Indicator (smoothed GST returns), financial returns (IR10 and IR4), Customs and some other surveys such as business operations survey, energy use survey, business finance survey etc. The spine of the LBD is the Longitudinal Business Frame (LBF) which contains demographical information pertaining to firms. LBD as a data source is a relatively recent development and the documentation on it is evolving. However, an excellent description of the LBD can be found in Fabling et al. (2008).

The panel extracted for this study was unbalanced containing data on 88,752 firms over the period 2000-07, of whom only 1,323 had an exporting history. On average, there are roughly 4 annual observations per firm.[7] The data construction and sources are presented in Table 1.

[5] For applications see Olley and Pakes (1992), and Pavcnik (2000).

[6] The implementation uses the Stata module "levpet" developed by Petrin et al. (2004).

[7] Observations that have either negative or zero values for the production function variables are excluded since the production function is estimated in natural logarithms.

Table 1: Variables, Data Sources and Summary Statistics

Variables	Acronym	Data Source and Construction
Value Added	VA	In constant 2007 NZ$000's. From Annual Enterprise Survey (AES).
Intermediate Consumption	IC	In constant 2007 NZ$000's. From AES.
Capital Services	CAP	In constant 2007 NZ$000's. Estimated from AES as the sum of depreciation and rate of return on total fixed assets.
Employment	RME	Employees plus working proprietor count. From Linked Employer Employee Database.
EXPORTER Dummy		Firms that first exported at time *t* are treated as non-exporters in all previous years. However, once a firm is labelled as an exporter, it remains one irrespective of whether it exported in any of the future years.

The preponderance of non-exporters in the sample (from a counts perspective) is intriguing given the widely acknowledged reliance of the agriculture and forestry sector on foreign markets. This is because, although fewer in number, exporters appear to be much larger and dominant players in the sector. Summary statistics are presented in Table 2.

Table 2: Summary Statistics

	Non-Exporters						Exporters					
	Value Added (000's)		Capital Services (000's)		RME		Value Added (000's)		Capital Services (000's)		RME	
Year	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD	Avg	SD
2000	152	2,243	24	488	3	12	11,368	43,396	2,578	14,039	120	372
2001	160	2,271	25	674	3	18	9,493	38,567	2,180	13,211	105	366
2002	171	2,873	34	1,221	3	18	7,840	31,588	1,771	12,075	96	351
2003	161	3,153	48	2,893	6	33	7,020	23,517	1,384	4,949	90	324
2004	161	1,962	50	2,826	3	36	7,042	25,249	1,261	4,461	90	330
2005	180	3,495	55	3,328	3	36	7,127	25,554	1,433	4,889	90	339
2006	198	7,468	60	3,623	3	42	6,909	24,198	1,535	5,219	90	360
2007	204	8,001	59	3,628	3	42	6,981	24,228	1,726	7,314	96	375

It is apparent that exporting firms are, on average, much larger than non-exporters. An average exporter in the agriculture and forestry sectors is 47 times larger than a domestic market oriented firm in terms of value added, employs 64 times more intermediate inputs and 33 times more labour. The capital service use of an average exporter is 48 times that of a non-exporter. This observation, while dramatic, is attributable to the exporting group being concentrated with larger firms and the non-exporting group being populated with a large number of small players. Because the statistical characteristics of exporters and non-exporters are so different, comparing them is a difficult exercise and several caveats need to be factored into the interpretation of the evidence. These include the results being contaminated by the size factor, foreign ownership effects, firm growth trajectories, age etc.

4. Results and Discussion

Table 3 provides the estimates of the production function estimated under the LP and the OLS.

Table 3: Production Function Estimates

Production Function Variables	LP	OLS
Capital	0.480* (0.007)	0.506* (0.003)
Labour	0.337* (0.004)	0.662* (0.002)
Sector Dummy 2	-0.713* (0.016)	0.287* (0.010)
Sector Dummy 3	-0.501* (0.022)	0.625* (0.013)

Notes: Standard errors are presented in parentheses; *Significant at less than 1 percent level;

The coefficients capital and labour obtained using the LP procedure are 0.48 and 0.34 respectively. The coefficient of labour is lower than what is obtained under an OLS estimation of a Cobb-Douglas production function.[8] This result is consistent with the theoretical and empirical results discussed in LP. As regards capital, the coefficient is larger than the thumb rule of 0.33 but less than the OLS estimate of 0.51. LP note, the capital coefficient obtained using their procedure may be more or less than the one obtained using OLS, depending on the degree of correlation among the inputs and the productivity shocks. The automated routine documented in Petrin et al. (2004) also provides for a Chi-squared statistic which tests is the sum of coefficients under the LP is equal to one. The p-value for this test was close to 0 indicating that there is evidence of decreasing returns. For the OLS, however, there is evidence of increasing returns.

The productivity distribution of exporters and non-exporters are presented separately in Table 4. One disadvantage of the MFP statistic relative to the labour productivity statistic is that it is less easy to comprehend in an intuitive sense. While labour productivity can be understood as value added per worker, MFP can be interpreted as value added per unit factor input mix, of which the capital-labour composition is determined by the technology used by the firm.[9] Few papers using NZ firm level data have reported MFP estimates (e.g., Fabling and Grimes 2009). The common practice is to use labour productivity and to some extent, this has conveyed an inaccurate picture on the productivity trajectory of the NZ economy. This paper is the first study providing MFP estimates of businesses in NZ agriculture and forestry sectors.

[8] An alternative to the Cobb-Douglas (CD) function would be a more flexible translog function or the CES, which are theoretically more attractive because of fewer restrictions. In practice, however, the applying the CD functional form rather than the translog or CES does not tend to make too much of a difference numerically. On the other hand, the CD function has the advantage that it is relatively easy to whether the estimated coefficients and the resulting returns to scale are broadly in line with common sense (Arnold 2005).

[9] According to the regression model MFP = $Y/(K^{\theta k}L^{\theta l})$, here $(K^{\theta k}L^{\theta l})$ can be viewed as a factor input mix.

Table 4: Productivity Distributions of Exporters and Non-exporters

	MFP (00-03)	MFP (04-07)	MFP (00-07)	MFP Growth	MFP (00-03)	MFP (04-07)	MFP (00-07)	MFP Growth
Quantile1	1.11	0.94	1.03	-80.25	2.79	2.16	2.47	-131.21
Quantile 5	3.38	2.84	3.11	-40.25	12.02	7.95	9.99	-54.98
Quantile 10	6.65	5.60	6.12	-26.81	19.12	14.78	16.95	-34.33
Quantile 25	17.61	14.75	16.18	-11.39	38.50	31.83	35.16	-13.77
Quantile 50	35.61	30.09	32.85	-0.91	64.41	57.12	60.76	-0.83
Quantile 75	56.85	49.42	53.14	8.95	97.77	90.32	94.05	11.41
Quantile 90	81.48	73.16	77.32	23.72	143.13	135.91	139.52	29.99
Quantile 95	101.20	93.05	97.12	37.53	193.22	178.72	185.97	50.03
Quantile 99	170.52	158.95	164.73	86.69	403.99	347.71	375.85	153.49
Mean	42.53	37.61	40.07	-0.66	85.16	73.33	79.24	-2.46
Unique Firms	87,429				1,323			

*Data by year is presented in Appendix 2.

The null hypothesis of equality in the productivity distributions of the exporters and non-exporters groups is overwhelmingly rejected at less than 1 percent using the two-sample Kolmogorov-Smirnov test for equality of distribution functions.

At all observed points in the distribution it is found that exporters are more productive than non-exporters. This is an expected result. As observed in Fabling and Sanderson (2009), that exporters outperform domestically focused firms has become something of an established fact in the empirical trade literature. Other emerging NZ longitudinal evidence has found similarly (e.g., Fabling et al., 2008). We find that, on average, exporters are roughly 2 times as productive as non-exporters. However, the productivity distributions, viewed in quantiles, provide a different perspective on the relative performance of exporters and non-exporters. At the first quartile (i.e., quantile 25), non-exporters are roughly as productive as exporters at quantile 10. Likewise, the productivity of non-exporters at the median (i.e., quantile 50) is comparable to the productivity of exporters at the first quartile. Non-exporters at quantiles 95 and 99 are more productive than exporters in the third quartile (i.e., quantile 75) and quantile 90 respectively. It appears unlikely that low productivity is the predominant factor underlying the export propensity decision of non-exporters, particularly ones in the higher quantiles. Considering that the number of non-exporters in the sample is 66 times that of exporters, the results suggest that the number of non-exporters not locked out of exporting owing to low productivity is a substantial number. The analysis was repeated after splitting the sample into two sub-periods: 2000-03 and 2004-07. The results were similar. Exporters were twice as productive as non-exporters across both sub-periods. Further, across both sub-periods, we find that non-exporters at the first quartile and median had productivity comparable to exporters at quantile 10 and the first quartile, respectively. At quantiles 95 and 99, non-exporters were more productive than exporters at the third quartile 75 and quantile 90, respectively. As one moves higher up the productivity distribution, the productivity of non-exporters is far too high for the supposed theoretical link between productivity and export propensity decision to be tenable.

In terms of the growth in productivity, both non-exporters and exporters record a negative rate. Intriguingly, exporters fare, on average, marginally worse than non-exporters. The underlying distribution is nuanced. Until (and including) the median, exporters register a higher negative productivity growth rate than the non-exporters. Beyond the median, the productivity growth is positive for both groups. As one would expect, exporters fare better than the non-exporters. Looking at the mean values alone might have been misleading in that the evidence could be interpreted as being consistent with the view that learning by exporting does not occur.[10] The finding that exporters that are in the sub-set of positive productivity growth firms do better than comparable non-exporters is in line with the learning by exporting hypothesis, although it would be a stretch to project the evidence as an empirical support for the hypothesis.

It is emphasised that a significant number of non-exporters (beyond the median firms) do register a positive growth rate in productivity (although as just observed they fare less well their exporting counterparts only at the same quantiles). This further strengthens the argument that productivity is possibly not the determining factor of in the export propensity decision on non-exporters.

[10] In any case, it would not have been appropriate to conclude that learning by exporting does not occur. The initial conditions of the firms need to be accounted for in order to derive such a conclusion.

The analysis was repeated after excluding the dairy sector (primary and manufacturing firms). The dairy industry in NZ is organized primarily as a co-operative, as a consequence of which individual dairy farms whose produce is exported, are not classified as exporters. The productivity of such non-exporting dairy farmers will be reflected in the productivity of the organization that takes up the exporting activity on their behalf. As one would expect, the gap between the productivity of exporters and non-exporters widens when the diary sector is excluded.

Table 5: Productivity Distributions of Exporters and Non-exporters (2000-07 Average, excludes dairy sector)

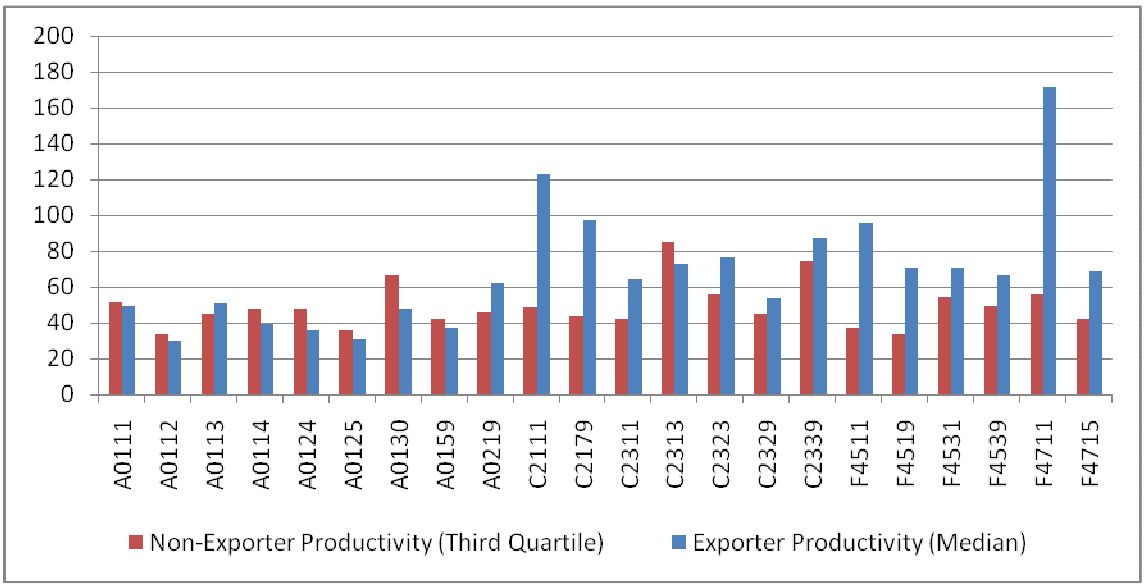
Quantiles	Non-exporters	Exporters
1	1.08	2.65
5	2.92	11.53
10	5.54	20.22
25	14.91	42.06
50	32.10	72.77
75	54.64	113.93
90	82.82	169.88
95	106.90	223.40
99	189.08	427.42
Number of Observations	64,689	1,209

For example, non-exporters at the first quartile, median and third quartile are less productive than exporters at quantile 10, first quartile and median respectively. However, at quantile 90, non-exporters are more productive than exporters at the median. Non-exporters at quantiles 95 are roughly as productive as exporters at the third quartile, and non-exporters at quantile 99 are more productive than exporters at the quantile 90. Considering the huge sample size of non-dairy non-exporters (64,689 unique firms), the number of non-exporters for whom productivity is not a constraining factor is a quite sizeable. Accordingly, the argument that the export propensity decision is not driven by productivity constraints still holds.

It is possible that differences at the disaggregated industry class level (ANZSIC 4 digits) are being masked by the data presented in Table 4, which is at the agriculture and forestry sector level. Addressing this requires the comparison of the productivity performance of exporters and non-exporters within each industry class. The sample could be classified into 69 industry classes: 28 in agriculture, 32 in manufacturing and 9 in wholesaling. 66 industry classes had observations pertaining to both exporters and non-exporters. In 17 cases, the productivity of non-exporters at the median was higher than the productivity of exporters at the first quartile. When the productivity between non-exporters at quartile 3 and exporters at the median are compared, in as many as 24 cases non-exporter productivity was higher than that of exporters. The incidences of such cases are greater at the top ends of the productivity distribution. Figure 1 provides the productivity distribution of exporters and non-exporters at the industry class level across the agriculture, manufacturing and wholesaling sub-divisions respectively. Here, exporter productivity at the median is compared to non-exporter productivity at the third quartile. Other quantile comparisons cannot be presented by ANZSIC due to data confidentiality issues. Again, data related issues allow presenting only 21 industry classes.[11]

[11] A minimum of 10 observations is required for releasing the median values and for quartiles, this number is 20. Within the exporter category only 21 industry classes had more than 10 observations.

Figure 1: MFP of Non Exporters (Third Quartile) and Exporters (Median)[12]



The evidence at the disaggregated industry class level re-affirms the view that low productivity is not the only/predominant factor explaining why non-exporters do not venture into exporting, especially in the agriculture and manufacturing sub-divisions. This pattern does not appear to hold in the wholesaling division where among the classes presented exporters at the median are more productive than non-exporters at the third quartile.

Potential reasons for the export propensity decision of non-exporters have to be explored. Dimensions such as business choice and managerial failure have been proposed as possible reasons. Summary statistics from this paper allude towards firm size being important. Further, an emerging view is that non-exporters might perceive exporting as being costly. None of these reasons have empirical support in the NZ context so far. Even this piece of research has not econometrically determined the possible reasons underlying the export propensity decision of productive non-exporters. The discussion of the potential reasons is simply speculative, although indicative of future research that will be taken up.

5. Conclusion

Firm-level evidence on the causal linkages between exporting and productivity is ambiguous. The traditional learning by exporting model is now being questioned and it is instead argued that productive firms self-select to exporting. The underlying theoretical rationale of the self

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[12]A0111:Plant Nurseries, A0112:Cut Flower and Flower Seed Growing, A0113:Vegetable Growing, A0114:Grape Growing, A0124:Sheep Farming, A0125:Beef Cattle Farming, A0130:Dairy Cattle Farming, A0159:Livestock Farming nec, A0219:Services to Agriculture nec, C2111:Meat Processing, C2179:Food Manufacturing nec, C2311:Log Sawmilling, C2313:Timber Resawing and Dressing C2323:Wooden Structural Component Manufacturing, C2329:Wood Product Manufacturing nec, C2339:Paper Product Manufacturing nec, F4511:Wool Wholesaling, F4519:Farm Produce and Supplies Wholesaling nec, F4531:Timber Wholesaling, F4539:Building Supplies Wholesaling nec, F4711:Meat Wholesaling, F4715:Fruit and Vegetable Wholesaling

selection hypothesis is that foreign markets have different conditions that determine the threshold level of productivity for export entry, effectively locking out the less productive firms from international markets. This paper investigates the existence of substantial group of non-exporters who are just as productive as exporters and gauges the size of this sub-set of firms. The exercise is motivated on the grounds that not attending to the real reason underlying the export propensity decision of productive non-exporters might mislead policy and manifest in lost exporting opportunities. An unbalanced panel dataset of 88,752 firms over the period 2000-07 from the NZ agriculture and forestry sectors is applied in the study. The data was derived from the prototype Longitudinal Business Database (LBD), administered by Statistics NZ. The focus on the primary sector is driven by the knowledge that the bulk of NZ exports come from the agriculture and forestry activities and this is an area of competitive advantage for the country.

The productivity levels and growth rate of the sample firms were measured after accounting for the endogeneity of factor inputs. The productivity distributions of exporters and non-exporters were examined separately. On average, exporters were twice as productive as non-exporters. A different perspective emerged on the relative performance of exporters and non-exporters when the productivity distributions were viewed in quantiles (1, 5, 10, 25, 50, 75, 90 and 95). The productivity of non-exporters at higher quantiles was comparable to or greater than the productivity of exporters in the lower quantiles. To cite an example, the productivity of non-exporters at quantiles 95 and 99 was higher than the productivity of exporters in the third quartile and quantile 90 respectively. Therefore, generalising that non-exporters are firms that are locked out of exporting due to low productivity would be erroneous. The sample of non-exporters was large (87,429 firms) - about 66 times that of exporters which suggested that the number of non-exporters not locked out of exporting owing to low productivity is sizeable. These observations continued to hold when the analysis was repeated at the disaggregated industry class level.

The immediate question then is: why do productive non-exporters choose not to export? Some reasons are speculated in this paper. There is ongoing research using LBD data investigating this question – by the present authors as well as by others. We await results from these studies.

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Appendix 1: Agriculture and Forestry Activities

Group	ANZSIC Codes	Description
1	A011, A012, A013, A014, A015, A016, A017, A019, C2130, F4715	Plant nurseries; flowers, vegetables fruits growing; fruit and vegetables processing; fruit and vegetables wholesaling.
2	A0121, A0122, A0169, C2140, C2151, C2152, C2161, C2162, C2163, C2171, C2172, C2174, C2179, F4512, F4519	Grain growing; crop and plant growing nec; manufacturing of: oil and fat; flour mill products, cereal and foods, bread, cake and pastry, biscuits, sugar, confectionaries, animal and bird feeds, food nec; wholesaling of: cereal and grain; farm produce and supplies.
3	A0123, A0124, A0125, A0141, A0142, A0152, A0153, A0159, C2111, C2112, C2113, F4711	Farming of: sheep; beef; beef cattle; poultry; eggs; pig; horse; deer; livestock nec, processing of: meat; poultry; bacon, ham and small goods; wholesaling of meat and poultry.
4	A0130, C2121, C2122, C2129, F4713	Dairy cattle farming, processing of: milk and cream; ice cream, dairy products nec, dairy produce wholesaling
5	A0213, A0219	Aerial agricultural services, services to agriculture nec.
6	A0301, A0302, A0303, C2311, C2313, C2321, C2322, C2323, C2329, C2331, C2332, C2333, C2334, C2339, C2411, F4531	Forestry, logging and services to forestry, log sawmilling, wood chipping, timber resawing and dressing, manufacturing of: plywood and veneer; fabricated wood, wooden structural components, wood products nec, pulp, paper and paper board, solid paperboard container, corrugated paper board, paper bag and sack, paper products nec, wholesaling of timber.
7	C2261, C2262	Leather tanning and fur dressing, leather and leather substitute product manufacturing.
8	F4511	Wool wholesaling.

Appendix 2: MFP at Quantiles of Non-Exporters and Exporters, by year

Qua-ntile	NE 2000	E 2000	NE 2001	E 2001	NE 2002	E 2002	NE 2003	E 2003	NE 2004	E 2004	NE 2005	E 2005	NE 2006	E 2006	NE 2007	E 2007
1	1.23	4.52	1.12	2.89	1.07	2.75	1.03	0.99	1.05	2.57	0.98	2.74	0.92	1.11	0.83	2.21
5	3.73	15.70	3.63	11.46	3.31	12.14	2.87	8.80	2.83	8.22	3.10	8.70	2.83	6.65	2.59	8.22
10	7.16	22.98	7.24	18.67	6.58	18.01	5.63	16.81	5.74	16.34	5.97	15.19	5.31	14.68	5.37	12.91
25	19.12	44.91	18.94	39.68	17.29	35.63	15.10	33.76	15.51	33.54	15.50	33.06	13.80	31.59	14.17	29.14
50	36.87	73.24	39.29	63.78	35.98	60.58	30.30	60.03	31.95	59.23	31.37	57.76	28.74	56.18	28.28	55.31
75	57.00	110.68	64.36	98.61	58.22	90.51	47.85	91.28	51.31	94.58	51.22	91.46	48.26	88.35	46.89	86.89
90	81.18	158.08	92.18	142.43	84.02	139.76	68.53	132.25	74.21	144.14	75.24	133.23	72.37	133.43	70.83	132.84
95	99.49	214.47	114.09	189.24	105.05	191.69	86.16	177.49	93.80	187.14	94.95	183.41	92.48	173.11	90.95	171.20
99	159.62	375.35	187.41	381.45	178.85	374.57	156.21	484.57	164.81	364.66	159.49	371.52	155.28	334.93	156.21	319.72
Mean	42.85	103.79	47.44	83.89	43.43	78.25	36.40	74.69	38.58	75.50	38.68	74.43	37.16	75.92	36.01	67.47
SD	44.79	308.65	52.14	114.01	51.64	91.74	40.34	80.26	39.39	75.04	50.84	84.10	77.91	166.39	50.11	62.34
obs	49,113	504	49,392	585	48,954	630	44,505	699	43,062	711	41,340	726	39,564	747	37,467	666

*NE: Non-exporters, E: exporters