MULTI-PRODUCT EXPORTERS AND PRODUCT SWITCHING BEHAVIOUR OF NEW ZEALAND FIRMS

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Abstract

Using a unique dataset that covers (at 10 digit product codes) all exporting firms in New Zealand from 1997 to 2007, this paper analyzes the patterns of their product mix, how it changes over time and how this relates to firm characteristics. We suggest that looking at the relative importance of added and dropped products is as important as firm entry/exit in reallocation of resources.

We find that product switching occurs frequently. It is also shown that dropping products is more likely to happen than adding products, suggesting the difficulty of entering new markets/products. We also show that products with a smaller share and tenure are more likely to be dropped by a firm. Finally, the link between volatility of earnings and the choice of product mix suggests that single product exporters are more stable.

The results make a good case for product-firm characteristics being an important part of export decisions and suggest that more work should be done on this link.

Keywords: Product differentiation, product switching, product market entry and exit, volatility of earnings

JEL classification: D21, E23, L11, L60

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Statistics NZ protocols were applied to the data sourced from the New Zealand Customs Service. Any discussion of data limitations is not related to the data's ability to support the New Zealand Customs Service's core operational requirements.

1. Introduction

Using firm level data, it has been found that exporters represent a small proportion of all firms and that they have better economic performance compared to non-exporters such as larger size, greater capital intensity and higher productivity. It has also been documented that multinational firms pay higher wages than domestic ones and that global firms undertake more innovation. Using U.S. data, Bernard et al. (2005) find that most importers as well as exporters tend to trade relatively few products and trade with a small number of high income countries. However, the small number of firms with the highest product and trading partner intensity employ larger number of workers. Over time, the number of importers and exporters rises substantially. For exporters, this is matched by larger product and trade partner intensity, whereas for importers the change is small.

The discussions of which firms are exporters and allocation of resources to their most efficient use generally focuses on dynamics of firm entry and exit, i.e., whether newly created firms are more creative than exiting ones. Another way of reallocating resources can occur within firms, as firms add and drop or "switch" products. In the analysis of firm behaviour, diversification is considered good as it creates a buffer zone against different types of shocks. Most studies on diversification focus on the financial portfolio of the firm and its effect on productivity or the value of the firm. Product diversification has largely been ignored due to lack of data. The prototype Longitudinal Business Database (LBD), which is discussed in detail in Section 2, enables us to approach this issue empirically for New Zealand. We observe the full set of products each firm exports in each month and analyze how different firms' product mix changes for over time.

The choice of product mix can be thought as a channel through which price volatility feeds into productivity. On one hand, if firms choose to have a more varied product mix due to volatility of prices, this leads to a diversification in their production, and increases their resilience to price shocks. On the other hand, such a diversification may lead to a decline in productivity as firms are unable to capture the benefits of comparative advantage and economies of scale. This creates a typical risk vs. return trade-off that can be analysed using firm level data.

This paper analyzes the product mix of New Zealand exporters and is a first step in linking this to the volatility of firm performance. It follows closely the work by Bernard et. al (2006) for US manufacturing firms. Section 2 describes the data, and Section 3 presents summary statistics on whether firms export single or multiple products. Section 4 extends the analysis to the relative share of new, continuing and exiting firms as well as dropped, added and continued products in the value of exports. Patterns of product switching as well as impact of product switching on firm characteristics are also considered. The final part of the section speculates why firms might be engaging in product switching behaviour. Section 5 looks at the volatility of firm performance in relation to product switching behaviour. Section 6 concludes.

2. Data Description

The dataset used in this paper is the prototype Longitudinal Business Database (LBD), developed by Statistics New Zealand (SNZ).[2] This dataset is a combination of several resources which are shown in Appendix A and includes longitudinal data on all economically active firms in New Zealand.

Economically active enterprises included in the dataset are defined as enterprises that met at least one of the following criteria in a particular year:

- LEED rolling mean employment (RME) greater than zero
- GST sales greater than zero
- GST purchases greater than zero
- IR 10 total income greater than zero
- IR 10 total expenditure greater than zero
- IR 10 total fixed assets greater than zero.

Most important sources in the prototype LBD are:[3]

GST Returns

Definition: Goods and services tax (GST) is a tax on most goods and services in New Zealand, most imported goods, and certain imported services.

Eligibility: Businesses need to register for GST if their annual turnover is more than $40,000. Below this threshold they may, but not have to register for GST.

[2]For more information, see the paper that have already used this dataset, such as Statistics New Zealand (2007), Fabling, et al. (2008, 2008a, 2008b).

[3] Most of this information was provided by Statistics New Zealand.

Collection: GST data is collected on a monthly, bi-monthly or six-monthly basis by IRD, depending on the annual turnover of the business.

Variables: GST data include information on sales/income & purchases/expenses.

IR10 Accounts Information

Definition: IR10 data is essentially a general summary of information relating to the customer's business and operations.

Variables: Consequently this form contains information on sales and other income, purchases, a breakdown of expenses including but not limited to depreciation, research and development, and salaries and wages. Balance sheet items also include: current assets, fixed assets (broken down into vehicles; plant and machinery; furniture and fittings; land & buildings; and other), other assets, liabilities (broken down into current and term), and shareholders funds.

Eligibility: IR10 is designed to collect information for statistical purposes and is not a compulsory form.

IR4 Income Tax Return for Companies

Eligibility: All active New Zealand resident companies must file an income tax return every year by completing IR4.

Variable: As such, this form includes variables on New Zealand and overseas income (including interest, dividends and income from "business or rental activities") and losses. They also contain a binary foreign-ownership indicator.

LEED

Definition: LEED data is constructed by Statistics NZ from IRD tax data, notably Pay-As-You-Earn (PAYE) returns for employees. To protect the confidentiality of individuals, LEED variables available in the LBD dataset have been aggregated to the enterprise-level (allowing the data to be accessed through the Data Lab).

Variables: Variables available in this manner include counts of employers (on an annual basis) and employees (on a monthly basis) with matching data on income. Summary characteristics of individuals also include gender and banded age breakdowns, tenure distributions of employees, and summary measures of the dispersion of wages within the firm. Accessions and separations are summarised at the firm level, as are counts of contractors employed (with remuneration).

Customs Data

The Customs data is recorded monthly at the shipment level and contains information on products at the 10 digit Harmonised System classifications, value, volume and currency of the transaction, whether it has been hedged, means of transport and the country of destination and origin.

The definition of "sector", "industry" and "product" are based on New Zealand Harmonised system classifications.[4] The international HS follows a hierarchical structure, comprising 21 sections, 98 chapters (2 digit), 1228 headings (4 digit), and 5,059 sub–headings (6 digit). This structure is further broken down into approximately 13,500 statistical keys (10 digit) for New Zealand's purposes. Throughout the paper, sections are referred to as sectors, chapters as industries and 10 digit codes as products.

In the sample period from 1996 to 2007, there have been various revisions to these 10 digit classifications such as introduction of new goods and changes in the tariff system. Since the analysis is based on the product mix of firms, it is crucial to get a consistent definition of products, so the dataset is manipulated such that if two or more products have been merged or if a single product has split into several products, these have been aggregated into a single product.[5]

3. Summary Statistics

Table 1 provides an indication of the relative level of details between sectors and industries. The table lists industries in Section 15, "Base Metals and Articles of Base Metal" and aims to show the amount of variation in terms of products. The frequencies are reported to show that there is variation across industries, although some are much more important than others.

Table 2 shows that on average a sector will have 5 industries and 494 products. The number of products ranges from a low of 9 in Section 21 to a high of 1600 in sector 16. In results not reported here, the mean and standard deviation of total sales in each

[4] More information can be found at http://www.stats.govt.nz/statistical-methods/classifications-and-related-statistical-standards/harmonised-system/default.htm.

[5] The code to do this analysis was kindly provided by Lynda Sanderson.

sector was calculated to see sectoral differences, and there is a lot of variation across sectors.

We find that firms exporting multiple products, industries and sectors dominate New Zealand exporters. This dominance is shown in Table 3, which reports the number of firms that export a single product, which is 6669 and their share of all exporting firms, which is 28 percent. The number of firms producing more than one good is 17406, which refers to 72 percent of all firms.

Firms which export in multiple industries make up 60% of all exporters, whereas the percentage for multiple sectors is 55%. In comparison, a similar study that analyzes US manufacturing firms finds that single product firms are 59% of all firms and multiple industry firms are 29% and multiple sectors are 13%. This could be due to two reasons. One potential cause is that New Zealand firms try to diversify by producing more than one product as a way of hedging against uncertainty in export markets. Another is that due to the small size of exporters in terms of world markets, New Zealand firms are forced to export a variety of products.

Figure 1 shows that for firms who export multiple products, the value of exports across products is not symmetric. As the number of products increase, the share of the largest product increases. This suggests that for firms with multiple products, they will have at least one major product that they export, and a number of smaller products that they export on the side.

Table 4a compares the characteristics of firms that export multiple products, industries, sectors with those exporting only single ones. The logs of firm characteristics are regressed on a dummy variable indicating the firm's status as a single/multiple product/sector/industry exporter. For example, *product10* is equal to 1 if a firm exports more than one product at the 10 digit code and 0 if only a single product is exported. Likewise, *product4* is equal to 1 if a firm exports products in more than one industry, and *product2* is equal to 1 if a firm exports products in more than one sector. Multi product firms on average have larger sales, higher employment and wages. Their value added defined as the difference of their sales and purchases is higher and the value of exports are lower. This suggests that exporters that concentrate on a single product might be a big exporter of that product, and do not have large domestic or foreign activities on the side. The results for productivity defined as the ratio of value added to

employment are inconclusive as the sign changes depending on the level of detail chosen to define a product/industry or sector. These regressions use product fixed effects, using industry fixed effects in Table 4B as a robustness check does not alter the results.

4. Product Switching

4.1 Relative Share of Firms in the Aggregate Value of Exports

Next, product switching behaviour is investigated further by calculating the relative share of export value contributions by entering, exiting and continuing firms. In order to do so, the change in export value from one period to the next—in this case quarters—is calculated for several categories.

The aggregate change in the value of exports, DY_t can be decomposed into the sum of the changes due to new (N), exiting (X), and continuing (C) firms,

$$\Delta Y_t = \sum_{j\in N} \Delta Y_{jt} + \sum_{j\in X} \Delta Y_{jt} + \sum_{j\in C} \Delta Y_{jt} \qquad (1)$$

where j indexes firms. At each continuing firm, the change in the value of exports can be further decomposed into the sum of the changes due to added (A), dropped (D), and continuing (B) products,

$$\Delta Y_{jt} = \sum_{i\in A} \Delta Y_{ijt} + \sum_{i\in D} \Delta Y_{ijt} + \sum_{i\in B} \Delta Y_{ijt} \qquad (2)$$

where i indexes products. Finally, the value of exports of continued products can be broken into products that grow (G) and shrink (S),

$$\sum_{i\in B} \Delta Y_{ijt} = \sum_{i\in G} \Delta Y_{ijt} + \sum_{i\in S} \Delta Y_{ijt} \qquad (3)$$

Substituting, the aggregate change in the value of exports can be written as

$$\Delta Y_t = \sum_{j\in N} \Delta Y_{jt} + \sum_{j\in X} \Delta Y_{jt} + [\sum_{i\in A} \Delta Y_{ijt} + \sum_{i\in D} \Delta Y_{ijt} + \sum_{i\in G} \Delta Y_{ijt} + \sum_{i\in S} \Delta Y_{ijt}] \quad (4)$$

The first two terms reflect the contribution of firm entry and exit. The third and fourth terms represent changes due to product adding and dropping by surviving firms, i.e. adjustments to firms' so called extensive margins. The last two terms account for the growth and decline of continuing firms' continuing products, i.e., their intensive margins.

Table 5 decomposes value of exports according to these contributions for each quarter. There is a lot of variation across quarters, and it is hard to pick up patterns, so in the future, this exercise will be repeated for changes across years to get a better idea of these patterns. The first column changes in the aggregate value of exports. The remaining columns show changes due to the new firms, continuing firms and exiting firms (columns three to five) and changes due to product switching behaviour.

The results show that between 1997 and 2007, continuing firms are the biggest contributors as expected, and new firms are mostly higher than exiting firms, which shows that new entrants to export markets are likely to be larger firms. It is expected that exiting firms are generally those that are not doing so well, thus the smaller contribution to the aggregate change in the value of exports. Looking at the extensive margin figures, continuing products are the biggest source of growth/decline, suggesting that perhaps adding and dropping of products does not alter firm behaviour or profits drastically. This issue is further investigated in the next section.

Finally, Table 5a shows the aggregate contributions through the whole sample of whether continuing products have been growing or shrinking. The results indicate that shrinking products make up a bigger share of continuing products in terms of value.

4.2. Patterns of Product Switching

Given these results, product switching behaviour is compared across firms that produce single/multiple products/industries/ sectors. Firms are split into groups according to their behaviour of (1) *Neither*—the firm does not change its product mix (2) *Add*-the firm only adds products and (3) *Drop*—the firm only drops products.

Table 6 shows that 51% of all firms alter their product mix by either dropping or adding products, with adding making up most of product switching behaviour. The second column shows the behaviour of product altering by multiple good exporters. For single product exporters, the likelihood of adding a new product is low, suggesting that there are strong reasons why firms choose not to export more than one product. For multiple product exporters, the pattern is the same as with all firms, with dropping being more prominent than adding, and half of them not altering their product mix at all. The next four columns show similar figures for single/multiple sector and industry exporters.

There is more variation for single industry/sector exporters, but the main patterns remain the same, especially for multiple industry/sector exporters.

Table 7 shows adding and dropping by single and multiple product exporters, weighted by their value of export share. This shows that for multiple product exporters, product switching constitutes a small portion of their business, suggesting perhaps that entering new products is more difficult.[6] This result also suggests that large firms are less likely to change their product mix, which is in contrast to findings of US manufacturing firms.

4.3 Impact of Product Switching

To analyze the relationship between product switching and firm behaviour, simple OLS regressions of changes in firm characteristics on dummy variables capturing contemporaneous product switching behaviour is used.

$$\Delta Z_{jt} = \alpha + \beta Drop_{jt} + \delta Add_{jt} + \varepsilon_{jt}$$

where Z represents firm characteristics, and *Drop* and *Add* are as defined above. These regressions use industry fixed effects and the standard errors are clustered at industry levels as well. The firm characteristics that we consider are sales, employment, wages, productivity, value of exports and value added.

Regressions reported in Table 8 include all the firms in the sample. The results show that both adding and dropping products lead to lower sales, employment, wages and value added. This is puzzling as one would expect adding products to increase these values. The results could be due to the fact that firms are engaging in other activities as they are adding new products or adding new products is a response to 'bad times' the firm is already experiencing.

It should be noted that these results only provide descriptive statistics on the correlation between firm characteristics and the decision to add or drop products. They show that changes to the product mix are associated with changes in observed firm outcomes. Determination of the product mix is endogenous.

[6] See Fabling, Grimes and Sanderson (2008) for a detailed analysis of the export market choice of New Zealand firms.

4.4 Why do Firms Switch Products?

Given these summary statistics, we consider different explanations for the product switching behaviour that is observed among New Zealand firms. First, product-specific factors that are common across firms are considered. For example, demand shocks can lead to firms adding 'hot' products for which demand is rising and drop 'cold' ones for which it is falling. Likewise, supply shocks due to technological progress or international trade might lead to dropping of uncompetitive products in line with the theory of comparative advantage. If this indeed is the main cause of the product switching behaviour, we should observe a negative correlation between add and drop rates. Another explanation is an extension of the existing models of industry dynamics (Jovanovic 1982, Hopenhayn 1992 and Ericson and Pakkes 1995) that are supported by empirical studies such as Baily et al (1992) and Foster et al (2001, 2006). In steady state equilibrium, the flow of firms that add a product each period must equal the flow of firms that drop the product. In this model, the equilibrium add and drop rates are positively correlated, as these rates depend on the costs of entry of products: products with low sunk costs of entry exhibit high entry and exit rates and vice versa.

Our results indicate that there is a positive correlation between adding and dropping rates. This suggests that the patterns of product switching are not solely a result of reallocation of resources from one group of products to another due to say a demand shock. A plausible interpretation then is that firm-product characteristics are important in explaining product switching behaviour of firms. To analyze this, we go back to theories of sunk costs of entry models that suggest that exiting firms should have a relatively low output and should have produced for a short period of time compared to other firms.

Table 9 reports OLS regressions of a dummy variable indicating that a firm drops a product on firms' relative product size and tenure in the product market as well as the relative firm size and firm age and the number of products,

$$Drop_{jit} = \alpha + \beta_1 Size_{jit} + \beta_2 Tenure_{jit} + \beta_3 Size\_firm_{ji} + \beta_4 Age_{jt} + \beta_5 Products_{jt} + \varepsilon_{jt}$$

where j and i index firms and products. Several specifications are considered. The first column reports industry fixed effects, second column has firm fixed effects and the third

column reports product fixed effects. These fixed effects control for unobserved firm and product specific effects that influence the probability of a product being dropped. Note that firm specific variables are dropped when firm fixed effects are included.

The results show that firm relative size and age are negatively correlated with product dropping. This is consistent with the literature on firm entry and exit that finds these variables to be negatively correlated with firm death. Likewise, firm-product relative size and tenure are negatively correlated with product dropping. The findings suggest that large and old firms are less likely to alter their product mix, so it is the new and small firms who engage in such behaviour. This is in line with our theory stated at the beginning of the paper that product mixing might be used as a way of hedging mechanism for firms who are more prone to fluctuations in export markets.

We have shown in the previous section that firms' product mix alterations are an important part of aggregate exports. Here, it is shown that firm-product drops exhibit lower relative product size and tenure. If we assume that relative size and tenure are positively correlated with firm-product productivity, we can potentially say that systemic reallocation of resources towards high productivity sectors occurs across products within firms as well as across firms.

5. Product Mix and Volatility of Firm Performance

The volatility of macroeconomic variables is a topic of constant debate. Blanchard and Simon (2002) showed that there has been a downward trend in the volatility of GDP beginning in the 50s with an interruption in the 70s. Stock and Watson (2002) analyzed the time series of 124 macro variables for the US since 1960 and found that the decline in aggregate volatility since 1984 is persistent. To understand the volatility in the economy, volatility of growth rates of sales at the firm level can be analyzed as well. Comin and Mulani (2004) uses data for the US to find that while the growth rate of aggregate sales has become more stable, the growth rate of sales at the firm level has become more volatile. They also show that both the aggregate and firm-level volatility of sales are pro-cyclical, although the correlation between aggregate volatility and output take place with a longer lag than that for firm-level volatility.

For New Zealand, the questions of interest are: Do different product mixes affect the profitability of firms? Does the product mix of a firm affect the volatility of its earnings? If so, does this affect the volatility of the economy as a whole? Are certain products a recipe for success? Should firms be encouraged to move into "successful" types of products to improve the performance of the New Zealand economy?

These questions are beyond the scope of this paper, but as a first pass, we present some summary statistics that link the volatility of sales and value added of firms whether they are single/multiple product/industry/sector producers, whether they are new/continuing/exiting firms and how they are altering their product mix.

Table 10 shows OLS regressions of the ratio of value added and sales relative to all firms in the sample on certain firm-product and firm characteristics such as relative size and tenure as well as on a dummy indicating whether the firm is a single or multiple product exporters. Product fixed effects are included. The results show that both value added and sales are higher for larger and older firms. Products that are smaller and newer are likely to have larger value added but smaller sales.

Table 11 shows that on average, the standard deviations of sales and value added are higher for multiple product firms. We can speculate that single product firms are more stable and less likely to face fluctuations, thus their decision to specialize in exporting a single good. The last two parts of the table show these variables according to the *Status* variable which is equal to 1 if it is a new firm, 2 if it is an exiting firm and 3 if it is a continuing firm and *Extensive* variable which is equal to 1 if it is an added product, 2 if it is a dropped product and 3 if it is a continuing product. Continuing firms and product are the most volatile in terms of sales and value added.

6. Conclusion

How resources are allocated to their most efficient use is an important concern in economics. Almost all of the empirical research on this topic concentrates on entry and exit of firms. This paper suggests that looking at the relative importance of added and dropped products is also important. Using a unique dataset that covers products at 10 digit codes for all exporting firms in New Zealand from 1997 to 2007, the patterns of

their product mix, how it changes over time and how this relates to firm characteristics are analyzed.

We find that there is something unique about firms that produce single products and this is likely to be a conscious decision. It is also shown that dropping products is more likely to happen than adding products, suggesting the difficulty of entering new markets/products. The results make a good case for product-firm characteristics being an important part of export decisions and suggest that more work should be done on this link.

Table 1: Example of Chapters in Sections

Section: Base Metals and Articles of Base Metal			
Chapter	***Description***	***Freq.***	***Percent***
72	Iron and steel	19,600	11
73	Articles of iron or steel	68,700	38
74	Copper and articles thereof	8,900	5
75	Nickel and articles thereof	40	0
76	Aluminium and articles thereof	27,000	15
78	Lead and articles thereof	1,200	1
79	Zinc and articles thereof	840	0
80	Tin and articles thereof	380	0
81	Other base metals, cermets	170	0
82	Tools, implements, cutlery, spoons and forks, of base metal, parts thereof of base metal	33,400	18
83	Miscellaneous articles of base metal	22,500	12
	Total	182,900	100

Table 2: Products per Industry and Product Characteristics

Sector	**Product**	**%**	**Industry**	**%**
1	800	8	6	6
2	520	5	9	9
3	80	1	0	0
4	680	7	9	9
5	180	2	3	3
6	1000	10	12	13
7	500	5	3	3
8	130	1	3	3
9	220	2	3	3
10	340	3	3	3
11	1400	14	15	16
12	290	3	3	3
13	330	3	3	3
14	80	1	0	0
15	1300	13	9	9
16	1600	16	0	0
17	280	3	3	3
18	270	3	3	3
19	45	0	3	3
20	330	3	3	3
21	9	0	3	3

Note: Table reports the number of 2 digit industries and 10 digit product codes within each 1 digit sector. Numbers rounded for confidentiality reasons.

Table 3: Prevalence of Firms producing Multiple Products, Industries and Sectors

Type of Firm	Number of Firms	Percentage of Firms
Single Product	6669	28
Multiple Product	17406	72
Multiple Industry	14520	60
Multiple Sector	13266	55

Note: Breakdown of firms according to whether they produce multiple products or in multiple sectors or industries. Pooled sample. Numbers rounded for confidentiality reasons.

Table 4A: Mean Percentage Differences Between Single and Multiple Product Attributes

	(1) lsales	(2) lempl	(3) lwages	(4) lva	(5) lprod	(6) lfob
product2	1.923	1.725	1.915	1.904	-0.032	-0.200
	(205.56)**	(180.77)**	(184.08)**	(188.91)**	(4.55)**	(26.97)**
Observations	1153575	1105435	1069175	1053830	968660	2077275
Product FE	9350	9295	9235	9250	9085	10305
R-squared	0.04	0.03	0.03	0.03	0.00	0.00
product4	2.062	1.451	1.710	2.003	0.400	
	(1228.26)**	(187.28)**	(948.22)**	(1033.43)**	(1240.11)**	
Observations	1153575	1105435	1069175	1053830	968660	
Product FE	9350	9295	9235	9250	9085	
R-squared	0.03	0.01	0.01	0.02	0.00	
product10	2.697	1.818	2.205	2.596	0.486	-0.250
	(109.41)**	(69.36)**	(72.23)**	(95.26)**	(23.67)**	(13.03)**
Observations	1153575	1105435	1069175	1053830	968660	2077275
Product FE	9350	9295	9235	9250	9085	10305
R-squared	0.01	0.00	0.00	0.01	0.00	0.00

Note: Table summarizes differences in firm characteristics according to choice of product mix. Product 2 is equal to 1 if the firm exports in multiple sectors, product 4 is equal to 1 if the firm exports in multiple industries and Product 10 is equal to 1 if the firm exports in multiple products. All regressions are OLS and include product fixed effects. Number of observations rounded to nearest five for confidentiality reasons.

Table 4B

	(1) lsales	(2) lempl	(3) lwages	(4) lva	(5) lprod	(6) lfob
product2	2.024	1.809	2.009	1.992	-0.013	-0.539
	(205.53)**	(180.94)**	(183.12)**	(188.31)**	(1.85)	(66.02)**
Constant	14.383	1.944	12.479	13.187	11.617	9.225
	(1493.94)**	(198.47)**	(1159.03)**	(1273.05)**	(1651.81)**	(1156.58)**
Observations	1153580	1105435	1069175	1053830	968660	2077275
Number of hs2_indicative	95	95	100	95	95	95
R-squared	0.04	0.03	0.03	0.03	0.00	0.00
product4	2.197	1.530	1.811	2.123	0.465	-0.591
	(176.67)**	(119.45)**	(126.86)**	(157.02)**	(49.58)**	(58.28)**
Constant	14.184	2.190	12.646	13.030	11.148	9.285
	(1157.40)**	(173.14)**	(896.20)**	(976.72)**	(1201.27)**	(928.42)**
Observations	1153580	1105435	1069175	1053830	968660	2077275
Number of hs2_indicative	95	95	100	95	95	95
R-squared	0.03	0.01	0.01	0.02	0.00	0.00
product10	3.042	2.014	2.471	2.907	0.577	-0.498
	(114.97)**	(72.41)**	(75.51)**	(99.49)**	(26.74)**	(23.12)**
Constant	13.297	1.679	11.956	12.208	11.029	9.204
	(503.99)**	(60.51)**	(366.02)**	(418.83)**	(511.86)**	(428.82)**
Observations	1153580	1105435	1069175	1053830	968660	2077275
Number of hs2_indicative	95	95	100	95	95	95
R-squared	0.01	0.00	0.01	0.01	0.00	0.00

Note: Industry fixed effects are used. Number of observations rounded to nearest five for confidentiality reasons.

Table 5a: Decomposition of Value of Exports

Products	No of Observations	Change in Value of Exports
growing	865100	5.22E+08
shrinking	648200	-6.87E+08

Note: Table reports aggregate change in the value of exports for products that are not added or dropped, i.e., continuing, whether they are growing or shrinking products.

Table 5: Decomposition of Aggregate Value of Exports

Date	Aggregate Growth	New Firms	Continuing Firms	Exiting Firms	Added Product	Cont	Dropped
199606	6.E+08	-4.E+06	6.E+08	4.E+05	-5.E+08	1.E+09	1.E+07
199609	-6.E+08	-5.E+06	-6.E+08	-1.E+06	3.E+07	-6.E+08	2.E+07
199612	8.E+07	-8.E+06	9.E+07	-3.E+05	2.E+07	5.E+07	-1.E+07
199703	-1.E+08	9.E+06	-1.E+08	6.E+06	-9.E+07	-3.E+07	-8.E+06
199706	8.E+08	3.E+06	8.E+08	-4.E+06	3.E+07	7.E+08	6.E+07
199709	-4.E+08	3.E+08	-7.E+08	3.E+07	4.E+08	-8.E+08	1.E+08
199712	4.E+08	-2.E+08	7.E+08	1.E+07	-3.E+08	7.E+08	-4.E+07
199803	-2.E+07	-5.E+07	4.E+07	-4.E+07	-6.E+07	4.E+07	-5.E+07
199806	4.E+08	2.E+06	4.E+08	-2.E+06	-4.E+07	4.E+08	-3.E+07
199809	-4.E+08	-1.E+07	-4.E+08	1.E+07	-2.E+07	-4.E+08	-2.E+07
199812	2.E+08	2.E+06	2.E+08	-3.E+06	-2.E+07	2.E+08	1.E+06
199903	-8.E+07	1.E+08	-2.E+08	-4.E+06	1.E+08	-2.E+08	-3.E+07
199906	3.E+08	-1.E+08	4.E+08	1.E+07	-9.E+07	3.E+08	3.E+07
199909	-4.E+07	1.E+07	-4.E+07	-1.E+07	-7.E+06	-4.E+07	-4.E+06
199912	3.E+08	4.E+07	2.E+08	4.E+06	4.E+07	2.E+08	1.E+07
200003	3.E+08	-5.E+07	3.E+08	-5.E+06	-6.E+07	4.E+08	-3.E+07
200006	9.E+08	1.E+07	7.E+08	2.E+08	4.E+07	7.E+08	2.E+08
200009	-2.E+08	-1.E+07	-1.E+08	-1.E+08	2.E+07	-1.E+08	-1.E+08
200012	1.E+09	1.E+08	9.E+08	2.E+06	1.E+08	9.E+08	-1.E+07
200103	-3.E+08	-1.E+08	-2.E+08	9.E+06	-1.E+08	-1.E+08	-2.E+07
200106	1.E+09	-3.E+06	1.E+09	-2.E+07	3.E+07	1.E+09	3.E+07
200109	-9.E+08	1.E+07	-9.E+08	-9.E+05	-1.E+07	-9.E+08	-1.E+07
200112	-4.E+07	4.E+07	-1.E+08	6.E+07	5.E+07	-1.E+08	3.E+07
200203	-1.E+08	-4.E+07	-5.E+07	-5.E+07	-3.E+07	-5.E+07	-5.E+07
200206	6.E+08	-2.E+07	7.E+08	-3.E+06	7.E+06	6.E+08	6.E+07
200209	-1.E+09	5.E+04	-1.E+09	-2.E+07	-3.E+07	-1.E+09	-7.E+07
200212	7.E+06	-8.E+06	1.E+07	5.E+06	-4.E+07	5.E+07	-4.E+06
200303	-2.E+08	4.E+06	-2.E+08	-3.E+06	6.E+06	-2.E+08	-4.E+05
200306	4.E+08	1.E+07	3.E+08	2.E+07	9.E+07	2.E+08	5.E+07
200309	-8.E+08	4.E+06	-8.E+08	-6.E+06	-3.E+07	-8.E+08	-4.E+07
200312	3.E+08	-5.E+06	4.E+08	-7.E+06	-6.E+07	4.E+08	-2.E+07
200403	3.E+08	6.E+04	3.E+08	2.E+07	2.E+07	3.E+08	3.E+07
200406	1.E+09	2.E+07	1.E+09	-6.E+06	7.E+07	1.E+09	6.E+07
200409	-2.E+09	-1.E+07	-2.E+09	-6.E+06	-2.E+07	-2.E+09	-5.E+07
200412	7.E+08	-2.E+07	7.E+08	6.E+06	-4.E+07	7.E+08	2.E+07
200503	-4.E+07	-1.E+06	-7.E+07	3.E+07	-2.E+07	-1.E+08	1.E+08
200506	6.E+08	1.E+07	6.E+08	-9.E+06	4.E+07	7.E+08	-7.E+07
200509	-1.E+09	-1.E+07	-1.E+09	-2.E+07	-2.E+07	-1.E+09	-1.E+07
200512	6.E+08	5.E+06	6.E+08	-1.E+06	-8.E+06	6.E+08	-3.E+06
200603	1.E+08	-1.E+07	1.E+08	2.E+06	3.E+07	7.E+07	-7.E+06
200606	2.E+09	-8.E+06	1.E+09	2.E+07	-2.E+07	1.E+09	7.E+07
200609	-1.E+09	9.E+06	-1.E+09	-3.E+06	-6.E+06	-1.E+09	6.E+07
200612	-5.E+07	-7.E+06	-6.E+07	1.E+07	-8.E+06	5.E+06	-5.E+07
200703	2.E+08	-3.E+06	2.E+08	-1.E+07	-1.E+07	2.E+08	3.E+07
200706	6.E+08	-3.E+06	3.E+08	3.E+08	2.E+06	-1.E+08	7.E+08
200712	-6.E+09	-2.E+06	-5.E+09		-3.E+07	-5.E+09	3.E+09

Table 6: Product Switching Behaviour

	All Firms	Multiple Product	Single Industry	Multiple Industry	Single Sector	Multiple Sector
Drop	0.402544	0.414694	0.243573	0.431992	0.306429	0.427872
Add	0.119386	0.122899	0.106684	0.125217	0.10183	0.117058
Neither	0.47807	0.462407	0.649743	0.442792	0.591741	0.45507

Note: Table reports average percent of firms that drop a product, add a product or do not alter their product mix at all according to their production behaviour.

Table 7: Product Switching Behaviour

	Single	Multiple
Drop	0.25056	0.02394
Add	0.25026	0.024623

Note: Table reports average percent of firms that drop a product or add a product, weighted by the value of their exports according to whether they are single or multiple product exporters.

Table 8: Changes in Firm Characteristics

	(1) lsales	(2) lempl	(3) lwages	(4) lprod	(5) lfob	(6) lva
dropped	-0.747	-0.732	-0.708	0.031	-1.235	-0.739
	(9.38)**	(9.12)**	(8.73)**	(1.00)	(22.25)**	(8.97)**
added	-0.787	-0.781	-0.787	-0.010	-0.998	-0.810
	(10.98)**	(9.80)**	(9.79)**	(0.31)	(17.29)**	(11.22)**
Constant	16.483	3.840	14.568	11.600	8.977	15.262
	(1018.82)**	(232.12)**	(891.88)**	(1841.60)**	(703.51)**	(921.89)**
Observations	1153575	1105435	1069175	968660	2077275	1053830
R-squared	0.02	0.02	0.02	0.00	0.04	0.02

Note: Table reports OLS regressions of log firm characteristics (sales, employment, wages, productivity, value of exports and value added) on a dummy indicating product switching behaviour. Standard errors are adjusted for clustering at the industry level, and regressions include industry fixed effects. Number of observations rounded to nearest five for confidentiality reasons.

Table 9: Firm-Product Drop OLS Regressions

	(1) drop	(2) drop	(3) drop
rel_prsize	-0.010	-0.008	-0.011
	(5.24)**	(3.62)**	(5.39)**
rel_tenure	-0.136	-0.101	-0.174
	(23.20)**	(13.61)**	(23.02)**
rel_fsize	-0.010	0.000	-0.011
	(8.17)**	(.)	(7.09)**
rel_age	-0.012	0.000	-0.008
	(3.79)**	(.)	(1.97)*
count10	-0.000	0.000	-0.000
	(0.49)	(.)	(2.53)*
Constant	0.931	0.911	0.958
	(76.86)**	(215.44)**	(160.72)**
Observations	11135	11135	11135
Number of hs2_indicative	90		
Number of ent		3325	
Number of hs10_indicative			3700
R-squared		0.03	0.09

Note: Table reports OLS regression results of dummy variable indicating a firm-product drop on firm-product and firm attributes. Attributes are relative to the whole sample of firms. Standard errors are clustered at the product level. Industry, firm and product fixed effects are used in different specifications. Count10 is the number of products, rel_prsize and rel_tenure are the relative firm-product size and tenure, and rel_fsize and rel_age are the relative firm size and age. Number of observations rounded to nearest five for confidentiality reasons.

Table 10

	(1) ratiova	(2) ratiosales
rel_prsize	-0.003	0.001
	(4.43)**	(3.57)**
rel_tenure	-0.015	0.000
	(6.01)**	(0.31)
rel_fsize	0.175	0.028
	(534.72)**	(297.07)**
rel_age	0.068	0.011
	(49.12)**	(28.65)**
product10	0.022	0.011
	(0.78)	(1.38)
Constant	-0.040	-0.003
	(1.40)	(0.43)
Observations	32085	32190
Number of hs10_indicative	4570	4575
R-squared		0.76

Note: Table reports OLS regression results of the ratio of the value added and sales of a firm to all firms on firm-product and firm attributes Standard errors are clustered at the product level. Product10 is a dummy variable equal to 1 if the firm is a multiple good exporter.

Table 11: Volatility of Firm Earnings

product10		**mean(sdva)**	**mean(sdsales)**
	0	205041	452514
	1	28700001	34500000
product4		**mean(sdva)**	**mean(sdsales)**
	0	1131747	1854099
	1	29200002	35199999
product2		**mean(sdva)**	**mean(sdsales)**
	0	1338351	2217573
	1	29600001	35600001
status		**mean(sdva)**	**mean(sdsales)**
	1	992115	2378454
	2	977655	1980420
	3	29299998	35300001
extensive		**mean(sdva)**	**mean(sdsales)**
	1	7365990	10700001
	2	5548371	9041664
	3	36200001	42999999

Note: Table reports means of the volatility of value added and sales of firms according to firm product choices. Variables defined in the text.

Figure 1: Average Share of the Largest Product

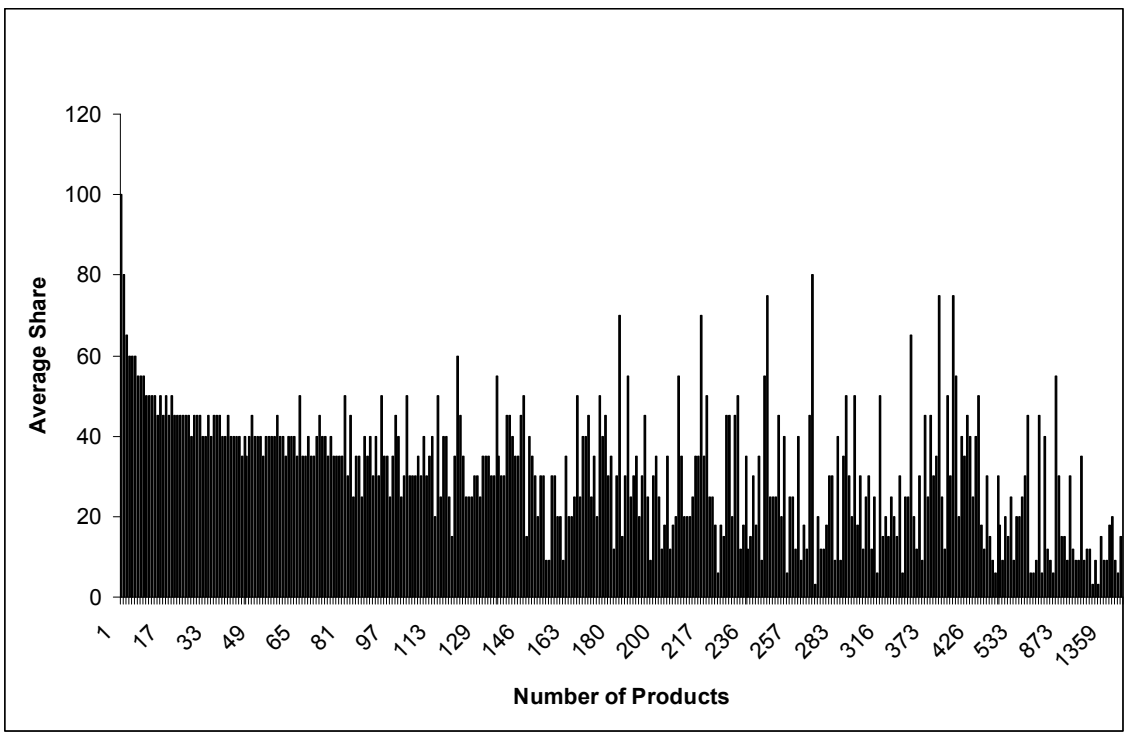

Table 2.01 – Integrated components of IBULDD

Component	Years	Description
The backbone of IBULDD		
Longitudinal Business Frame (LBF)	2000–2006	Contains longitudinally linked data for most enterprises operating in New Zealand. It includes information on employment, location, industrial activity, and firm ownership relationships. The LBF enables individual business units to be tracked over time.
Administrative data linked to the LBF		
Business Activity Indicator (BAI)	1992–2006	The BAI is a monthly series based on the supply of administrative data from Inland Revenue. The main source of this data is the GST (Goods and Services Tax) 101 form. GST is a tax based on the sale of goods and services.
Financial accounts (IR 10)	2000–2006	The Accounts information form (IR 10) collects a general summary of information relating to the business and its operations (profit and loss statement and balance sheet). Inland Revenue supplies IR 10 data to Statistics NZ where it is transformed and linked to IBULDD.
Company tax returns (IR 4)	2000–2006	The IR 4 income tax return is compulsory for businesses that are registered as companies. It includes income, tax calculation, refunds and/or transfers, provisional tax, and disclosures. IR 4 data is supplied to Statistics NZ by Inland Revenue and is then linked to IBULDD.
Linked Employer-Employee Database (LEED)	2000–2006	A Statistics NZ integrated database that provides an insight into the operation of New Zealand's labour market, such as job and worker flows. Created by linking a longitudinal employer series from the Business Frame to a longitudinal series of Employer Monthly Schedule (EMS) payroll data from Inland Revenue.
Overseas Merchandise Trade data	1988–2007	A monthly series based on administrative data supplied by the New Zealand Customs Service. It provides information on the importing and exporting of merchandise goods between New Zealand and other countries.
Government assistance data	2000–2006	Provides information on the assistance provided directly to businesses by the Foundation for Research, Science and Technology, New Zealand Trade and Enterprise, and Te Puni Kōkiri.
Survey data linked to the LBF		
Annual Enterprise Survey (AES)	2000–2006	Provides annual financial performance and financial position information about industry groups operating within New Zealand. AES is the basis of the national accounts (produced by Statistics NZ).
Business Operations Survey (BOS)	2005–2006	Collects measures of business performance and a range of practices and behaviours which may have some impact on that performance, including innovation and business use of information and communication technology.
Innovation Survey	2003	Collected information on the characteristics of innovation in New Zealand private-sector businesses.
Research & Development Survey (R&D)	Biennially 1996–2006	Collects information on business, government and higher education (university) spending on R&D.
Business Practices Survey (BPS)	2001	Collected information on business and management practices.
Business Finance Survey (BFS)	2004	Collected information on the capital structure of businesses in New Zealand, the sources of finance they use and their recent financing experiences.

Source: Potential Outputs from the Longitudinal Business Database

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