

## Living on the edge: An anatomy of New Zealand's most productive firms

February 2021

The Government has asked the Productivity Commission to undertake an inquiry into maximising the economic contribution of New Zealand's most productive "frontier" firms. For this inquiry the Commission contracted Richard Fabling, an independent researcher, to identify the key characteristics of New Zealand's frontier firms: *Living on the edge: An anatomy of New Zealand's most productive firms*.

### Defining frontier firms

The paper uses a novel definition of frontier firms that is less reliant on a specific production function or industry comparator group. It is instead a composite measure based on four different approaches to estimating multifactor productivity (MFP), whereby a firm is defined as belonging to the frontier if it is in the top decile in at least three measures.

### Key characteristics of frontier firms

Fabling investigates the characteristics and performance of New Zealand's frontier firms from 2005 to 2018, using the rich microdata in the Longitudinal Business Database (LBD). This paper draws on the labour-input, output and productivity statistics on individual firms available in the LBD (Fabling and Mare 2019).

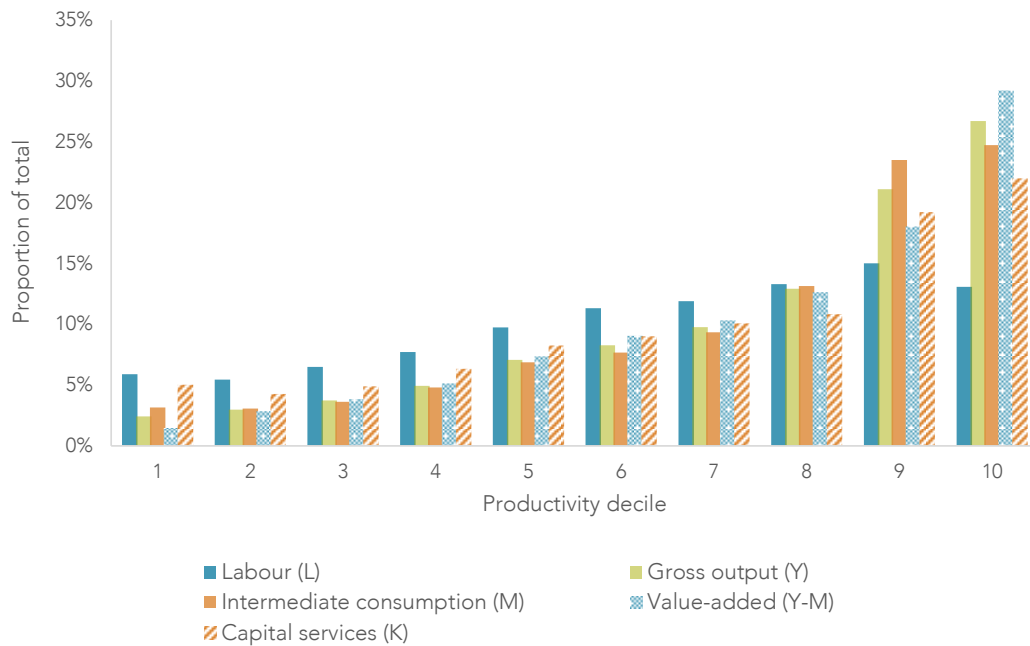
### Frontier firms are disproportionately important in the economy

Fabling found that frontier firms:

- are disproportionately important in the economy - while constituting only 8% of firms, frontier firms account for 13% of total labour input, 27% of aggregate gross output, 29% of value added (gross output minus intermediate consumption) and 22% of aggregate capital services (See Figure 1);
- have much higher levels of labour productivity than non-frontier firms. On average, frontier firms' value added per worker is almost double that of the second most productive group of firms (those in the second decile) and is nine times as productive as those firms in the bottom 10% of the productivity distribution, ranked by MFP (See Figure 2);
- have had low labour productivity growth over the period, yet the combination of their high productivity levels and input share has meant that they have made a significant contribution to aggregate productivity growth since 2005. If, for example, frontier firms had experienced no increase in labour productivity or in labour inputs over the period, the annual growth rate in labour productivity would have fallen from 0.83% to 0.59%; and

- are marginally younger, employ more skilled workers and pay a higher firm wage premium than non-frontier firms. They are also more likely to be in most major urban areas such as Auckland.

**Figure 1 Distribution of selected totals across MFP 'deciles', 2005-18**

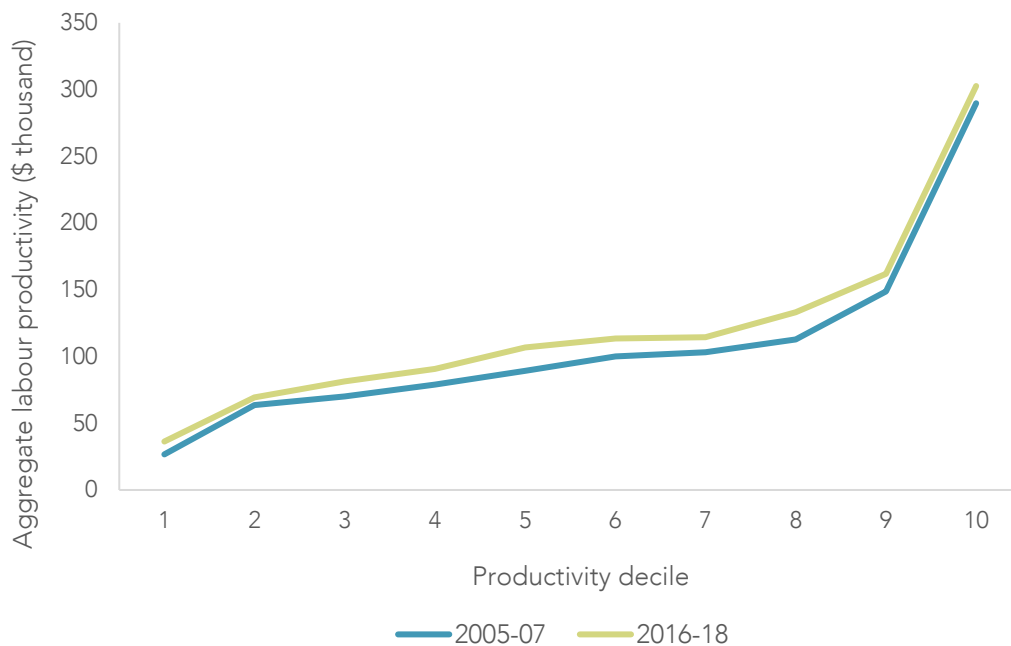


Source: Fabling (2021)

Notes:

1. The Figure 1 shows, for example, how the total number of workers (L) are distributed across the deciles. The number of workers in, say, the 8th decile is the number who work for firms in the 8th decile.
2. Frontier firms (the ones in "decile" 10) are those meeting a frontier threshold on three out of four measures of MFP. Frontier firms are around 8% of all firms.

**Figure 2 Labour productivity by MFP decile, 2005-07 and 2016-18**



Source: Fabling (2021)

Notes:

1. Labour productivity is measured by total value added divided by total number of workers in each decile, thus giving larger firms a bigger weight than smaller firms. The vertical distance from the blue line up to the green line indicates the growth in labour productivity between the midpoints of the two periods.
2. Frontier firms (in "decile" 10) are those meeting a frontier threshold on three out of four measures of MFP. Frontier firms are around 8% of all firms.

## Frontier firms are different in size and capital intensity

Fabling uses data from the Business Operations Survey (BOS) to identify several other key characteristics. Based on average measures, he found that there are significant differences between frontier and non-frontier firms in firm size and capital intensity. On average, frontier firms are more likely to:

- be exporters and have high export intensity. Among those firms that export, frontier firms are significantly more likely to enter new export markets. They are also more likely to be foreign owned and to have foreign-ownership stakes in overseas ventures (outward direct investment);
- report that their core equipment is up to date in terms of the best commonly available technology;
- report that they have no competitors, which could reflect their ability to produce differentiated products;
- report better human-resource management practices than non-frontier firms; and
- have ultrafast broadband.

## Frontier firms spend more on research and development

The propensity to undertake research and development (R&D) is not significantly different between frontier and non-frontier firms. Yet among those firms that invest in R&D, the average share of total expenditure spent on R&D is higher in frontier firms.

Frontier firms are less likely than non-frontier firms to spend on product design, but when they do, they spend more (on average), and also on marketing and market research.

## Frontier firms have higher foreign ownership and value added per worker

Some key characteristics of frontier firms in New Zealand are detailed in Table 1.

Table 1 Characteristics of frontier and non-frontier firms, LBD and BOS data (average 2005-18)

Firm type	Firm age (years)	Capital intensity (\$ of capital services per worker)	Exporter (% of total firms)	Exports (% share of sales)	Foreign ownership (% of total firms)	Firm size (number of workers)	Value added per worker (\$)
Frontier firms	11.8	58 980	17.5	8.4	13.7	24.1	282 635
Non-frontier firms	12.3	31 481	16.3	6.4	6.4	13.8	103 041

Source: Fabling (2021)

Notes:

1. Frontier firms are defined as the top firms in the MFP distribution by industry based on meeting three out of four criteria. In the sample, frontier firms numbered 81 288 and non-frontier firms 943 254.
2. Firm and employee counts are randomly rounded according to the confidentiality rules from Stats NZ.
3. Capital intensity, also called the capital-labour ratio, is defined as the flow of capital services available per year per worker.



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