PRODUCTIVITY DISTRIBUTION AND DRIVERS OF PRODUCTIVITY GROWTH IN THE CONSTRUCTION INDUSTRY

This Executive Summary outlines the main findings of a Working Paper published by Motu Economic and Public Policy Research.

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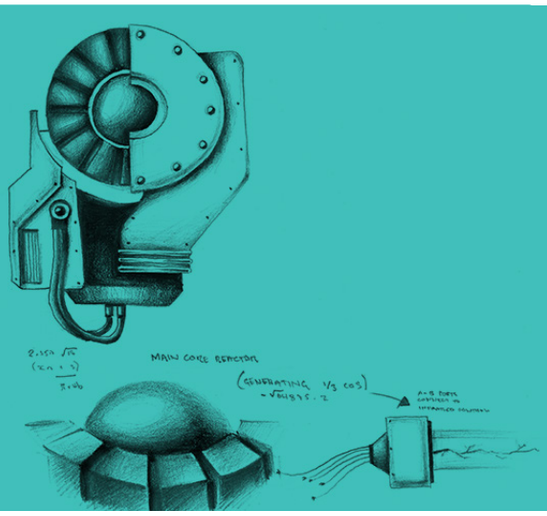

INTRODUCTION

Productivity
has risen. Thank entry and
reallocation.

The construction industry contributes a large and growing share of the New Zealand economy, with total employment rising to almost 10% and value added (GDP contribution) rising to about 9% by 2012. While aggregate statistics have raised some concerns about poor construction productivity, the New Zealand construction industry is not an underperformer when looked at through the lens of individual firms.

Using firm-level data, this study finds that over the period 2001–2012, labour productivity of the average firm in the construction industry grew by 1.7 percent annually and MFP by 0.5 percent annually, compared with 0.5 and 0.1 percent annually respectively for the overall measured sector.

Within the construction industry, productivity growth rates vary markedly by sub-industry and other firm characteristics. Labour productivity is more widely dispersed than is MFP. High-productivity firms tend to be younger, more likely to be a new start-up, to belong to a business group, and to locate in Auckland than low-productivity firms. Working-proprietor-only firms are slightly less productive on average than employing firms, while displaying more productivity dispersion (both more high productivity firms and more low productivity firms).

METHODOLOGY

Quantifying what makes the difference between firms and measuring productivity isn't easy. This study measured productivity by looking at the differences between specific sub-industries within construction right down to the individual firm level and accounting for other types of input beyond labour and capital. This is only possible with the sort of data found in the Longitudinal Business Database (LBD).

Weak productivity growth in construction has been a concern for some time. What we found, however, was that many individual construction firms—particularly new entrants—exhibit healthy productivity levels.

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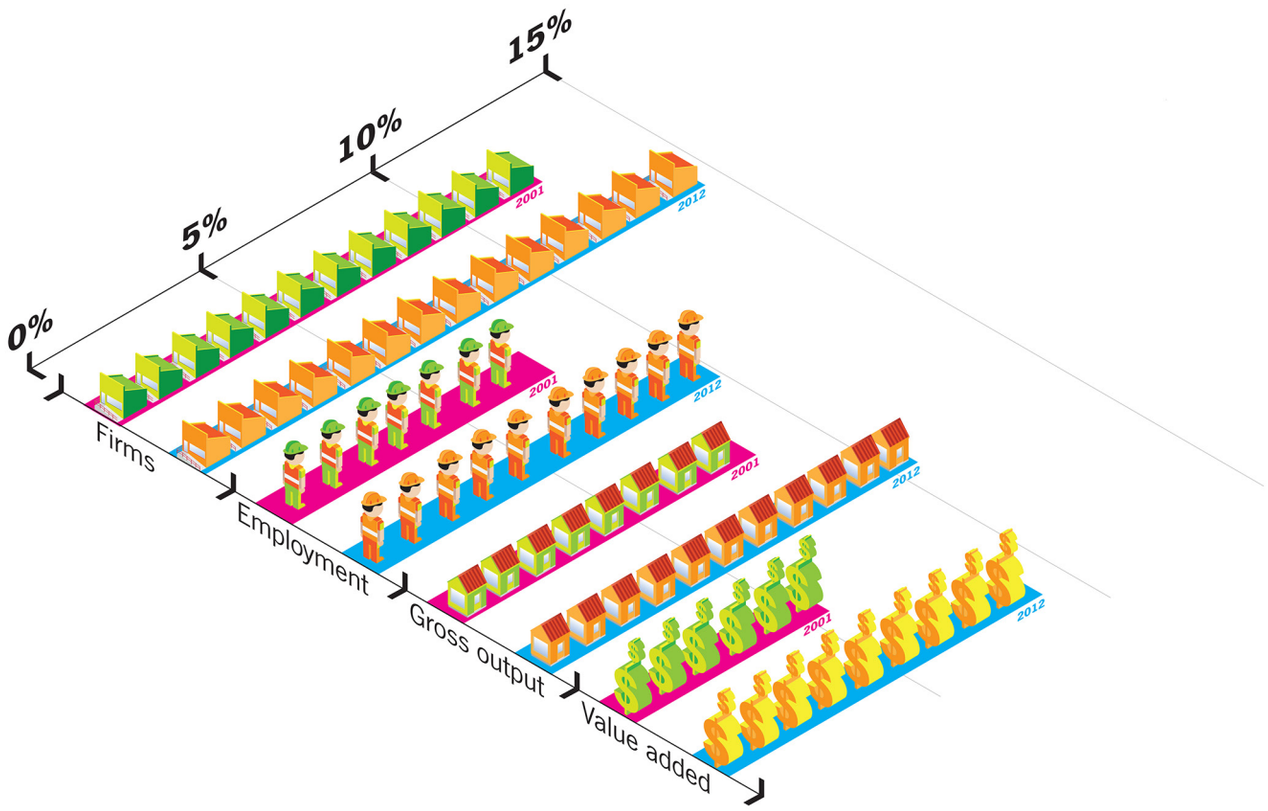
The LBD is a linked longitudinal database that contains tax- and survey-based financial data, merchandise and services trade data, a variety of sample surveys on business practices and outcomes, and government programme participation lists (Fabling, 2009), providing comprehensive information on firms' demographic characteristics, business activity and performance.

Figure 1: Construction Industry as Percentage of Measured Business Sector



The research looked at approximately 2.3 million yearly observations of 487,000 firms, including 358,000 observations of 78,000 construction firms in the LBD across the twelve years that were examined.

Comparison of the output of these firms with the industry aggregates constructed by Statistics New Zealand suggests that about 40% of industry gross output comes from firms we are not including. By definition, it is difficult to know what is going on at the firms for which we do not have data. But it would be worthwhile to bring together Statistics New Zealand's modelling of the industry aggregates with these analyses of individual firms, to see if more can be understood about the relationship between micro performance and aggregate statistics.

The study uses an econometric multi-factor productivity approach, which measures productivity via estimating the parameters of a production function. This means that instead of using revenue to compare across industries the researchers analyse rates of growth that are not accounted for by observed labour, capital, intermediate inputs, or revenue factors within the industry in question. Using the production function approach allows comparisons between different firms while providing micro-level patterns that elucidate change.

Acknowledgements

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This approach differs from all previous productivity research into the construction industry in New Zealand and is an international first in studies of this kind.

INITIAL RESULTS

Across the measured sector there was an increase of 2.1 percent in the number of economically active firms, from 476,000 in 2001 to 485,000 in 2012. During this time, the number of construction firms increased by 15 percent (from 54,000 to 62,000). This proportional increase is greater than for other services (7.4 percent), and is only lower than in the utilities industry (18 percent).

In terms of size, construction firms tend to be relatively small, with around three workers on average compared with the overall measured sector average of over five. The only smaller industry is primary, while manufacturing and utilities have much larger firms on average. Within construction, the upper quartile of employment is lower than the mean, indicating that a few large firms account for most of the employment in this industry.

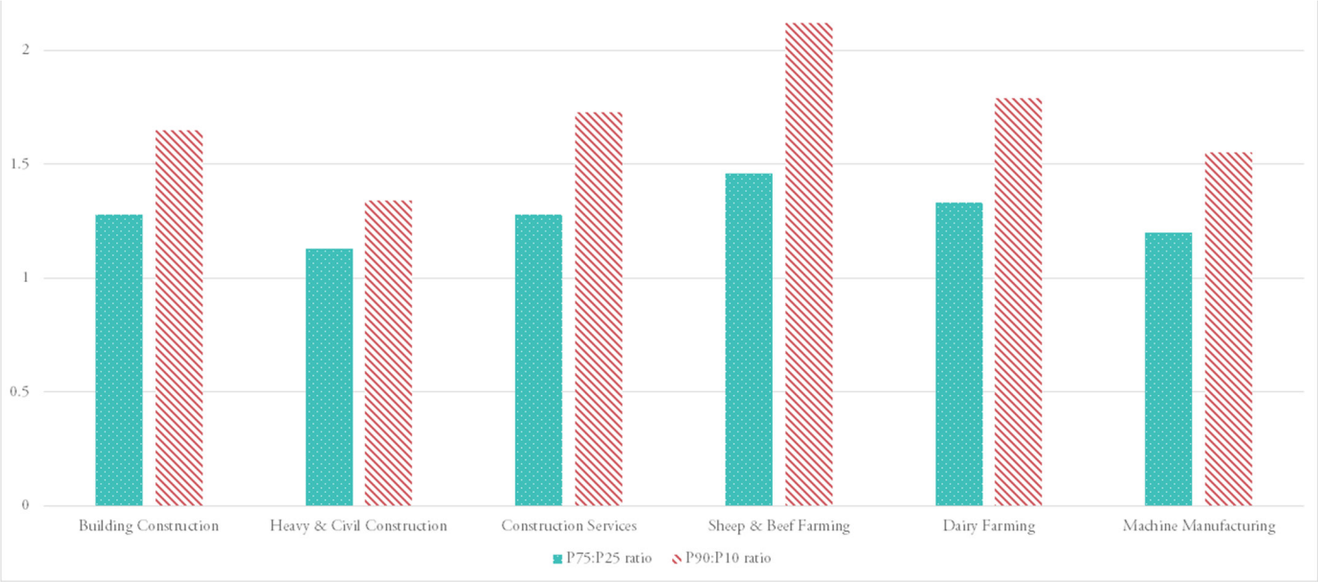
Construction has a high (71 percent in 2012) percentage of working-proprietor-only firms (i.e., those with no employees other than the proprietors).

COMPARISON WITH OTHER INDUSTRIES

Labour productivity in construction firms tends to be lower than in other industries, likely due to lower average skill and lower capital intensity in construction compared to other industries. There is also significant dispersion in labour productivity, meaning that firms with the same number of workers vary widely in their "value added" (revenue minus cost of inputs other than labour and capital). For example, in 2012 the firm at the 75th percentile of labour productivity distribution for construction had 2.2 times the value-added output per worker as the 25th percentile firm.

Interestingly, this ratio is actually smaller in the construction sector than in other industries, e.g. the corresponding ratio is 5.4 for manufacturing and 3.7 for primary. There is therefore no evidence to support a conjecture that relatively poor average productivity performance in construction is due to a greater proportion of firms that significantly lag behind the best performers. Indeed, while construction has similar lower quartile labour productivity to that of most other industries, its median and upper quartile are much lower. This means that the lower overall average labour productivity in construction is associated with a relative absence of star performers, rather than with an over-abundance of productivity underperformers.

Figure 2: Multi-Factor Productivity across Different Firm Types



In making these comparisons, it is assumed that the many different input and outputs in different industries can be put on a comparable basis by measuring everything in dollar values. This is only approximately true, so that all cross-industry productivity comparisons should be taken with a grain of salt.

To allow for the possibility that production technology varies across industries, the production function is estimated separately for building construction, heavy and civil engineering construction, construction services, sheep and beef farming, dairy cattle farming, and machinery and other equipment manufacturing.

Among the six industries examined, the construction and manufacturing industries are relatively more labour intensive, while the agricultural industries are relatively more capital intensive. Returns to scale are more or less constant. MFP dispersion is widest in 'Sheep and beef farming ', where the 90th percentile firm is 2.1 times as productive as the 10th percentile firm.

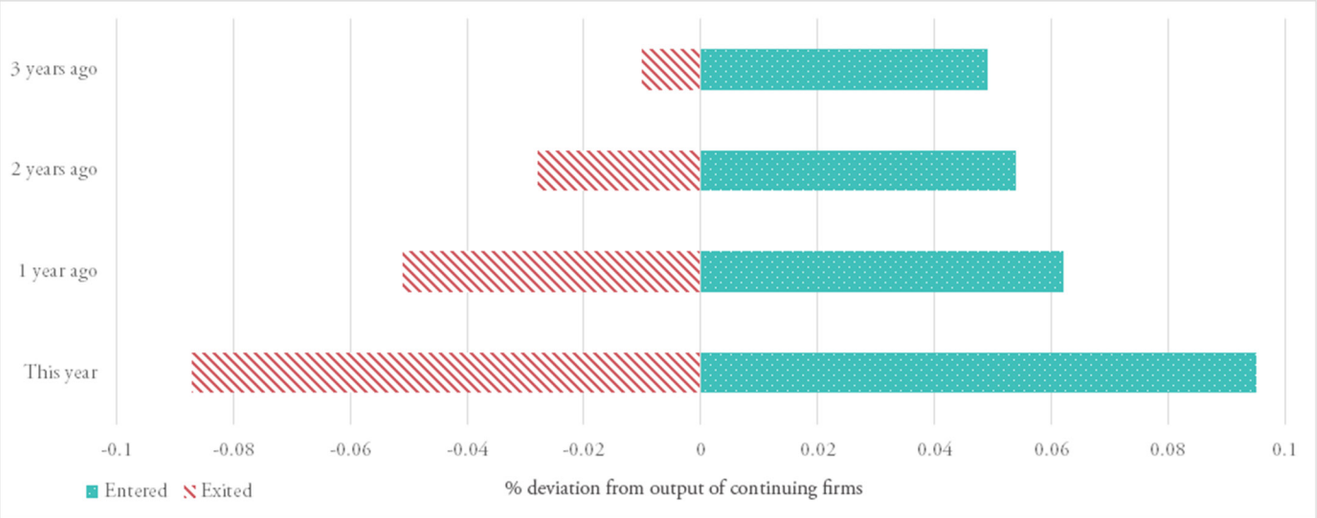
CHARACTERISTICS OF PRODUCTIVE FIRMS

Several firm characteristics are strongly linked to labour productivity, which is

- Higher in entrants than continuing firms.
- Negatively correlated with firm's age in the construction industries and 'machinery and other equipment manufacturing'.
- 19–36 percent higher for firms that contract out (due to lower labour input).
- Significantly lower in firms that have no employees other than the working proprietors.
- 0–41 percent higher for firms that belong to business groups than firms that do not.
- Higher for firms located in Auckland.

Age, entry status, Auckland location and employing status also have similar associations with MFP. However, business group membership and contracting status are less strongly linked to MFP than to labour productivity. Interestingly, exiters have lower MFP in the construction and manufacturing industries. It is, however, important to remember that these correlations do not establish causality. For example we cannot say that if a firm starts contracting out it will become more productive as a result.

Figure 3: Dispersion of Output of Firms Entering and Exiting the Sector Compared to Continuing Firms



The findings that new entrants are the most productive and that age is negatively correlated to productivity are surprising. It seems that, on average, new firms either have new, productive ideas, or their proprietors work extra hard initially. Since we cannot capture the effects of innovation or effort in our explicit input measures, their effect on measured output would, instead, be captured as an increase in average productivity for newer firms.

TURNOVER

The majority of construction firms are continuers, accounting for 73–80 percent of firm counts and even a larger share of gross output (77–91 percent). Entry and exit groups account for much smaller shares of gross output than their respective share in firm counts, suggesting that these firms are relatively less economically significant. Overall, there is more turnover (i.e. higher fractions of entrants and exiters) in the construction industry than in the measured sector, consistent with the common belief.

Coupled with strong growth due to firm reallocation (3.9 percent), MFP for this industry grew by 12 percent over 2001–2012. Overall, the largest positive contributors to MFP growth in the construction industry were growth within continuers and firm reallocation in 'construction services' and turnover in 'heavy and civil engineering construction', while the major drags were productivity slow-down by continuers in 'building construction' and 'heavy and civil engineering construction'.

DIFFERENCE IN FINDINGS

It is widely reported that the construction industry has poor productivity performance. For example, Statistics New Zealand figures from 2014 showed that over the period 1978–2012, labour productivity for this industry grew by 0.6 percent annually, compared with 1.5 percent for all goods-producing industries and 2.1 percent for the business sector.

Similar patterns were seen with respect to multi-factor productivity (MFP).

The discrepancies between our findings and macro data could be due to:

- The current study only including firms with production data, which represents only around 60 percent of the industry's total annual gross output (Fabling and Maré, 2015) and not making aggregate adjustments to improve coverage and accuracy of official data.
- This study using a firm-level econometric approach rather than an aggregate index number approach.
- This study ignoring productivity change due to between-industry reallocation.

The inconsistency between macro and micro productivity statistics has been documented in the international literature. This study does not attempt to reconcile these differences. Rather, it shows that, looking at firm-level data for those firms with usable production data, the New Zealand construction industry is not a productivity underperformer.

SUMMARY

Contrary to received wisdom, frequent firm turnover does not appear to be a drag on productivity, but rather is associated with productivity improvement. New firms are, on average, more productive than incombent firms while those that exit have lower productivity than those who remain. The largest positive contributors to MFP growth in the overall construction industry were growth within continuers and reallocation from low-productivity to high-productivity firms in 'construction services' and turnover in 'heavy and civil engineering construction', while the major drags were productivity slow-down by continuers in 'building construction' and 'heavy and civil engineering construction'.

As in other industries, there is a considerable gap within the industry between the productivity of the best and worst performing firms. This gap is largest for the large number of firms that have no workers other than a worker-proprietor. We find no evidence, however, that the 'problem' of a significant tail of low-performing firms is worse in construction than in other sectors. Indeed, although comparisons of this sort across very different industries are somewhat hard to interpret, the construction sector appears to have less dispersion than other large sectors.

The study raises a number of important new questions that we hope to address in future research. Understanding the dynamic process by which employees interact with firms, move between firms, and start new firms is key to the productivity challenge. Other questions include the effect of the cost of compliance and the impact of "phoenix" firms. Continued research on these topics will broaden the evidence base and help inform policymaking and discussion.