Productivity distributions in New Zealand:
The dangers of international comparison

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Abstract

Recent discussions of New Zealand's relative economic performance have drawn a link between firm-level productivity dispersion and a lack of competitive pressure. This note describes a simple example using New Zealand firm-level data which casts doubt on the assertion that New Zealand has a "long tail" of low productivity firms relative to other countries.

JEL code

Keywords

1 Introduction

Over the last 20 years, advances in the availability and analysis of business microdata across countries have generated a new set of stylised facts, some of which initially seem to be at odds with standard assumptions of competitive markets. In particular, firm-level productivity research "documents, virtually without exception, enormous and persistent measured productivity differences across producers, even within narrowly defined industries" (Syverson, 2011, p326).

More recently, comparisons have been drawn between productivity dispersion in New Zealand and that in other countries. One of these comparisons suggests that labour productivity in New Zealand is more widely dispersed than that in comparator countries. This finding has been used to argue that the New Zealand economy suffers from a lack of competitive pressure. However, international comparisons of this nature are inherently subject to a range of practical and conceptual difficulties. The analysis below describes a simple example using New Zealand firm-level data which casts doubt on the assertion that New Zealand has a relatively wide productivity distribution.

2 Analysis

Using data from Statistics New Zealand's Longitudinal Business Database (LBD), we generate measures of multi-factor productivity (MFP) dispersion for New Zealand manufacturing industries. These distributions are compared to those reported by Syverson (2011), citing Syverson (2004) for the United States. The comparison is very partial – we consider productivity dispersion at the level of the enterprise within 2-digit ANZSIC manufacturing industries, while Syverson uses

plant-level data for 4-digit SIC industries – but is indicative of the key point we wish to emphasize: benchmarking New Zealand against international comparators can only be valid if we are confident that the underlying data and methods of analysis are actually comparable.

A key difference between the LBD and most similar datasets internationally is the coverage of micro-enterprises. As the LBD is based on administrative data from Inland Revenue, it includes a large number of firms which fall beneath standard thresholds for survey data collections. In particular, the US Census of Manufactures classifies most plants with less than five employees as "administrative record" cases, and does not collect data on inputs. In contrast, the LBD includes many very small and even non-employing (working proprietor only) firms (Fabling & Maré (2015b), Fabling & Maré (2015a)). We show that this distinction is sufficient to generate an apparent difference between productivity dispersions in New Zealand and the United States.

Table 1 reports measures of productivity dispersion in 2010 for 2-digit manufacturing industries, based on the full population of firms with available productivity data in the LBD (MFP is mean zero within industry by construction). Taking the average dispersion across industries, this shows a difference in logged MFP within industries of 0.904, translating to an MFP gap of $\exp^{0.904} = 2.47$. That is, firms at the 90th percentile of their industry are, on average, around two and a half times as productive as those at the 10th percentile. A comparison of this figure with the 4-digit average of 1.92 reported in Syverson (2004) would indeed suggest that productivity dispersion in New Zealand is wider than that in the US.

However, a simple restriction to employing firms suggests a very different picture. Table 2 reports the same statistics, but excludes working proprietor only firms.[1]

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[1]Working proprietor only firms make up over 40 percent of the total firm population, but account for only four percent of measured labour input and one percent of aggregate gross output.

Table 1: MFP dispersion by industry, all firms pooled

	p10	p25	p75	p90	p90-p10	exp(p90-p10)
Food, Beverage and Tobacco	-0.389	-0.197	0.158	0.456	0.845	2.33
Textile, Clothing, Footwear and Leather Manufacturing	-0.497	-0.177	0.246	0.544	1.041	2.83
Wood and Paper Product Manufacturing	-0.373	-0.113	0.167	0.377	0.750	2.12
Printing, Publishing and Recorded Media	-0.451	-0.181	0.200	0.530	0.981	2.67
Petroleum, Coal, Chemical and Associated Product Manufacturing	-0.362	-0.139	0.192	0.426	0.788	2.20
Non-Metallic Mineral Product Manufacturing	-0.449	-0.139	0.244	0.496	0.945	2.57
Metal Product Manufacturing	-0.407	-0.151	0.181	0.485	0.892	2.44
Machinery and Equipment Manufacturing	-0.488	-0.185	0.218	0.534	1.023	2.78
Other Manufacturing	-0.425	-0.144	0.211	0.446	0.871	2.39
Average	-0.427	-0.158	0.202	0.477	0.904	2.47

Table 2: MFP dispersion by industry, employing firms only

	p10	p25	p75	p90	p90-p10	exp(p90-p10)
Food, Beverage and Tobacco	-0.322	-0.174	0.125	0.351	0.673	1.96
Textile, Clothing, Footwear and Leather Manufacturing	-0.266	-0.109	0.228	0.492	0.758	2.13
Wood and Paper Product Manufacturing	-0.185	-0.057	0.158	0.303	0.488	1.63
Printing, Publishing and Recorded Media	-0.270	-0.122	0.153	0.337	0.607	1.84
Petroleum, Coal, Chemical and Associated Product Manufacturing	-0.259	-0.107	0.159	0.344	0.603	1.83
Non-Metallic Mineral Product Manufacturing	-0.225	-0.091	0.201	0.389	0.614	1.85
Metal Product Manufacturing	-0.231	-0.106	0.117	0.281	0.512	1.67
Machinery and Equipment Manufacturing	-0.294	-0.122	0.151	0.344	0.638	1.89
Other Manufacturing	-0.228	-0.097	0.182	0.356	0.584	1.79
Average	-0.253	-0.109	0.164	0.355	0.609	1.84

This reduces the average MFP gap between the 90th and 10th percentiles to $\exp^{0.609} = 1.84$, slightly lower than the figure in Syverson (2004). This difference is due to the wide productivity dispersion apparent in working proprietor only firms. Figure 1 plots estimated MFP against total firm size (employees plus working proprietors) across four groups of firms. The first three panels cover all employing firms – the first panel focuses on firms with employees but no working proprietors, while the second and third panels show firms with both employees and working proprietors (separating according to whether the count of working proprietors is greater or less than the number of employees). The last panel restricts to firms whose only labour input is from working proprietors. Comparison of the working proprietor only firms with all groups of employing firms shows substantially more dispersion among the former group.

While some of the dispersion in MFP among working proprietors is likely to reflect real differences in performance across these firms, much of it is likely due to measurement error in both capital and labour inputs. On the labour side, the LBD only includes information about the number of working proprietors drawing income during the year, but does not have any information about the extent of labour input. As such, full-time working proprietors are attributed the same labour input as those providing minimal (or no) input. Similarly, other inputs are also more likely to be mismeasured for these firms. For example, the capital input of sole proprietors may include a specified proportion of their housing expenses, as mandated by Inland Revenue, as well as the physical capital associated with the business.
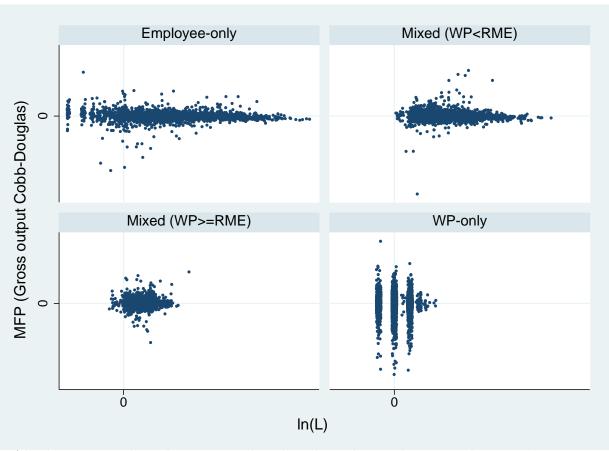
Figure 1: MFP dispersion and firm size

All observations have been jittered and outliers dropped in accordance with Statistics New Zealand confidentiality requirements. All four graphs are presented on the same scale.

3 Conclusion

The results reported above are in no way an attempt to provide an answer to the question of whether the productivity distribution in New Zealand is in fact wider than that in comparator countries. Nor should it be used to infer anything about the relative degree of competition across different manufacturing industries within New Zealand. Rather, it is intended simply as an example to show that a simple restriction on data coverage, made by default in many other jurisdictions, is sufficient to generate measures of productivity dispersion which fall on either side of potential comparator. International comparisons of this type need to be carefully evaluated, with regard to both comparability of the data and methods and the appropriateness of inference in different contexts.

References

Fabling, R. & Maré, D. (2015a). Addressing the absence of hours information in linked employer-employee data. Working Paper 15-17, Motu Economic and Public Policy Research.

Fabling, R. & Maré, D. (2015b). Production function estimation using New Zealand's Longitudinal Business Database. Working Paper 15-15, Motu Economic and Public Policy Research.

Syverson, C. (2004). Product substitutability and productivity dispersion. *The Review of Economics and Statistics, 86*(2), 534–550.

Syverson, C. (2011). What determines productivity? *Journal of Economic Literature, 49*(2), 326–365.

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