

CHAPTER 25

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**THE DISTRIBUTION OF  
PRODUCTIVITY IN IRISH  
MANUFACTURING, 1995-2003**

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**ABSTRACT**

At the root of productivity dynamics at the aggregate level are huge differences in productivity between plants in even narrowly defined sectors. This chapter provides a synthesis of the results of a study using relative distribution methods and transition matrices to describe the changes in labour productivity in Irish manufacturing industries from 1995 to 2003. While labour productivity may be a poor measure to compare performance across plants, at the industry level comparisons over time should still produce reasonably reliable results.

## 25.1 Introduction

At the root of productivity dynamics at the aggregate level are huge differences in productivity between plants in even narrowly defined sectors. The increasing availability of plant-level data sets has directed attention to this productivity ‘spread’, i.e., the difference between the best and the worst performing firms in an industry as well as to its causes and implications (e.g. Bartelsman and Doms (2000), Ahn (2001), Haskel and Martin (2002), Martin (2004)).

There are different perceptions as to whether one should be concerned about the productivity spread (Martin, 2004). First, the productivity spread is an expression of the co-existence of more and less successful firms in the competitive selection process in a market economy. Second, the presence of ‘a long tail of underperforming firms’ could indicate that the selection process is hampered and, therefore, resources are bound in an unproductive way in firms that do not exit. And third, any observed differences in productivity might be attributed to measurement problems. The last point applies in particular to labour productivity as a measure of productivity. That is, a plant that substitutes few higher skilled employees for more lower skilled employees will have higher measured labour productivity, but their contributions to welfare need not be any different.

For Ireland two studies have looked at productivity: Girma, Görg and Strobl (2004) compare the performance of purely domestic plants, domestic exporters and domestic multinationals using a non-parametric approach based on the principle of first order stochastic dominance. They find that the distributions for multinationals dominate those of domestic exporters and non-exporters. They do not find clear differences in plant performance between domestic exporters and non-exporters. Ruane and Ugur (2004) decompose labour productivity into the components attributable to surviving, entering and exiting domestic and foreign-owned plants. Their analysis shows that foreign-owned plants in Ireland contributed a substantial share to overall productivity growth between 1991 and 1999. Most of the productivity growth is generated within surviving plants. The process of entry and exit is also productivity enhancing except in some of the low-tech industries where substantial restructuring is evident.

This chapter provides a synthesis of the results of a study using relative distribution methods (Handcock and Morris, 1999) and transition matrices to describe the changes in labour productivity in Irish manufacturing industries from 1995 to 2003. While labour productivity may be a poor measure to compare performance across plants, at the industry level comparisons over time should still produce reasonably reliable results. The analysis is based on the data set of local units, which is collected as part of the annual Census of Industrial Production.<sup>1</sup>

## 25.2 Discussion of Results

As labour productivity is defined as the natural log of turnover per employee, Table 25.1 provides summary statistics of turnover per employee in ten broadly defined manufacturing sectors for 1995 and 2003. In 1993, plants in the food and tobacco, chemical, rubber, mineral and electrical and optical equipment sectors had on average higher levels of turnover per employee than the manufacturing sector as a whole. At the other end, textiles and clothing and leather stand out with a median level of turnover per employee well below average. There are large differences within and between sectors among the best and the worst performing plants. Turnover per employee of an average plant in manufacturing at the 90<sup>th</sup> percentile of

the distribution is 8.2 times higher than that of an average plant at the 10<sup>th</sup> percentile of the distribution. In food and tobacco this spread is twice as large, and also the chemical, mineral, electrical and optical equipment sectors plants at the 90<sup>th</sup> percentile have about ten times as much turnover per employee as plants at the 10<sup>th</sup> percentile.

By 2003 the median of turnover per employee has increased in all sectors. Those industries with a substantially higher median than the all manufacturing average are food and tobacco, chemicals and electrical and optical equipment. At the lower end are textiles, clothing and leather together with other manufacturing. On average productivity spreads have decreased between 1995 and 2003, although in a number of industries they have increased.<sup>2</sup> Obviously in Table 25.1 the presence of highly productive foreign-owned plants alleviates the differences between and within sectors. Both the median of turnover per employee as well as the productivity spreads are lower when only domestic plants are considered, but the ranking of sectors according to these criteria remains roughly the same.

**Table 25.1:** Turnover (€1,000) per Employee in Constant Prices (2000) Across Industries and Over Time

CSO Nace Code	Industry	Median	1995 p90/p10	Median	2003 p90/p10
15,16	Food & Tobacco	118.6	16.9	128.0	11.9
17-19	Textiles, Clothing & Leather	43.6	4.6	73.4	6.2
20	Wood	57.2	4.5	89.0	5.8
21-22	Paper, Printing & Publishing	60.3	4.9	87.0	3.9
24	Chemical	150.2	10.0	190.6	10.3
25	Rubber	78.2	5.0	98.4	4.1
26	Mineral	74.0	9.6	84.3	6.7
27,28	Basic Metal & Metal Products	58.8	4.2	80.5	4.9
29	Machinery	67.6	4.2	85.6	4.1
30-33	Electrical & Optical Equipment	73.1	9.7	119.0	9.6
34,35	Transport	66.2	4.8	86.8	5.8
36,37	Other Manufacturing	50.8	4.2	73.7	4.1
	<b>All Manufacturing</b>	<b>65.9</b>	<b>8.2</b>	<b>90.2</b>	<b>6.5</b>

When looking at the sectoral distributions of labour productivity in more detail another interesting observation emerges. In most sectors in Irish manufacturing the range of values labour productivity takes above the median is larger than below. That is, if anything, we observe a long thin tail of overperforming plants. However, it has to be borne in mind that this is relative to other plants in Ireland only.

The long thin tail of very productive plants is a particularly salient feature of the chemical and the optical and electrical equipment sectors. Both of them have a large share of foreign-owned plants. Yet even when the foreign-owned plants are excluded from the analysis, there is still a high incidence of very productive plants in these sectors albeit to a somewhat smaller extent. This suggests that the presence of foreign-owned firms in these sectors has strengthened the indigenous plants as well. The question to what extent this has been through technology or productivity spillovers or through increased competition has yet to be resolved (for a survey of the evidence on spillovers in Ireland see Görg, 2006).

In the textile, clothing and leather sectors substantial restructuring is visible. This is not surprising, given that the Multi Fibre Agreement that restricted market access for developing country producers of textiles and clothing to developed countries was finally phased out on 1<sup>st</sup> January 2005. A prominent Irish example that fell victim to this process was the 'Fruit of the Loom' plant in Donegal. By 2003, the ongoing restructuring had left the sector with on average higher labour productivity than in 1995, but also with a large share of poorly performing plants. That is, this is the one industry where one can in fact speak of a long tail of underperforming plants. Given that the implications of the end of the Multi Fibre Agreement did not hit seriously until 2005 when imports from developing countries soared, it is more than likely that continued restructuring, including the exit of inefficient plants has brought about further changes in the distribution of productivity in this sector.

The only sector that has seen hardly any changes at all from 1995 to 2003 is food and tobacco. In this sector, the plants at the lower end of the productivity distribution have increased their labour productivity marginally, whereas the high-productivity plants witnessed a decline in their levels of labour productivity. This may be attributable to the still fairly regulated and supported environment a lot these plants operate in which shields them from the common forces of competition.

Overall the increase in labour productivity over time together with the observed dynamics of plants within the productivity distribution indicates that the competitive selection process ensures a rather efficient reallocation of resources. When examining how plants move within the productivity distribution, it emerges that the increase in productivity over time must be largely due to a positive external environment together with relatively more entry of efficient plants and relatively more exit among the inefficient plants.

Evidence from transition matrices suggests that, after three years 30-50 per cent of plants are still in the same quintile, i.e., in the same position of the productivity distribution. Taking the full nine-year period, almost half of those plants that have not gone out of business by 2003 are still in the same quintile of the productivity distribution as they were in 1995. This holds in particular for plants at the very top of the distribution and even more so for plants at the lower end. This large degree of persistence suggests that a lot of plants manage to improve their productivity by just about enough to keep up with their competitors, but very few plants manage to strengthen their performance enough to move upwards in the productivity distribution. This raises questions about the effectiveness of grants to improve firm performance.

There is an additional caveat to the observed increase in productivity from 1995 to 2003. Comparing the productivity distributions in the two years under the assumption that the median shift had not happened reveals that there would have been a smaller share of plants at the very top of the distribution in 2003 than there was in 1995. This is true when looking at manufacturing as a whole as well as for several of the individual sectors, but not for those sectors that host a large share of foreign-owned plants. This is somewhat disconcerting, as it suggests that the plants in industrial production in Ireland in 2003 are not working as hard to achieve a productivity performance in the top range as they did nine years earlier. As the sectors with a large share of foreign-owned plants together with textiles are also the ones where also the indigenous plants are most export-oriented (Lane and Ruane, 2006: 36), one might even take this as an indication that the focus on the Irish market of plants in the remaining sectors has sheltered them from increasing international competition.

## Notes

- 1 The possibility for controlled access to this anonymised micro data set on the premises of the CSO is provided for in the Statistics Act 1993. Assistance with the data by George Hussey, CSO is most gratefully acknowledged. The chapter has been screened by the CSO to ensure that no confidential information is revealed.
- 2 Haskel and Martin (2002) document a small increase in the UK between 1980 and 2000.

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