

CHAPTER 23

EXPORTS AND PRODUCTIVITY

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ABSTRACT

This chapter investigates whether the best firms become exporters or whether a firm becomes better as a result of being an exporter. The evidence reviewed suggests that productivity growth in exporting firms generally occurs before rather than after the firm starts to export. It concludes that policy intervention to encourage exports is often useful, in particular where firms don't recognise the benefits of exporting, cannot find customers or when there are barriers to exporting. However the economic evidence presented in this chapter underpins a case for general rather than targeted intervention.

23.1 Introduction

Over the last decade there has been a dramatic increase in the amount of empirical research on the manner through which firms engage with global markets, either as exporters or through the establishment of production and sales facilities abroad. The fundamental insight of this literature has been that multinationals, exporting and non-exporting firms all co-exist in the same industry, but are marked by clear defining characteristics. Multinationals are more productive, larger, more innovative, more capital intensive, more skill intensive, and pay higher wages than exporters, who in turn, are on average ‘better’ than non-exporters.

A key question that follows from this positive association between the level of engagement in global markets and improved firm performance is the direction of causality. Does exporting or becoming a multinational help to raise productivity or not? Here we concentrate on the relationship between exports and productivity.

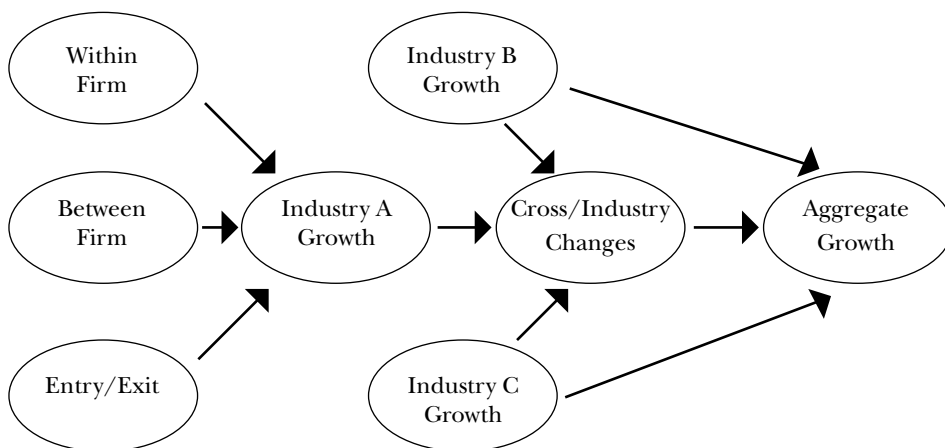
First, what constitutes the most important parts of aggregate productivity growth? Is it individual firms becoming more productive or the best firms getting bigger? In a similar manner, we establish some stylised facts about exporting. From this we then order the review of the empirical evidence to concentrate on the dominant forces of productivity growth. This process is helpful for indicating where policy might be best focused and what the value of that policy might be. Finally, we discuss a complication to the strong positive correlation between exports and productivity found at the aggregate level: the role that multinationals play in exports.

23.2 An Introduction to Productivity

Aggregate productivity is simple to describe: it is the sum of the individual productivity of all firms within the economy, where the contribution of any one firm is weighted by its relative size. Productivity growth is more complicated and depends not only on how productivity changes over time within the firm (within-firm changes), but also on how firms relative weight changes within and across industries in the overall index (between-firm changes) as well as the dynamic process of firms entering and leaving the industry (net-entry). It follows that to understand the impact of exporting on aggregate productivity we need to investigate its effect on the productivity of individual firms and the size of firms.

The process of aggregate productivity growth is summarised in Figure 23.1 below. Within-firm productivity changes combine with the changing relative size of firms (between firm effects) and the entry and exit of firms to give the rate of productivity growth within an industry. Within-firm productivity growth depends on improvements in efficiency and intensity with which inputs are used by firms, and depending on whether it is being measured as labour productivity (rather than total factor productivity), the contribution of physical capital investment.¹ Shifts in market shares (the between effect) and net entry will reflect resource reallocation and aggregate productivity trends and therefore competitive pressures within the market (both from domestic and from overseas firms) as well as technological progress in the industry. This same process occurs in other industries and in addition, there is reallocation of resources across industries (some industries grow while others decline) to give an economy-wide rate of productivity growth.

Figure 23.1: Aggregate Productivity and its Components



A sensible place to begin our understanding of the relationship between exports and productivity is to focus on the channels in Figure 23.1 that make up the major part of overall productivity growth. While there are many studies that might be useful here, Scarpetta et al. (2002) provides a set of cross-country comparisons measured on a consistent basis. We summarise the evidence for the manufacturing sector for various countries and time periods drawn from the paper in Table 23.1 below.

According to their estimates the within, between and net-entry components are all important. As can be seen in Table 23.1 the rate of productivity growth varies considerably across countries, from 1.6 per cent per annum in the US (1987-92) to 5.3 per cent in Portugal (1987-92). The relative contribution of the within, between and net-entry components differs across countries and time. The within effect accounts for some 50 to 85 per cent of the total, net entry for between 20 and 40 per cent and the between component for -20 to 18 per cent.²

Scarpetta et al. (2002) also describe the patterns in the components of aggregate productivity across time. As one might expect they find the net-entry component becomes relatively more important in industries undergoing rapid technical change (i.e. ICT industries).

Table 23.1: Productivity Growth across Countries and Time

Country	Time Period	Productivity Growth (per cent annual growth)	Within component per cent	Between component per cent	Net Entry component per cent
Finland	1987-92	5.0	52	18	30
	1989-94	5.2	58	17	25
France	1987-92	2.3	87	0	9
Italy	1987-92	3.9	51	13	36
	1992-97	4.3	58	12	30
Netherlands	1987-92	2.3	78	4	17
	1992-97	4.1	68	-7	37
Portugal	1987-92	5.3	75	-9	34
	1992-97	4.7	79	-6	40
UK	1987-92	2.5	60	12	32
	1992-97	3.1	77	-6	29
US	1987-92	1.6	88	-6	19
	1992-97	3.0	100	-20	20

Source: Scarpetta et al., (2002).

The central message to draw from Table 23.1 is that particular attention should be focused on the evidence of the sources of within-firm productivity growth as they relate to exporting and less to the reallocation effects from the between effects and net entry. Perhaps not by coincidence, the literature has chosen to distribute its research effort in a similar manner.

With possible policy conclusions in mind, it is helpful to add two other pieces of information about productivity. As Figure 23.1 suggests, what is important for aggregate productivity within an industry is the relative productivity of the best and worst firms and the relative size of these firms. Small and large firms co-exist within the same industry, with differences in employment that can be measured in thousands. Similar differences exist for productivity. Bartelsman and Doms (2000) estimate that in the US, the best firms have productivity two to four times that of the worst firms, while the DTI (2004) estimate that in some UK industries the productivity differences are as large as 800 per cent. It follows that large and productive firms account for the dominant part of overall industry productivity.

Where then do exporters fit into the productivity distribution? The general consensus would suggest that they lie in the middle, between non-exporters and multinationals (see Figure 23.7). In almost all countries studied, exporters are found to be more productive and bigger than non-exporters, but less productive than multinational firms (see Greenaway and Kneller, 2006).

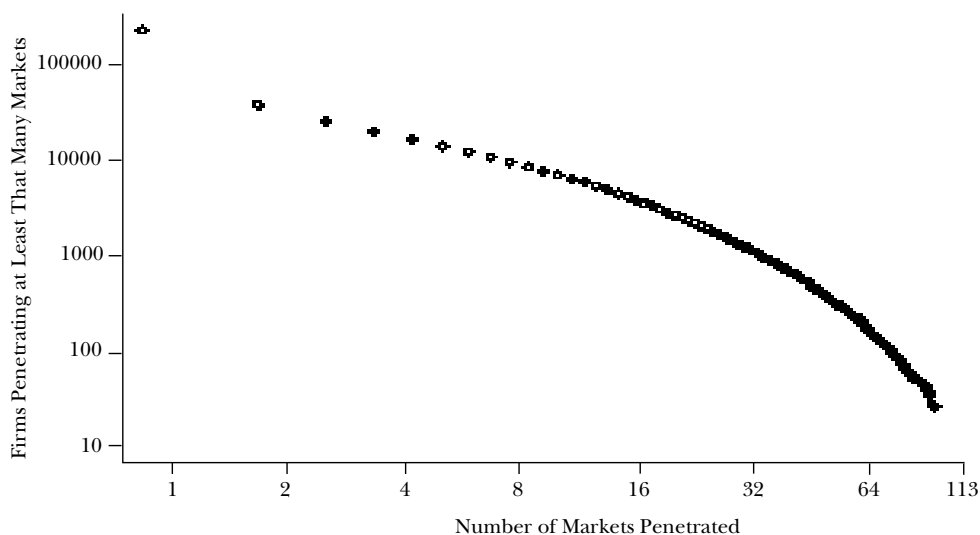
23.3 The Stylised Facts about Exporters and Exporting

It is helpful to have some stylised facts about the pattern of exports across firms. This literature is limited to a small sub-set of countries, namely France, Sweden and the US. However, the patterns derived look very similar across these countries which suggests that they are generally quite consistent.

Most firms do not of course export, and where they do, they tend to export to a limited number of markets. Figure 23.2 uses information taken from Eaton, Kortum and Kramarz (2006) to highlight this. On the left hand axis is the number of firms and on the horizontal scale the number of export markets (with a maximum of 113 countries).

The first point on the far left hand side of the diagram represents selling within France, the second to France and to one other country. As can be seen, the line declines very smoothly and relatively quickly. Around 35 per cent of all firms export to one overseas country, close to 20 per cent export to ten or more countries and only 1.5 per cent to more than 50 countries. Few firms export to all countries.

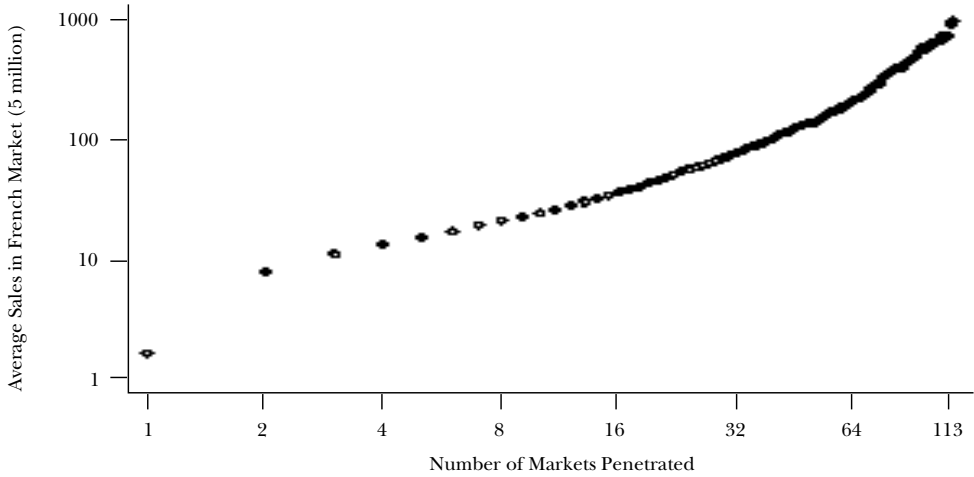
Figure 23.2: The Number of Export Markets Served in France



Source: Eaton, Kortum and Kramarz, (2005).

The number of overseas markets the firm exports to is strongly correlated with its size and productivity. In Figure 23.3 the number of markets served is plotted against the size of the firm (measured by its sales in the domestic market). This figure shows that big firms sell to more markets.

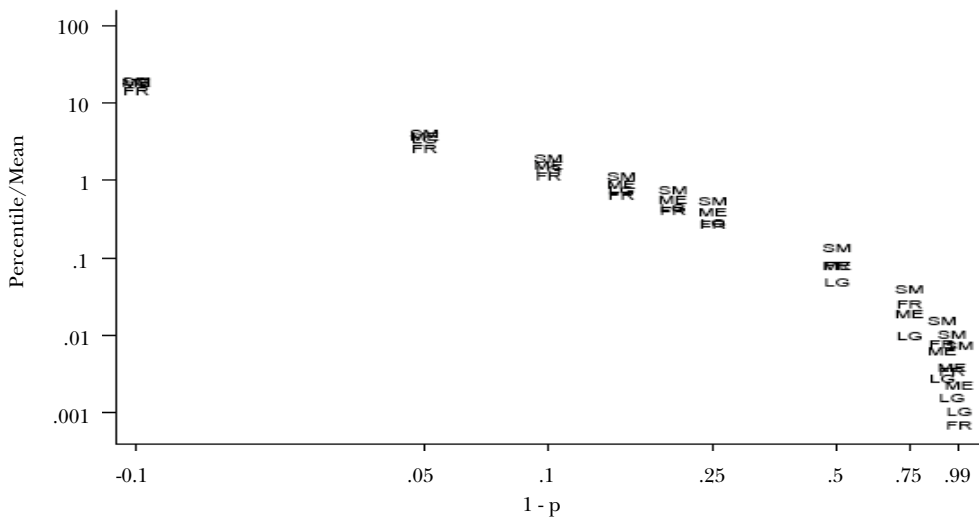
Figure 23.3: The Number of Export Markets Served and Firm Size



Source: Eaton, Kortum and Kramarz, (2005).

A final pattern of note is that of the firms that do export, the distribution of sales to those markets is strongly skewed. For the US, Bernard, Jensen and Schott, (2006) show that when ranked by the distribution of export sales the top one per cent of firms account for 80 per cent of total trade, the top ten per cent account for 96 per cent and the top 25 per cent for 99 per cent of all trade. A similar pattern can be seen in Figure 23.4 below (Eaton et al., 2006). The figure describes the sales across different market sizes according to their percentile in French sales to that market. According to the Figure firms in the 99th percentile sell more than 10,000 times those in the first percentile.

Figure 23.4: The Distribution of Export Sales and Firm Size



Source: Eaton, Kortum and Kramarz, (2005).

To summarise the message that we might draw from these patterns, like productivity, exporting is highly concentrated in the largest and most productive firms. These firms export to the most markets and export larger volumes to any given market.

23.4 The Evidence – Within Firm Effects

As described in the introduction, all but a few of the studies within this literature show that exporters have higher productivity than non-exporters (see Lopez, 2005, or Greenaway and Kneller, 2005, for a review). It has been more difficult to demonstrate the direction of causality between exporting and productivity. This has become known as the self-selection versus learning debate. Do the best firms become exporters or do they somehow benefit as a result of being an exporter?

Given that the majority of aggregate productivity growth is driven by within firm improvements to productivity we start our review of the evidence on the relationship between exporting and productivity here.

We begin by briefly reflecting on the concepts of learning and self-selection. The umbrella label ‘learning’ in fact describes four separate effects on the firm. First, observation or interaction with foreign competitors and customers provides the firm with information about best-practice production processes and product requirements encouraging the firm to invest and improve itself, reducing costs and raising quality. Second, exporting allows firms to increase the scale of production.³ Third, increased competition in foreign markets forces firms to become more efficient and stimulates innovation, and fourth, along similar lines, firms invest in new equipment or products in order to start exporting. The common theme amongst these is that the productivity of the firm is within its control, it is endogenous, and is affected by decision made as a result of starting to export.

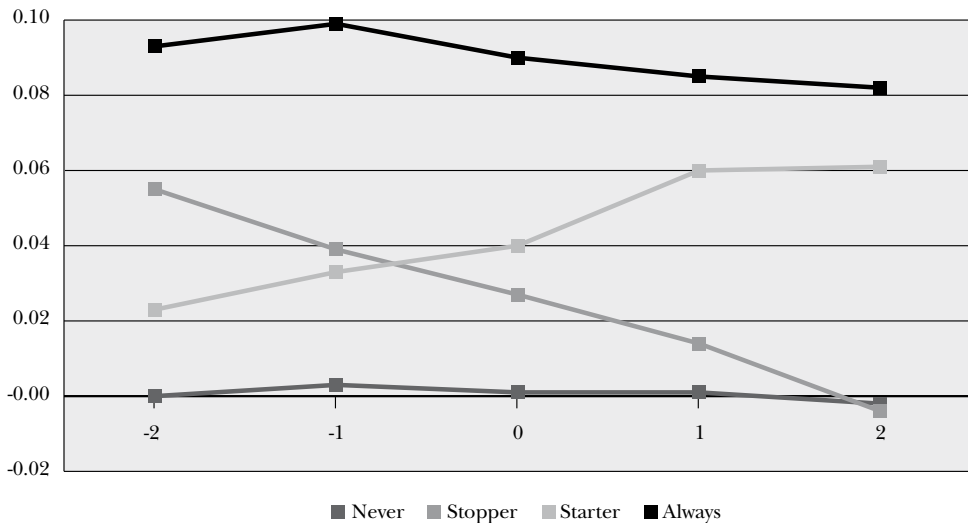
Self-selection in this context is often taken to mean that high productivity firms ‘select’ themselves by becoming exporters: the firm is productive and therefore becomes an exporter. The fact that the firm serves foreign markets does not influence the decisions that managers make, nor does it affect its productivity performance.

In the earliest literature the hypothesis being examined was a simple test of self-selection versus learning. It was a debate that was won by those advocating self-selection. The argument is made up of several parts and was most powerfully put by Bernard and Jensen (1999; 2004b). In their study of US plants they found first, that the productivity growth of exporters was not significantly different from that of non-exporters. This implies that the productivity distribution of firms in any given industry does not widen continuously over time. Or put differently, to the extent that learning effects exist, the growth effects are not permanent (though they will have a permanent effect on the *level* of productivity).

The second part of the argument relates to new exporters. They showed that out of the pool of non-export firms, firms that went on to become exporters were already amongst the best. They also found that for new exporters, any productivity improvement pre-dated the point in time in which export sales began and did not last long after it. Future entrants had many of the right characteristics that make them likely to export and were improving relative to non-exporters before they entered export markets. Then, after a short period, they become indistinguishable from other exporters. The improvement in productivity appeared poorly timed with the firms’ first exposure to export markets and therefore the type of mechanisms discussed by the proponents of the ‘learning by exporting’ school of thought.

This evidence has been replicated almost without fail across numerous countries. Based on data from Bernard and Jensen (2004b), Figure 23.5 displays the productivity level of firms that always export, firms that never export, those that start and those that stop relative to the industry mean for the time periods leading up to, and following the commencement of exporting. Firms that never exported have productivity close to the industry mean. Firms that always exported have productivity levels that are around ten per cent higher, while new exporters and firms that stop exporting lie somewhere in between. Over time, firms that start exporting catch-up with established exporters, while firms that stop exporting regress towards firms that never exported.

Figure 23.5: Productivity Levels of Exporters and Non-Exporters



Source: Bernard and Jensen, (2004).

The strong conclusions reached by Bernard and Jensen (1999) in favour of self-selection led quickly to an adaptation of the hypothesis being tested. Recognising that new exporters appeared to already have many of the right characteristics to become exporters, the test then became whether the surge in productivity associated with entry was explained by the decision to become an exporter, or whether the productivity surge led to the export decision. This is suggestive of a kind of learning conditional on self-selection. As argued in Van Biesebroeck (2005), not controlling for self-selection will overstate evidence of learning for new exporters in the data.

The evidence from this literature would appear to be more mixed than earlier evidence. The best support for the idea that firms benefit from exposure to export markets is that the effect is confined to a sub-set of firms. Firms that are young (Delgado et al., 2002; Fernandes and Isgut, 2005), or those highly exposed to export markets (Kraay, 1999; Castellani, 2002; Girma et al., 2004; Damijan et al., 2004) appear most likely to benefit. Others have found that post-entry changes depend on existing industry characteristics. Productivity changes are lower in industries in which current exposure to foreign firms is high (Greenaway and Kneller, 2003).

An alternative explanation put forward by Lopez (2004) and Alvarez and Lopez (2005) muddies the water still further by arguing that the surge in productivity found amongst new exporters in the period leading up to the start of export sales is in fact explained by firms investments in new products or capital in order to successfully serve the foreign market.

A more direct approach to testing evidence of learning through exporting has come from literature studying investments in new technologies that firms make in order to, or as a result of, entering export markets. These studies have tried to see inside the black-box of learning by exporting and generally find more supportive evidence. Exporting affects firm decisions that then impact on productivity.

Good examples of this can be found in those studies that have considered whether exporters invest in Research and Development (R&D) to a greater extent than before they started exporting, and a second strand that considers how exporters undertake their R&D activities, specifically whether they now use foreign information or skills. In the first strand exporting acts as an incentive to undertake R&D, while the second strand explores differences in the production of knowledge between exporters and non-exporters.

Of the studies based on firm data sets, a number have found that exporters have higher levels of R&D, see for example Bleaney and Wakelin (2002) and Roper and Love (2002) for the UK, Bernard and Jensen (2004a) for the US, Barrios et al. (2001) for Spain, Aw et al. (2005) for Taiwan and Baldwin and Gu (2004) for Canada.

Of these, only Baldwin and Gu (2004), Solomon and Shaver (2005) and Aw et al. (2005) provide evidence that causation flows from exporting to R&D investment or outputs. Baldwin and Gu (2004) find that there is no statistical difference between the R&D intensity of exporters and non-exporters prior to their internationalisation (but there is following it), while for Spanish firms, Solomon and Shaver (2005) find that exporting affects patent applications only with a two to three year lag. Along similar lines Criscuolo et al. (2005) report that globally engaged firms, including exporters, are more innovative.

Aw et al. (2005) take a very different approach, recognising the interdependence of the export and R&D decisions. They find that for a panel of Taiwanese firms in the electronics industry, those that do not invest in R&D have lower productivity growth than those that just export which in turn is lower than those firms that invest in both. They argue that these findings are consistent with the interpretation that R&D investments are necessary for firms to benefit from their exposure to international markets.

Evidence on differences in the inputs used to produce new knowledge by exporters and non-exporters is generally offered through case studies and survey work. This choice reflects difficulties in collating the detailed information necessary to study the R&D production function for large numbers of firms or time periods. The general hypothesis tested here is that external knowledge is an important input into the innovation process of firms and that some of this comes from abroad. In this literature, a number of studies report case study evidence that domestic firms receive technical information from overseas customers or suppliers which improves product quality (Lopez 2004; Alvarez and Lopez, 2005; Van Biesebroeck, 2005; and Blalock and Gertler, 2004).

The alternative approach has been to focus on a single input into the production process. Criscuolo et al. (2005) reports on the extent of the use of foreign information used in innovation. They concern themselves with the type of information - whether it is internal to the firm, or whether it is free from a university. They report that on average, multinationals use information from more sources than exporters who in turn make more use of information external to the firms than non-exporters.

A novel approach adopted by Baldwin and Gu (2004) is to combine the firm data typically used with detailed survey data on a smaller number of firms. The authors test whether Canadian exporters are more likely to collaborate with foreign buyers than non-exporters in their R&D, and find strong evidence to support the idea that they do.

To summarise the evidence from this section: on balance the weight of evidence would point to a relationship between exporting and productivity that is two-way causal. But, importantly, it is skewed towards self-selection. Firm productivity would appear largely independent of the firm's export decision. There is evidence that firms benefit from their exposure to export markets, but it is confined to a sub-set of new exporters.

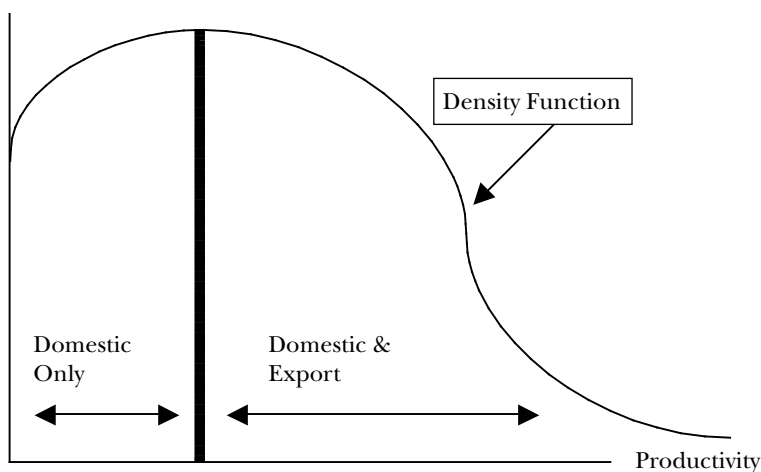
While the within firm component is very important in the overall rate of productivity growth, because new exporters are small in number and the productivity improvements are relatively small and temporary, the contribution of exporting to overall productivity growth is likely to be small.

23.5 The Evidence – Between Firm Effects

Only a limited number of studies have considered the role of exporting in explaining the between firm effect. For this reason, we refer to economic theory to explain the dynamics of how exporting is expected to impact on productivity and refer to the empirics to provide the detail and magnitudes.

The pioneering paper here is Melitz (2003). He builds on the empirical facts described above to derive a dynamic industry model (there is entry and exit for firms and reallocation of market shares) with heterogeneous firms (some firms have higher productivity than others). Fundamental to the outcome is the interaction of these firm differences with the up-front fixed costs that firms are required to pay to enter export markets. The outcome is that only the best firms can pay the up-front cost of export market entry and still make a profit. This is consistent with the idea that exporters are more productive than non-exporters.

This sorting of firms is outlined in Figure 23.6. Firms with productivity greater than some critical level (black), serve the domestic market and export, while those with productivity less than that serve just the domestic market.

Figure 23.6: Productivity and the Decision to Export

In the model however, exporting raises *industry* productivity. First, there is a rationalisation effect. Exporting increases profits for firms, which induces the entry of new firms to the market, driving out the least efficient firms in a Schumpeterian wave of ‘creative destruction’. Clearly this raises average industry productivity. Second, exporting allows the most productive firms to expand and causes less productive firms to contract. This between-firm reallocation effect again acts to raise average industry productivity.

Empirically Bernard and Jensen (2004a) for the US and Hansson and Lundin (2004) for Sweden estimate that the contribution of exporters to the between component as 60 per cent in the US (they estimate a lower bound at 8 per cent) and 62 per cent in Sweden. Also for Sweden, Falvey et al. (2004) follow up the prediction that increased export opportunities attract new entrants to the market and force low productivity firms to quit. They estimate that the effect occurs primarily through the first channel.⁴

To summarise: while between effects account for a smaller proportion of overall productivity growth in the economy there is perhaps clearer evidence that exporting contributes positively to this process.

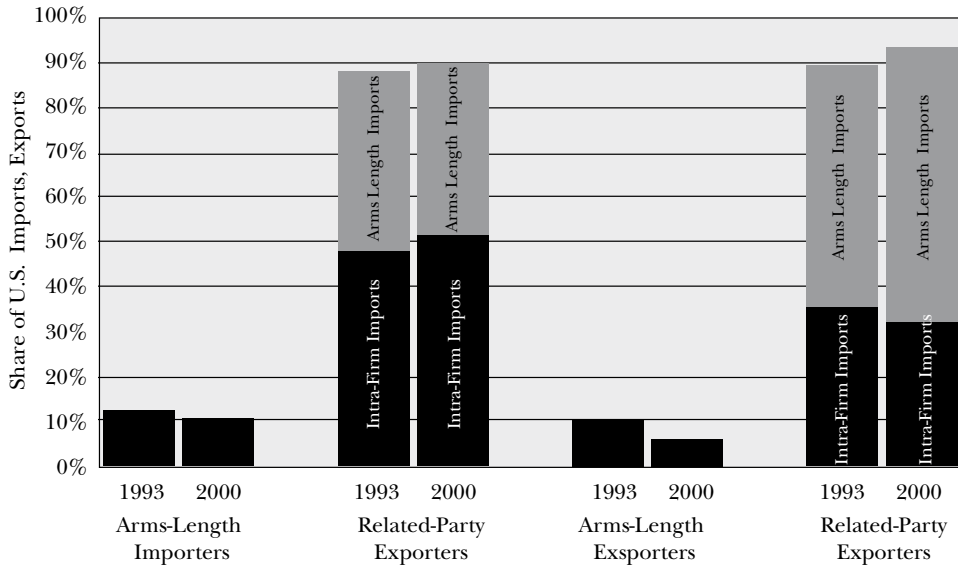
23.6 The Evidence – Exporting and Multinationality

So far we have discussed the relationship between exporting and productivity without the complication that some firms have production facilities abroad, i.e., that they are multinational. At the simplest level this is reasonable; exports and FDI are substitute channels for firms wishing to globalise. The conditions for foreign production become more favourable relative to exporting as the size of the foreign market increases and costs of exporting increase. They become less favourable as the costs of setting up a foreign production facility grow. This is the proximity - concentration trade-off as explained by Brainard (1993).

In practice the stylised facts for exports suggest a more complicated relationship. First, we find that most multinationals still export to some countries. The numbers of non-exporting multinational firms are relatively small in number. Second, multinational firms dominate total export flows between countries and third, part of these exports are trades back to firms within the same group (intra-firm trade).

Figure 23.7, using data taken from Bernard et al. (2005), displays the share of US exports (and imports) accounted for by firms that undertake arms length exports only and by multinationals, where the latter is broken into that within the firm (intra firm) and that to non-related parties. According to the evidence in Figure 23.7, multinationals account for the lion’s share of total US exports, around 95 per cent by 2000. Around 60 per cent of all exports (about two-thirds of total exports by multinationals) is to non-related parties and between 30-35 per cent represents intra-firm trade.

Figure 23.7: Exports and Imports by Multinationals



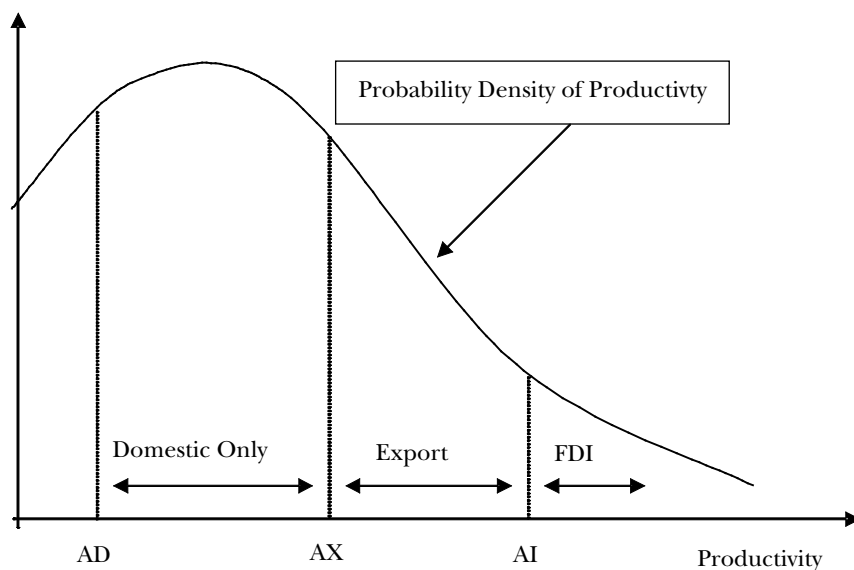
Source: Bernard, Jensen and Schott, (2005).

Detailed information on other countries is not available, so it is not possible to establish how representative the data for the US are. However, according to the United Nations World Development Report, one third of world trade is within firm exports (exports from one part of a multinational to another), similar to the US figure.

Some of this greater export performance would be expected of course. A well-established result is the superior performance of foreign firms over domestic companies with respect to employment, wages and productivity, all of which have been found to be good predictors of firm exports. Kneller and Pisu (2004) show however, that even controlling for these advantages, foreign multinationals located in the UK are still more likely to export than indigenous ones, and when they do export they do so more intensively.

So what explains export decisions of multinationals and what is the relationship with productivity? The answer would appear to be that it is complicated. Using the fact that exports and multinationals are substitute methods of serving foreign markets, Helpman, Melitz and Yeaple (2004) extend Meltiz (2003) to allow firms to become multinational. Now when firms become sufficiently productive they swap exports for overseas production, as shown in Figure 23.8 below, and the correlation between productivity and exports becomes negative.

Figure 23.8: Productivity and the Decision to Export or Become Multinational



Source: Helpman, Melitz and Yeaple, (2004).

Head and Ries (2003a) extend the Melitz (2003) model to allow firms to break up the production chain and locate some of this abroad to take advantage of low labour costs. They show that for a certain range of the parameter of the model, it is the least productive firms that locate abroad whereas more productive ones produce at home. Again the relationship between exporting and productivity is reversed.

Others have considered the motivation for multinationals to locate production within one member of a Free Trade Area (FTA), such as the EU, and then export to other members (see Motta and Norman, 1996, or Ekholm et al., 2003). The relationship between productivity and exports then depends on the method through which the multinational locates production within the FTA, whether it establishes new production facilities or acquires a domestic firm, and in the case of the latter whether that domestic firm already exported. For example, for the UK Girma et al. (2005b) finds foreign multinationals tend to acquire domestic firms that export – i.e., they cherry-pick the best firms – such that the productivity impact is uncertain. They also find differences in the post-acquisition export trajectories of the acquired firm according to whether the foreign firm is from inside or outside the EU. When the acquiring firm is from outside the EU, the export intensity of the acquired firm rises, whereas it falls for firms inside the EU. The net export impact is again ambiguous.

Grossman, Helpman and Szeidl (2003), developing a model of ‘complex FDI’ to show that firm characteristics may also be important. If firms within the same industry are heterogeneous in their productivity levels they may make different choices, even though costs of exporting and FDI are the same. Their analysis allows for the coexistence in the same sector of a rich array of profitable FDI strategies. In brief, the general lesson is that least productive firms will not undertake FDI, whereas more productive firms choose complex strategies that involve a mix of FDI and exports.

To summarise: up until this section the evidence was that exports and productivity were positively correlated, even if establishing the direction of causation between the two was difficult. Adding multinationals complicates this, with the exporting-productivity relationship varying across the different motives for becoming multinational. Exports by multinationals are the dominant part of international trade flows, and their size and productivity are important in overall productivity. At the moment the empirical literature is not developed enough to answer what the net effect between exports and productivity will be.

23.7 Policy Dimension

Intervention to promote exports is very widespread - every WTO Trade Policy Review contains a chapter on ‘Measures Directly Affecting Exports’ and there are always numerous measures to report.⁵ These range from intervention to improve market intelligence (for example public support for trade missions), to sector specific fiscal intervention (for example, tax concessions or duty drawbacks), to export processing zones (i.e. free zones).

Does the microeconomic evidence we have reviewed reinforce or undermine a case for active export promotion of this type? Lopez (2005) concludes that the microeconomic evidence reinforces the rationale for intervention. He argues that even if self-selection is the key driver of export market entry and therefore exporting has a reduced impact on the within component of productivity, it may nevertheless be ‘conscious self-selection’. What he means is that firms consciously improve their productivity with the international market in mind, rather than the best firms just starting to export. Policy intervention could then stimulate more conscious self-selection and deliver a productivity boost. Clearly if other types of learning by exporting occur, as the evidence suggests, productivity gains are boosted further.

Lopez (2005) himself stresses the importance of reducing (overseas) barriers to exports. If sunk costs to export market entry are important, intervention to improve aspects of infrastructure, reducing regulatory burdens, promoting clustering and so on may be beneficial.

Of the barriers to exporting, networks may be important to improve information flows between customers and suppliers. Eaton estimates that the self-selection model is capable of explaining about 60 per cent of firm export behaviour, suggesting such network effects may be important for the residual - there are some firms that could export but do not because they do not fully recognise the benefits or cannot find customers. Providing introductions and networks is a common form of support used by export promotion agencies in developed countries.

Altogether this is a plausible argument in support of state intervention, though it underpins a case for general rather than targeted intervention. As the stylised facts about exporting suggest (Section 23.3), new exporters make up a very small fraction of overall exports and therefore policy should not be biased away from firms that are well established in export markets to help new entrants. Policy will have a larger impact on overall exports if it is used to encourage exporters to expand sales in existing markets and to enter new ones.

However the stylised facts about productivity and exports, combined with the evidence from the relationship between exports and within-firm productivity growth, suggest that such interventions are likely to have only a small positive impact on overall productivity growth through the within firm effect. Exports and productivity is highly skewed towards the largest firms and to the extent that learning effects exist they are for a sub-set of new exporters only.

Perhaps a stronger motivation for policy intervention comes from the literature studying the effect of exporting on the between component of overall productivity growth (Section 23.5). Although the between component is relatively less important, there is much clearer evidence that exports is a driving factor behind it and that its contribution might be large (some 60 per cent of the total). Exporting allows good firms to get bigger and has some impact on making them perform better. The relative contribution of these effects is not yet known, and ignores the importance of large and productive multinational firms on exporting.

All this said, a final point of caution: existing evidence has found limited impact from export promotion policies. Bernard and Jensen (2004a), Alvarez (2004) and Görg et al. (2005) all find weak or no significant effect from export promotion schemes.

Notes

- 1 We abstract from a discussion of whether labour or total factor is the appropriate measure of productivity and of their measurement.
- 2 Negative growth suggests that for some periods there was a reallocation of market share towards the least productive firms.
- 3 Evidence from Tybout and Westbrook (1995) suggests that this may be an unimportant source of efficiency change.
- 4 There is a related industry which has looked at the productivity impact of trade liberalisation - Roberts and Tybout (1991) and Pavcnik (2002).
- 5 The WTO's Trade Policy Review Mechanism ensures that the trade policies of Members are audited on a regular basis. For the 'big three' (US, EU and Japan) this means every two years; for the smallest Members, it takes place every seven years.

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