5th FIW Special - International Economics

The Trade-Productivity Nexus in the European Economy

Empirical Evidence from Firm Level Data

This FIW Special – International Economics contains a policy report on the relationship between trade and productivity in the European Economy. The report is related to the 15th FIW-Workshop on the same topic which took place in Vienna on the 16th of March, 2012.

Foreword

On March 16th, 2012 the Austrian 'Research Centre International Economics' (Forschungsschwerpunkt Internationale Wirtschaft, or FIW for short) organised the 15th FIW-Workshop which was dedicated to 'The Trade-Productivity Nexus in the European Economy', focusing on empirical evidence from firm level data. The Workshop took place on the premises of the Vienna Institute for International Economic Studies (wiiw) and was attended by a mixed audience of academics and policy makers. Given this 'dual' target audience the workshop consisted of two parts. The first part consisted of keynote speeches by two well-known economists in the field of international trade and the internationalisation of firms, while the second part took the form of a policy panel where policy makers and applied researchers discussed several issues related to export promotion policies.

This FIW Special – International Economics takes the form of a policy report, summarising the main ideas, facts and results of the FIW workshop on 'The Trade-Productivity Nexus in the European Economy' that where presented during the first part of the workshop. We are very grateful to the keynote speakers of the workshop, Carlo Altomonte (Bocconi University) and Richard Kneller (University of Nottingham) who made very valuable contributions both to the workshop and to this policy report.

Like the workshop this policy report starts out with an introduction to the topic in which Neil Foster (wiiw) and Roman Stöllinger (wiiw) review some stylised facts of the empirical heterogeneous firm literature using Austrian exporters as an example. This includes the so-called 'export premium' which refers to the fact that exporting firms are larger and more productive than their non-exporting peers as well as some initial findings on the performance of export starters, including the productivity growth path before and after export entry.

The empirical evidence on the positive relationship between exporting and productivity is based mainly on country-specific studies due to the lack of comparable cross-country data. At the workshop Carlo Altomonte presented new insights into the relationship between exporting and productivity by introducing the cross-country dimension of the export behaviour and internationalisation strategies of European firms. This kind of analysis became possible due to a recently compiled cross-country firm level data set covering seven European countries. The cross-country dimension of the trade and productivity nexus is at the centre stage of the second chapter of this report. In particular, it reports on the role of productivity thresholds that induce exporting and other forms of internationalisation which are found to be fairly stable across countries. This has implications for trade and industrial policies which will have different impacts on firms in different positions of the firm productivity distribution.

A key question regarding the trade and productivity nexus is the question of causality which Richard Kneller addresses in the third chapter of this report. The positive relationship between exporting and productivity is undisputed but it leaves open the question whether firms export because they are more productive to begin with or whether exporting makes firms more productive (or both). In the literature these two explanations have become known as the self-selection and learning-by-exporting hypotheses respectively with both hypotheses not being mutually exclusive. Following the presentation at the workshop this chapter discusses the question of causality, including state-of-the-art methods to capture learning-by-exporting effects, and summarises existing results on that issue. The causality issues which is relevant for

within-firm productivity growth is also put into the broader context of aggregate productivity growth and due acknowledgement is given to the fact that productivity growth is also driven by the reallocation of resources between firms, the entry and exit of firms as well as shifts of resources between industries.

We want to use this policy report as an opportunity to thank again all participants of the 15th FIW-Workshop on 'The Trade-Productivity Nexus in the European Economy'. In particular, our thanks go to Manfred Schekulin from the Federal Ministry of Economy, Family and Youth (BMWFJ) and Michael Landesmann from the Vienna Institute for International Economic Studies (wiiw) for opening and chairing the Workshop, to the keynote speakers Carlo Altomonte from Bocconi University and Richard Kneller from the University of Nottingham as well as the panelists of the policy panel, Norbert Knoll from the Austria Wirtschaftsservice (AWS), Ferdinand Schipfer from Oesterreichische Kontrollbank (OeKB) and Werner Hölzl from the Austrian Institute of Economic Research (WIFO).

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Content

1. Exporting and Productivity: Some initial results for Austria

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This chapter first revisits the main theoretical framework for analysing the export decision of firms incorporating firm heterogeneity. This theoretical framework relating exporting to firm-level performance has largely been driven by stylised facts from firm-level studies. Second, it presents findings on the trade and productivity nexus for Austrian manufacturing firms. In line with the findings of a very large number of empirical studies for other countries we find that exporters are more productive – irrespective of whether measured in terms of labour productivity or total factor productivity - than their non-exporting peers, even after controlling for firm size, investment in information and communication technologies (ICT) and R&D intensity. Distinguishing between non-exporters, export starters, continuous exporters and export stoppers we find that export starters enjoy a small productivity premium over non-exporters supporting the idea of a self-selection mechanism of more productive firms into exporting. Focusing on export starters and tracking their productivity growth path over time reveals that productivity growth is not significantly higher in the period after their export start than in the period preceding their export engagement which can be interpreted as evidence against sustained learning effects of Austrian firms due to exporting. Given the wealth of studies for other countries more research in this field would be needed in order to establish firm results on the incidence of learning-by-exporting for Austrian firms.

1.1 Introduction

The purpose of this chapter is twofold. Firstly, it is intended as an introduction to the topic of this report, the trade and productivity nexus. To this end it revisits the basic theoretical framework for analysing the decision of firms to export and the role of productivity in this decision. Moreover, it presents some stylised facts that have been established by the empirical literature on the relationship between exporting and productivity. Secondly, some initial findings concerning the relationship between exporting and productivity for Austrian manufacturing firms are presented. These include results on the productivity premium of exporting firms over non-exporters, an exposition of the (labour) productivity differences between non-exporters, export starters, continuous exporters and export stoppers, as well as some initial insights from the productivity growth path of export starters covering the period before and after their entry into export markets.

1.2 Theoretical background and stylised facts from the empirical literature

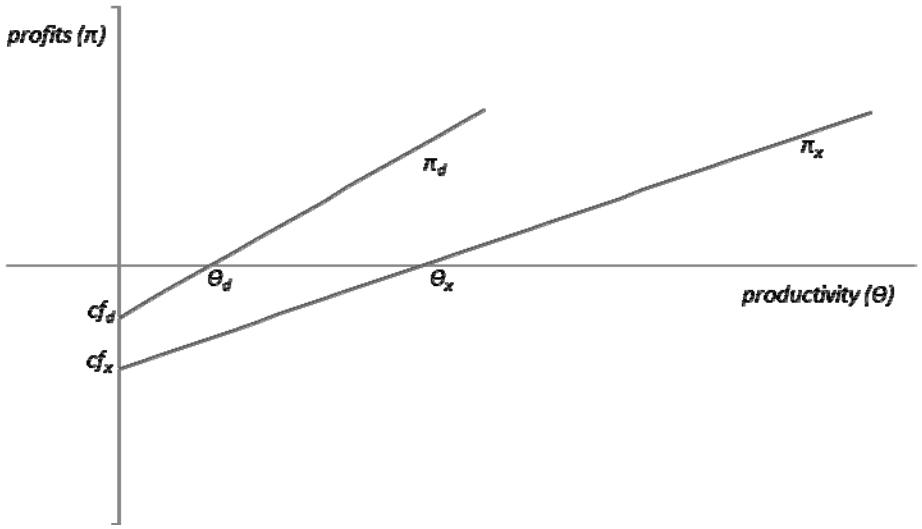
The recent theoretical literature addresses two related issues; firstly, why some firms export and others choose to focus on production for the domestic market only, and secondly, the relationship between exporting and productivity. In terms of the second issue, there are two alternative – though not necessarily mutually exclusive – explanations as to why exporters may be more productive than non-exporters, namely self-selection and learning-by-exporting[1]. Self-selection of the more productive firms into export markets may occur because there are additional costs associated with selling goods abroad. Such costs may include transport, distribution and marketing costs, the cost of personnel with skills to manage foreign networks, or production costs from modifying domestic products for foreign consumption (Fryges and Wagner, 2007). According to the learning-by-exporting hypothesis exporting results in an improvement in post-entry performance. Exporting can be an important channel

[1] The question of causality in the relationship between exporting and productivity is explored in more detail in Section 3 of this report.

of information flows with overseas buyers sharing knowledge of the latest design specifications and production techniques that might otherwise be unavailable, as well as providing a competitive environment, in which efficiency advantages can be obtained.

A useful theoretical framework incorporating heterogeneous firms and the decision to export has been developed by Melitz (Melitz, 2003) which has been highly influential for the heterogeneous firm literature (Bernard et al., 2011). In the Melitz model firms are 'born' by drawing at random a certain productivity level. If they are lucky enough to draw a sufficiently high productivity they will be able to cover the fixed cost of production and will serve the domestic market charging a fixed mark-up on their marginal cost[2]. This is shown in Figure 1.1 where firm level productivity (□) is depicted on the horizontal axis and firm profits (π) at the vertical axis. As can easily be seen, a firm must have a productivity level of $□_d$ – the cut-off productivity level – to break-even. Firms below this cut-off productivity will exit the market (in Figure 1.1 these are all firms to the left of $□_d$). Firms with a productivity level greater than $□_d$ will stay in the market and earn positive profits (π_d).

Figure 1.1: Schematic representation of firms' self-selection into exporting



Source: Adapted from Helpman (2006).

If a country is open to trade, firms may also find it profitable to engage in exporting. This export decision depends again on their productivity. Assuming fixed costs of exporting, not all firms will be able to cover this additional fixed cost. Only firms with a productivity level above $□_d$ – the export productivity cut-off – have large enough profits (because they have sufficiently large sales) to cover the fixed cost of exporting (as well as potential variable trade costs) and earn positive profits from exporting (π_x). Obviously, the Melitz model suggests a direct link between firm productivity and exporting: firms with sufficiently high productivity become exporters while low productivity firms only serve the domestic market (or exit the market entirely)[3].

[2] Melitz (2003) assumes constant cost mark-ups but the same analysis can also be made with variable mark-ups as in Melitz and Ottaviano (2008).

[3] Such a self-selection mechanism of more productive firms into exporting is also present in earlier trade models featuring firm heterogeneity (e.g. Clerides et al., 1998). However, these models did not provide an explanation for there to be differences in pre-entry productivities across firms.

Hence, the Melitz model as well as other heterogeneous firm models suggests that the reason why some firms export and others don't is the presence of sunk costs of exporting. Such costs include market research, product modification costs, compliance and so on. In the presence of such costs profit-maximising firms will enter export markets only if the present value of their profits exceeds the fixed costs of entry (Girma et al., 2004).

The theory relating exporting to firm-level performance has largely followed and been driven by empirical results. Since the seminal study of Bernard and Jensen (1995) there have been a large number of research papers that have considered the relationship between exporting and firm-level performance, with new papers still appearing. These papers consider data on a large number of developed, developing and transition economies. Despite differences in methodology (i.e. ordinary least squares, quantile regression, stochastic dominance tests) and differences in country samples the results tend to be fairly consistent. With a couple of exceptions the results point to the conclusion that productivity is higher for exporters. In a recent meta-analysis of the existing empirical literature, Martins and Yang (2009) survey over 30 papers on the relationship between export status and productivity growth and find that: *(i)* the productivity premium from exporter (i.e. the exporter premium) is higher in developing than developed countries; *(ii)* the exporter premium is higher in the year that firms start exporting than in later years; *(iii)* the exporter premium is lower when only matched firms are considered. In addition to productivity, many studies examine the relationship between export status and other indicators of performance, examples including employment, shipments, value-added, investment measures and capital intensity. The results from estimating such relationships tend to be consistent with those from considering the relationship between exporting and productivity and indicate that numerous firm performance measures are higher for exporters than for non-exporters.

1.3 Productivity premium of Austrian exporters

The Melitz framework suggests that only the more productive firms find it profitable to sell to foreign markets. Hence, exporting firms are expected to be more productive than non-exporters. Indeed, this is one of the most robust findings of the empirical heterogeneous firm literature. Tables 1.1 and 1.1.b shows this for Austrian manufacturing firms.

Following the approach of Bernard and Jensen (1999) which has been used intensively in the literature we regress a dummy variable, the export status variable, which takes the value 1 if a firm is an exporter and 0 otherwise, on the (labour) productivity of firms (in log form). In this simple regression set-up the exporter premium is indicated by the coefficient on the export status variable. In specification (1) in Table 1.1a the export premium is estimated controlling only for industry and time fixed effects but no additional control variables. This yields an economically large and statistically highly significant coefficient implying a 70% productivity advantage of exporting over non-exporting firms[4]. In specifications (2) – (4) we add a number of control variables such as employment, the share of R&D personnel and software per employee to control for firm size, R&D intensity and ICT intensity of firms which are all supposed to be positively correlated to productivity. As can be seen in Table 1.1a the export premium is robust to the inclusion of control variables. For example, controlling for firm size by the number of employees (specification 2) reduces the export premium to about 50% but leaves fully in-

[4] The export premium of 70% is retrieved by taking the estimated coefficient (0.533) to the power of one and deduct 1.

tact its statistical significance. This shows that the export premium is not just due to the fact that exporting firms are larger than non-exporters and therefore more productive. Similarly, controlling for R&D intensity and ICT intensity further reduce the export premium, reducing it to 37% when all control variables are included (specification 4).

Table 1.1a: Productivity premia of Austrian manufacturing exporters

Panel fixed effect regressions

	labour productivity (2002-2006)				TFP (OP) (1997-2006)
	(I)	(II)	(III)	(IV)	(V)
EXPORT STATUS	0.533 ***	0.397 ***	0.390 ***	0.318 ***	0.621 ***
	(65.397)	(44.407)	(42.437)	(24.896)	(86.141)
employment		0.162 ***	0.159 ***	0.142 ***	
		(35.131)	(32.743)	(24.403)	
share R&D personnel			0.837 ***	0.852 ***	
			(2.649)	(5.280)	
software/employee				0.080 ***	
				(17.215)	
R^2-adj.	0.282	0.329	0.333	0.306	0.304
Obs.	29828	29828	29828	12357	39499
implied export premium	*1.704*	*1.49*	*1.48*	*1.37*	*1.86*

Source: Stöllinger et al. (2011); wiiw-calculations based on data from Statistik Austria provided via remote access. All regressions use a full set of industry dummies and time fixed effects. Coefficients of the constant, industry dummies and year fixed effects are not shown; *t*-values in parenthesis. ***, ** and * denote coefficients being significantly different from zero at a 1, 5 and 10% level. The implied export premium is calculated according to footnote 4. TFP (OP) is total factor productivity estimated according to the methodology of Olley-Pakes (1996).

In specification (5) we change the dependent variable and regress the export status variable on total factor productivity (TFP), where total factor productivity has been estimated following the methodology suggested by Olley-Pakes (1996). The TFP regression yields a slightly larger coefficient which is again highly statistically significant. Hence, the productivity premium of exporters is also confirmed for the TFP measure ruling out the possibility that exporters have higher labour productivity just because they are more capital intensive.

The results in Table 1.1a therefore empirically support the prediction of the Melitz model that exporters are more productive than non-exports, a result which has also been found for many other European and non-European countries (see e.g. Mayer and Ottaviano, 2007; ISGEP, 2008).

As pointed out in the previous section, exporters seem to outperform non-exporters across a number of firm characteristics. A theoretical underpinning for the existence of a wage premium is provided by the model of Yeaple (2005), which assumes that firms can produce differentiated products as in Melitz (2003). Different to Melitz (2003) however, in the model of Yeaple (2005) firms do not draw their productivity from a random distribution but can chose whether to produce with high-tech or low-tech technology whereby the former requires an investment. Moreover, it can employ different types of workers, skilled or unskilled. The model predicts that only firms which invest in the high-tech technology (making them more productive) and employ high-skilled labour engage in exporting. Due to these characteristics exporters also pay higher wages than non-exporters.

In line with this we can also detect a 'wage premium' of exporting firms in the Austrian manufacturing sector (Table 1.1b). The wage premium is smaller in magnitude compared to the productivity premium, amounting to 11% in specification (4) when including the full set of control variables[5]. Note however, that the wage premium of exporters is highly significant and robust across all specifications.

Table 1.1b: Wage premia of Austrian manufacturing exporters

Panel fixed effect regressions

	wages (2002-2006)			
	(I)	(II)	(III)	(IV)
EXPORT STATUS	0.215 ***	0.120 ***	0.118 ***	0.101 ***
	(53.883)	(29.307)	(27.907)	(16.811)
employment		0.114 ***	0.113 ***	0.100 ***
		(61.294)	(55.637)	(40.176)
share R&D personnel			0.312 **	0.454 ***
			(2.366)	(5.902)
software/employee				0.029 ***
				(15.248)
R^2-adj.	0.388	0.468	0.470	0.452
Obs.	29833	29833	29833	12355
implied export premium	*1.240*	*1.13*	*1.13*	*1.11*

Source: Stöllinger et al. (2011). All regressions use a full set of industry dummies and time fixed effects. Coefficients of the constant, industry dummies and year fixed effects are not shown; *t*-values in parenthesis. ***, ** and * denote coefficients being significantly different from zero at a 1, 5 and 10% level. The implied export premium is calculated according to footnote 4. All regressions include industry and time fixed effects.

1.4 More types of firms: Export starters and export stopper

In this section we refine the distinction between exporters and non-exporters and distinguish between four types of firms. In addition to non-exporters, these types are export starters, export stoppers and continuous exporters. These different types of firms are best explained by looking at the transition matrix by firm type which shows the frequency with which firms 'switch' from being an exporter to being a non-exporter or vice versa. Table 1.2 shows the transition for Austrian manufacturing firms over the period 1998-2006.

Looking at the first row in Table 1.2 reveals that over the whole sample period an overwhelming majority of firms (1,142 or 83%) that started out as non-exporters in a given year (period *t*) remained non-exporters in the next year (period *t+1*). In contrast, 213 firms or 17% of the initially non-exporting firms started to export in the subsequent year. Such firms, which switch from being a non-exporter to being an exporter, are classified as 'export starters'.

The transition of the export starters is shown in the second row of the transition matrix in Table 2.1. By definition, firms that are export starters in the initial year (i.e. they were exporting in period *t* but not in the period before) can either continue to export in the following year or they can quit again their export activities. In the former case, the firm turns from being an export

[5] In this result no distinction between the pure productivity effect and the effect of exporting on wages is made. This is done in Leitner and Stehrer (2011).

starter to being a 'continuous exporter'; in the latter case the firm is considered as an 'export stopper'[6].

Table 1.2: Transition matrix of Austrian manufacturing firms by firm type, 1998-2006

	firm type (period t+1)				
firm type (period t)	non-exporter	export starter	continuous exporter	export stopper	total nb. of firms
non-exporter	1142 (83.2)	231 (16.8)			1373
export starter			217 (77.0)	65 (23.1)	282
continuous exporter			1026 (88.7)	131 (11.3)	1157
export stopper	179 (87.8)	25 (12.3)			204
total nb. of firms	1321	256	1243	196	3016
share in total	43.8	8.5	41.2	6.5	100.0

Source: wiiw-calculations based on data provided by Statistik Austria via remote execute.

Table 1.2 shows that more than three quarters (77%) of export starters continue their export activities in the year following their export start while 23% stop exporting in the year following their export start. Turning to continuous exporters, which are firms that have been exporting for at least two years including the current year, it is obvious to see that these firms can either remain continuous exporters or they can stop exporting which would make them export stoppers. The third row of Table 1.2 shows that continuous exporters overwhelmingly stick to exporting (89%) providing evidence for the strong persistence of exporting. Only 131 or 11% of firms stop exporting after having exported for at least two years. This is a much lower share of export stoppers compared to the export starters which shows that first time exporters are much more likely to quit exporting than firms with a longer history of exporting. Finally, firms that are export stoppers in the initial year will in 88% of cases not export in the subsequent year making them non-exporters in that period. Only 25 firms or 12% start exporting again after having stopped exporting in the period before.

Having presented some descriptives of export starters, continuous exporters, export stoppers and non-exporters, we can investigate the productivity of these four types of firms as well as additional firm characteristics. As can be seen in Table 1.3 productivity levels in the Austrian manufacturing sector vary considerably across the different types of firms and they show a clear pattern. The average productivity is highest for continuous exporters and lowest for export stoppers. In between are export starters and non-exporters. It is interesting to note that export starters have a slightly higher labour productivity than non-exporters prior to exporting already. Nevertheless there is also a large productivity gap between export starters and continuous exporters. The productivity advantage of continuous exporters over non-exporters, which amounts to 31%, can be interpreted as the export premium as before. Most interestingly is the productivity difference between the export starters and non-exporters which can

[6] In this section we classify the firms as export starters (export stoppers) only in the year where they start (stop) exporting but not in the following years. Hence, a firm can only be an export starter for one period. 'Double switching' Firms, i.e. firm that start exporting twice over the sample period are excluded from the sample. An alternative way to classify the firms as export starters and export stoppers in a permanent way meaning that an initially non-exporting is considered to be an export starter in the year where it starts exporting and all subsequent years and likewise for export stoppers. We will use these 'permanent' firm types later.

be interpreted as pre-export entry differences in productivity. Since this difference is positive (amounting to 6%) this provides evidence for the self-selection of more productive firms into exporting. Finally, the negative productivity differential of export stoppers (again relative to non-exporters) indicates that the decision of firms to quit exporting may be related to a negative productivity shock.

Table 1.3: Productivity and other firm characteristics by firm type, 1998-2006

firm type	number of firms	share of total	labour productivity	sales	employment	investment	investment intensity
non-exporters	1522	44.9	120	12626	81	781	7
export starters	301	8.9	127	12035	73	699	8
continuous exporters	1340	39.5	157	18525	92	856	9
export stoppers	230	6.8	112	12079	77	774	7

Source: wiiw-calculations based on data provided by Statistik Austria via remote execute.

The pattern found for labour productivity across the four types of firms is similar though not identical for other firm characteristics. While continuous exporters are also larger both in terms of sales and employment, export starters are not larger than non-exporters. The advantage of export starters over non-exporters is limited to labour productivity and investment intensity[7].

Table 1.4 shows again labour productivity by firm type but now at the level of (selected) manufacturing industries. The results show that the productivity advantage of both continuous exporters and export starters is a general pattern across industries. The continuous exporters are, as expected, the most productive firms in all industries – and in most cases by a wide margin. The magnitude of the productivity advantage of export starters over non-exporters varies considerably across industries. In the textile industry or the transport equipment industry, the differences in labour productivity between non-exporters and export starters are comparable to or even larger than those between export starters and continuous exporters. In contrast, it is only marginal in the machinery industry.

One of the main insights to be gained from Tables 1.3 and 1.4 is that continuous exporters are clearly a distinct set of firms which are more productive, larger and have higher investment intensity than both non-exporters and export starters. In contrast, the differences between export starters and non-exporters are generally less pronounced with the former being on average more productive but the latter being larger on average. The productivity premium of export starters over non-exporters, however, is to a varying degree a general feature found in all manufacturing industries which may be interpreted in favour of a self-selection of already initially more productive firms into exporting.

[7] Investment intensity is defined as gross investment expenditure per employee.

Table 1.4: Productivity by firm type in selected manufacturing industries, 1998-2006

	labour productivity - absolute level and relative to non-exporters							
industry	non-exporters		export starters		continuous exporters		export stoppers	
Food, beverages, tobacco (DA)	164	*100%*	180	*110%*	244	*149%*	143	*87%*
Textiles (DB)	84	*100%*	103	*123%*	117	*139%*	103	*123%*
Chemicals (DG)	125	*100%*	136	*109%*	152	*122%*	82	*66%*
Metal products (DJ)	117	*100%*	131	*112%*	153	*131%*	122	*104%*
Machinery (DK)	134	*100%*	135	*101%*	137	*102%*	148	*110%*
Electronics (DL30-32)	88	*100%*	107	*122%*	114	*130%*	101	*115%*
Medical and optical instruments (DL33)	66	*100%*	79	*120%*	85	*129%*	59	*89%*
Transport equipment (DM)	72	*100%*	129	*179%*	138	*192%*	99	*138%*

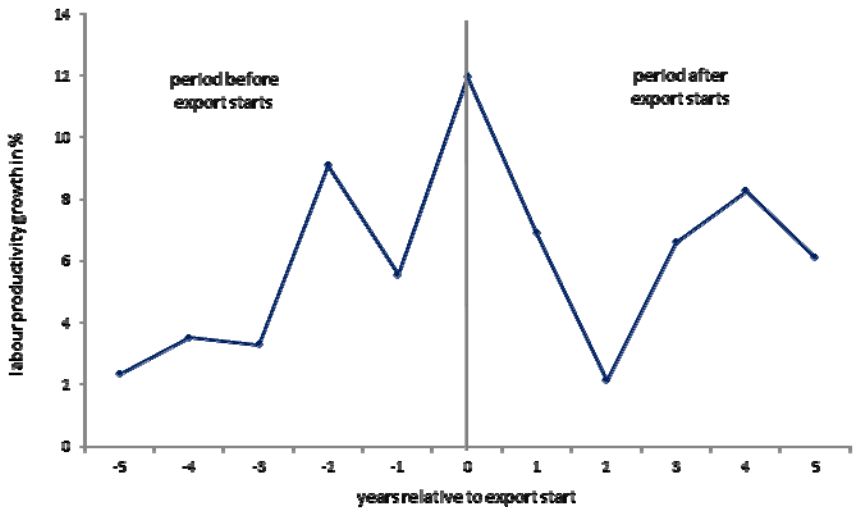
Source: wiiw-calculations based on data provided by Statistik Austria via remote execute.

1.5 Productivity growth path of export starters

The previous results suggest that exporters are, on average, already more productive than non-exporters in the year they begin exporting. We now focus on export starters and their growth rates at the time before their entry into exporting, in the year they start exporting and after they start exporting.

Figure 1.2: Productivity path of export starters

Austrian manufacturing firms, productivity growth in percentage points



Source: wiiw-calculations based on data provided by Statistik Austria via remote execute. Numbers on horizontal axis indicate years before and after start of export.

When considering the productivity growth path of export starters we change the definition of export starters. In line with Kraay (2002) we define export starters as firms that began exporting during the sample period. Figure 1.2 visualises the labour productivity growth path of export

starters where period 0 indicates the year of export start of the respective firm. The graph shows that the productivity growth rate of firms tends to increase in the period preceding their entry into export markets. This development could indicate that firms are preparing to export and reap the benefits of their efforts (through investment in new machinery, innovation activity, etc.) at the time they start exporting. For example, in a recent contribution analysing Mexican firms, Iacovone and Javorcik (2012) find evidence on quality upgrading in firms that prepare for penetrating export markets. In their study this effect, which allows firms selling their output at a 'price premium', appears one year before export start. However, there is no upgrading after the entry into export markets. Alternatively, it could mean that firms which embark on a positive productivity path finally engage into export activities

The productivity path of Austrian export starters in Figure 1.2 suggests that productivity growth declines again after export entry. This development is in line with the finding of a recent meta-analysis of the existing empirical literature by Martins and Yang (2009) that surveys over 30 papers on the relationship between export status and productivity growth. This study comes to the conclusion that the productivity effect of exporting is higher in the year that firms start exporting than in later years.

In Table 1.5 we test for the statistical significance of productivity effects due to exporting. This is done by regressing a dummy variable that takes the value 1 if a firm starts exporting in that year and 0 otherwise ('time of export start'); and a second dummy variable that takes the value 1 in all periods after a firm's export starts and 0 otherwise ('time after export start') on the labour productivity. This set-up implies that the coefficients of the dummy variables indicate the difference in productivity growth rate relative to the period before export start (i.e. when the export starters were still non-exporters).

Table 1.5: Differences in firm productivity growth before, at and after export start

Austrian manufacturing firms, 1998-2006 – export starters only

	(1)		(2)		(3)		(4)	
time of export start	6.830	*	6.727	*	7.379	*	7.329	*
	(1.856)		(1.864)		(1.772)		(1.792)	
time after export start	0.911		0.519		2.662		2.384	
	(.739)		(.416)		(1.275)		(1.216)	
constant	5.122	***	2.403	*	9.153	***	6.510	**
	(6.525)		(1.935)		(2.700)		(1.965)	
industry dummies	no		yes		no		yes	
years dummies	no		no		yes		yes	
F-test	1.843		0.915		1.228		0.885	
R^2	0.005		0.013		0.01		0.018	
R^2-adj.	0.004		0.006		0.005		0.007	
Obs.	1854		1854		1854		1854	

Source: wiiw-calculations based on data provided by Statistik Austria via remote execute.

The result confirms the result suggested by Figure 1.2, i.e. that at the time of export start, firms do indeed have exceptionally high productivity growth rates which are significantly higher than in the pre-export phase. For the time after export start the productivity growth rate is also higher compared to the pre-export period (indicated by the positive coefficient) but the difference in productivity growth is statistically not significant. This result could suggest that Aus-

trian manufacturing firms do not benefit from learning-by-exporting effects – at least not in a sustainable manner. At the time of export start, however, there is a short term productivity boost which may be the immediate impact of the export orders. Alternatively, it may reflect the productivity gains firms can reap after a phase in which (the still non-exporting) firms prepare for exporting, e.g. by investing in new machinery or in R&D (see above).

1.6 Conclusions

This chapter presented some results on the link between exporting and productivity for a sample of Austrian firms in the manufacturing sector over the period from 1997-2006. In line with the findings from a very large number of empirical studies for other countries we find that exporters are more productive than their non-exporting peers, also when controlling for other firm characteristics like firm size, investment in ICT and R&D intensity. The result holds regardless of whether labour productivity or total factor productivity is considered. This result is in line with the predictions offered by heterogeneous firm models à la Melitz (2003) which suggest that only the more productive firms have sufficiently large profits to cover the fixed costs of exporting and therefore find it profitable to serve foreign markets. Distinguishing between non-exporters, export starters, continuous exporters and export stoppers we find that export starters enjoy a small productivity premium over non-exporters prior to exporting. While the advantage of export starters in terms of productivity does not extend to other firm characteristics such as firm size, it is robust across industries. This provides some evidence in favour of the self-selection mechanism of more productive firms into exporting. Another result is that continuous exporters are more productive, larger and invest more than non-exporters (and all other types of firms) which confirms the finding on the export premium. Focusing on export starters and tracking their productivity growth path over time reveals that productivity growth is not significantly higher in the period after their export start than in the period preceding their export engagement. While there are more sophisticated approaches to test for learning-by-exporting effects, this result may suggest that there are no sustained learning effects of Austrian firms due to exporting. However, there is a marked hike in the productivity growth of export starters in the year in which they start exporting which is another stylised fact established by the empirical heterogeneous firm literature.

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2. Exporting and Productivity – The cross country dimension

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What triggers competitiveness in Europe? This chapter takes a systematic approach to addressing this question, exploiting a novel dataset (EFIGE) which, for the first time, allows for a cross-country comparison of firm level data across seven European countries. Focusing on external competitiveness,, proxied by 'total factor productivity' (TFP) computed at the firm level, the chapter first shows that firms become competitive in international markets when their TFP raises above a minimum threshold: competitiveness requires a quantum leap in a firm's TFP. Interestingly, such a minimum threshold tends to be stable across countries, but varies across international activities, with more complex activities (e.g. foreign investment) associated to a higher threshold of minimum productivity. Secondly, exploiting the richness of the dataset, the chapter finds that this quantum leap in productivity is triggered by specific firm characteristics related to innovation (human capital and R&D intensity), finance (adequate capital in the form of equity), managerial style (the use of performance-based salaries and a reduced presence of managers belonging to the family owning the firm), and the affiliation to a foreign group. Competitiveness is therefore more likely to be triggered by a policy environment conducive to the emergence of these specific firm-level characteristics across the Single Market, rather than by ad hoc country and/or industry-specific policy interventions based on aggregate indicators.

2.1 Introduction

The ability of 'growing out' of the crisis is widely recognised nowadays as the only long-term viable option for the sustainability of the EU and its model of social market economy. The latter requires enhanced 'competitiveness' at the EU level, which in turn would allow to capture growth currently taking place mainly in emerging markets.

Given the macroeconomic context, growth and competitiveness are thus strongly linked to the international performance of firms. Indeed, and more generally, a recent economic literature has increasingly underlined and shown empirically that aggregate industrial performance depends strongly on firm-level factors, such as size, organization, technological capacity, as well as on other conditions firms are confronted with in their specific environments, not least their ability to successfully operate on international markets. The punchline of this literature is that it is not countries that produce, sell and export but rather firms within countries, so 'competitiveness' at the country level is determined by the aggregation of individual firms' ability to compete successfully. It follows that the 'competitiveness' of a country should be defined as the ability of its firms to mobilize and efficiently employ (also outside the country's borders) the productive resources required to offer the goods and services in exchange for which other goods and services can be obtained, domestically or internationally, at favorable rates of substitution or terms of trade. In this sense, 'competitiveness' is just 'a poetic way of saying productivity' (Krugman, 1997).

In this chapter we take this 'bottom up' approach and discuss the ways through which international exposure and 'competitiveness' interact at the firm level. In so doing, we capitalize on the EU-EFIGE/Bruegel-UniCredit dataset (from now on the EFIGE dataset) that has recently become available thanks to the EFIGE project, coordinated by Bruegel and financed by the European Commission and UniCredit within the 7th Framework Program.[9] This dataset is unique

[8] This Chapter is derived from the EFIGE publication "The Triggers of Competitiveness", the EFIGE Cross-Country Report, jointly authored by C Altomonte, T. Aquilante and G.I.P. Ottaviano (forthcoming).

[9] For additional details and updates on the project, see www.efige.org.

in its kind, in that it allows for a comparison of firms' international activities, both across a rich set of internationalization activities and across key EU countries. Moreover, the EFIGE dataset can be matched with balance sheet information available from the Amadeus dataset of Bureau van Dijk, thus allowing for a control of firms' performance over time.

We exploit this wealth of information to correlate the entire range of international activities (imports, exports, foreign direct investment (FDI), international outsourcing) of firms in seven European countries (Austria, France, Germany, Hungary, Italy, Spain, United Kingdom) and their 'competitiveness'. In particular we proxy competitiveness via a number of firm-level productivity measures, namely total factor productivity (TFP), labour productivity and unit labour costs, with the latter being the measure typically used as the basis for the analysis of 'competitiveness' at the country-level. The aim is to check whether and to what extent firms involved in the various types of internationalization activities display higher levels of 'competitiveness' compared with firms that are internationally inactive.

We find that, controlling for country and industry characteristics[10], international exposure is, indeed, positively correlated with our measures of productivity at the firm-level.

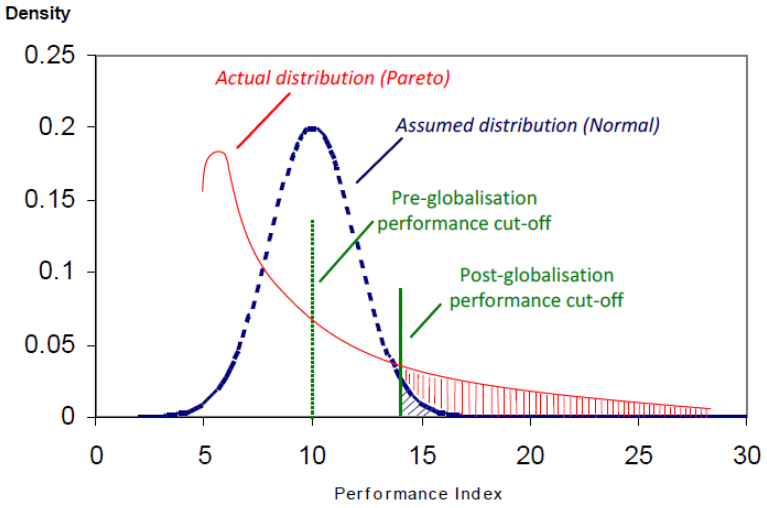
From a policy perspective, it is therefore crucial to identify the characteristics of those firms that are able over time to move from below to above the minimum productivity cut-off required to become competitive in the international environment. In other words, it is interesting to identify which variables (innovation, access to finance, training of the workforce, organization, etc.) might matter more in driving the productivity of European firms so as to trigger their international competitiveness. This exercise, only possible thanks to the richness of the EFIGE dataset, shows that the quantum leap is indeed triggered by specific firm characteristics such as human capital intensity, financial stability, productivity-based salaries, R&D intensity, quality certification, non-family management and affiliation to a foreign group. Policy-makers should therefore be cautious in basing their choices on aggregates that do not take into account firm characteristics and could thereby suffer large averaging bias. Consequently, policies aiming at creating a more favourable business environment in general - especially by promoting the skill upgrading of the workforce as well as competition in the product and labour markets - should be preferred to ad-hoc interventions.

2.2 Competitiveness at the micro-level

The trade literature has shown both empirically and theoretically that aggregate industrial performance depends heavily on firm-level factors (e.g. size, organization, technological capacity). It has also highlighted a crucial fact that, if neglected, can induce bad quality policy-making: contrary to standard beliefs enshrined in the iconic "average firm", in reality the shares of bad and good firms are not balanced in that, while there are a lot of bad firms, there are only a handful of very good firms, no matter which specific measure of firm-level performance (employment, turnover, value added per worker, total factor productivity, wage, etc.) is chosen. Indeed, within an industry or a country firm performance is typically distributed as in Figure 2.1.

[10] Throughout the chapter, 'industry' refers to the manufacturing industries of NACE Rev. 1 classification at two-digit level of aggregation. The terms 'industry' and 'sector' are used interchangeably.

Figure 2.1: Actual (Pareto) vs. Assumed (Normal) Distribution of firms' performances



Source: Altomonte *et al.* (2011).

The figure compares the standard assumed distribution (Normal) with the actual distribution (Pareto). It shows that the former underestimates the share of bad firms as in reality bad firms are much more frequent than good firms. This poses at least two problems. From a statistical point of view, if performance indicators are derived as averages over the available individual observations, the resulting average performance measure runs the risk of being biased because of improper weighting, thus delivering a distorted picture on the real underlying competitive position of a given industry or country. The second problem arises from an economic point of view. To see this, the figure reports two cut-offs. The basic idea is that, due to competition, only firms that are good enough can survive. This is true both before and after globalization. Before globalization, however, survival was easier as represented by the dashed vertical line labelled 'Pre-globalization performance cut-off'. With globalization survival has become tougher and this is captured by the vertical solid line labelled 'Post-globalization performance cut-off' to the right of the pre-globalization one.

Policies aimed at raising the average performance index (which in Figure 2.1 corresponds to the pre-globalization cut-off) could possibly be successful, but their success would not be reflected in a significant change of the competitive position of the industry as long as the number of firms above the post-globalization cut-off remained largely unchanged. What really matters for industry competitiveness is the ability to reallocate resources so that firms move from below to above the relevant cut-off. In this respect, micro-level analysis can be very informative as it unveils channels of competitiveness otherwise hidden by industry-level aggregations.

Being aware of the above, it is now crucial to converge towards a 'good' measure of firm's performance. In this chapter we will focus on total factor productivity (TFP), defined as the ability of a firm to combine its inputs (labour, capital and materials) in order to produce a certain output, since it is the measure that better suits the trade-based definition of competition adopted, as proved in several empirical contributions on the topic as well as in Altomonte *et al.* (2012). On the empirical ground, TFP is computed as the residual term of the estimation of

a Cobb-Douglas production function, and, in particular, we follow the approach suggested by Levinsohn and Petrin (2003).[11]

2.3 Description of the data

The EFIGE dataset constitutes a powerful tool given the needs of the research, as it has been constructed in order to obtain representative and comparable samples of manufacturing firms across seven European countries. In particular the dataset includes around 3,000 firms for Germany, France, Italy and Spain, more than 2,200 firms for the UK, and some 500 firms for Austria and Hungary (precise figures are reported in Table 2.1).

Overall, the questionnaire contains both qualitative and quantitative data on firms' characteristics and activities, for a total of around 150 different variables split into six different sections.[12] All questions mainly concern the year 2008, with some questions asking information for 2009 and the previous years in order to have a picture of the effects of the crisis as well as the dynamic evolution of firms' activities.[13]

Table 2.1: EFIGE sample size, by country

Country	Number of firms
Austria	443
France	2,973
Germany	2,935
Hungary	488
Italy	3,021
Spain	2,832
UK	2,067
Total	14,759

Source: EFIGE Survey dataset. Note: Industry codes are not available for 316 firms.

An interesting characteristic of the EFIGE dataset is that, on top of the unique and extensive cross-country firm-level information contained in the survey, data can be matched with balance sheet figures. More precisely, EFIGE data have been integrated with balance sheet data drawn from the Amadeus database managed by Bureau van Dijk, retrieving nine years of usable balance sheet information for each surveyed firm, from 2001 to 2009.

Given the focus of the chapter we exploit the richness of the dataset to retrieve information of exposure on the international markets of each firm in the sample. To that extent, we classify firms along seven, non-mutually exclusive, internationalization categories. Firms are consid-

[11] Using ordinary least squares when estimating productivity implies treating labour and other inputs as exogenous variables. However, profit-maximizing firms adjust their inputs each time they observe a productivity shock, which makes input levels correlated with the same shocks. Since the latter are unobserved to the econometrician, inputs turn out to be correlated with the error, biasing the OLS estimates of production functions. Olley and Pakes (1996) and Levinsohn and Petrin (2003) have developed two similar semi-parametric estimation procedures to overcome this problem, using investment and material costs, respectively, as proxies for these unobservable shocks.

[12] Proprietary structure of the firm; Structure of the workforce; Investment, technological innovation and R&D; Internationalization; Finance; Market and pricing.

[13] The complete questionnaire is available on the EFIGE web page, www.efige.org. A discussion of the dataset as well as preliminary evidence on the internationalization modalities of firms is available in the 2nd EFIGE Policy Report by Barba Navaretti et al. (2011). The 3rd EFIGE Policy Report by Békés et al. (2011) discusses explicitly the reaction of firms to the crisis.

ered exporters if they reply "yes, directly from the home country" to a question asking whether the firm has sold abroad some or all of its own products / services in 2008.[14] Concerning imports, we follow the same procedure, distinguishing materials and service imports. With respect to Foreign Direct Investment (FDI) and International Outsourcing (IO), we have exploited a question asking whether firms were running at least part of their production activity in another country: firms replying "yes, through direct investment (i.e. foreign affiliates/controlled firms)" are considered as undertaking FDI, while firms replying "yes, through contracts and arm's length agreements with local firms" are considered as pursuing an active international outsourcing strategy.[15] We have then looked at firms involved in international value chains, although not actively pursuing an internationalization strategy, through a question asking whether part of the firm's turnover was made up by sales produced according to a specific order coming from a customer (produced-to-order goods): firms replying positively, and indicating that their main customers for the production-to-order activity are other firms located abroad, are considered as pursuing a passive outsourcing strategy. Hence, a passive outsourcer is the counterpart of an active outsourcer in an arm's length transaction. Finally, thanks to a question that allows identifying the main geographical areas of the exporting activity, we have identified 'global exporters', i.e. firms that export to countries outside the EU.

Table 2.2 provides some descriptive statistics for our seven categories of international activities, as well as the residual category of local firms not active abroad.

Table 2.2: International categories of firms-Descriptive statistics, 2008

	N. of firms	Avg. turnover per firm (in 1,000 EUR)	Avg. n. of employees	Avg. Capital stock per employee (in 1,000 EUR)
Non Active abroad	3,402	4,443.33	31.44	152.16
Active abroad	11,357	19,273.46	139.85	196.4
of which				
Exporter	9,849	20,494.21	151.42	199.03
Importer of services	3,449	38,659.98	332.12	223.57
Importer of materials	7,298	24,976.44	191.17	200.36
Global exporter	4,016	24,777.71	103.43	222.93
Passive outsourcer	5,799	17,052.42	83.96	204.98
Active outsourcer	590	24,657.11	119.55	225.28
FDI	719	77,637.20	334.13	239.55
Whole sample	14,759	15,589.29	114.52	186.59

Source: EFIGE dataset.

From Table 2.2, we can identify a clear ranking of firm characteristics with respect to the degree of involvement in international activities, in line with an enriched theory of self-selection of heterogeneous firms into international activities à la Helpman *et al.* (2004). In particular, Table 2.2 shows that internationally active firms tend to be larger, have higher sales and are

[14] In order to encompass the phenomenon of temporary traders, we have considered as exporter also a firm replying "regularly/always" or "sometimes" to the question "Before 2008, has the firm exported any of its products?". For importing firms, we combine the following questions: firms replying "yes, from abroad" to "In 2008 has the firm purchased any materials (services) for its domestic production?" and firms replying "regularly/always" or "sometimes" to "Before 2008, did the firm purchase any materials (services) from abroad?".

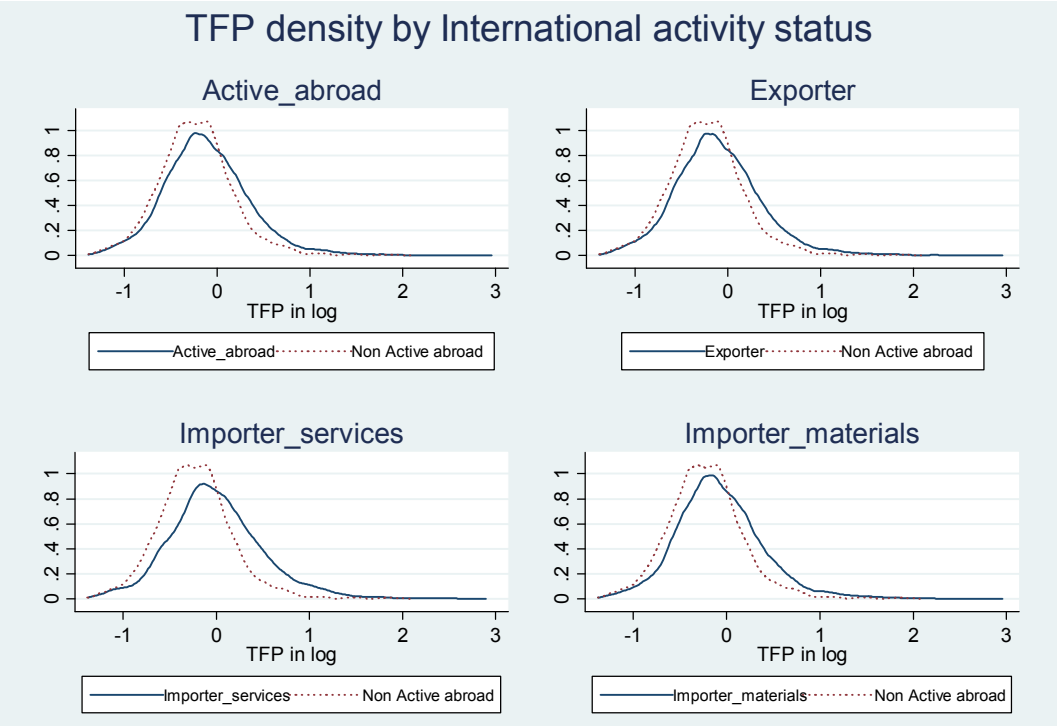
[15] Note that these firms are attributed to the country in which they are located and thus surveyed, although the 'nationality' of the group they possibly belong to may be different.

more capital intensive.[16] The position along the turnover ranking tends to increase with the degree of complexity of international activities, from exporter, to importer of material / active outsourcing, to importer of services and FDI. Local firms involved in international value chains (i.e. the 'passive outsourcers') are somewhat smaller than the average of all internationally active firms, but larger than purely local firms.[17]

2.4 Exposure on the international markets and competitiveness

We can now assess the correlation patterns between the degree of involvement in international activities and firm 'competitiveness'. As said above, we proxy the latter with total factor productivity (TFP). As a preliminary result, Figure 2.2 compares the distribution of TFP for every specific international activity with the one of firms that are not involved in any of these. As well as providing evidence of the consistency of our dataset with the pattern described in Figure 2.1, Figure 2.2 shows clearly that being active in some sense on the international markets is associated with higher productivity.

Figure 2.2a: TFP distribution by international activity, 2008

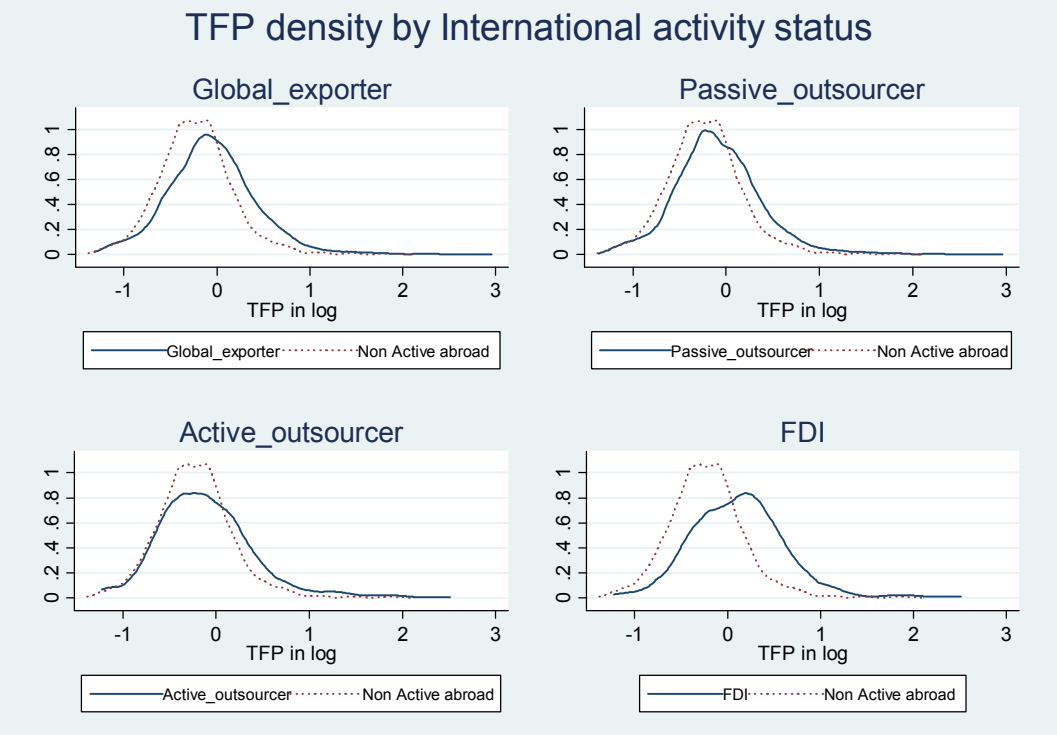


In order to assess more properly this relationship and be sure that the correlation found is not driven by any compositional effect, we estimate the relationship through ordinary least squares. We thus estimate the impact of various international activities, included one by one to avoid multicollinearity problems, on the dependent variable which is the logarithm of TFP, controlling for country and sector fixed-effects. The results are provided in Table 2.3.

[16] As already stated, the fact that internationally active firms are more numerous in our sample with respect to domestic firms derives from the truncation of the sample at 10 employees. A general validation of firms' characteristics as derived from the sample with respect to official structural business statistics is provided in Section 4.1.

[17] We do not control here for foreign ownership, that is, whether a given firm is controlled by a foreign entity, while we account for the fact that a given firm controls an affiliate abroad (foreign investment).

Figure 2.2b: TFP distribution by international activity



Source: EFIGE Cross Country Report.

Table 2.3: Estimation results

	(1)	(2)	(3)	
Dep. variable: TFP	OLS	OLS	O.Probit	N
Active abroad	0.0906***	0.0353***	0.261***	7,259
	(0.0132)	(0.0128)	(0.0290)	
Exporter	0.0999***	0.0399***	0.272***	6,563
	(0.0136)	(0.0131)	(0.0298)	
Importer of services	0.171***	0.0626***	0.620***	3,334
	(0.0171)	(0.0171)	(0.0531)	
Importer of materials	0.118***	0.0449***	0.394***	5,320
	(0.0142)	(0.0138)	(0.0332)	
FDI	0.257***	0.0980***	0.750***	1,862
	(0.0329)	(0.0357)	(0.0750)	
Passive outsourcer	0.122***	0.0558***	0.329***	4,372
	(0.0151)	(0.0150)	(0.0342)	
Active outsourcer	0.134***	0.0477	0.364***	1,777
	(0.0309)	(0.0306)	(0.0755)	
Global exporter	0.156***	0.0699***	0.425***	3,652
	(0.0168)	(0.0167)	(0.0368)	
Country fixed effects	Yes	Yes	Yes	–
Industry fixed effects	Yes	Yes	Yes	–
Firm size	No	Yes	No	–

NOTE: Standard errors in parentheses. *** denotes statistical significance at the 1-percent level. One cross-sectional regression for each internationalization characteristic, with sector and country dummies. Column 2 controls also for the size class of firms (10-19; 20-49; 50-249; >=250 employees). The number of observations is given by the number of inactive firms plus the number of firms active in the selected international activity.

The table confirms the evidence of a productivity premium associated with the openness to the international markets; moreover it emerges that some activities are more complex and require higher productivity levels, especially for what concerns doing foreign direct investment, whereas some others are less demanding, such as exporting. This pattern is robust throughout all the models tested even if we notice that when we control for the size of the firm (column (2)) all the premia decrease, but remain positive and significant, coherently with the common finding of a strong correlation between the size of a firm and its ability to compete on the international market. Column (3) reports the result of the same set of regressors used in column (1) but on the deciles of TFP, rather than on the continuous variable, and the model is fitted via ordered probit. Comparing columns (1) and (3) we can easily conclude that the results are robust to both the modelling frameworks chosen.

The evidence presented in Table 2.3 constitutes a sound building block and leads to another research question: once assessed the relationship between competitiveness and exposure on the international market, which could be the drivers that foster productivity and thus enable the firms compete abroad? Notice that this issue relays on the common finding in the literature, that the causal relationship goes from productivity to the international activities and not the other way round.[18] Following the framework proposed by Melitz (2003), we assume that there is a productivity cut-off that allows a firm to compete on the international market, and those firms that do not overcome it serve only the domestic market. Observing the distribution of TFP and its relationship with exporting, the most common international activity, we proxy this cut-off with the 7th decile of the TFP distribution.[19] Once the relevant threshold has been identified, we have classified all EFIGE firms according to their positioning in the TFP distribution before and after 2008, thus endogenizing their international status through their relative TFP level.[20] This allows us to sort four categories of firms: those that remain always below the critical cut-off for the entire time span of our sample (2001 to 2008); those 'superstar' firms that remain always above it; those firms losing out in competitiveness and moving from above to below the cut-off; and finally those 'switching' firms, able to climb the competitiveness ladder and pass the cut-off in 2008. The latter category deserves major attention as these are the firms moving from below to above the criticial productivity threshold significantly associated with an international presence.

Exploiting the richness of the EFIGE dataset we link these categories to a set of firm-specific characteristics concerning the age of the firm, the propensity of doing R&D, the relative presence of high-skilled human capital, the use of flexible labour contracts, the ownership and management, the use of performance-related bonuses and the reward of some kind of quality certification. We also included two measures of financial well-being, the Cash Ratio, measuring the firm's chances of paying off short-term debts without the need for additional external funds[21] and the Financial Independence Index (FII), a proxy for the long term's financial stability of a firm.[22] Table 2.4 provides an overview of the relationship between the firm-level structural characteristics obtained from EFIGE and the four categories identified with respect to the critical productivity threshold. With respect to virtually all the considered vari-

[18] See as references among others Bernard and Jensen (1999) and Melitz and Ottaviano (2008).

[19] The 7th decile threshold of productivity is also confirmed by an econometric analysis.

[20] To avoid dealing with missing data and attrition bias, we have considered average TFP in the 2001-2007 vs. 2008-2009 periods.

[21] The indicator is derived as the ratio between cash flows and current liabilities.

[22] The ratio is calculated as capital + cash flows over total assets. The "optimal" ratio is fixed greater than or equal to 0.33, meaning that at least one third of the firm's assets must be financed (covered) by internal resources.

ables there is a common ranking emerging, which goes from the 'remain below' firms, to the 'switching', to the 'move below' and to the 'remain above' ones. An exception to this pattern is provided by human capital, which marks whether the firms employ a number of graduates workers higher than the national average, for which the switching firms display a higher average than the 'remain above' ones.

Table 2.4: Firms' structural characteristics as measured in EFIGE (2008) vs. TFP threshold

	N. of firms	Revenues	Empl.	TFP	FII	CashR	Age	R&D	HK	Lab. flex	Fam. Mng.	Fam. CEO	For. Group	Bonus	Qual. Cert.
Remain below	3,823	4,146.08	27	0.65	0.38	0.13	0.29	0.5	0.28	0.81	0.39	0.7	0.02	0.2	0.47
Move below	1,010	12,271.07	66.5	0.82	0.49	0.17	0.37	0.58	0.3	0.82	0.23	0.6	0.08	0.32	0.64
Move above (swing)	942	7,805.91	34.03	1.13	0.43	0.21	0.28	0.61	0.34	0.84	0.28	0.62	0.06	0.31	0.6
Remain above	2,856	53,921.06	341.92	1.55	0.5	0.26	0.41	0.65	0.32	0.84	0.15	0.5	0.17	0.45	0.73
Total	8,631	19,462.24	126.26	0.99	0.43	0.18	0.33	0.56	0.3	0.82	0.29	0.62	0.08	0.3	0.58

Source: EFIGE dataset. Empl. = employment; TFP = total factor productivity; FII = financial independence index; CashR = cash ratio; R&D = research and development; HK = human capital; Lab.flex = flexible labour contracts; Fam Mbg. = family managed; Fam. CEO = CEO related to the family owning the firm; For. Group = owned by a foreign group; Bonus = payment of performance-related bonuses; Qual. Cert. = quality certification.

In order to assess more properly the relationship between the probability of overcoming the productivity cut-off and the various firm-level characteristics we estimate a probit model where the dependent variable is a dichotomous variable marking the switching firms and the regressors are the firm-level structural characteristics introduced above. Table 2.5 provides the resulting coefficients. We have tested separately the impact of the two financial indicators introduced above, to avoid multicollinearity problems. Furthermore, notice that each model is tested on the dependent variable once against both the firms that get and remain below the cut-off, and once against only those firms that remain below.

Table 2.5: Firms' characteristics and switching probability, 2008

	(1) Switch	(2) Switch	(3) Switch	(4) Switch
Variables	Move Up=1 Remain/ get below=0	Move Up=1 Remain Below=0	Move Up=1 Remain/ get below=0	Move Up=1 Remain Below=0
R&D	0.135***	0.142***	0.149***	0.152***
	(0.0500)	(0.0529)	(0.0501)	(0.0529)
Age	-0.0579	-0.0355	-0.0424	0.00304
	(0.0512)	(0.0548)	(0.0512)	(0.0547)
HK	0.0596	0.0791	0.0457	0.0591
	(0.0509)	(0.0543)	(0.0514)	(0.0549)
Labour flex	-0.0421	-0.0521	-0.00824	-0.0245
	(0.0653)	(0.0693)	(0.0661)	(0.0703)
FII	0.238**	0.535***		
	(0.114)	(0.124)		
CashR			1.322***	1.583***
			(0.134)	(0.146)
Fam. Mng.	-0.0768	-0.0917	-0.118**	-0.142**
	(0.0570)	(0.0597)	(0.0574)	(0.0601)
Fam. CEO	-0.0699	-0.0847	-0.0714	-0.0947*
	(0.0524)	(0.0558)	(0.0527)	(0.0560)
For. group	0.211*	0.310**	0.268**	0.363***
	(0.113)	(0.129)	(0.113)	(0.129)
Decentr. Mng.	-0.00840	0.0211	0.000900	0.0138
	(0.0552)	(0.0593)	(0.0556)	(0.0595)
Bonus	0.0614	0.0853	0.0363	0.0603
	(0.0537)	(0.0579)	(0.0542)	(0.0583)
Qual cert.	0.0721	0.100*	0.0831*	0.114**
	(0.0494)	(0.0519)	(0.0496)	(0.0520)
Comp	-0.0431	-0.0174	-0.0234	8.88e-05
	(0.0492)	(0.0523)	(0.0494)	(0.0525)
Country fixed-effects	Yes	Yes	Yes	Yes
Industry fixed-effects	Yes	Yes	Yes	Yes
Firm size	Yes	Yes	Yes	Yes
Observations	4,718	3,912	4,815	4,036

Note: Standard errors in parentheses. ***, **, * denotes statistical significance at the 1,5 and 10-percent level respectively. Empl. = employment; TFP = total factor productivity; FII = financial independence index; CashR = cash ratio; R&D = research and development; HK = human capital; Lab.flex = flexible labour contracts; Fam Mbg. = family managed; Fam. CEO = CEO related to the family owning the firm; For. Group = owned by a foreign group; Bonus = payment of performance-related bonuses; Qual. Cert. = quality certification; Comp = intensity of competition as reported by the firm.

The results suggest that there are, indeed, some firm-level characteristics that are robustly related to a higher probability of overcoming the critical threshold, such as undertaking R&D activities, being part of a foreign group or possessing some kind of quality certification. Conversely there are some variables that reduce the probability of switching, such as being managed by members of the owning family or having a CEO related to the family. Both models highlight the positive driving role of the financial shape of the firms, with both the indicators included displaying positive and significant coefficients.

2.5 Conclusions and policy implications

What triggers competitiveness? This chapter has taken a systematic approach to addressing this question. Focusing on external competitiveness, it first has argued that this issue can be better explored exploiting firm-level data, as aggregate measures of competitiveness are typically plagued by a number of potential biases which lower their ability to lead to precise policy conclusions.

The chapter has shown that firms become competitive in international markets when their TFP rise above a minimum threshold (i.e. competitiveness requires a quantum leap) that tends to be stable across countries but varies across international activities. Exploiting the richness of a novel dataset (EFIGE), it has also found that this quantum leap is triggered by specific firm characteristics related to innovation (human capital and R&D intensity), financial well-being, managerial style (reduced presence of managers belonging to the family if owning the firm), and the affiliation to a foreign group. Moreover, we have shown that, although firms able to move over time above the minimum productivity threshold are relatively small (an average of 34 employees vs. a sample average of 126), it is not size per se that triggers competitiveness, but rather the ability to grow in productivity: relatively smaller firms, if endowed with certain characteristics, are more likely to grow, and for these reasons are picked up by our exercise.

Finally, the chapter has shown that these effects do not necessarily depend on specific countries or industries, as they are typically related to systematic features of firms characteristics in general ignored in the policy debate on competitiveness.

From a policy making viewpoint, four main policy messages can be derived from our analysis:

1. The single best predictor of a firm's ability to successfully compete in international markets is its total factor productivity (TFP). Hence, firm productivity growth, and not internationalization per se, should be the central target of the policy dartboard.
2. all forms of internationalization of firms (including imports and participation in global value chains) matter for competitiveness, not only exports;
3. The promotion of firm productivity should go beyond the traditional exercise of educated guesswork around a black-box. In this respect, we have shown that firm productivity growth is triggered by the combination of very precise firm characteristics such as human capital intensity, financial stability, productivity-based salaries, R&D intensity, quality certification, non-family management and affiliation to a foreign group.
4. Firms' attitudes are not immutable but rather shaped by policies. Hence, the promotion of productivity growth and competitiveness should go beyond the logic of mere compensation (subsidies), targeting instead the specific institutional aspects that make firms inclined to acquire the described right set of characteristics. The eagerness to acquire these characteristics can be nurtured, for example, through the design of incentives to R&D, of more direct links between wages and productivity within the national wage bargaining systems, of capital markets less dependent on banking finance and more favourable to the development of equity finance and the availability of adequate skills in the workforce.

To summarize, 'competitiveness' is the cause rather than the consequence of firm internationalization, EU policies promoting internationalization per se would hardly affect 'competitiveness'. Vice versa, policies that foster the ability of competitive firms to trade, outsource

and invest abroad via the acquisition of the 'right' set of characteristics would be beneficial for both the external, but also the internal, competitiveness of the country.

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3. Exporting and Productivity – The issue of causality

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This chapter summarises the evidence from the economics literature on the direction of causation between exports and productivity, It identifies four channels through which aggregate productivity might change in response to exports and exporting: 1) it affects the productivity within firms 2) it reallocates resources across firms 3) it encourages new entry and the exit of weak firms 4) it reallocates resources across industries. The main research themes under each of these headings are identified and the main challenges and controversies are discussed. A conclusion is reached that there is evidence that exporting increases aggregate productivity by affecting each of those channels. The effects are however, weakest for the reallocation across industries and most difficult to identify on the productivity within firms.

3.1 Introduction

During the current global economic crisis it has become clear to many that the economies of countries that are successful exporters, Germany and China for example, have proved to be far more resilient than the economies of countries such as Greece, Spain and Italy, which are not. For many, this would be seen a prima-face evidence that government policy should be targeted at encouraging exports and that exporting is a way to improve the rate of economic growth or productivity - the fundamental driver of changes in living standards. Indeed, given the plethora of policy statements made by governments of different colours around the world about the need to boost exports, this same conclusion would appear to have been reached by many others.

Academic economists, being the most dismal proponents of the dismal science, would view themselves as reluctant to endorse such a policy conclusion without a much stronger evidence base. So, what evidence does exist that exporting causes changes to economic or productivity growth, and where and how should we look for it?

Looking at this question from the perspective of whether countries that are more open to international trade grow more quickly than countries that are not, the evidence looks encouraging and would tend to support the view that exports matters for growth. The simplest measures of trade orientation, such as exports plus imports as a share of GDP, or the growth rates of imports and exports, show a positive correlation with GDP growth. Academics might quibble about the accuracy of these measures of openness, but there are ways to correct for these problems, and then the results look even stronger. Measures of trade orientation based on the ratio of exports and imports to GDP are affected by differences in country size. On this measure of trade openness the UK would be classed as less open to international trade compared to a small country like Belgium, whose ratio is over 100%. Yet the two countries are governed by the same trade policies. These differences in the share of international trade to GDP simply reflect that the United Kingdom (UK) has a larger internal market. Leamer (1988) uses a method that takes out the effect of factors such as domestic market size and constructs a measure of the extent to which actual openness to international trade differs from its predicted level (what would be predicted in the absence of trade policy distortions). This is then used in a study by Edwards (1992) to show a positive and statistically significant effect of openness on growth.

Whilst this macro evidence also points to a strong robust correlation between exports and growth it has a number of limitations. Firstly, it has limited value as a basis for intervention. It is after all, firms that are engaged in international trade, not countries. Several explanations have been put forward to explain why exports matters for growth. These include scale economies (larger sales allow firms to produce things more cheaply); learning by exporting (firms learn about higher quality technologies and work practices overseas); competition effects (firms reduce waste and inefficiencies in the face of greater import competition); quality upgrading (firms are encouraged to produce higher quality products) and imports (firms can import higher quality intermediate inputs from abroad, which improves the quality of the products they produce). But which of these effects dominate? Where should policy efforts be targeted in a time of fiscal austerity order to maximise the bang-from-each-buck? Is it actually better to encourage importing, so as to encourage greater competition or availability of intermediate inputs? Or should firms be encouraged to invest to improve the quality of their products?

The second problem is that the macro evidence provides evidence of a correlation between exports and productivity but not, necessarily, of a causal effect from exports to productivity. Casual empiricism is not evidence of causal relationships. GDP, and therefore its growth, is a determinant of exports, just as exports is a determinant of GDP growth. So, does the above evidence capture the effect of exports on GDP growth or does it reflect the effect of GDP growth on exports? Alternatively it might be that they are they both explained by some other variable – maybe there are productivity shocks that increase both GDP growth and the ability to export. Does establishing the direction of causation matter? Yes. Policy intervention costs money, even if it just includes the time of the civil servants needed to design and implement it, and so it would be helpful to know whether it has at least some a-priori chance of succeeding. Luckily, an entire army of academic economists have tried to disentangle the direction of causation.

For some, the solution to deal with both of those problems has been to argue for the use of data on firms rather than countries. If we know what happens to firms when they export we will have some idea about which of those different channels has the largest effect. We also may be better able to deal with causality issues at the micro level - trade policy is unlikely to be determined by the preferences of an individual firm (for most firms at least). In practice the use of micro data, not surprisingly, is a better solution to the question about detail, than it is about the issue of causation. That said, and as will be evident below, the controversy on the direction of causation between exports and productivity at the micro level is confined to one aspect of the possible effects of exporting on productivity.

Before we get there we need a bit of background detail on how we get from aggregate productivity growth down to firms though, if only because this provides a means of organising the available evidence.

3.2 Aggregate Micro Productivity

Productivity is the value of output produced from a given level of inputs. The simplest measure is output per worker (output/worker time). More complicated measures account for the amount of machines, computers etc. that the worker has at their disposal. This is known as total factor productivity. I'll just refer to both as productivity so as not to confuse matters any further, but recognise that to some this is an important assumption.

Aggregate productivity within an economy is then the weighted average of the productivity of every firm, weighted so as to give more importance to large firms (using their employment of market share). These weights matter because the differences in productivity between firms are large. According to Syverson (2004), in the US firms near the top of the productivity distribution (the 90th percentile) produce close to twice as much output from an identical amount of inputs compared to firms that are near the bottom of the productivity distribution (the 10th percentile). In other countries these differences are even larger (Syverson, 2011).

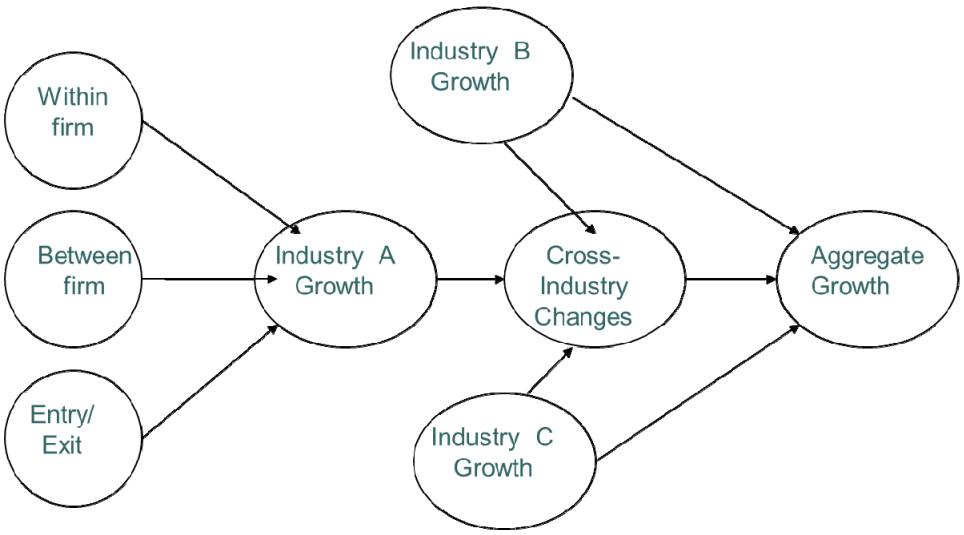
Aggregate productivity growth, as set out in Figure 3.1, depends on how the productivity of those firms changes over time, what happens within firms, but also if those weights change. So, for example if small firms are very productive compared to large ones, then if those small firms gain market share they will become more important in the productivity calculation and even if they don't change what they do, they don't become any more productive, aggregate productivity will rise.

As set out in Figure 3.1 productivity change also depends on the entry and exit of firms. Every year some firms enter an industry and some leave. These rates of entry and exit are also large. According to data from the OECD, in the manufacturing sector amongst OECD countries, between 4.38% (Slovenia) and 10.58% (Latvia) of the firms in an industry each year are new. In the service sector the rate of entry are even larger, in the range from 6.77% (Sweden) to 13.36% per annum (Norway). Exit rates are in a similar range. Lots of firms shut-down each year, irrespective of whether we are in a boom or a recession.[23] What matters for aggregate productivity growth is whether the firms that leave are more, or less, productive than the ones that enter. One would hope that it is the former, but that is not always the case.

Those changes within firms, between firms and net-entry happen in each industry (say industry A in figure 3.1). The same process happens in other industries as well (industries B and C). There is also reallocation across industries. Some industries get smaller, perhaps because the country has a comparative disadvantage in its production compared to other countries, whereas other industries grow. Again it matters whether those industries where economic activity moves to are more or less productive than those they leave.

[23] These figures are also of a comparable magnitude to those reported in other studies. Bartelsman et al. (2005) for example report rates of churn (entry + exit) for 16 countries from the early 1980's to 2001 as between 20-25% per annum. Similarly, Roberts and Tybout (1997) using data for Chile, Colombia and Morocco report turnover rates of between 25 and 30%, while Aw et al. (1997) report for Taiwan an exit rate of 87% over a 10 year period.

Figure 3.1: A Decomposition of Aggregate Productivity Change



Source: author

There are then, four different channels of productivity growth that we need to consider

- Within firm productivity change
- The reallocation of resources between firms
- The net-entry-exit of firms
- The reallocation of resources across industries

The evidence suggests that all of these channels can matter, it is not the case that the within firm effect is the largest for example (see the evidence in Scarpetta et al., 2002). There is therefore no reason to emphasise the results from one of these channels over another.

3.3 Exports and Within Productivity Change

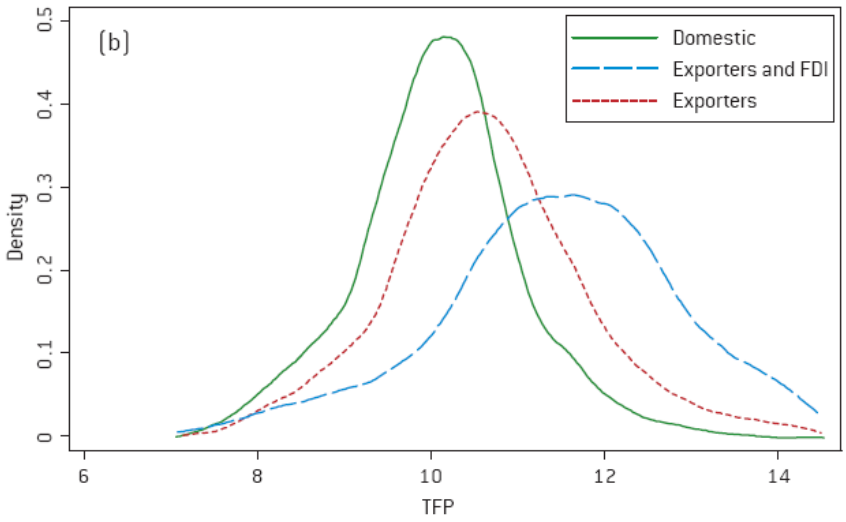
The basic patterns of exporting at the micro level have now been studied for many different countries.[24] Each paints a picture that is remarkably similar. Two very strong results are that not all firms export, and those that do are different from those that do not. This is summarised in Figure 3.2 below. Taken from a study on Belgian firms by Mayer and Ottaviano (2008), the figure shows the productivity distribution of firms that just sell their output in the domestic market (labelled domestic), those that export (and sell in the domestic market) and those that both export and are multinational firms (and sell in the domestic market). As can be seen the distributions overlap, we will discuss some implications of this below, but the peak of the distribution of domestic-only firms is to the left of the peak for the exporters, which is to the left of the peak for exporter-FDI firms. This implies that the average productivity of non-exporters is less than that for exporters, which is less than that for multinational firms. The best firms become multinationals, but exporters are more productive than non-exporters. As evident from the figure the peak of each of the curves becomes lower as one moves from firms that sell just in the domestic market, to those that export, to exporter-FDI firms. This indicates that there are fewer multinationals, compared to exporters, compared to non-exporters. Not all firms in an

[24] Greenaway and Kneller (2007b) and Wagner (2007) discuss the evidence in this section in greater detail.

industry sell their output in international markets. Mayer and Ottaviano (2008) call them the 'lucky few'.

Figure 3.2: The Productivity Distribution of Non-exporters, Exporters and Multinational Firms

Belgian firms, 2004



Source: Mayer and Ottaviano (2008)

So firms that export are more productive than the firms that do not. That begs the question of which came first, the exporting or the productivity. This was also the question that academic economists began with. Their answer was emphatic, it was the productivity. They reasoning developed along the following lines. If firms benefit from their exposure to international markets, they learn[25] from others, then, firms that export should keep learning at a faster rate than non-exporters. They should therefore, have faster productivity growth than non-exports. In practice they don't, in fact they have near identical rates to each other. Whatever was being learnt by these new exporters, its effects did not last forever. Instead the best firms become exporters, because you need to be a good firm to deal compete with foreign firms in their own back-yard (this is called self-selection).

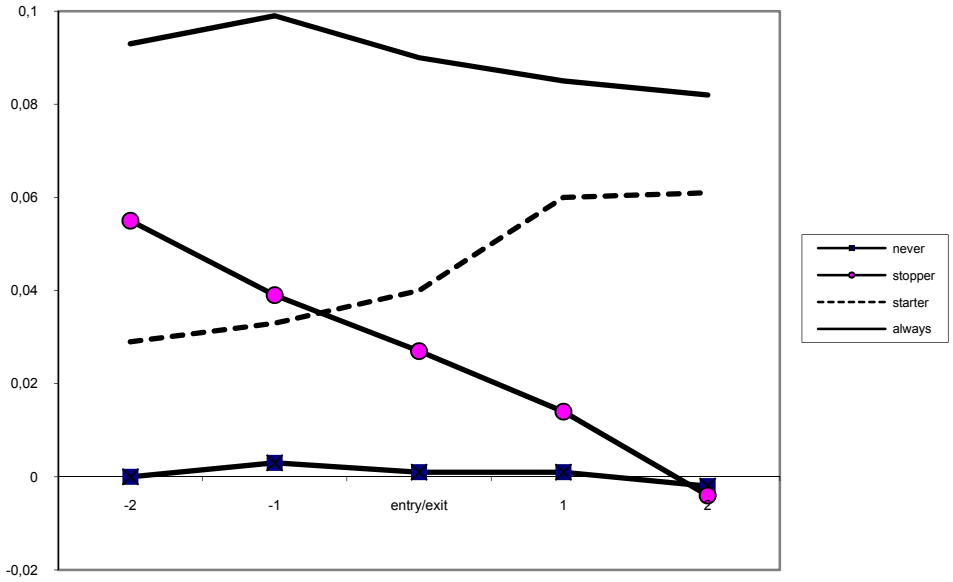
For firms that started exporting the results were a mix of higher initial productivity levels and faster growth. These firms that started to export had higher productivity than non-exporters, but not quite as high as established exporters. This suggested that future export-market entrants already had many of the right characteristics and therefore were always likely to leave the pool of non-exporters. They also had faster productivity growth than both established exporters and non-exporters, but this was faster both before and after they started exporting. After a few years they settled down to having a similar rate of productivity growth to everyone else. The difference in the level of productivity between new exporters and non-exporters seemed to strongly suggest that much of what was taking place was self-selection. The most productive firms were selecting into export markets – where their higher productivity allowed them to manage any complications associated with selling in foreign markets. If there was to be any benefit from starting to export on the productivity effect it was only going to top-up

[25] The umbrella label 'learning' contains all of the channels described previously in the text; competition effect; product quality; imported inputs; efficiency etc. In this regard, micro data offer no solution to the problem of detail.

the advantages these firms already had. To put this another way, it was only going to temporarily boost productivity growth.

What happens to new exporters, non-exporters and established exporters is all summarised in Figure 3.3 below. Adapted from a paper on US firms, in this figure the productivity of the firm is being measured relative to the industry mean. As most firms in an industry are non-exporters the productivity of the never exporting firms is close to zero (close to the industry mean). The line at the top refers to firms that always export. This indicates that they have a higher level of productivity (about 10% higher according to the figure), but the slope is reasonably flat. They have a higher level of productivity than non-exporters, but they do not have faster productivity growth. All of the action is by firms that start to export or stop. The starters are better than the non-exporters, but not as good in terms of their productivity to always exporters. This line also trends up over time, revealing the change in productivity that occurs around the point of export market entry.

Figure 3.3: Productivity Change for Non-exporters, Exporters and Firms that Start or Stop Exporting



Source: adapted from Bernard and Jensen (2004).

Building on the above evidence, the hypothesis under test therefore evolved to one of a bi-causal relationship between self-selection and learning for new exporters. Self-selection is important for new exporters, but does it also lead to additional productivity as a result of learning by exporting? Recognising that new exporters appeared to already have many of the right characteristics to become exporters one can test 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.[26]

The impact of these changes to the hypothesis being tested (and as a consequence the methodology) has been largely to confirm that self-selection is more important than learning,

[26] As a consequence of the change in focus, the methodology used also evolved, with attempts to control for self-selection using either instrumental variable or matching (alone or in combination with difference in differences). As argued in Van Biesebroeck (2005) not controlling for self-selection will overstate evidence of learning for new exporters in the data.

although not consistently so. For example, comparisons of new exporters and non-exporters in Germany (Wagner, 2002) find no learning effects for new exporters, whereas for the United Kingdom (Girma et al., 2004) there are. So what explains these differences in outcomes across countries that would appear broadly similar? Two issues have been explored, heterogeneity and timing. Some have argued that learning is likely to be specific to some firms, such as those that are young (Delgado et al. 2002; Fernandes and Isgut, 2005), or highly exposed to export markets (Kraay, 1999; Castellani, 2002; Girma et al., 2003; Damijan et al., 2006). Others have argued they depend on the scope for learning (Greenaway and Kneller, 2007a).

More pertinent is the issue of timing. Lopez (2004) and Alvarez and Lopez (2005) have questioned the timing issue, arguing that productivity changes occur after the decision to export, that is they may pre-date the point at which sales begin.[27] Firms invest in new technologies leading to pre-entry changes in productivity: they *learn to* export rather than *learn by* exporting. This has existed as an idea within the case study literature for some time (see the review by Pack, 2000) and a number of studies report anecdotal evidence (Lopez 2004; Alvarez and Lopez, 2005; Van Biesebroeck, 2005; and Blalock and Gertler, 2004). It takes the view that learning effects are neither inevitable nor automatic but require investments in domestic technology (Keller, 2004).

Empirical testing of the learning to export hypothesis using micro data sets becomes more difficult owing to the unobservable nature of the decision to try export, and the likelihood that preparation time varies across firms. As Lopez (2004) notes however, without information on timing of the decision, the time path of productivity in the presence of learning to export is likely to look similar to that of one where it has nothing to do with exporting. Another way to say the same thing, is that studies that compare non-exporters with new exporters at the point at which export sales begin probably do not reveal very much about which causes which.

Two studies that have got closest to solving this issue have been that by Lileeva and Trefler (2010) and Iacavone and Javorcik (2012). These studies share a similar approach using future changes in trade policy (tariff cuts) as a signal for firms to invest. Lileeva and Trefler also capture the idea of heterogeneity in this effect. Studying a period of trade liberalisation between Canada and the US, they argue that firms with low-productivity but who produced products that are subject to large tariff cuts were induced to invest in their productivity in order to start to export. In contrast, for firms that were initially productive, but did not export, the tariff cut was large enough to induce them to export, but not invest in their productivity. The largest benefits to productivity from exporting will therefore be those with initially low-productivity. They find strong support for the predictions summarised in Table 3.1. Moreover, as the tariff cuts are exogenous to the firm these results reveal causal effects from starting to export on the productivity of firms. By looking in the right way, causal effects from exporting can be found.

[27] Alvarez and Lopez (2005) label pre-entry effects as 'learning to export' compared to 'learning by exporting' for post-entry effects. The common element between these is the effect of the decision to export on the firms' productivity.

Table 3.1: Relationship between Tariff Cuts and Productivity in Lileeva and Trefler (2010).

		Initial Productivity	
		Low	High
Tariff Cut	Small	Remain as Non-exporter Do not invest in productivity	Start to Export Do not invest in productivity
	Large	Start to Export Invest in productivity	Start to Export May invest in productivity

Source: Based on results in Lileeva and Trefler (2010)

Iacovone and Javorcik (2012) do not directly study productivity but instead use the prices a firm charge for its products. Under certain assumptions higher prices indicate higher quality goods. They observe that future export products have the same price as other products sold in the domestic market until 2-years before export sales begin. Then there is a sudden jump in price, which indicates an increase in the quality of products. They interpret this as being indicative of firms consciously readying themselves for export market entry. The firm invests to upgrade the quality of their products to meet the higher standards demand by foreign customers. Again this suggests a causal effect from exporting to productivity.

3.4 Exporting and the Reallocation of Resources Between Firms

The reallocation of resources across firms is a significant source of productivity growth. According to calculations by Scarpetta et al. (2002), between 30 and 85 per cent of total productivity growth in OECD countries is explained by the reallocation of resources across firms within the same industries. If exporters are more productive than non-exporters then, even without any additional learning effects, as their output grows they will have a greater weight in the total productivity index and aggregate productivity will rise. In the international economics literature this seems a very uncontroversial statement, at least compared to the one about within-firm effects from exporting.

The evidence also seems to suggest that this occurs. For example there is widespread evidence of an aggregate productivity effect through resource reallocation (Bernard and Jensen, 2004; Hansson and Lundin, 2004; Falvey et al., 2004). Bernard and Jensen (2004) for the US and Hansson and Lundin (2004) for Sweden estimate that the contribution of exporting firms to the between component amounts to 60 per cent in the US (they estimate a lower bound at 8 per cent) and 62 per cent in Sweden. The Bernard and Jensen (2004) study is particularly interesting as it covers the same policy change studied by Lileeva and Trefler (2010). Combining the evidence from these two studies, Lileeva and Trefler (2010) calculate that productivity rose by close to 14 per cent as a result of the trade liberalisation between Canada and the US. Around 1/3rd of the total effect came from within-firm changes, one-third from the reallocation of resources across firms (the between effect) and the final third from the entry-exit effect we discuss below.

Before one is tempted to conclude that the reallocation of market shares is the policy answer to everything about the effects of exporting on aggregate productivity, a couple of notes of caution.

1. Pushed to the limit, this could be used to imply that the process of mergers and acquisitions should be encouraged to the point where the most productive firm acquires all other firms. History is littered with examples that this is a bad idea and for many other reasons than its productivity effects.
2. There is evidence of a positive relationship between firm size and productivity works. Aggregate productivity is therefore higher than it would be were market shares simply randomly allocated. However, this is far from perfect. We know that the reallocation mechanisms works better in the US than in Europe (Bartelsman et al. 2009) but we do not know why. One symptom of this is that there are non-exporting firms that have a productivity level higher than some exporters, and there are some exporters with productivity lower than many non-exporters (the overlap in the productivity distributions in Figure 2 above). Again, we do not have a strong explanation for why. It does seem to suggest however, that there are some deeper policy factors within an economy that disrupt this reallocation process.

3.5 Exporting and Net-entry-exit

Again, that exporting leads to productivity growth through entry and exit is relatively uncontroversial. Not that there is too much evidence to support this claim. There exists evidence in Kessides (1991) that domestic profitability affects rates of entry, but changes in foreign market access have been less commonly studied. An exception is Sleuwaegen and Dehandschutte (1991), who show for Belgium that the size of the European market is important for new firm entry. There is instead a greater amount of evidence that import competition leads to the closure of firms.

A final, some intriguing finding, worth mentioning in this section is that exporting seems to insulate firms from exit. Some of this effect comes from the fact that exporting firms are more productive, bigger etc., which are all factors that have been found to reduce the likelihood a firm shuts. But, even when controlling for the effect of these better firm characteristics, exporters are less likely to be shut. As far as I am aware, no good explanation for this finding has been offered.

3.6 Exporting and the Reallocation of Resources Across Industries

A central insight from the literature on economic development is that economic progress entails structural change. Countries become richer by shifting resources from low productivity sectors (agriculture) towards ones with higher productivity (manufacturing). In modern developed economies this shift is away from labour intensive manufacturing (textiles) towards knowledge intensive manufacturing or services (pharmaceuticals and business services). The speed with which this structural transformation takes place is the key factor that differentiates successful countries from unsuccessful ones (McMillan and Rodrik, 2011). A tension, long recognised in the international economics literature, is that for some countries the direction of this structural change is not towards high productivity industries but towards industries in which the country has a comparative advantage. This, McMillan and Rodrik (2011) argue is what has occurred in Latin America and Africa: globalisation has caused labour to move from more productive, to less productive activities, including, most notably, informality.

There is very limited evidence on this, but quantitatively these structure change effects on aggregate productivity appear to be large. In Latin America McMillan and Rodrik (2011) cal-

culate these effects are about one third as large as the sum of the within industry effects discussed above (the within firm + between firm + entry-exit change). In high income countries they make a very small contribution however, not much above zero. Therefore whilst these are important in some countries, given our focus on the evidence from high income countries in the rest of this piece we end our discussion of them here.

3.7 Conclusions

Does exporting cause rising productivity? The balance of evidence would therefore appear to be yes. Most convincingly these effects occur because exporting firms are more productive than non-exporting firms and the export sales they win mean they become bigger relative to non-exporters. This is the between firm channel. There also appears to be a generally positive effect from the entry and exit of firms. Larger markets attract more firms, and the Darwinian process of creative destruction leads to the exit of the least productive. There also appears to be an effect on productivity within firms. A large part of the challenge here appears to be finding a way to convincingly uncover it though, because better firms self-select into becoming exporters. Once these problems have been overcome the effect here appears to be large, according to Lileeva and Trefler (2010) at least as large as the between and net-entry-exit effects. The final effect, on the reallocation of resources across industries, appears to be comparatively unimportant at least for developed economies.

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