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Productivity and International Firm Activities:

What do we know?

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Productivity and International Firm Activities: What do we know?

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Abstract:

This paper summarizes in a non-technical way what we know from empirical studies based on firm-level data about the mutual links between international activities of firms and productivity. It is written with a view to inform policy makers in an evidence-based way. A special focus is on the empirical evidence we have from studies using firm-level data from the Nordic countries. It is argued that this empirical evidence does not provide a sound basis to search for similarities and differences (and their causes) between the Nordic countries, and the empirical results reported cannot qualify as stylized facts that can inform policy makers in an evidence-based way.

Keywords: International firm activities, productivity, firm level data, Nordic countries
JEL classification: F14, F23, D22, L25

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1. Motivation

Productivity – the efficiency with which firms turn inputs (labor, physical capital, energy, materials, managerial know-how) into outputs (goods, services) – is important for the competitiveness of firms, regions and countries on local, national and international markets. Productivity is an important driver of growth and welfare. Therefore, the study of productivity has been a core topic in economics for a long time.

Empirical studies that use firm-level micro data to investigate the determinants and consequences of productivity differentials between firms, however, are of a more recent vintage. A case in point is the literature dealing with the links between productivity and international firm activities. This literature started with a Brookings paper by Bernard and Jensen (1995) that documents a positive exporter productivity premium in US manufacturing industries – exporters are more productive that non-exporting firms of the same size from the same narrowly defined industry. This paper started a literature. During the past 15 years economists all over the world used firm-level micro data to investigate productivity differences between exporting and non-exporting firms and the direction of causality between export activity and firm-level productivity (see Wagner (2007) for a survey). More recently researchers interested in the links between international firm activities and productivity started to look beyond exports and to investigate other forms of international firm activities (imports, foreign direct investment, offshoring), to look beyond manufacturing and to investigate services, and to investigate the role of countries of origin and destination of imports and exports.[1]

[1] Furthermore, other dimensions of firm performance besides productivity – like growth, profitability, and wages paid – were investigated, too. This literature, however, is beyond the scope of this paper

This literature on the *micro-econometrics of international firm activities* inspired theorists to develop what is now labeled the *new new trade theory* where heterogeneous firms that differ in productivity are at the heart of the theoretical models.[2]

All this resulted in a mushrooming literature.[3] This paper summarizes in a non-technical way what we know from this literature about the mutual links between international activities of firms and productivity with a view to inform policy makers in an evidence-based way. Given the focus on the Nordic countries of the conference this paper is prepared for Table 1 summarizes the empirical evidence we have from studies using firm-level data from the Nordic countries.[4] These studies will be discussed in turn in the appropriate sections of the paper.

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that has a focus on productivity. For international firm activities and growth see Wagner (2002), for profitability Fryges and Wagner (2010), and for wages Schank, Schnabel and Wagner (2007, 2010).

[2] The canonical model from this literature is Melitz (2003); Redding (2010) is a survey.

[3] For partial surveys see Lopéz (2005), Helpman (2006), Greenaway and Kneller (2007), Wagner (2007) and Hayakawa, Kimura and Machikita (2010).

[4] I am grateful for hints to papers on international firm activities and productivity that are based on firm level data from Nordic countries and that are not listed in Table 1. Given the topic of the conference this paper is prepared for the focus is on *productivity* and international firm activities. Other important dimensions of firm performance that are closely linked to international firm activities include survival, employment, profitability, innovation, and wages. Empirical studies using firm level data to investigate these links abound, and some of the papers covered in this survey at least touch upon other issues besides productivity. Studies for Nordic countries from this literature that do not discuss productivity but other dimensions of firm performance include the following: *Survival* (Bandick (2010) on foreign ownership and plant survival in Sweden; Bandick and Görg (2010) for foreign acquisition in Sweden; Greenaway, Gullstrand and Kneller (2008a, 2009) for international trade and foreign ownership with relation to firm exit in Sweden); *employment* (Bandick and Görg (2010) for foreign acquisition in Sweden; Deschryvere and Kotiranta (2008) for offshoring of Finnish firms; Ekholm and Hakkala (2008) for offshoring of Swedish firms; Eliasson, Hansson and Lindvert (2010) on jobs and exposure to international trade within the service sector in Sweden; Hummels et al. (2010) for outsourcing in Denmark; Huttunen (2007) for foreign acquisitions in Finnish establishments; Ibsen, Warzynski and Westergard-Nielsen (2009) on the relation between export and import decision and employment

[Table 1 near here]

The rest of the paper is organized as follows. Section two looks at exports and imports. Section 3 deals with outward and inward foreign direct investment. Section 4 looks at offshoring of activities to foreign countries. Section 5 summarizes what we know and what we don't know about the mutual links between international firm activities and productivity in Nordic countries and elsewhere and discusses policy implications.

2. International trade and productivity

2.1 Exports and productivity

Discussions of the role of exports in promoting growth in general, and productivity in particular, have been going on for many years.[5] Earlier empirical studies in this field

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growth in Denmark; Lehto and Böckermann (2008) on the effects of cross-border mergers and acquisitions on employment in Finland; Lööf (2009) on trade and employment growth in firms from manufacturing and services in Sweden; Munch (2010) on international outsourcing and job loss in Denmark; Pesola (2009) on labor market transitions following foreign acquisitions in Finland); *innovation* (Andersson and Lööf (2009b) for trade and innovative activities in small and medium sized enterprises in Sweden; Dachs, Ebersberger and Lööf (2007) for foreign owned vs. domestic enterprises from Denmark, Finland, Norway and Sweden; Bandick, Görg and Karpaty (2010) for foreign acquisition and R&D activities in Sweden); Laursen (2008) for innovation and export performance in Danish manufacturing and services firms; w*ages* (Bandick (2009) on foreign acquisition in Sweden; Fosse and Maitra (2010) for offshoring to China from Danish firms; Geishecker, Görg and Munch (2010) for offshoring by Danish firms; Heyman, Sjöholm and Gustavsson Tingvall (2007) on foreign ownership wage premium in Sweden; Hummels et al. (2010) for outsourcing in Denmark; Huttunen (2007) for foreign acquisitions in Finnish establishments; Lundin and Yun (2009) on international trade and wages in Sweden; Munch and Skaksenon exports and wages in Denmark; Pesola (2007) on foreign ownership in Finland).

[5] This section is based on Wagner (2007) where technical details are discussed and detailed references to the literature can be found.

used data at the country or industry level to test whether exports promote productivity growth or vice versa. In 1995 Bernard and Jensen published the first of series of papers that changed this research perspective (see Bernard and Jensen 1995). They used large comprehensive longitudinal data from surveys performed regularly by official statistics in the U. S. to look at differences between exporters and non-exporters in various dimensions of firm performance, including productivity. These papers started a literature. During the years following the publication of Bernard and Jensen's Brookings paper researchers all over the world discovered the rich data sets collected by their statistical offices as a source to investigate the export activity of firms, and its causes and consequences. The extent and cause of productivity differentials between exporters and their counterparts which sell on the domestic market only is one of the core topics in this literature.

There are two alternative but not mutually exclusive hypotheses why exporters can be expected to be more productive than non-exporting firms (see Bernard and Jensen 1999; Bernard and Wagner 1997). The first hypothesis points to self-selection of the more productive firms into export markets. The reason for this is that there exist additional costs of selling goods in foreign countries. The range of extra costs include transportation costs, distribution or marketing costs, personnel with skill to manage foreign networks, or production costs in modifying current domestic products for foreign consumption. These costs provide an entry barrier that less successful firms cannot overcome. Furthermore, the behaviour of firms might be forward-looking in the sense that the desire to export tomorrow leads a firm to improve performance today to be competitive on the foreign market, too. Cross-section differences between exporters and non-exporters, therefore, may in part be

explained by ex ante differences between firms: The more productive firms become exporters.

The second hypothesis points to the role of learning-by-exporting. Knowledge flows from international buyers and competitors help to improve the post-entry performance of export starters. Furthermore, firms participating in international markets are exposed to more intense competition and must improve faster than firms who sell their products domestically only. Exporting makes firms more productive.

A common approach to investigate differences in productivity between exporters and non-exporters is to follow (sometimes only in part, and sometimes with modifications and extensions) the methodology introduced by Bernard and Jensen (1995, 1999). Studies of this type use longitudinal data for plants (usually from the regular surveys conducted by official statistics) to document differences in levels and growth rates of productivity between exporters and non-exporters in a first step. Here one starts by looking at differences in average labour productivity (total value of shipments per worker, or value added per worker) or average total factor productivity between exporters and non-exporters. The result is an unconditional productivity differential.

The next step is the computation of so-called exporter premia, defined as the ceteris paribus percentage difference of labour productivity between exporters and non-exporters. These premia are computed from a regression of log productivity on the current export status dummy and a set of control variables (usually including industry, region, firm size measured by the number of employees, and year). The export premium shows the average percentage difference between exporters and non-exporters.

To shed light on the empirical validity of the first hypothesis mentioned – namely, that the more productive firms go abroad – the pre-entry differences in productivity between export starters and non-exporters are investigated next. If good firms become exporters then we should expect to find significant differences in performance measures between future export starters and future non-starters several years before some of them begin to export. To test the second hypothesis mentioned – namely, that exporting fosters productivity - the post-entry differences in productivity growth between export starters and non-exporters are investigated.

Wagner (2007) gives a synopsis of findings from 54 empirical studies that use firm-level data from 34 countries and that investigate the relationship of exports and productivity. Among the countries covered are highly industrialised countries (e.g., U.S., UK, Canada, Germany); countries from Latin America (Chile, Colombia, Mexico); Asian countries (China, Korea, Indonesia, Taiwan); transition countries (Estonia, Slovenia); and least developed countries from sub-Saharan Africa. Given this wide range of countries the big picture is amazingly clear-cut: With only a few exceptions exporters are found to have higher productivity, and often higher productivity growth, and this tends to hold after controlling for observed plant characteristics (like industry and size), too. Exporters are better.

The findings for pre-entry differences often present evidence in favour of the self-selection hypothesis: Future export starters tend to be more productive than future non-exporters years before they enter the export market, and often have higher ex-ante growth rates of productivity. The good firms go abroad.

Evidence regarding the learning-by-exporting hypothesis is somewhat more mixed: Results for post-entry differences in performance between export starters and

non-exporters point to faster productivity growth for the former group in some studies only. Exporting does not necessarily improve firms.[6]

Does the big picture sketched here – exporters are more productive than non-exporters, and the more productive firms self-select into export markets, while exporting does not necessarily improve productivity – describe the situation in the Nordic countries, too? From the empirical studies summarized in Table 1 we see that exporters tend to be more productive than firms that serve the national market only in all four countries. Some evidence for self-selection of more productive firms into exporting has been found for Denmark, Finland and Sweden (but not in every study testing for it), while this hypothesis is not tested in the studies using data for Norway. The learning-by-exporting hypothesis has only been investigated with Danish and Swedish firm level data – with mixed results. Apparently, in the case of the Nordic countries the jury is still out on the direction of causality between exporting and productivity.

2.2 Imports and productivity

While the causes and consequences of export and its mutual relationships with productivity are prominent topics in the recent literature on internationally active firms, imports are seldom dealt with. A case in point is the recently published Bruegel study on the internationalisation of European firms (Mayer and Ottaviano 2007) where imports are not dealt with at all. As Bernard et al. (2007: 123) recently put it, "(t)he empirical literature on firms in international trade has been concerned almost

[6] Note, however, that De Loecker (2010) recently showed that current methods that are used to test for learning by exporting are biased towards rejecting the hypothesis of positive effects of exports on productivity. He provides evidence for this in the case of Slovenia. Comparable empirical results for other countries are to the best of my knowledge not available.

exclusively with exporting, largely due to limitations in datasets … . As a result, the new theories of heterogeneous firms and trade were developed to explain facts about firm export behavior and yield few predictions (if any) for firm import behavior."

This situation, however, is changing rapidly.[7] With new datasets that include information on imports at the firm level becoming available for more and more countries a new literature is emerging since 2005 that has a focus on the links between productivity and imports. A number of recently published empirical studies based on data from a wide range of countries document the shares of firms that are exporters, importers, and two-way traders (that both export and import), or that sell or buy on the national market only, and they look at differences between these four types of firms. Differences in productivity and their relationship with different degrees of involvement in international trade are at the centre of these studies.

Details aside, the big picture that emerges from this literature can be sketched as follows: There is a positive link between importing and productivity at the firm level, documented by a significant productivity differential between firms that import and firms that do not trade internationally; the same holds for exporting. Two-way traders are more productive than firms that either only import, or only export, or do not trade at all. Often, two-way traders are the most productive group of firms, followed by importers and then exporters, while firms selling or buying on the national market come last.

How can this empirical regularity of a positive relationship between importing and productivity at the firm level be explained theoretically? In the literature arguments for both a positive impact of productivity on importing (which is in

[7] For a comprehensive discussion of the literature on imports and productivity and technical details see Vogel and Wagner (2009).

accordance with self-selection of more productive firms into import markets) and for a positive impact of importing on productivity ('learning-by-importing') are discussed.

To start with the arguments in favour of self-selection of more productive firms into importing it is pointed out that the use of foreign intermediates increases a firm's productivity but, due to fixed costs of importing, only inherently highly productive firms import intermediates. Importing is associated with fixed costs that are sunk costs, because the import agreement is preceded by a search process for potential foreign suppliers, inspection of goods, negotiation, contract formulation etc. Furthermore, there are sunk costs of importing due to the learning and acquisition of customs procedures.

As regards learning-by-importing it is stated that there are strong arguments in favour of a causal effect of imports on productivity, because by importing a firm can exploit global specialization and use inputs from the forefront of knowledge and technology. Proponents of this view point to the literature on international technology diffusion that advances imports as an important vehicle for knowledge and technology transfer. Furthermore, importing intermediate products allows a firm to focus resources and to specialize on activities where it has particular strengths. Importers may improve productivity by using higher quality foreign inputs or by extracting technology embodied in imported intermediates and capital goods. Furthermore a variety effect is mentioned (in which the broader range of available intermediates contributes to production efficiency) and a quality effect caused by imported intermediates that might be of better quality than local ones. If importing increases productivity, this might lead firms to self-select into export markets and help to improve their success in these markets, which might contribute to an

explanation of the empirical regularity that two-way traders are the most productive firms on average.

From a theoretical point of view, therefore, the direction of causality between productivity and importing can run from one of the two sides or from both sides simultaneously. Only some of the studies mentioned above tackle this issue (or at least a part of it) empirically. The bottom line, then, is that we have convincing empirical evidence on a positive relationship between importing and productivity at the level of the firm for a large and growing number of developed and developing countries, while research on the direction of causality between productivity and import status is still in its infancy.

Vogel and Wagner (2009) use a newly available comprehensive panel data set for manufacturing enterprises from 2001 to 2005 to document the first empirical results on the relationship between imports and productivity for Germany, a leading actor on the world market for goods. Furthermore, for the first time the direction of causality in this relationship is investigated systematically by testing for self-selection of more productive firms into importing, and for productivity-enhancing effects of imports (‘learning-by-importing’). They find a positive link between importing and productivity. From an empirical model with fixed enterprise effects that controls for firm size, industry, and unobservable firm heterogeneity they report that the premia for trading internationally are about the same in West and East Germany. Compared to firms that do not trade at all two-way traders do have the highest premium, followed by firms that only export, while firms that only import have the smallest estimated premium. They find evidence for a positive impact of productivity on importing, pointing to self-selection of more productive enterprises into imports, but

no evidence for positive effects of importing on productivity due to learning-by-importing.

Empirical evidence on the links between imports and productivity based on econometric studies using firm-level data from the Nordic countries is scarce. From Table 1 we see that imports and productivity are positively associated in Denmark and Sweden. For Denmark, we have evidence for self-selection into importing of more productive firms but not for learning from importing. Furthermore, for Sweden we have evidence that imports lead to an increase in productivity, and that this effect is larger for imports from highly developed countries. This evidence, however, is based on only one study per country and topic. Studies with data from Finland and Norway are missing. The bottom line, therefore, is that we have no sound empirical evidence on the links between imports and productivity in the Nordic countries.

3. Foreign direct investment and productivity

3.1 Outward foreign direct investment

Besides international trade (exports and imports) other forms of international activities of firms and their relation with productivity are investigated both theoretically and empirically. A case in point is the multi-country, multi-sector general equilibrium model of Helpman, Melitz and Yeaple (2004) that explains the decision of heterogeneous firms to serve foreign markets either trough exports or through foreign direct investment, i.e. by building new production facilities in a foreign county or by acquiring existing firms there. They show that, in equilibrium, only the more productive firms choose to serve the foreign markets, and the most productive among this group will further choose to serve these markets via foreign direct investment. The intuition behind this theoretical result is similar to the argument put

forward in the case of exports and productivity. There exist additional costs of starting production activities in a foreign country, including costs to become familiar with all legal and economic aspects related to doing business abroad, and these costs can be expected to be even larger than the extra costs a firm that exports has to pay compared to a firm that sells its products on the national market only. Only the most productive firms can be expected to be able to pay these costs and to produce profitably in a foreign country.

Several empirical papers take the Helpman-Melitz-Yeaple model as a point of departure.[8] Wagner (2006) uses German establishment level data and uses a non-parametric test for first order stochastic dominance to show that, in line with this hypothesis, foreign direct investors are indeed more productive (not only at the mean but over the whole range of the productivity distribution) than exports, which in turn are more productive (again, not only at the mean but over the whole range of the productivity distribution) than firms that sell their products on the national market only. Empirical evidence for other countries (including Japan and the UK) points in the same direction (see Wagner (2006)).

However, according to the summary of empirical studies on international firm activities and firm performance reported in Table 1 there is as yet no evidence on the link of outward foreign direct investment and productivity from the Nordic countries.

3.2 Inward foreign direct investment

Foreign direct investment cannot only take the form of domestic firms from country A buying a firm in a foreign country B or building a new production facility abroad in B

[8] See Wagner (2006) for a more complete discussion of this literature.

(i.e. outward foreign direct investment from the point of view of country A). Foreign firms from country B can buy a domestic firm in country A or build a new production facility in A. This latter type of foreign direct investment is called inward foreign direct investment (from the point of view of country A) and it leads to foreign owned firms in country A.

Productivity differences between domestic and foreign owned firms have been investigated in a large number of empirical studies. From a theoretical point of view it can be expected that foreign owned firms are more productive than domestic firms because foreign owned firms can use technological knowledge and management know-how owned by their parent company that made the parent company highly successful and productive (which can be viewed as a prerequisite for the parent company to become a multinational firm with production facilities in a foreign country). Furthermore, it might be the case that foreign investors engage in "cherry picking" – they buy the best and most productive domestic firms. Productivity differentials should then show up between domestic and foreign owned firms of the same size and from the same industry. The big picture from empirical studies is in line with these hypotheses – foreign owned firms tend to be more productive than domestic firms.[9]

The empirical evidence we have from studies based on firm level data from the Nordic countries (summarized in Table 1) is in line with the findings from the international literature. Dachs, Ebersberger and Lööf (2008) report that foreign owned enterprises exhibit a significantly higher labor productivity than do domestically owned enterprises in all four Nordic countries. Ilmakunnas and

[9] For a survey of empirical studies on productivity differentials between foreign owned firms and domestic firms see Barba Navaretti and Venables (2004), p. 155 – 162.

Maliranta (2004) find that foreign ownership increases the total factor productivity by between 9 and 11 percent in Finland. Balsvik and Haller (2010) show that in Norway prospective foreign owners pick high-productivity plants and that labor productivity increases after foreign acquisitions. A similar positive effect of acquisition of home firms by foreign firms on productivity is reported by Karpaty (2008) for Sweden; Bandick (2009), however, finds that targeted Swedish firms have better productivity growth after vertical foreign acquisition only and not after horizontal foreign acquisition.

4. Offshoring

The third type of international firm activity besides international trade (exports and imports) and (outward and inward) foreign direct investment that is looked at in this paper with a view on its relation to productivity is offshoring. Offshoring means different things to different people. Here offshoring describes the relocation of processes to any foreign country without distinguishing whether the provider is external or affiliated with the firm. It is a process whereby an activity which was previously undertaken in-house is contracted to another supplier in a foreign country.

There is evidence that offshoring firms differ systematically from non-offshoring firms.[10] In a comprehensive survey of the literature Görg, Greenaway and Kneller (2008, p. 34) ask "whether, among a random sample of firms we would expect all to engage in offshoring or whether it is only a certain group of firms that do so". According to the authors the "short answer to this is: only a certain group – and we would expect this to comprise the 'better' firms in any sample." Görg, Greenaway

[10] For a more complete summary of the literature on offshoring and productivity see Wagner (2011).

and Kneller (2008, p. 35) summarize empirical evidence from a number of studies showing that offshoring firms are more productive.

If firms that relocated parts of their activities abroad are more productive than non-offshoring firms at a point in time this might be caused by self-selection of "better" firms into offshoring. Self-selection would be in line with recent developments in economic theory of international firm activities. Offshoring involves substantial sunk costs related to searching for a foreign partner, doing market research, fixing contractual arrangements etc. Therefore, only the more productive firms will be able to overcome these sunk cost barriers and successfully start to offshore (see Antràs and Helpman (2004) and Görg, Greenaway and Kneller (2008, p. 34f.). Studies focusing on the consequences of offshoring for productivity are rare (see Olsen (2006), p. 9). Görg, Greenaway and Kneller (2008, p. 8) summarize the findings by stating that for manufacturing firms offshoring results in higher labour productivity.

For West German firms from manufacturing industries Wagner (2011) finds that, compared to non-offshoring firms, offshoring firms are more productive. These differences existed in the year before some firms started to offshore, and this points to self-selection of more productive firms into offshoring. This finding is in line with results from recent theoretical models and with results for other countries.

To investigate the effects of relocation across borders on productivity, the performance of firms with and without offshoring was compared for 2000 - 2004 when some firms were relocating firms and the others were not. Looking at first-time offshorers in 2001 - 2003 he finds no evidence for a causal effect of offshoring on productivity. When the group of offshoring firms includes firms with offshoring activities before 2001, however, he reports a positive and statistically significant causal effect, but this effect is rather small.

The bottom line, then, is that the empirical evidence points to higher productivity in offshoring firms compared to non-offshoring firms, and to self-selection of more productive firms into offshoring, while the jury is still out on the issue whether offshoring improves productivity in a firm or not. Note that due to the absence of empirical studies on offshoring and productivity that are based on firm-level data from the Nordic country we have no evidence at all on this issue for these countries.

5. Discussion

The big picture shown by the literature on the micro-econometrics of international firm activities for the links between productivity and engagement on foreign markets can be summarized as follows. Details aside, internationally active firms are more productive than firms of the same size and from the same industry that are active on the domestic market only. The direction of causality between productivity and international activities is somewhat less clear. Higher productivity seems to be a prerequisite for international activities, and we have ample evidence for self-selection of more productive firms into exporting, foreign direct investment and offshoring. Whether international activities cause higher productivity or not, however, is still an unresolved question, and there are empirical studies reporting evidence for or against the learning-by-international-activities hypothesis.

Empirical evidence from firm-level data based studies for the Nordic countries on the links between international firm activities and productivity is scarce (see Table 1). While there are studies on exports and productivity and on productivity differences between foreign owned firms and domestic firms for Denmark, Finland, Norway and Sweden, evidence for imports is only available for Denmark and Sweden, while there is no empirical evidence at all on the relationship between productivity and both

outward foreign direct investment and offshoring. Furthermore, there is often only one study dealing with one form of international firm activity for a country. The empirical evidence available, therefore, is no sound basis that allows searching for similarities and differences (and their causes) between the Nordic countries, and the empirical results reported cannot qualify as stylized facts that can inform policy makers in an evidence-based way.[11] A suggested step on the way to a solid empirical basis for such an exercise is an ex-ante coordinated international comparative study that uses identically specified empirical models and comparable firm-level data for all forms of international firm activities covering firms from all Nordic countries and for other countries that are thought to be useful as a benchmark.[12]

An important topic that is not dealt with in this paper but that is closely related to the links between productivity and international activities of firms is the cause of productivity differences between firms. In the theoretical models a la Melitz (2003) that are at the core of the *new new trade theory* productivity of a firm is the result of a random draw from a productivity distribution. While this is for sure an appropriate approach to build a theoretical model for trade with heterogeneous firms, it is far from satisfactory from an empirical point of view. Obviously there is a role for random shocks, or good or bad luck, in shaping the productivity level of a firm, but we have good reasons to believe that a high or low level of productivity is not a matter of luck

[11] This is yet another case that illustrates what I call *Bartelsman's Lament*: "For policy makers, the state of affairs of productivity research is frustrating, at best." (Bartelsman 2010, 1891). For a comprehensive discussion of how to go from estimation results to stylized facts when empirically investigating international activities of heterogeneous firms see Wagner (2010).

[12] See International Study Group on Exports and Productivity (ISGEP) (2008) for an example of such a study and Wagner (2010) for a broader discussion of this approach.

alone. Productivity can be expected to be related to the quality of inputs used in the production process, and to the way these production factors are combined.

Using a knowledge production framework and a rich set of plant level data Wagner (2008) demonstrates that in Germany firms that are active on international markets as exporters or foreign direct investors do generate more new knowledge than firms which sell on the national market only. These differences are not only due to a larger firm size, or different industries, or the use of more researchers in these firms, but due to the fact these globally engaged firms learn more from external sources, too. The importance of these knowledge sources varies with the type of innovation – for example, cooperation in R&D with universities and other research institutes matters in the case of new patents registered, while suppliers are important in the case of the share of new products in total sales and new production processes introduced. These results, which are broadly in line with the findings by Criscuolo, Haskel and Slaughter (2005) in their study using UK firm level data, can help to explain the strong positive correlation between productivity and international activities of firms. Firms that are active on markets beyond the national borders generate higher levels of new knowledge that feed into higher productivity.

Another important aspect that might help to explain the positive productivity premium of internationally active firms is management quality. Although management quality has been considered as an important source of performance differences between firms for a very long time – Syverson (2010, p. 14) mentions a study published in 1887 that made this point – empirical evidence on this is scarce due to data limitations. As Syverson (2010, p. 14) puts it, “(t)he identity, much less the characteristics, practices, or time allocation of individual managers are rarely known. Furthermore, managerial inputs can be very abstract. It’s not just time allocation that

matters, but what the manager does with their time, like how they incentivize workers or deal with suppliers." A recent study by Bloom and Van Reenen (2010) that relates management practices to productivity shows, among others, that firms that export (but do not produce) overseas are better-managed than domestic non-exporters, but are worse-managed than multinationals.

These findings demonstrate that there is more than sheer luck behind the observed productivity differences between firms. Before one speculates about implications of these results for the design of policy measures, however, one should remember that productivity differences at the firm level are notoriously difficult to explain empirically. "At the micro level, productivity remains very much a measure of our ignorance." (Bartelsman and Doms 2000, p. 586)

My suggested take-home message for policy makers and for their advisers from my reading of the literature on productivity and international firm activities, therefore, is simple if not trivial. Any policy measures that foster productivity are policy measures that help to make more firms more fit for the world market, and any policy measures that make domestic and foreign markets more open for internationally active firms help to improve productivity and to foster economic growth. Following the holy principle of comparative advantage, however, I leave any detailed suggestions for such policy measures to the specialists in that field.

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Table 1: Synopsis of empirical studies on productivity and international firm activities using data from Nordic countries

Author(s) (Year of publication)	Data used	Type of international firm activity investigated	Important findings
Country			
Denmark			
Dachs, Ebersberger and Lööf (2008)	Third European Community Innovation Survey (CIS 3), 1998 – 2000, 844 firms	Foreign ownership	Foreign owned enterprises exhibit a significantly higher labor productivity than do domestically owned enterprises
International Study Group on Exports and Productivity (2008)	All firms from manufacturing with at least 20 employees, 1999 – 2002 29,161 observations	Exports	Exporters are substantially more productive than non-exporters.
Eriksson, Smeets and Warzynski (2009)	All firms from manufacturing with at least 10 employees, 1993 – 2003. 95,365 firms in 1993, 125,684 firms in 2003.	Exports, imports	Exports, imports of intermediate goods, and imports of final goods positively associated with higher productivity.
Smeets and Warzynski (2010)	Product-firm-level dataset for manufacturing firms, 1998 – 2005	Exports, imports	Importing and exporting positively associated with productivity, firms that import and export are most productive. Evidence for self-selection into importing and Exporting but no learning from trade effects.

Finland

Ilmakunnas and Maliranta (2004)	Linked employer-employee data for 1994 to 2001; 2,200 to 2,500 plants annually.	Foreign ownership	Foreign ownership increases the total factor productivity by between 9 and 11 percent
Ylä-Anttila, Ali-Yrkkö and Nyberg (2004)	500 largest companies, 1986 – 1998	Foreign ownership	Labor productivity has increased more rapidly in companies with high foreign ownership
Dachs, Ebersberger and Lööf (2008)	Third European Community Innovation Survey (CIS 3), 1998 – 2000, 818 firms	Foreign ownership	Foreign owned enterprises exhibit a significantly higher labor productivity than do domestically owned enterprises
Ilmakunnas and Nurmi (2010)	Linked employer-employee data for 1980 – 2005	Exports	Highly productive plants are likely to enter the export market earlier and to survive in the export market longer. The upper and lower tails of the productivity distribution are represented by plants that start exporting and those that are exiting.
Ilmakunnas, Maliranta and Pesola (undated)	Linked employer-employee panel data	Foreign ownership	Hiring workers from foreign multinationals has a positive effect on productivity in local domestic firms, indicating knowledge spillovers from multinationals to domestic firms.

Norway

Dachs, Ebersberger and Lööf (2008)	Third European Community Innovation Survey (CIS 3), 1998 – 2000; 2,286 firms	Foreign ownership	Foreign owned enterprises exhibit a significantly higher labor productivity than do domestically owned enterprises
Balsvik and Haller (2010)	Annual survey of all Norwegian manufacturing plants with at least 10 employees; 1992 – 2004. 65,740 observations	Acquisition of home firms by foreign firms	Prospective foreign owners pick high-productivity plants. Labor productivity increases after foreign acquisitions.

Irarrazabal, Moxnes and Ulltveit-Moe (2010)	Matched employer-employee data for all non-oil joint-stock firms 1996 – 2005; ca. 8,000 firms per Year	Exports	Exporters are more productive; 15 – 40 percent of the exporter premium reflects differences in workforce rather than true efficiency.
Castellacci (2010)	814 firms in the service sector Information for 2004-2006, but data are cross-section data only	Exports	Labor productivity positively related to export participation
Balsvik and Haller (2011)	Panel data from the Norwegian Manufacturing Census	Foreign direct investment in Norway	Greenfield entry both in the same industry and in the same labor market region has negative impact on productivity of domestic plants; entry via acquisition affects productivity of domestic plants in the same industry positively

Sweden

Hansson and Lundin (2004)	All manufacturing firms with at least 50 employees, 1990 – 1999. 3,275 unique firms, Between 1,565 and 1,820 firms each year	Exports	Exporting firms have significantly higher productivity than non-exporting. More productive firms self-select into the export market. Exporting further increases firm productivity.
Karpaty and Lundberg (2004)	All manufacturing firms with at least 50 employees, 1990 - 2000	Inward FDI	Presence of foreign ownership in the same industry and region seems to enhance the total factor productivity of domestic firms
Greenaway, Gullstrand and Kneller (2005)	Manufacturing firms 1980 – 1997; at least 50 employees. 36,903 observations	Exports	Productivity growth of exporters on entry does not appear to differ significantly from non-exporters either in the periods leading up to or after entry.
Dachs, Ebersberger and Lööf (2008)	Third European Community Innovation Survey (CIS 3), 1998 – 2000; 1,197 firms	Foreign ownership	Foreign owned enterprises exhibit a significantly higher labor productivity than do domestically owned enterprises
Greenaeay, Gullstrand	Unbalanced panel of 1,570 firms	Exports	Exporters are more productive than non-exporters;

and Kneller (2008b)	in the food and beverage sector, 1997 - 2002		more productive firms tend to reach out to more markets.
Karpaty (2006)	Sample from FIEF longitudinal firm level data base for Swedish manufacturing firms, 1993 – 2002. All firms with at least 50 Employees. 23,848 observations.	Foreign ownership	Foreign-owned firms have higher total factor productivity than domestic firms; no productivity differential between Swedish and foreign multinational enterprises. Foreign greenfields in Sweden are more productive compared to both acquired firms and Swedish multinational enterprises. No evidence for reverse causality.
Karpaty (2008)	All manufacturing firms with at least 50 employees, 1986 - 2002	Acquisition of home firms by foreign firms	Positive effect of foreign acquisition on productivity starting between 1 – 5 years post acquisition
Andersson, Lööf and Johansson (2008)	Detailed matched data from various sources for firms from manufacturing industries; unbalanced panel 1997 – 2004,	Exports, Imports	Export and import productivity premiums are significant and of similar magnitudes, and premium is highest for firms that both export and import. Premiums increase in both number of markets and number of products traded.
International Study Group on Exports and Productivity (2008)	Manufacturing firms with at least 20 employees, 1997 – 2004 31,838 observations	Exports	Exporters are more productive than non-exporters (but not if firm fixed effects are controlled for); no evidence for self-selection of more productive firms into exports or for learning-by-exporting.
Andersson and Lööf (2009a)	Manufacturing firms with at least 10 employees, 1997 -2004, 38,929 observations	Exports	Learning-by-exporting effect on productivity found among persistent exporters with high export intensity, but not among temporary exporters or persistent exporters with low export intensity.
Bandick (2009)	All manufacturing firms with 20 or more employees, 1993 - 2002; ca. 3,400 firms per year	Foreign acquisition	Targeted Swedish firms have better productivity growth after vertical foreign acquisition only; no such impact found from horizontal foreign acquisition
Eliasson, Hansson and Lindvert (2009)	Manufacturing firms with less than 50 employees, 1997 – 2006. Some 200,000 observations	Exports	Evidence of self-selection of more productive firms into Exports. Learning-to-export occurs but learning-by-exporting does not.

Gullstrand (2009)	Unbalanced panel of all firms in the food and beverage sector, 1997 – 2002. 1,570 firms, 9,858 firm-destination-year observ.	Exports	More productive firms are more likely to export.
Lööf (2009)	Unbalanced panel of firms from manufacturing and services, 1997 – 2006; ca. 260,000 observations	Exports	Self-selection of more productive firms into exporting in services and manufacturing; exporter premium larger in services. No evidence found that exporting increases productivity growth.
Lööf and Andersson (2010)	All manufacturing firms with at least 10 employees, 1997 – 2004. Ca. 57,000 observations	Imports	Imports lead to an increase in productivity; effect is larger for imports from highly developed countries.

Note: For each country the studies are listed in chronological order by year of publication and in alphabetical order for each year.

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