IZA DP No. 5916

# International Trade and Firm Performance: A Survey of Empirical Studies since 2006

Joachim Wagner

August 2011

# International Trade and Firm Performance:
# A Survey of Empirical Studies since 2006

**Joachim Wagner**
*Leuphana University Lueneburg
and IZA*

# ABSTRACT

# International Trade and Firm Performance:
# A Survey of Empirical Studies since 2006[*]

The literature on international trade and firm performance grows exponentially. This paper attempts to summarize what we learn from this literature to guide both future empirical and theoretical work in this area, and public debates and policy makers, in an evidence-based way. The focus is on the empirical part of the literature that consists of recently published papers using data for firms from manufacturing or services industries to study the links between international trade (exports and imports) and dimensions of firm performance (productivity, wages, profitability and survival). It discusses recent add-ons to the box of tools for empirical investigation in this field and suggests topics for future research.

Corresponding author:

Joachim Wagner
Leuphana University Lueneburg
Institute of Economics
P.O. Box 2440
D-21314 Lueneburg
Germany
E-mail: wagner@leuphana.de

---

# 1.    Introduction

During the recent past the literature on international firm activities and firm performance grew exponentially. This holds both for the empirical part made of micro-econometric studies, kicked-off by the Brookings Paper by Bernard and Jensen (1995), that investigate the mutual links between firm characteristics and international activities and for the theoretical part, started by the Econometrica paper by Melitz (2003), that deals with international activities of heterogeneous firms. Many topics discussed in this literature are not only relevant for academic discussions but for public debates, too, and they rank high on the agenda of policy makers – "globalization" is one of today's buzzwords, and its causes and consequences are important for developments at the individual, regional, national and international level. Therefore, it seems to be useful to look for results from the hundreds of papers that can guide both future empirical and theoretical work in this area, and public debates and policy makers, in an evidence-based way.

Any attempt to summarize what we learn from this literature, however, has to be selective and has to focus on a subset of topics to keep the project tractable. Due to my own comparative advantage regarding the depth of knowledge of various aspects of the literature this survey

- focuses on the empirical part of that literature and does not deal with theoretical models,[1]

- looks at studies using micro data at the level of the firm (establishment or enterprise) only and does not deal with studies that use aggregate data at the industry or country level,[2]

---

[1] Redding (2010) is a review of the recent theoretical literature on heterogeneous firms and trade.

- covers only more recent papers published since 2006[3] from the economics literature,[4]

- and has a focus on international trade.[5]

That said, the survey is organized as follows. Section 2 reviews recent studies on international trade and productivity. It starts with the old core topic of the literature, the relation between exports and productivity in manufacturing firms, in section 2.1 and turns to a more recent topic, imports and productivity, afterwards in section 2.2. Next, it looks beyond manufacturing and asks in section 2.3 whether services firms are different. The discussion of findings related to productivity ends with looking beyond international trade, summarizing findings on the productivity pecking order among exporters, firms with foreign direct investments and firms that serve the national market only in section 2.4. Section 3 looks beyond productivity and reviews findings on international trade and further dimensions of firm performance, i.e. wages (section 3.1), profits (section 3.2) and firm survival (section 3.3). Section 4 concludes with suggestions for further research.

---

[2] Singh (2010) is a comprehensive survey of studies on the effects of international trade on productivity and economic growth based on macro data.

[3] The earlier literature is surveyed in Greenaway and Kneller (2007) and Wagner (2007a).

[4] For a survey and meta-analysis of studies on the relation between internationalization and firm performance from the international management literature see Bausch et al. (2007) and Bausch and Krist (2007).

[5] See Hayakawa et al. (2011) for a review of the literature on foreign direct investment and productivity. For inward foreign direct investment and a survey of empirical studies on productivity differentials between foreign owned firms and domestic firms see Barba Navaretti and Venables (2004, p. 155 – 162); for offshoring and productivity see Wagner (2011a).

## 2.    New evidence on international trade and productivity

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. Afterwards 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 (2007a) for a survey). This literature on the *micro-econometrics of international trade* 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 (see the canonical model by Melitz (2003) and the recent survey by Redding (2010)).

**2.1    New evidence on exports and productivity in manufacturing industries**

**2.1.1   Perceived knowledge and an update**

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 the literature on international trade and firm performance. 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.

The now standard 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 firms (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 exporter 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. In doing so the self-selection of more productive firms into exporting is often controlled for by using matched firms from the groups of

export starters and non-starters that were identical in all (observed) characteristics in the year before some of these firms started to export. Starting to export is considered as a treatment that some firms received and other firms not; performance differences between the treated export starters and their twins from the group of the non-treated non-exporters are then interpreted as a causal effect of exports on productivity growth (see Wagner 2002).

Wagner (2007a) gives a synopsis of findings from 54 empirical studies published between 1995 and 2006 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, countries from Latin America and Asian countries, transition economies and least developed countries. 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.

Does the big picture sketched here based on studies published until 2006 still describe the state of our knowledge in 2011? While it was possible to prepare a

comprehensive synopsis of empirical studies in this field in 2007 this is no longer the case today – there are now several hundred studies a summary of which would fill a (boring to read) book. The recent survey by Singh (2010) includes some of the papers published between 2006 and 2008. He concludes that "studies supporting the *self-selection* hypothesis numerically overwhelm the studies supporting the *learning-by-exporting* hypothesis, and this implicitly provides a stronger support for the effects of productivity and growth on trade as compared to the effects of trade on productivity and growth" (Singh 2010:1537).

The overall results from the study by the International Study Group on Exports and Productivity (2008) that uses comparable micro level panel data for 14 countries to look at the relationships between exports and productivity using identically specified empirical models are in line with this big picture. However, the authors point out that the paucity of evidence on learning-by-exporting found in this study should be qualified, as it might be dependent on the specific methodology utilized. 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, however, are to the best of my knowledge not available.[6]

The average exporter premium estimated in the study by the International Study Group on Exports and Productivity (2008) for the 14 countries, after controlling for fixed effects, is 7 percent. This premium varies substantially across countries. The

---

[6] Silva et al. (2010) provide a detailed survey of the learning-by-exporting literature. They argue that so far no final consensus has been reached on the best way to test the hypothesis of learning-by-exporting. For a meta-analysis of 33 empirical studies reporting almost 300 estimates see Martins and Yang (2009).

large number of countries and the high degree of comparability of results allow the authors to address a central question not investigated before: what country characteristics help explain the differences in exporter premia across countries? In a meta-analysis they build on gravity models of international trade, as well as on recent theories of trade with heterogeneous firms, to explore the relationship between a set of country characteristics and the cross-country variation in exporters' premia. Consistent with theoretical predictions, they report that on average productivity premia are larger for countries with lower export participation rates, with more restrictive trade policies, lower per capita GDP, less effective government and worse regulatory quality, and for countries exporting to relatively more distant markets.

### 2.1.2 A new topic: Export destination and productivity in manufacturing firms

According to findings from the literature on exports and productivity (discussed above) an important reason for the positive productivity differential between exporters and non-exporters is self-selection of more productive plants on export markets. Furthermore, there is evidence for a market driven selection process in which exporters that have low productivity fail as a successful exporter, while only those that are more productive continue to export (Wagner 2007b, 2008).

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. This implies that plants that export to a larger number of foreign markets have to be more productive than plants that serve a smaller number of foreign markets only, because at least some of the extra costs mentioned recur for each market (e.g., preparing a user's

manual in another language, or checking the relevant national laws). Lawless (2009) presents a simple theoretical model that builds on the seminal contributions by Melitz (2003) and Chaney (2008) and that has this testable prediction. Furthermore, it seems plausible to assume that the larger the number of markets the higher will be (at least, on average) the distance related costs of exporting an exporter has to bear and that market entry costs differ across markets.

Only recently empirical studies started to look at exports by a firm broken down by destination regions or countries – an approach that is not feasible for all countries of origin of exports due to data limitations. These studies apply the standard approach (outlined above) used in empirical studies on the exporter productivity premium when investigating the relationship between exports and productivity by destination country or region. They reveal new insights and shed light on hitherto not known facts.

Table 1 summarizes[7] 25 micro-econometric studies on export destination and productivity for 11 different countries, most of which are highly industrialized western countries. These studies are mostly of a recent vintage – only two were published before 2006 and many papers are still in a working paper state.


[Table 1 near here]

---

[7] In this (and in all other tables in this literature survey) important results from empirical studies are summarized qualitatively only. Any attempt to reproduce the quantitative results by stating the size of the estimated coefficients and effects would suggest a high degree of comparability across the studies. This, however, is not given due to differences in the unit of analysis (establishment vs. enterprise), the sampling frame (all firms versus firm with a number of employees above a certain threshold only), the specification of the empirical models estimated and the econometric methods applied. This point is discussed in the concluding section 4 below.

While 5 studies use cross-section data only, 20 are based on panel data that allow to control for unobserved heterogeneity via fixed effects and that offer the opportunity to look at the direction of the relationship between productivity and destination of exports by testing for the presence of ex-ante differences (that existed before exporting to a destination started) and positive effects of exporting to a destination on firm performance (learning-by-exporting to a destination).

Although results are not strictly comparable between the studies due to differences in, among others, the number and type of destinations looked at (e.g., EU vs. non-EU; areas defined according to per-capita income; or a large number of destination countries), the definition of the sample used (establishments or enterprises; cut-off point of number of employees), the period under investigation, and the statistical methods applied, a big picture emerges that can be sketched as follows:

(1) *The number of export markets served increases with productivity* (Belgium – Muuls and Pisu (2009); Germany – Wagner (2007), Vincenzo and Wagner (2010); Ireland – Ruane and Sutherland (2005), Lawless (2009); Italy - Castellani, Serti and Tomasi (2010), Conti, Turco and Maggioni (2010); Japan – Wakasugi and Tanaka (2009); Slovenia – Damijan, Polanec and Prasnikar (2004), De Loecker (2007); Spain – Blanes-Cristobal, Dovis, Milgram-Baleix and Moro-Egido (2007), Mánez-Castillejo, Rochina-Barrachina and Sanchis-Llopis (2010); Sweden – Andersson, Lööf and Johansson (2008), Eliasson, Hansson and Lindvert (2009)).

(2) *Exporters to more developed economies have superior ex-ante productivity levels than non-exporters and firms exporting to less developed countries* (Belgium – Pisu (2008); Italy – Serti and Tomasi (2009); Slovenia - Damijan, Polanec and Prasnikar (2004), Damijan and Kostevc (2006), De Loecker (2007), Kostevc

(2008); Portugal – Silva, Afonso and Africano (2010a); Russia – Wilhelmsson and Kozlov (2007); Spain - Blanes-Cristobal, Dovis, Milgram-Baleix and Moro-Egido (2007)).

(3)     *Evidence for different causal effects of exporting on productivity by destination of exports is rare and not conclusive* (Belgium – Pisu (2008) reports no causal effect irrespective of development level of destination countries; Japan – Yashiro and Hirano (2009) find only exporters serving worldwide enjoyed significant advantage in productivity growth;  Portugal – Silva, Afonso and Africano (2010b) report no learning effects for firms that export to non-developed countries only but fast effects for exporters only to EU countries; Russia – Wilhelmsson and Kozlov (2007) find inconclusive evidence for learning-by.-exporting; Slovenia - Damijan, Polanec and Prasnikar (2004), state that exporters can benefit from exporting through learning and competition effects only when serving more demanding advanced markets; De Loecker (2007) finds that firms exporting only to low income regions get additional productivity gains that are lower than in firms exporting to high income countries; and Kostevc (2008), states that evidence of the learning process is not conclusive).

What can we learn from the micro-econometric studies surveyed here about the relationship between export destinations and productivity? Even if the evidence we have so far might not qualify as a stylized fact due to restrictions in the comparability of the studies it seems fair to state that we know that the number of export destinations is positively related to productivity and that we have evidence for self-selection of more productive firms into more demanding markets while the jury is still out regarding the issue of different learning-by-exporting effects by different export destinations.

### 2.1.3 New approaches to the empirical analysis of the exporter productivity premium

The standard approach in empirical studies of the exporter productivity premium that is outlined above uses OLS regression (with or without fixed firm effects to control for time invariant unobserved heterogeneity) to identify productivity differences between exporters and non-exporters at a point in time (including tests for self-selection of more productive firms into exporting) and OLS regression plus propensity score matching methods to test for causal effects of starting to export on productivity growth (testing for learning-by-exporting). Several studies step beyond a comparison of (unconditional or conditional) mean values of productivity between exporters and non-exporters and apply the non-parametric Kolmogorov-Smirnov test for differences in the whole unconditional productivity distribution between groups of firms that has been introduced to the literature on exports and productivity by Delgado, Farinas and Ruano (2002) and quantile regression for an evaluation of the size of the exporter premium at different points of the conditional productivity distribution (see Wagner (2010a) for a summary of these studies and illustrative examples with German data).

In recent research it is demonstrated that these "traditional" methods do not deal with firm heterogeneity in an adequate way when it comes to the study of exports and productivity and more appropriate methods are suggested. These new approaches that are reviewed in this section deal with three topics, namely firms with extreme observations (outliers), different productivity premia over the productivity distribution when unobserved heterogeneity matters and causal effects of exporting for different shares of export in total sales (on not only of exporting or not).

### *Extremely different firms (outliers)*

In a sample of heterogeneous firms often values for some variables for some firms are far away from the other observations in the sample. For example, in a sample of exporting and non-exporting firms one usually has a few firms with labour productivity values that are extremely low or extremely high compared to the mean values. These extreme values might be the result of reporting errors (and, therefore, wrong), or due to idiosyncratic events (like in the case of a shipyard that produces a ship over a long time and that reports the sales in the year when the ship is completed and delivered), or due to firm behavior that is vastly different from the behavior of the majority of firms in the sample. Observations of this kind are termed outliers. Whatever the reason may be, extreme values of labour productivity may have a large influence on the mean value of labour productivity computed for the exporters and non-exporters in the sample, on the tails of the distribution of labour productivity, and on the estimates of the exporter premium. Conclusions with regard to the productivity differences between exporters and non-exporters, therefore, might be influenced by a small number of firms with extremely high or low values of productivity, and the same is true for any other empirical investigation using data for a sample of heterogeneous firms.

Researchers from the field of micro-economics of international firm activities usually are aware of all of this. Given that due to confidentiality of the firm level data single observations as a rule cannot be inspected closely enough to detect and correct reporting errors, or to understand the idiosyncratic events that lead to extreme values, a widely used procedure to keep these extreme observations from shaping the results is to drop the observations from the top and bottom one percent of the distribution of the variable under investigation. A case in point is the international

14

comparison study on the exporter productivity premium by the International Study Group on Exports and Productivity (ISGEP) (2008: 610).

Dropping the firms from the top and the bottom one percent of the productivity distribution and comparing the results of empirical investigations with and without these firms with extremely high or extremely low values of labour productivity might be considered as a first and useful step to check the sensitivity of results. However, although this approach seems to be rather popular it is in some sense arbitrary. Why the top and bottom one percent? Why not choose a larger or smaller cut-off point? There are alternative approaches to deal with extreme observations (outliers) that are substantiated in statistics.[8]

Wagner (2010a) reports results for the exporter premium computed for a cross-section sample of 618 German manufacturing firms using OLS and various methods that are designed to deal with outliers (Least Absolute Deviations (LAD) regression, Huber M-estimator, fully robust MM-estimator). The estimated labour productivity premium is statistically highly significant and large from an economic point of view for all estimators applied. The estimated size, however, differs considerably. The estimated premium from the fully robust MM-estimator is considerably lower than the values from both OLS and LAD applied to the full or the trimmed sample without the firms from the top/bottom one percent of the productivity distribution. This illustrates that it is important to document the extent to which estimation results are influenced by extreme observations.

---

[8] A discussion of these methods is beyond the scope of this paper; see Verardi and Croux (2009) for an introduction with a view on applications (plus Stata code) and for references to the theoretical literature.

Thus far the consequences of observed firm heterogeneity for micro-econometric studies of international firm activities are considered. Firm heterogeneity, however, might be caused by factors that are either not observed by the researcher and that, therefore, are not included in the empirical model, or that are unobservable to a researcher. A case in point with regard to the exporter productivity premium is management quality. In the data sets used to empirically investigate international firm activities variables that measure management quality are missing. This would not pose a big problem if management quality would be uncorrelated with the other variables included in the empirical model (e.g., the exporter status) – of course it would not be possible to investigate the role of management quality for productivity differences between firms empirically, but the estimated coefficient for the exporter dummy variable would be an unbiased estimate of the exporter productivity premium (given all other assumptions for the applicability of OLS are fulfilled). However, one would not expect that management quality is uncorrelated with either the exporter status or other variables like firm size. Not controlling for management quality then leads to biased estimates for the exporter premium.

A standard solution for this problem that is widely used in the literature on the micro-econometrics of international firm activities is the estimation of fixed effects models for panel data. Using pooled cross-section time-series data for firms and including fixed firm effects in the empirical model allows to control for time invariant unobserved firm heterogeneity, and to estimate the coefficients for the time variant variables that are included in the models without any bias caused by the non-inclusion of the unobserved variables that are correlated with these included variables. A case in point is the paper by ISGEP (2008), were in table 4 exporter productivity premia are reported based on empirical models with and without fixed

effects. If fixed firm effects are added to control for time invariant unobserved heterogeneity the point estimates of the exporter productivity premia are much smaller compared to the results based on pooled data only.

Thus, unobserved firm heterogeneity does matter. Is it possible to tackle both aspects of firm heterogeneity - outliers and unobserved heterogeneity - simultaneously? A highly robust MM-estimator for panel data with fixed effects has been proposed recently by Bramati and Croux (2007). While a discussion of details of this estimator is beyond the scope of this paper the underlying idea is to center the series of observations for a firm in a similar way to what is generally done when applying the within transformation that is used to estimate a fixed effects model. The difference here is that the series are centered by removing the median instead of demeaning because the mean is largely distorted by outliers. Having centered the series, a robust estimator can be applied to deal with atypical individuals. The outcoming results will be comparable to those of a fixed effects estimator but will not be distorted by the presence of atypical individuals.

Verardi and Wagner (2011) apply this newly developed method to the estimation of exporter productivity premia for firms from manufacturing industries in West Germany and compare the results to those from using the standard fixed effects estimator. 3.07 percent of the enterprises are identified to be outliers. Dropping these outliers leads to a drastic change in the estimation results for the exporter productivity premium and to a dramatic change in the conclusions drawn: While the estimated exporter premium is statistically highly significant and large from an economic point of view, taking on a value of 13.43 percent, this estimate (while still statistically highly significant) drops to 0.997 percent when the same model is estimated using the robust fixed effects method. According to the results from the

robust fixed effects regression there is no such thing as a large exporter productivity premium!

This demonstrates that outliers can drive results from an empirical study with heterogeneous firms. Verardi and Wagner (2010) report similar results in a study on the exporter premia by destination of exports (euro-zone vs. non-euro zone). Furthermore, Verardi and Wagner (2011) show in a Monte Carlo study that the standard procedure of trimming the data by deleting the observations from the top/bottom one percent of the productivity distribution leads to biased estimations. Therefore, the newly available method of robust estimation of linear fixed effects models should be considered as a valuable add-on to the box of tools for empirically analyzing international activities of heterogeneous firms.


***Exporter premia along the productivity distribution***

As stated above in the literature on exports and productivity quantile regression (described in detail in Koenker (2005)) has been used for an evaluation of the size of the exporter premium at different points of the conditional productivity distribution. Until recently it was not feasible to control for unobserved heterogeneity via fixed firm effects in a quantile regression. Powell and Wagner (2011) apply a newly developed method for quantile regression for panel data developed by Powell (2009) to estimate the exporter productivity premium at quantiles of the productivity distribution for manufacturing enterprises in Germany.

In West Germany the productivity premium of exporters over non-exporters is statistically different from zero at each quantile of the productivity distribution, and this holds for East Germany, too, with the exception of the very high end. While the premium tends to be small (but not negligible) over large parts of the distribution from

the 30th percentile onwards where it is about 5 percent, it is much larger at the lower end. For the 5th percentile the estimate in favor of the exporters is 29.0 percent in West Germany and 33.1 percent in East Germany, and the corresponding figure at the 10th percentile is 15.6 percent in both parts of Germany.

Powell and Wagner (2011) argue that the finding that the exporter productivity premium is positive, statistically significant and of an order of magnitude that is relevant from an economic point of view all over the productivity distribution is important because it shows that the central policy implication of the Melitz (2003) model is still valid here with the presence of low productivity exporters and high productivity non-exporters: a reduction in trade barriers leads to an increase in productivity. They note that the estimates of the exporter premia decrease substantially when fixed effects are included, suggesting that existing estimates in the literature are biased due to unobserved firm heterogeneity. However, the pattern of the results survives – the effect is largest at the bottom of the productivity distribution.

These interesting and important new insights demonstrate that the newly available method for quantile regression in a linear fixed effects models should be considered as another valuable add-on to the box of tools for empirically analyzing international activities of heterogeneous firms.


***The causal effect of exports on productivity reconsidered: A continuous treatment approach***

Previous empirical studies (reviewed above) show that exporting does not necessarily improve productivity. One possible reason for this result is that most previous studies are restricted to analyzing the relationship between a firm's export *status* and the growth of its labour productivity, using the firms' export status as a

binary treatment variable and comparing the performance of exporting and non-exporting firms. In two papers Fryges (2009) and Fryges and Wagner (2008) apply the newly developed generalised propensity score (GPS) methodology by Hirano and Imbens (2004) that allows for continuous treatment, that is, different levels of the firms' export activities.

Using the GPS method and a large panel data set for German manufacturing firms Fryges and Wagner (2008) estimate the relationship between a firm's export-sales ratio and its labour productivity growth rate. They find that there is a causal effect of firms' export activities on labour productivity growth. However, exporting improves labour productivity growth only within a sub-interval of the range of firms' export-sales ratios. Furthermore, they report that the relationship between labour productivity growth and the export-sales ratio is not stable over time.

These are important findings that cannot be uncovered using the standard approach by applying propensity score matching and comparing export starters and observational identical non-starters over the years after the export start of some of them to compute the average treatment effect on the treated. This illustrates that the GPS method should be considered as a third valuable add-on to the box of tools for empirically analyzing international activities of heterogeneous firms besides the robust fixed effects estimator and the estimator for quantile regression with fixed firm effects.

## 2.2    Imports and productivity in manufacturing firms

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 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."

In the literature arguments for both a positive impact of productivity on importing (which is in 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 (see Kasahara and Lapham (2008), Andersson et al. (2008), Castellani et al. (2010)).

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 why two-way traders are the most productive firms on average (see Andersson et al. (2008), Castellani et al. (2010), Altomonte and Békés (2010), Halpern et al. (2005) and Muuls and Pisu (2009)).

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. With new datasets that include information on imports at the firm level becoming available for more and more countries a new literature is emerging 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. Table 2 summarizes the findings from 20 micro-econometric studies on imports and productivity based on firm data from 12 countries. All papers are published since 2007 and many of them are still in working paper status.

[Table 2 near here]

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. We have evidence for self-selection of more productive firms into exporting from most of the studies that look at this issue; the evidence on learning-by-importing, however, is still rare and inconclusive.

## 2.3    Beyond manufacturing: International trade and productivity in services firms

While we have evidence on the links between international trade and productivity in manufacturing firms from a large number of empirical studies published during the past 15 years comparable information for firms from services industries is scarce and of a recent vintage. Given the high and increasing importance of the services sector – Jorgenson and Timmer (2011, p. 1) state in their comprehensive analysis of structural change in advanced nations: "Since 1980, the services sector has overwhelmingly predominated in the economic activity of the European Union, Japan and the US …" – it is interesting to review the empirical evidence from studies using

micro-data on trade and productivity in services firms.[9] Table 3 summarizes the findings from seven micro-econometric studies on trade and productivity based on services firm data from six countries. All papers are published in 2010 or 2011, and only Breinlich and Criscuolo (2011) look beyond exports by investigating imports, too.


[Table 3 near here]


The big picture is similar to the one sketched above for trade in manufactured goods. Exporters are more productive than non-exporters and we have evidence for self-selection of more productive firms into services exports but no evidence for learning-by-exporting effects on productivity growth. Note, however, that Vogel and Wagner (2011) find an estimated exporter productivity premium that is statistically significant and relevant from an economic point of view only when a standard fixed effects estimator is used. When a robust estimator (discussed in detail in section 2.1.3 above) that takes care of the presence of extreme observations, or outliers, is applied, this premium drops to zero. At least for Germany, therefore, like in the case of manufacturing industries results are driven by a fraction of firms with extreme values in services, too. An important next step in research in this area consists in similar empirical investigations that use firm level panel data from services industries in other countries.

---

[9] For a comprehensive survey of the literature on services trade with a focus on investigations of the determinants of international trade and investment in services, the potential gains from greater trade and efforts to achieve trade liberalization through agreements see Francois and Hoekman (2010).

**2.4    Beyond trade: Outward foreign direct investment and productivity**

Besides international trade (exports and imports) other forms of international activities of firms and their relation with productivity are investigated both theoretically and empirically. Given the focus of this survey paper on international trade we will look at one of these activities only that is closely related to trade because firms may consider it as a substitute for exports – outward foreign direct investment in its horizontal variant, i.e. the creation of a production facility in a foreign country to produce products identical to or similar to the products produced in the home country.

In a multi-country, multi-sector general equilibrium model of Helpman, Melitz and Yeaple (2004) investigate 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 recent empirical papers take the Helpman-Melitz-Yeaple model as a point of departure. Table 4 summarizes the findings from 14 micro-econometric studies on the productivity pecking order among firms with different forms of

international activities. All but two of these studies use data for highly industrialized countries,[10] and all but one look at firms from manufacturing industries only.[11]

The big picture is well in line with the predictions derived from the theoretical model by Helpman, Meltiz and Yeaple (2004) – firms that serve the home market only are the less productive group, followed by firms that export and by firms that engage in outward foreign direct investment (usually these firms are exporters, too).

[Table 4 near here]

An interesting finding from the only study that looks at firms beyond manufacturing industries and that considers firms from software services in India is a reversed pecking order between exporters and firms with outward foreign direct investment in services compared to firms in manufacturing (here: from the chemicals industry) for the same country (India) and the same time period. Bhattacharya et al. (2010) report that *less* productive software companies engage in outward foreign direct investments. It would be important to have comparable empirical evidence from other studies based on firm level data from services industries to get an impression whether this is an anomaly or whether it points to fundamental differences in the way firms determine the form of international activities used.

---

[10] The exceptions are Bhattacharya et al. (2010) for India and Damijan et al. (2007) for Slovenia; the sample used by Oberhofer and Pfaffermayr (2011) includes firms from Croatia, Cyprus, Greece and Slovenia, too.

[11] Bhattacharya et al. (2010) look at data from firms in the chemicals industry and in a services industry, software development.

## 3. Beyond productivity: International trade and further dimensions of firm performance

The prominent position of productivity as a topic in the empirical literature on international trade and firm performance is due to the central role played by productivity in the Melitz-type models from the *new new international trade theory*. Stakeholders in firms care for other dimensions of firm performance, too – workers for working conditions in general and especially for wages, shareholders for stock prices, dividends and profits, and all of them for the longer-run development of the firm including survival as an ultimate goal. Empirical evidence on the links between international trade and further dimensions of firm performance beyond productivity will be surveyed next, starting with wages (in section 3.1) and profitability (in section 3.2) and concluding with survival (in section 3.3).

### 3.1 International trade and wages

One of the new and exciting findings documented in the Brookings paper by Bernard and Jensen (1995) is that exporters tend to pay higher wages and benefits. Average wages and benefits (per worker, per production worker, and per non-production worker) are higher in exporting plants than in non-exporting plants of all size classes. Exporter wage premia are statistically significant for all categories of wages and benefits after controlling for capital per worker, size of plant, multi-plant dummy, industry, year, plant age, and region. Coefficients of exporter status dummies are statistically significant in fixed effects regressions controlling for capital per worker, hours per worker, size of plant, and year. Schank et al. (2007) provide a synopsis of 21 studies published between 1995 and 2005 covering 22 different countries from highly developed economies like the U.S., Germany, and Sweden, and emerging

economies like Taiwan, Korea, and Mexico, to transition countries (Estonia, Slovenia) and least developed Sub-Saharan African economies like Burundi or Ethiopia. The empirical strategies used in these papers replicate (sometimes only partly) the approach introduced by Bernard and Jensen, and the results regarding the exporter wage premia are broadly consistent with the findings from the pioneering study.

An open question not dealt with in this literature is whether these exporter wage premia do indeed indicate that exporting plants pay higher wages in the sense that comparable workers are better paid when working on a comparable work place for an exporter, i.e. *ceteris paribus*. Given that all these empirical studies use average data at the plant or firm level, individual characteristics of the workers that might influence their productivity (and, therefore, their wages) cannot be taken into account, and certain characteristics of the work place that might call for compensating wage differentials are not represented adequately. This shortcoming has been recognized from the outset: Commenting on the presentation of the paper by Bernard and Jensen, Robert Z. Lawrence argued that "the impact of exports, while positive and statistically significant, is considerably reduced once the effects of capital intensity, industry, plant scale, and location are controlled for. One suspects, moreover, that the premiums would be even further reduced if the authors were able to control for worker characteristics. Thus the wage benefits that are attributable solely to exporting appear to be rather small." (Bernard and Jensen 1995: 113f.)

Starting with the pioneering study by Schank et al. (2007) a number of recent empirical papers tests for the existence of these premia when observable and unobservable individual characteristics of the employees and the work place are controlled for using linked employer-employee panel data set. Furthermore, Schank et al. (2010) investigate the direction of causality of the exports-wages link by looking

28

for self-selection of firms that pay higher wages ceteris paribus into exporting and testing for a causal effect of exports on wages paid to employees in a firm. Table 5 summarizes the findings from these recent studies.[12]

[Table 5 near here]

The number of these "second generation" studies on trade and wages based on linked employer-employee data is still small (and the number of countries covered is even smaller) and some studies only use cross-section data that do not allow to control for unobserved firm or worker heterogeneity. Therefore, a big picture has not emerged until day. One consensus, however, has been reached: Compared to the empirical evidence based on average information at the firm level the exporter wage premium is much smaller when (observed or unobserved) individual worker characteristics are controlled for; in some studies based on linked employer-employee data there is no such thing as a wage premium for exporting per se. This points out that the use of linked employer-employee panel data is much more appropriate to investigate the existence and the size of the exporter wage premium.

Other findings vary between studies and some interesting aspects (like the role of imports, or destination markets, or skill categories; the existence or not of self-selection and of causal effects of exporting on wages paid) are only dealt with in single studies. Internationally comparable studies are urgently needed here before results can be taken as a basis for any sound (policy) conclusions.

---

[12] In table 5 only studies based on linked employer-employee panel data are included. Recent studies on the relation between trade and wages using average data at the firm level include Serti et al. (2010) for exports and imports in Italy; Tsou et al. (2006) for Taiwan; Kandilov (2009) for Chile; Brambilla et al. for Brazil; and Amiti and Davis (2008) for Indonesia.

## 3.2    Exports and profitability

A huge literature (reviewed in section 2.1 above) demonstrates that exporting firms are more productive than otherwise identical firms that sell on the national market only. Exporting firms have to bear extra costs due to, among others, market research, adaptation of products to local regulations, or transport costs. These extra costs are one reason for a self-selection of the more productive firms on international markets. Furthermore, as seen in section 3.1 exporting firms tend to pay higher wages than non-exporting firms. A question that has been investigated in the literature on the micro-econometrics of international trade only recently is whether the productivity advantage of exporting firms does lead to a profitability advantage of exporters compared to otherwise identical non-exporters even when exporters are facing extra costs and pay higher wages.

This apparent gap in the literature on the micro-econometrics of international trade comes as a surprise because maximization of profits (and not of productivity) is usually considered as a central goal for firms. Furthermore, looking at profitability instead of productivity is more appropriate from a theoretical point of view, too. Even if productivity and profitability are positively correlated (which tends to be the case) productivity is, as was recently pointed out by Foster, Haltiwanger and Syverson (2008, p. 395), only one of several possible idiosyncratic factors that determine profits. Success of firms in general, and especially survival, depends on profitability. Often profitability is viewed both in theoretical models of market selection and in empirical studies on firm entry and exit as a positive monotonic function of productivity, and selection on profits then is equivalent to selection on productivity. In empirical studies the use of productivity instead of profitability is usually due to the fact that productivity is easily observed in the data sets at hand while profitability is

not. Fortunately, there are data sets that are rich enough to allow to measure profitability. Table 6 summarizes the findings from recent studies on trade and profits.


[Table 6 near here]


The number of studies on exports and profits is still small and the number of countries covered (all of which are member states of the EU) is even smaller. Results differ widely across the studies – from positive to no to negative profitability differences between exporters and non-exporters; from evidence for self-selection of more or less profitable firms into exporting to no evidence for self-selection at all; from no positive effects of exports on profits to positive effects. As of today, a big picture has not emerged. Open questions include the role played by different export destinations and by the characteristics of these export-markets, and the importance of the number and the quality of products exported, for the relationship between exports and profitability.

Only one study listed in table 6 looks at imports and profitability. This paper by Wagner (2011b) documents for the first time the relationship between profitability and three types of international trade activities – exports, imports and two-way trade for manufacturing enterprises from Germany. Descriptive statistics and regression analysis (with and without controlling for unobserved firm heterogeneity and the role of outliers) point to the absence of any statistically significant and economically large effects of trade activities on profits. This demonstrates that in German manufacturing firms any productivity advantages of trading firms are eaten up by extra costs related to selling and buying on foreign markets. Whether this holds for firms from other countries, too, is an important topic for future research.

## 3.3    International trade and firm survival

Why should we expect that international trade activities and firm survival are linked, and in which direction should we expect these links to work? Following Wagner (2011c), to start with, exporting can be considered as a form of risk diversification through spread of sales over different markets with different business cycle conditions or in a different phase of the product cycle. Therefore, exports might provide a chance to substitute sales at home by sales abroad when a negative demand shock hits the home market and would force a firm to close down otherwise. Furthermore, Baldwin and Yan (2011, p. 135) argue that non-exporters are in general less efficient than exporters (younger, smaller and less productive) and that, as a result, one expects that non-exporters are more likely to fail than exporters.

As regards imports, imported intermediate inputs or capital goods might be cheaper and / or technically more advanced than inputs bought on the national market. Gibson and Graciano (2011) argue that the benefit of using imported inputs lies in a combination of the relative price and the technology embodied in the inputs. Imports, therefore, lead to an increase in price competitiveness and non-price competitiveness of importers compared to firms that do not import. Furthermore, there is empirical evidence for a positive link of imports and productivity (discussed in Vogel and Wagner 2010a), documented by a significant productivity differential between firms that import and firms that do not trade internationally. Therefore, the probability to survive can be expected to be higher for importers than for non-importers, ceteris paribus.

Firms that both export and import can be expected to benefit from the positive effects of both forms of international trade on firm survival. Furthermore, two-way traders tend to be more productive than firms that either only import, or only export,

or do not trade at all (see Vogel and Wagner 2010a). Therefore, we expect the probability of firm exit to be smaller for two-way traders than for firms that only export or only import.

A small number of recent empirical studies look at the role of international trade activities in shaping the chances for survival of firms; Table 7 summarizes this literature.[13] As a rule the estimated chance of survival is higher for exporters, and this holds after controlling for firm characteristics that are positively associated with both exports and survival (like size, age, productivity). This might point to a direct positive effect of exporting on survival.


[Table 7 near here]


López (2006), Gibson and Graciano (2011), Namini et al. (2011) and Wagner (2011c) are the only empirical studies on imports and survival. The first three studies use data for Chile. These studies find that importers are less likely to exit than non-importers. However, López (2006) reports that exporters are more likely to survive only if they import intermediate inputs – exporting per se, therefore, does not seem to decrease the probability of plant failure. In the light of the empirical evidence for a positive link of imports and productivity the positive link between imports and firm survival does not come as a surprise. The same holds for the positive link between two-way trading (i.e. importing and exporting) and survival. Wagner (2011c) provides the first evidence on the role of exports, imports and two-way trade for firm survival in

---

[13] This literature looks at the survival of exporting and non-exporting firms on the home market; studies that investigate the determinants of surviving as an exporter on the export market include Ilmakunnas and Nurmi (2010) and Wagner (2008a, 2010).

a highly developed country, Germany, one of the leading actors on the world market for goods. Descriptive statistics and regression analysis (with and without explicitly taking the rare events nature of firm exit into account) point to a strong positive link between firm survival on the one hand and imports and two-way trading on the other hand, while exporting alone does not play a role for exiting the market or not. It would be interesting to see whether this pattern revealed for Germany is the same in other countries (and if not, why there is a difference).

## 4.     Discussion

The numerous empirical studies on international trade and firm performance that were published in recent years all added pieces of evidence to the state of our knowledge. One important aim of empirical studies in this field of economics (like in other fields, too) is to uncover stylized facts that hold over space and time, and that can both inspire theoretical models that are based on reasonable assumptions and inform policy debates in an evidence-based way. Can the accumulated evidence on international trade and firm performance qualify as stylized facts in this sense? I doubt.

On some topics we have a large enough number of empirical studies using data from different countries reporting results that point in the same direction so that we can paint a big picture – exporters and importers are more productive that non-exporters and non-importers and they were more productive in the years before they started to export or import (self-selection); the number of export markets served increases with firm productivity, and exporters to more developed economies have superior ex-ante productivity levels than non-exporters and firms exporting to less developed countries; firms that serve the home market only are the least productive

group, followed by firms that export and by firms that engage in outward foreign direct investment (productivity pecking-order).

However, this big picture summarizes the results from the studies in a qualitative way only. Any attempt to extract information on the size of the effects – the economic relevance, not the statistical significance – is hindered by the absence of a reasonably high degree of comparability across the studies. This lack of comparability is due to differences in the unit of analysis (establishment vs. enterprise), the sampling frame (all firms versus firm with a number of employees above a certain threshold only), the specification of the empirical models estimated and the econometric methods applied. The approach of the International Study Group on Exports and Productivity (ISGEP) (2008) to agree on the use of identically specified empirical model and identical econometric methods in the analysis of comparable samples of comparable data for a number of countries to compute estimates for each country and to use a meta-analysis in the second stage to explain cross-country differences is a promising way to make progress here. The use of this approach in investigations of other topics and for a larger group of countries, therefore, is highly recommended.

Besides topics were we have a big picture already there are others where the jury is still out. The most important of these topics is the presence or not of learning-by-exporting (and learning by importing) effects. Here results differ widely across studies (see Silva et al. (2010) for a comprehensive discussion). The use of a continuous treatment approach that applies a generalized propensity score approach to look for causal effects of different shares of exports in total sales on productivity (discussed in section 2.1.3) and that finds that exporting improves labor productivity growth only within a sub-interval of the range of firms' export-sales ratios in German

manufacturing firms should be replicated with data for other countries to shed more light on this topic.

In other sub-fields the number of studies is still too small to argue that we have sound empirical evidence on the direction (not to talk about the size) of the link between trade and the respective dimension of firm performance. Topics here include trade in services and productivity, trade and wages (after controlling for observed and unobserved heterogeneity in employers and employees), trade and profits, and trade and firm survival. The marginal return to further micro-econometric studies on these topics, therefore, is large.

Furthermore, even in sub-fields of the empirical literature on firm performance and trade that lead to a kind of consensus based on results of a large number of studies recent research casts doubts that the standard approach applied in these studies deal with firm heterogeneity in an adequate way. Cases in point are the studies (discussed in section 2.1.3 above) that apply robust methods to deal with extreme observations (outliers) in an adequate way and find a dramatic reduction in the estimated exporter productivity premium, and that point to different exporter productivity premia at different parts of the productivity distribution. The lack of replication studies with data from other countries, however, makes it impossible to judge whether these results are specific for firms from manufacturing in Germany only or of a wider relevance. The marginal return to replication studies, therefore, is large in this case, too.

The bottom line, then, is that we made remarkable progress on the way to understand the links between international trade and firm performance over the recent past – but we are not yet there.

**References**

Alcalá, Francisco and Pedro J. Hernández (2010), Firms' main market, human capital, and wages. *SERIEs* 1 (4), 433-458.

Altomonte, Carlo and Gabor Békés (2010), Trade Complexity and Productivity. CeFiG Working Papers 12, September.

Amendola, Adalgiso, Anna Ferragina, Rosanna Pittiglio and Filippo Reganati (2010), How is the 2007 Crisis Affecting Firms' Survival? Evidence from Italy, Paper presented at ETSG 2010 Lausanne, 9-11 September.

Amendolagine, Vito, Rosa Capolupo and Nadia Petragallo (2008), Export Status and Performance in a Panel of Italian Manufacturing Firms. Università degli Studi Bari Dipartomento di Scienze Economiche S.E.R.I.E.S Working Paper No. 27.

Amiti, Mary and Donald R. Davis (2008), Trade, Firms, and Wages: Theory and Evidence. National Bureau of Economic Research NBER Working Paper 14106, June.

Andersson, Martin, Hans Lööf and Sara Johansson (2008), Productivity and international trade: Firm Level Evidence from a small open economy. *Review of World Economics* 144 (4), 774-801.

Augier, Patricia, Olivier Cadot and Marion Dovis (2010), Imports and TFP at the Firm Level: The Role of Absorptive Capacity. DEFI, University of Aix-Marseilles, mimeo, March.

Baldwin, John and Beiling Yan (2011), The death of Canadian manufacturing plants: heterogeneous responses to changes in tariffs and real exchange rates. *Review of World Economics* 147 (1), 131-167.

Barba Navaretti, Giorgio and Anthony J. Venables (2004), Multinational Firms in the World Economy. Princeton and Oxford: Princeton University Press.

Bas, Maria and Vanessa Strauss-Kahn (2010), Does importing more inputs raise exports? Firm level evidence from France. MPRA Paper No. 27315, December.

Baumgarten, Daniel (2010), Exporters and the Rise in Wage Inequality. Evidence from German Linked Employer-Employee Data. Ruhr Economic Papers #217, October.

Bausch, Andreas, Thomas Fritz and Kathrin Boeseke (2007), Performance Effects of Internationalization Strategies: A Meta-Analysis. *Research in Global Strategic Management* 13, 143-176.

Bausch, Andreas and Mario Krist (2007), The Effect of Context-Related Moderators on the Internationalization-Performance Relationship: Evidence from Meta-Analysis. *Management International Review* 47 (3), 319-347.

Békés, Gabor, Péter Harasztosi and Balázs Muraközy (2011), Firms and Products in International Trade: Evidence from Hungary. *Economic Systems* 35 (1), 4-24.

Bellone, Flora, Sarah Guillou and Lionel Nesta (2010), To what extent innovation accounts for firm export premia? University of Nice – Sophia Antipolis, mimeo, February 2010.

Bernard, Andrew B. and J. Bradford Jensen (1995), Exporters, Jobs, and Wages in U.S. Manufacturing: 1976 – 1987. *Brookings Papers on Economic Activity, Microeconomics* 1, 67-119.

Bernard, Andrew B. and J. Bradford Jensen (1999), Exceptional exporter performance: cause, effect, or both? *Journal of International Economics* 47 (1), 1-25.

Bernard, Andrew B. and J. Bradford Jensen (2007), Firm Structure, Multinationals, and Manufacturing Plant Deaths. *Review of Economics and Statistics* 89 (2), 193-204.

Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding and Peter K. Schott (2007), Firms in International Trade. *Journal of Economic Perspectives* 21 (3), 105-130.

Bernard, Andrew B. and Joachim Wagner (1997), Exports and Success in German Manufacturing. *Weltwirtschaftliches Archiv* 133 (1), 134-157.

Bhattacharya, Rudrani, Ila Patnaik and Ajay Shah (2010), Exports versus FDI in services. International Monetary Fund IMF Working Paper WP/10/290, December.

Blanes-Cristóbal, José Vicente, Marion Dovis, Juliette Milgram-Baleix and Ana I. Moro-Egido (2008), Do sunk exporting costs differ among markets? Evidence from Spanish manufacturing firms. *Economics Letters* 101 (1), 110-112.

Bogheas, Spiros and Holger Görg (2008), Organizational forms for global engagement of firms. Kiel Institute for the World Economy, Kiel Working Papers No. 1448, September.

Bramati, Caterina Maria and Christophe Croux (2007), Robust estimators for the fixed effects panel data model. *Econometrics Journal* 10 (3), 521-540.

Brambilla, Irene, Daniel Lederman and Guido Porto (2010), Exports, Export Destinations, and Skills. National Bureau of Economic Research NBER Working Paper 15995, May.

Breau, Sébastian and David L. Rigby (2006), Is there really an export wage premium? A case study of Los Angeles using matched employer-employee data. Center for Economic Studies Discussion Paper CES 06-06, February.

Breinlich, Holger and Chiara Criscuolo (2011), International Trade in Services: A Portrait of Importers and Exporters. *Journal of International Economics* 84 (2), 188-206.

Casaburi, Lorenzo, G. Alfredo Minerva and Valeria Gattai (2008), Firms' International Status and Heterogeneity in Performance: Evidence From Italy. Fondazione Eni Enrico Mattei Nota di Lavoro 3.2008, January.

Castellani, Davide, Francesco Serti and Chiara Tomasi (2010), Firms in international trade: Importers' and exporters' heterogeneity in the Italian manufacturing industry. *The World Economy* 33 (3), 424-457.

Castellani, Davide and Antonello Zanfei (2007), Internationalisation, Innovation and Productivity: How Do Firms Differ in Italy? *The World Economy* 30 (1), 156-176.

Chaney, Thomas (2008), Distorted gravity: the intensive and extensive margins of international trade. *American Economic Review* 98 (4), 1707-1721.

Conti, Giuliano, Alessia Lo Turco and Daniela Maggioni (2010), Exporters in Services: New evidence from Italian firms. *Applied Economics Quarterly* 56(1), 73-98.

Crinò, Rosario and Paolo Epifani (2009), Export intensity and productivity. IAE-CSIC and Bocconi University, mimeo, April.

Damijan, Joze P. and Crt Kostevc (2006), Learning-by-exporting: Continuous productivity improvements or capacity utilization effects? Evidence from Slovenian Firms. *Review of World Economics* 142 (3), 599-614.

Damijan, Joze P. and Crt Kostevc (2010), Learning from trade through innovation: Causal link between imports, exports and innovation in Spanish microdata. Institute for Economic Research Working Paper No. 48, August.

Damijan, Joze P., Saso Polanec and Janez Prasnikar (2004), Self-selection, export market heterogeneity and productivity improvements: Firm level evidence from Slovenia. Katholieke Universiteit Leuven, LICOS Centre for Transition Economics Discussion Paper 148/2004, May.

Damijan, Joze P., Saso Polanec and Janez Prasnikar (2007), Outward FDI and Productivity: Micro-evidence from Slovenia. *The World Economy* 30 (1), 135-155.

Delgado, Miguel A., Jose C. Farinas and Sonia Ruano (2002), Firm productivity and export markets: a non-parametric approach. *Journal of International Economcis* 57 (2), 397-422.

De Loecker, Jan (2007), Do exports generate higher productivity? Evidence from Slovenia. *Journal of International Economics* 73 (1), 69-98.

Dovis, Marion and Juliette Milgram-Baleix (2009), Trade, Tariffs and Total Factor Productivity: The Case of Spanish Firms. *The World Economy* 32 (4), 575-605.

Eliasson, Kent, Pär Hansson and Markus Lindvert (2009), Do firms learn by exporting or learn to export? Evidence from small and medium-sized enterprises (SMEs) in Swedish manufacturing. Örebro University, Swedish Business School, Working Paper No. 15.

Engel, Dirk and Vivien Procher (2009), Export, FDI and Productivity – Evidence for French Firms. Ruhr Economic Papers #111, June.

Engel, Dirk, Vivien Procher and Christoph M. Schmidt (2010), The Asymmetries of a Small World: Entry Into and Withdrawal From International Markets by French Firms. Ruhr Economic Papers #192, June.

Eriksson, Tor, Valérie Smeets and Frédéric Warzynski (2009), Small Open Economy Firms in International Trade: Evidence from Danish Transaction-Level Data. Aarhus School of Business Department of Economics Working Paper 09-7, March.

Esteve-Pérez, Silviano, Juan A. Mánez-Castillejo and Juan A. Sanchis-Llopis (2008), Does a "survival-by-exporting" effect for SMEs exist? *Empirica* 35 (1), 81-104.

Esteve-Pérez, Silviano, Vicente Pallardó-López and Francisco Requena-Silvente (2011), The duration of firm-destination export relationships: Evidence from Spain, 1997-2006. Universitat de Valencia Working Papers in Applied Economics WPAE-2011-02, January.

Fafchamps, Marcel (2009), Human Capital, Exports, and Earnings. *Economic Development and Cultural Change* 58 (1), 111-141.

Forlani, Emanuele (2010), Irish firms' productivity and imported inputs. CORE Discussion Paper 2010/15, April.

Foster, Lucia, John Haltiwanger and Chad Syverson (2008), Reallocation, Firm Turnover, and Efficiency: Selection on Productivity or Profitability? *American Economic Review* 98, 1, 394-425.

Francois, Joseph and Bernard Hoekman (2010), Services Trade and Policy. *Journal of Economic Literature* 48 (3), 642-692.

Frías, Judith A., David S. Kaplan and Eric A. Verhoogen (2009), Exports and Wage Premia: Evidence from Mexican Employer-Employee Data. Columbia University, mimeo, August.

Fryges, Helmut (2009), The Export-Growth Relationship: Estimating a Dose-Response Function. *Applied Economics Letters* 16 (18), 1855-1859.

Fryges, Helmut and Joachim Wagner (2008), Exports and Productivity Growth: First Evidence from a Continous Treatment Approach. *Review of World Economics* 144 (4), 695-722.

Fryges, Helmut and Joachim Wagner (2010), Exports and Profitability: First Evidence for German Manufacturing firms. *The World Economy* 33 (3), 399-423.

Gibson, Mark J. and Tim A. Graciano (2011), Costs of Starting to Trade and Costs of Continuing to Trade. Washington State University, mimeo, January.

Görg, Holger and Marina-Eliza Spaliara (2010), Financial Health, exports, and firm survival: A comparison of British and French firms. Kiel Institute for the World Economy, mimeo, February.

Grazzi, Marco (2011), Export and Firm Performance: Evidence on Productivity and Profitability of Italian Companies. *Journal of Industry, Competition and Trade* (in press).

Greenaway, David, Joakim Gullstrand and Richard Kneller (2008), Surviving globalization. *Journal of International Economics* 74 (2), 264-277.

Greenaway, David, Joakim Gullstrand and Richard Kneller (2009), Live or Let Die? Altrnative Routes to Industry Exit. *Open Economies Review* 20 (3), 317-337.

Greenaway, David and Richard Kneller (2007), Firm Heterogeneity, Exporting and Foreign Direct Investment. *Economic Journal* 117 (February), F134-F161.

Haller, Stefanie A. (2010), Exporting, Importing, Intra-Firm Trade and Firm Performance. ESRI mimeo, March.

Halpern, László, Koren Miklós and Ádám Szeidl (2005), Imports and Productivity. Institute of Economics, Hungarian Academy of Sciences, mimeo, June.

Hayakawa, Kazunobu, Tomohiro Machikita and Fukunari Kimura (2011), Globalization and Productivity: A Survey of Firm-Level Analysis. *Journal of Economic Surveys* 25 (1), 19-68.

Helpman, Elhanan, Marc J. Melitz and Stephen R. Yeaple (2004), Export versus FDI with Heterogeneous Firms. *American Economic Review* 94 (1), 300-316.

Hirano, Keisuke and Guido W. Imbens (2004). *The Propensity Score with Continuous Treatments*. in: Gelman, Andrew and Xiao-Li Meng (eds.). Applied Bayesian Modeling and Causal Inference from Incomplete-Data Perspectives, Chichester: Wiley, 73-84.

Ilmakunnas, Pekka and Satu Nurmi (2010), Dynamics of Export Market Entry and Exit. *Scandinavian Journal of Economics* 112 (1), 101-126.

International Study Group on Exports and Productivity (ISGEP) (2008), Understanding Cross-Country Differences in Exporter Premia: Comparable Evidence for 14 Countries. *Review of World Economics* 144 (4), 596-635.

Jorgenson, Dale W. and Marcel P. Timmer (2011), Structural Change in Advanced Nations: A New Set of Stylised Facts. *Scandinavian Journal of Economics* 113 (1), 1-29.

Kandilov, Ivan T. (2009), Do Exporters Pay Higher Wages? Plant-level Evidence from an Export Refund Policy in Chile. *World Bank Economic Review* 23 (2), 269-294.

Kasahara, Hiroyuki and Beverly Lapham (2008), Productivity and the Decision to Import and Export: Theory and Evidence. CESifo Working Paper No. 2240, March.

Kasahara, Hiroyuki and Joel Rodrigue (2008), Does the use of imported intermediates increase productivity? Plant level evidence. *Journal of Development Economics* 87 (1), 106-118.

Kimura, Fukunari and Kozo Kiiyota (2006), Exports, FDI, and Productivity: Dynamic Evidence from Japanes Firms. *Review of World Economics* 142 (4), 695-719.

Klein, Michael W., Christoph Moser and Dieter M. Urban (2010), The Contribution of Trade to Wage Inequality: The Role of Skill, Gender and Nationality. National Bureau of Economic Research NBER Working Paper 15985, May.

Koenker, Roger (2005), *Quantile Regression*. Cambridge etc.: Cambridge University Press.

Kostevc, Crt (2008), Foreign market competition as a determinant of exporter performance. Evidence from Slovenian manufacturing firms. University of Ljubljana, mimeo.

Kox, Henk L. M. and Hugo Rojas-Romagosa (2010), Exports and productivity selection effects for Dutch firms. *De Economist* 158 (3), 295-322.

Lawless, Martina (2009), Firm export dynamics and the geography of trade. *Journal of International Economics* 77 (2), 245-254.

Lööf, Hans (2010), Are Services Different Exporters? *Applied Economics Quarterly* 56 (1), 99-117.

Lööf, Hans and Martin Andersson (2010), Imports, Productivity and Origin Markets: The Role of Knowledge-intensive Economies. *The World Economy* 33 (3), 458 – 481.

López Ricardo A. (2006), Imports of intermediate inputs and plant survival. *Economics Letters* 92 (1), 58-62.

Mánez-Castillejo, Juan A., Mariá E. Rochina-Barrachina and Juan A. Sanchis-Llopis (2010), Does firm size affect self-selction and learning-by-exporting? *The World Economy* 33 (3), 315-346.

Martins, Pedro S. and Luca David Opromolla (2009), Exports, Imports and Wages: Evidence from Matched Firm-Worker-Product Panels. Institute for the Study of Labor IZA DP No. 4646, December.

Martins, Pedro S. and Yong Yang (2009), The impact of exporting on firm productivity: a meta-analysis of the learning-by-exporting hypothesis. *Review of World Economics* 145 (3), 431-445.

Mayer, Thierry and Gianmarco I. P. Ottaviano (2007). The Happy Few: The Internationalisation of European Firms. New Facts based on Firm-level Evidence. Bruegel Blueprint Series Volume III, November.

Melitz, Mark J. (2003), The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica* 71 (6), 1695-1725.

Munch, Jacob Roland and Jan Rose Skaksen (2008), Human capital and wages in exporting firms. *Journal of International Economics* 75 (2), 363-372.

Muuls, Mirabelle and Mauro Pisu (2009), Imports and exports at the level of the firm: Evidence from Belgium. *The World Economy* 32 (5), 692-734.

Namini, Julian Emami, Giovanni Facchini and Ricardo López (2011), Export growth and factor market competition: theory and evidence. Department of Economics, Erasmus University Rotterdam, mimeo, February.

Oberhofer, Harald and Michael Pfaffermayr (2011), FDI versus Exports: Multiple Host Countries and Empirical Evicence. University of Salzburg Working Papers in Economics and Finance N0. 2011-03, February.

Pisu, Mauro (2008), Export destination and learning-by-exporting: Evidence from Belgium. National Bank of Belgium Working Paper No. 140, September.

Powell, David (2009), Unconditional Quantile Regression for Panel Data with Exogenous or Endogenous Regressors. RAND Working Paper WR-710, October.

Powell, David and Joachim Wagner (2011), The Exporter Productivity Premium along the Productivity Distribution: Evidence from Unconditional Quantile Regression with Firm Fixed Effects. RAND Working Paper WR-837, February.

Redding, Stephen J. (2010), Theories of Heterogeneous Firms and Trade. National Bureau of Economic Research NBER Working Paper 16562, December.

Ruane, Frances and Julie Sutherland (2005), Export Performance and Destination Characteristics of Irish Manufacturing Industry. *Review of World Economics* 141 (3), 442-459.

Schank, Thorsten, Claus Schnabel and Joachim Wagner (2007), Do exporters really pay higher wages? First evidence from German linked employer-employee data. *Journal of International Economics* 72 (1), 52-74.

Schank, Thorsten, Claus Schnabel and Joachim Wagner (2010), Higher wages in exporting firms: self-selection, export effect, or both? First evidence from linked employer-employee data. *Review of World Economics* 146 (2), 303-322.

Serti, Francesco and Chiara Tomasi (2009), Self-selection along different export and import markets. Laboratory of Economics and Management – Sant'Anna School of Advanced Studies LEM Working Paper 2009/18, November.

Serti, Francesco, Chiara Tomasi and Antonello Zanfei (2010), Who Trades with Whom? Exploring the Links between Firms' International Activities, Skills, and Wages. *Review of International Economics* 18 (5), 951-971.

Silva, Armando, Óscar Afonso and Ana Paula Africano (2010a), Do Portugese Manufacturing Firms Self Select to Exports? Universidade de Porto FEP Working Papers N. 371, April.

Silva, Armando, Óscar Afonso and Ana Paula Africano (2010b), International trade involvement and performance of Portuguese manufacturing firms: causal links. Instituto Politécnico do Porto – ESEIG, mimeo, July.

Silva, Armando, Óscar Afonso and Ana Paula Africano (2010c), Economic Performance and International Trade Engagement: The Case of Portuguese Manufacturing Firms. Universidade de Porto FEP Working Papers N. 369, April.

Silva, Armando, Ana Paula Africano and Óscar Afonso (2010), Learning-by-exporting: What we know and what we would like to know. Universidade de Porto FEP Working Papers N. 364, March.

Smeets, Valérie and Frédéric Warzynski (2010), Learning by Exporting, Importing or Both? Estimating productivity with multi-product firms, pricing heterogeneity and the role of international trade. Aarhus University, mimeo, October.

Singh, Tarlok (2010), Does International Trade Cause Economic Growth? A Survey. *The World Economy* 33 (11), 1517-1564.

Temouri, Yama, Alexander Vogel and Joachim Wagner (2011), Self-selection into export markets by business services firms – Evidence from France, Germany and the United Kingdom. Aston Business School and Leuphana University Lueneburg, mimeo, March.

Todo, Yasuyuki (2011), Quantitative Evaluation of the Determinants of Export and FDI: Firm-level Evidence from Japan. *The World Economy* 34 (3), 355 – 381.

Tomiura, Eiichi (2007), Foreign outsourcing, exporting, and FDI: A productivity comparison at the firm level. *Journal of International Economics* 72 (1), 113-127.

Tsou, Meng-Wen, Jin-Tan Liu and Cliff J. Huang (2006), Export Acitivity, Firm Size and Wage Structure: Evidence from Taiwanese Manufacturing Firms. *Asian Economic Journal* 20 (4), 333-354.

Verardi, Vincenzo and Christophe Croux (2009), Robust regression in Stata. *The Stata Journal* 9 (3), 439-453.

Verardi, Vincenzo and Joachim Wagner (2010), Productivity premia for German manufacturing firms exporting to the Euro-area and beyond: First Evidence from robust fixed effects estimations. University of Luenebug Working Paper Series in Economics No. 172, May.

Verardi, Vincenzo and Joachim Wagner (2011), Robust Estimation of Linear Fixed Effects Panel Data Models with an Application to the Exporter Productivity Premium. *Jahrbücher für Nationalökonomie und Statistik* 231 (in press).

Vogel, Alexander (2011), Exporter Performance in the German Business Services Sector. *The Services Industries Journal* 31 (7), 1015 - 1031.

Vogel, Alexander and Joachim Wagner (2010a), Higher productivity in importing German manufacturing firms: self-selection, learning from importing, or both? *Review of World Economics* 145 (4), 641-665.

Vogel, Alexander and Joachim Wagner (2010b), Exports and Profitability – First Evidence for German Business Services Enterprises. *Applied Economics Quarterly* 56 (1), 7-30.

Vogel, Alexander and Joachim Wagner (2011), Robust estimates of exporter productivity premia in German business services enterprises. University of Luenebug Working Paper Series in Economics No. 207, July.

Wagner, Joachim (2002), The causal effects of exports on firm size and labor productivity: first evidence from a matching approach. *Economics Letters* 77 (4), 287-292.

Wagner, Joachim (2006), Exports, foreign direct investment, and productivity: Evidence from German firm level data. *Applied Economics Letters* 13 (6), 347-349.

Wagner, Joachim (2007a), Exports and Productivity: A Survey of the Evidence from Firm-Level Data. *The World Economy* 30 (1), 60-82.

Wagner, Joachim (2007b), Exports and productivity in Germany. *Applied Economics Quarterly* 53 (4), 353-373.

Wagner, Joachim (2007c), Productivity and size of the export market – Evidence for West and East German plants 2004. *Jahrbücher für Nationalökonomie und Statistik / Journal of Economics and Statistics* 227 (4), 403-408.

Wagner, Joachim (2008), Export Entry, Export Exit and Productivity in German Manufacturing Industries. *International Journal of the Economics of Business* 15 (2), 169-180.

Wagner, Joachim (2010a), From estimation results to stylized facts – Twelve recommendations for empirical research in international activities of heterogeneous firms. University of Luenebug Working Paper Series in Economics No. 186, September (forthcoming, *De Economist*).

Wagner, Joachim (2010b), The post-entry performance of cohorts of export starters in German manufacturing industries. University of Luenebug Working Paper Series in Economics No. 187, September (forthcoming, *International Journal of the Economics of Business*).

Wagner, Joachim (2011a), Offshoring and firm performance: self-selection, effects on performance, or both? *Review of World Economics* 147 (2), 217-247.

Wagner, Joachim (2011b), Exports, imports and profitability: First evidence for manufacturing enterprises. University of Luenebug Working Paper Series in Economics No. 206, June.

Wagner, Joachim (2011c), Exports, Imports and Firm Survival: First evidence for manufacturing enterprises in Germany. University of Luenebug Working Paper Series in Economics No. 211, August.

Wakasugi, Ryuhei and Ayumu Tanaka (2009), Firm heterogeneity and different modes of internationalization: Evidence from Japanese firms. Kyoto Institute of Economic Research, KIER Discussion Paper No. 681, September.

Wilhelmsson, Frederik and Konstantin Kozlov (2007), Exports and productivity of Russian firms: in search of causality. *Economic Change and Restructuring* 40 (4), 361-385.

Yashiro, Naomitsu and Daisuke Hirano (2009), Do all exporters benefit from export boom? Evidence from Japan. Kyoto Institute of Economic Research, KIER Discussion Paper No. 689, December.

Table 1:     Micro-econometric studies on export destination and productivity

| Country Author(s) (year of publication) | Period covered Areas covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| Belgium Pisu (2008) | 1998 – 2005 Four groups of countries by per capita income | Exports and productivity by destination | Regression; matching approaches; diff-in-diff | Exporters to more developed economies have superior ex-ante productivity levels than non-exporters and firms exporting to less developed countries. No causal effect of export on productivity irrespective of development level of destination countries |
| Belgium Muuls and Pisu (2009) | 1996 – 2004 Country of destination | Facts about Belgium firms | Descriptive statistics; regressions | Firms tend to serve only few foreign markets. Negative relation between number of exporting firms and number of export destinations served. Number of export markets served increase with productivity. |
| France Bellone, Guillou and Nesta (2010) | 2005 Europe vs. rest of the world | TFP differences between non-exporters, exporters to Europe, and global exporters | t-test; Kolmogorov-Smirnov-test; OLS; Quantile regression | Global exporters have higher productivity than intra-Europe exporters while the TFP distribution of intra-Europe exporters is not significantly different from the one of non-exporters. No exporter premium for only intra-Europe exporters, but high and significant for global exporters. Export premia are very stable over the different quintiles, but tend to be higher for highest quintiles. |
| Germany (West/East) Wagner (2007c) | 2004 Euro-zone vs. non-Euro zone | Productivity differences | t-test; Kolmogorov-Smirnov-test; with and without top/bottom one percent of the productivity distribution | Exporters inside Euro-zone more productive than firms selling in Germany only, but less productive than firms selling outside the Euro-zone too |

| | | | | |
|---|---|---|---|---|
| Germany<br>Verardi and<br>Wagner<br>(2010) | 2003 – 2006<br>Euro-zone versus<br>Non-Euro zone | Productivity premia for exporters<br>to Euro-zone and beyond; test for<br>self-selection | Fixed-effects linear<br>panel data model -<br>standard and robust<br>version | Exporters beyond Euro-zone are more productive<br>than exporters to Euro-zone only; self-selection for<br>exporters beyond Euro-zone only. Robust estimation<br>methods point to tiny exporter premia only. |
| Ireland<br>Ruane and Sutherland<br>(2005) | 1991 – 1998<br>Exports to UK vs.<br>global exports | Exports and performance by<br>destination | Regression | Non-UK exporters are larger than UK exporters in<br>terms of turnover ,pay increasingly higher wages,<br>employ a higher proportion of skilled labour and<br>are more productive. |
| Ireland<br>Lawless<br>(2009) | 2000 – 2004<br>>50 countries of<br>destination | Productivity and destinations | Descriptive statistics;<br>OLS | Firms with greater market coverage tend to be<br>more productive. No rigid ordering of destinations<br>found. Firm-level export growth largely driven by<br>existing markets; most growth due to continuing<br>exporters. Changes in market portfolios of exporters<br>a relatively common occurrence. |
| Italy<br>Serti and Tomasi<br>(2009) | 1993 – 1997<br>Geographical areas | Firm performance and export<br>destinations | Regression | Productivity levels higher for firms exporting to high<br>medium income countries compared to firms<br>exporting to European and low income countries.<br>Results more mixed in terms of size and workforce<br>composition. Ex-ante trade premia higher for those<br>firms that start investing in more advanced countries |
| Italy<br>Crinò and Epifani<br>(2009) | 2003<br>EU15; new EU members;<br>other European countr.;<br>North America; Latin<br>America; China; other<br>Asian countries; Africa;<br>Oceania | Export intensity and productivity | Descriptive statistics;<br>regression | TFP strongly negatively correlated with export<br>intensity to low-income destinations and<br>uncorrelated with export intensity to high-income<br>destinations, conditional on exporting |

| | | | | |
|---|---|---|---|---|
| Italy<br>Castellani, Serti and Tomasi<br>(2010) | 1993 – 1997<br>Countries of destination | Differences between firms with different numbers of countries of destination | Descriptive statistics; non-parametric kernel regressions; pooled OLS and fixed effects | Bulk of firms trade only with a few countries, but a handful of diversified traders account for the majority of exports. Firms that export to larger number of countries are larger, more productive, and more capital intensive |
| Italy<br>Conti, Turco and Maggioni<br>(2010) | 2003<br>EU25; EU15; non-EU; industrial markets outside Europe | Exporters in services and productivity | Descriptive statistics; regression | Only more productive and skilled labour endowed firms have a higher probability to export to industrial countries outside Europe |
| Japan<br>Wakasugi and Tanaka<br>(2009) | 2005<br>Asia, North America, Europe | Productivity and exports by destination area | Regression | Productivity of firms simultaneously internationalized in multiple regions higher than in firms exporting in a single region |
| Japan<br>Yashiro and Hirano<br>(2009) | 2002 – 2005<br>Asia, Western, other regions | Productivity effects of export boom | Diff-in-diff | Only exporters serving worldwide enjoyed significant advantage in productivity growth |
| Portugal<br>Silva, Afonso and Africano<br>(2010a) | 1996 – 2003<br>All destination countries of exporters | Self-selection into exporting | Random-effects probit OLS regression | Firms that start exporting only to developed countries most productive in pre-entry period, together with firms that export to multiple countries. Self-selection varies over markets, suggesting different productivity thresholds |
| Portugal<br>Siva, Afonso and Africano<br>(2010b) | 1996 – 2003<br>All destination countries of exporters | Learning-by-exporting | Propensity score match-Ing, diff-in-diff estimator | No learning effect for exporters only to non-developed countries; fast effect for exporters only to EU countries; firms that mix several types of destinations get moderately positive effects |
| Russia<br>Wilhelmsson and Kozlov<br>(2007) | 1996 – 2002<br>OECD versus former Soviet Union (CIS) and other countries | Self-selection versus learning-by-exporting | Fixed-effects, pooled OLS, GMM | Firms that export mainly to OECD more productive than firms that exporter mainly to CIS or other countries; evidence for learning-by-exporting inconclusive |

| | | | | |
|---|---|---|---|---|
| Slovenia Damijan, Polanec and Prasnikar (2004) | 1994 – 2002 Countries of destination | Productivity and different export markets | Descriptive statistics; OLS, fixed effects, sytem-GMM | Firms that export to more markets are on average more labor productive. Only high productivity firms can afford to export to advanced markets. Exporters can benefit from exporting through learning and competition effects only when serving more demanding advanced markets |
| Slovenia Damijan and Kostevc (2006) | 1994 – 2002 ex-Yugoslav vs. EU | Learning-by-exporting | Correlations; matching, diff-in-diff | Both firms exporting to EU markets as well as those exporting to former Yugoslav countries experience only a one-time increase in their productivity the year after they start exporting |
| Slovenia De Loecker (2007) | 1994 – 2000 8 groups of countries | Productivity and different export markets | Propensity score matching; regression | Positive correlation between number of destinations and productivity. Productivity premia considerably higher for firms shipping products to more developed regions. Firms exporting only to low income regions get additional productivity gains, however, lower than their counterparts exporting to high income countries |
| Slovenia Kostevc (2008) | 1994 – 2002 EU, Eastern and Central Europe, ex-Yugoslav | Productivity differences ex ante and learning-by-exporting | OLS; System GMM | More efficient exporters choose to serve more demanding markets; evidence of the learning process not conclusive |
| Spain Blanes-Cristóbal, Dovis, Milgram-Baleix, Moro-Egido (2007) | 1990 – 2002 EU, OECD, rest of the world | Sunk exporting cost differences between export destination markets | Descriptive statistics | Share of exports, advertisement, R&D on sales and presence of foreign capital larger for firms that export to the EU non exclusively and to OECD. Exporters to EU more productive than other exporters and than non-exporters. |
| | | | Panel Probit | Sunk costs differ among markets, higher in developed Markets than in rest of the world |

| | | | | |
|---|---|---|---|---|
| Spain<br>Mánez-Castillejo,<br>Rochina-Barrachina,<br>Sanchis-Llopis<br>(2010) | 1990 – 2002<br>EU; rest OECD;<br>rest of the world | Learning-by-exporting, firm size,<br>and area of export destination | Descriptive statistics | Level of diversification across areas substantially<br>higher for large firms than for small firms, and<br>higher diversification in destination markets is<br>expected to be associated with higher learning<br>opportunities |
| Spain<br>Esteve-Pérez,<br>Pallardó-López,<br>Requena-Silvente<br>(2011) | 1997 – 2006<br>Full portfolio of<br>destinations (max.<br>122 countries) | Duration of firm-destination export<br>relationships | Survival analysis | Firm productivity enhances duration of trade with<br>low-risk countries but has no effect on trade<br>survival with high-risk countries |
| Sweden<br>Andersson, Lööf<br>and Johansson<br>(2008) | 1997 – 2004<br>Number of countries<br>of destination | Productivity differences | GLS random effects;<br>two-step GMM | Exporter premium for labor productivity is increasing<br>in the number of countries which firms export to |
| Sweden<br>Eliasson, Hansson and<br>Lindvert<br>(2009) | 1997 – 2006<br>Number of countries<br>of destination | Productivity differences | OLS; propensity-score<br>matching | Larger firms tend to export to more destination<br>countries. Information on destination of exports<br>not used in investigation of learning-by-exporting<br>vs. learning-to-export |

Table 2:    Micro-econometric studies on imports and productivity

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| Belgium Muuls and Pisu (2009) | 1996 – 2004 | International trading activities of firms | Regression analysis, dynamic panel probit | Two-way traders are most productive, followed by importing-only firms, exporting-only firms and non-traders. Number of import origins and number of products imported rise with increasing productivity. High degree of hysteresis in imports. |
| Chile Kasahara and Lapham (2008) | 1990 – 1996 | Productivity, exports and imports | Regression analysis, ML estimation of structural model | Two-way traders more productive than one-way traders; self-selection of more productive firms in import activities. |
| Chile Kasahara and Lapham (2008) | 1979 - 1996 | Imports of intermediate goods and plant performance | Fixed Effects, System GMM, TFP using Olley/Pakes and Levinsohn/Petrin estimators | Becoming an importer of foreign intermediates improves productivity |
| Denmark Eriksson, Smeets and Warzynski (2009) | 1993 – 2003 | Key elements in characterizing Danish firms in international trade | Regression analysis | Entry into importing associated with higher productivity in the past |
| Denmark Smeets and Warzynski (2010) | 1998 – 2005 | Learning by exporting and/or importing | Regression analysis | Exporting and importing positively related with firm productivity, two-way traders most productive. Evidence of self-selection into importing; no learning effect. |

57

| | | | | |
|---|---|---|---|---|
| France<br>Bas and Strauss-Kahn<br>(2010) | 1995 – 2005 | Link between imported intermediate inputs and firms' exports | Olley-Pakes and ACF estimates of TFP | Positive impact of higher diversification and increased number of imported inputs varieties on firms' TFP. |
| Germany<br>Vogel and Wagner<br>(2010a) | 2001 – 2005 | Productivity differences between firms that do not trade, exporters, importers and two-way traders; test for self-selection into importing and for learning-by –importing | Kolmogorov-Smirnov-test; OLS and Fixed Effects; Propensity Score Matching | Compared to firms that do not trade at all two-way traders have the highest productivity premium, followed by firms that only export, while firms that only import have smallest premium. Evidence for self-selection of more productive firms into imports. No clear evidence for learning-by-importing. |
| Hungary<br>Békés, Harasztosi and Muraközy<br>(2011) | 1992 – 2003 | Description of Hungarian trade data and key patterns at firm and product level | Regression analysis | Both exporters and importers show better performance than non-traders |
| Hungary<br>Alomonte and Békés<br>(2010) | 1992 – 2003 | Relation between firms' trading activity and productivity | Regression analysis | Evidence of self-selection of the most productive firms into both importing and exporting; when taking importing status of exporters into account the productivity premium of exporters is greatly reduced. |
| Ireland<br>Forlani<br>(2010) | 2000 - 2006 | Firms' productivity and imported inputs | OLS and Fixed Effects, GMM | Increase in the intensive margin of imports raises efficiency of domestic firms. No evidence for self-selection of more productive firms into importing, Evidence for learning-by-importing. |
| Ireland<br>Haller<br>(2010) | 1996 – 2005 | Detailed analysis of Irish manufacturing firms engaged in international trade | OLS and Fixed Effects, quantile regression | On average firms can be ranked in terms of productivity from low to high as follows: no trade, export only, import only, two-way traders, firms engaged in intra-firm trade; within-group heterogeneity in some cases exceeds differences between groups of traders. |

| | | | | |
|---|---|---|---|---|
| Italy<br>Serti and Tomasi<br>(2009) | 1993 – 1997 | Firm performance and different characteristics of markets where exports are directed and imports originate from | Descriptive statistics, OLS regression, quintile regression | Positive correlation between import and firm's productivity, two-way traders have highest productivity. Firms sourcing from more than one group of countries are by far the most productive. Importers sourcing from developed countries more productive than firms buying only from low income countries. Evidence for self-selection of more productive firms into importing; importers from high income countries have higher productivity premium. |
| Italy<br>Castellani, Serti and Tomasi<br>(2010) | 1993 – 1997 | Firms' heterogeneity on the import and the export side | OLS and Fixed Effects | Firms engaged in international activities are more productive; results point to self-selection but some post-entry effects cannot ruled out. Two-way traders outperform one-way traders. |
| Portugal<br>Silva, Afonso and Africano<br>(2010c) | 1996 – 2003 | Relationship between international trade engagement (exports and imports) and firms' performance | Descriptive statistics, OLS and Fixed Effects regression, dynamic panel data model | Two-way traders outperform only importers, only exporters and above all domestic firms. Greater diversification of imported goods and source markets related to higher productivity. Origin markets of Imports important for performance. |
| Portugal<br>Silva, Afonso and Africano<br>(2010b) | 1996 – 2003 | Learning-by-exporting | Propensity Score Matching; differences-in-differences | Learning effects higher for new exporters that are also importers or start importing at the same time. |
| Spain<br>Dovis and Milgram-Baleix<br>(2009) | 1991 – 2002 | Effects of tariffs and foreign competition on TFP | Olley-Pakes TFP estimation, System-GMM estimation | Evidence of additional productivity gains for importing firms |
| Spain<br>Augier, Cadot and Dovis<br>(2010) | 1991 – 2002 | Effect of imported intermediate inputs and capital goods on TFP | Porpensity score matching and diff-in-diff; Olley-Pakes and ACF estimates | Starting to import raises productivity when proportion of skilled labour is controlled for; effect greatest for skill-intensive firms. |

59

| | | | | |
|---|---|---|---|---|
| Spain<br>Damijan and<br>Kostevc<br>(2010) | 1991 – 1999 | Learning from trade | Propensity Score Matching | Sequencing between imports, exports and innovation Firms learn primarily from import links, which enable them to innovate products and processes and to dress up for starting to export in small and partially medium firms. |
| Sweden<br>Lööf and Andersson<br>(2010) | 1997 - 2004 | Imports from various groups of countries and productivity | OLS and Fixed Effects, dynamic GMM estimator | Instantaneous causality from import to productivity; productivity is an increasing function of the G7 fraction in total imports. |
| USA<br>Bernard, Jensen,<br>Redding and Schott<br>(2007) | 1997 | Evidence on firm imports from transaction data | OLS regression | Firm importing relative rarer than firm exporting; 41 (79) percent of exporting (importing) firms also import (export). Productivity premium positive for exporters and importers compared to firms that do not trade. |

Table 3:     Micro-econometric studies on trade and productivity in services firms

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| France Temouri, Vogel and Wagner (2011) | 2003 – 2007 | Comparison of business services exporters and non-exporters | Descriptive statistics, pooled OLS and fixed effects, propensity score matching | Exporters are more productive than non-exporters. Self-selection of more productive firms into exports, no empirical evidence for positive effects of exporting on productivity growth. |
| Germany Vogel (2011) | 2003 – 2005 | Exports and enterprise characteristics in German business services firms | Descriptive statistics, probit and pooled OLS / fixed effects, | Exporters are more productive than non-exporters; evidence for self-selection of more productive firms into exports. |
| Germany Temouri, Vogel and Wagner (2011) | 2003 – 2007 | Comparison of business services exporters and non-exporters | Descriptive statistics, pooled OLS and fixed effects, propensity score matching | Exporters are more productive than non-exporters. Self-selection of more productive firms into exports, no empirical evidence for positive effects of exporting on productivity growth. |
| Germany Vogel and Wagner (2011) | 2003 – 2007 | Role of outliers in shaping the relation between exports and productivity | Descriptive statistics, pooled OLS and fixed effects, robust fixed effects regression | Estimated exporter premium drops to zero when a robust estimator that controls for outliers is applied. |
| Italy Conti, Lo Turco and Maggioni (2010) | 2003 | Determinants of export performance of firms in services | Descriptive statistics, regression analysis | Exporters are more productive than non-exporters; more productive firms have higher probability to export to more distant and costly markets in terms of trade and transport costs. |

| | | | | |
|---|---|---|---|---|
| Netherlands<br>Kox and<br>Rojas-Romagosa<br>(2010) | 1997 – 2005 | Determinants of export patterns of Dutch firms and plants in manufacturing and services | Descriptive statistics, probit, pooled OLS and fixed effects | Exporter productivity premium of services firms positive but smaller than for manufacturing firms. Evidence for self-selection of more productive firms into exports, but no evidence for learning-by-export. |
| Sweden<br>Lööf<br>(2010) | 1997 – 2006 | Exports of services firms | Pooled OLS, random effects, fixed effects, dynamic GMM, propensity score matching | Exporter productivity premium larger for services firms than for manufacturing firms; self-selection of more productive firms into exporting, no evidence for positive effects of exporting on productivity growth. |
| UK<br>Breinlich and<br>Criscuolo<br>(2011) | 2000 – 2005 | Stylized facts on firms engaging in service trade (exports and imports) | Descriptive statistics, regression analysis | Service traders are more productive, but export premia smaller for service traders than for goods traders. Service exporters are more productive than service importers. |
| UK<br>Temouri, Vogel and<br>Wagner<br>(2011) | 2003 – 2007 | Comparison of business services exporters and non-exporters | Descriptive statistics, pooled OLS and fixed effects, propensity score matching | Exporters are more productive than non-exporters. Self-selection of more productive firms into exports, no empirical evidence for positive effects of exporting on productivity growth. |

Table 4: Micro-econometric studies on trade, outward foreign direct investiment and productivity

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| France Engel and Procher (2009) | 2002 – 2005 | Relation between export, fdi and productivity in French firms | Kolmogorov-Smirnov test for first-order stochastic dominance | Foreign direct investors exhibit the highest productivity level followed by exporters and domestic companies. Firms with fdi in both low-wage and high-wage countries more productive than firms with fdi in low-wage countries only. |
| France Engel, Procher and Schmidt (2010) | 2000 – 2007 | Internationalization behavior of French companies (entry into and exit from foreign markets) | Multinomial probit, rare events logit | Domestic firms with higher productivity more likely to enter international markets; more productive firms more likely to enter foreign markets via fdi. |
| Germany Wagner (2006) | 1995 | Productivity ranking of non-exporters, exporters and foreign direct investors | Kolmogorov-Smirnov test for first-order stochastic dominance of productivity distribution; t-test for differences in means | Foreign direct investors outperform exporters which in turn outperform national market suppliers. |
| Germany Arnold and Hussinger (2010) | 1996 – 2002 | Test of productivity pecking order hypothesis | Kolmogorov-Smirnov test for first-order stochastic dominance of productivity distribution; quantile regression | Exporters outperform firms that serve the domestic market only; firms with outward foreign direct investment outperform exporters and firms that sell on the domestic market only. |
| India Bhattacharya, Patnaik and Shah (2010) | 2000 – 2008 | Differences between manufacturing and services industries with regard to productivity pecking order between exporters and foreign direct investors | Stochastic frontier analysis | In chemicals industry firms with outward fdi are more productive than exporters, but less productive software companies do outward foreign direct investment. |

63

| | | | | |
|---|---|---|---|---|
| Ireland<br>Bogheas and<br>Görg<br>(2008) | 1999 - 2000 | Relationship between productivity and choice of form of inter-nationalization | Multinomial logit | Exporters are more productive than non-exporters; exporting firms that also invest abroad are more productive than firms that only export. |
| Italy<br>Castellani and Zanfei<br>(2007) | 1996 | Links between internationalization, innovation and productivity | Regression ananlysis, Kolmogorov-Smirnov test | Productivity highest for firms with manufacturing activities abroad, followed by firms with non-manufacturing activities abroad only, followed by firms with exports only, followed by firms that serve the domestic market only. |
| Italy<br>Casaburi, Minerva and Gattai<br>(2008) | 1998 – 2003 | Link between productivity and firms' international activities | Regression analysis; Kolmogorov-Smirnov test | Firms that engage in foreign production of final goods in addition to export activities are more productive than firms that only export abroad; purely domestic producers are the less productive firms. |
| Japan<br>Kimura and Kiyoto<br>(2006) | 1994 – 2000 | Relationship between exports, foreign direct investment and firm productivity | Fixed effects regression | The most productive firms engage in foreign direct investment and exports, medium productive firms engage in either exports or foreign direct investment, least productive firms serve only domestic market. |
| Japan<br>Tomiura<br>(2007) | 1998 | Document the extent to which firms engage in global activities and to evaluate how productivity varies with the choice of globalization mode | Descriptive statistics | Foreign outsourcers and exporters tend to be less productive than the firms active in FDI or in multiple globalization modes but more productive than domestic firms. |
| Japan<br>Wakasugi and Tanaka<br>(2009) | 2005 | Role of productivity in sorting of firms into exporting and fdi between North and South as well as between single and multiple destinations | Descriptive statistics, regression analysis, multinomial logit model | Productivity smallest for firms supplying the domestic market only, followed by exporters, followed by firms that have fdi in North America and Europe; productivity of firms with fdi in Asia lower than that of exporters to Asia. |
| Japan<br>Todo<br>(2011) | 1997 – 2005 | Determinants of export and FDI decision of Japanese firms | Mixed logit model | Productivity level positively affects probability of engaging in export and FDI, but impact of productivity is negligible in magnitude. |

| | | | | |
|---|---|---|---|---|
| Slovenia<br>Damijan, Polanec and<br>Prasnikar<br>(2007) | 1994 - 2002 | Empirical test of the productivity pecking order hypothesis with Slovenian data | Descriptive statistics, regression analysis, probit | Productivity advantage of exporting firms and firms with outward foreign direct investment over firms that serve the domestic market only, but no statistically significant productivity advantage of firms with foreign affiliates over exporting firms. |
| 10 European Countries[1]<br>Oberhofer and<br>Pfaffermayr<br>(2011) | -[2] | Ceteris paribus influence of productivity on probability of exporting and using fdi | Bivariate probit | More productive firms less (more) probably use the export (foreign direct investment) strategy to serve foreign markets. |

Notes:   [1] Croatia, Cyprus, France, Greece, Iceland, Liechtenstein, Slovenia, Sweden, Switzerland, United Kingdom (91.5% of firms from UK or France)
         [2] not reported

Table 5:     Micro-econometric studies on trade and wages using linked employer-employee data

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| Denmark Munch and Skaksen (2008) | 1995 – 2002 | Human capital and wages in exporting firms | Linked employer-employee panel data; individual level wage regressions using spell-fixed effects | Inclusion of an interaction term between export intensity and the proportion of educated workers at the firm level enters the wage equation with a significant positive effect. Exporting per se does not matter for wages. |
| Germany Schank, Schnabel and Wagner (2007) | 1993 – 1997 | Do exporters pay higher wages, cetris paribus? | Linked employer-employee panel data; individual level wage regressions using spell-fixed effects to control for unobserved firm and worker heterogeneity | Exporting per se hardly matters for wages, but wages increase with share of exports in total sales ceteris paribus. |
| Germany Schank, Schnabel and Wagner (2010) | 1994 – 2006 | Direction of causality between exports and wages | Linked employer-employee panel data; individual level wage regressions and propensity score matching | Exporter wage premium already exists in the years before firms start to export (self-selection), but does not increase in the years after exporting started (no causal effect of exports on wages). |
| Germany Klein, Moser and Urban (2010) | 1993 – 2007 | Skill structure of the wage premia in exporting firms | Linked employer-employee panel data; individual level wage regressions with worker-firm spell effects | Significant export wage premium for workers in the two highest skill categories, evidence of an export wage discount for lower-skilled workers. |

| | | | | |
|---|---|---|---|---|
| Germany<br>Baumgarten<br>(2010) | 1996 -2007 | Role of exporting firms in explaining rising wage dispersion | Linked employer-employee panel data; individual level wage regressions; decomposition of change wage dispersion | Wage differential between exporters and non-exporters increased substantially; changes in skill compositions and skill prices can only account for a small fraction of this increase. Rising exporter wage gap contributed to growth in wage dispersion. |
| Mexico<br>Frías, Kaplan and Verhoogen<br>(2009) | 1993 - 2001 | Relationship between exports and wage premia | Linked employer-employee panel data; dynamic panel approach. | Approximately two thirds of the correlation between plant level average wages and plant size can be explained by exporter wage premia and one third by workforce composition (*levels*); nearly all of the Differential within-industry wage change due to the export shock (peso devaluation of late 1994) is explained by changes in wage premia (*changes*). |
| Morocco<br>Fafchamps<br>(2009) | 2000 | Education wage premium in exporting and non-exporting firms | Linked employer-employee data (10 workers per firm); firm fixed effects | No evidence that exporters pay higher premium to educated workers; no evidence that firms that start to export or increase exports increase wages as well; no evidence that workers who switch jobs enjoy larger pay increase if start to work for an exporter. |
| Portugal<br>Martins and Opromolla<br>(2009) | 1995 – 2005 | Relation of exports, imports types of goods traded with wages | Linked employer-employee panel data combined with firm-transaction panel data; job-spell fixed effects | Firms that increase their exports (imports) of high- (intermediate-) technology products tend to increase their salaries. |
| Spain<br>Alcalá and Hernández<br>(2010) | 2002 | Destination market effect in exporter wage premium | Linked employer-employee data; individual level regressions with worker and firm characteristics | Output-market exporter wage premia are increasing in market remoteness and employer education. |
| U.S. (Los Angeles)<br>Breau and Rigby<br>(2006) | 1990, 2000 | Wage premium in exporting firms | Linked employer-employee data; individual level wage regressions | After controlling for worker characteristics the export wage premium vanishes. |

Table 6:        Micro-econometric studies on exports and profits

_____

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| | | | | |

_____

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| France Temouri, Vogel and Wagner (2011) | 2003 – 2007 | Exports and profitability in business services enterprises | Descriptive analysis; regression analysis; propensity score matching | Services exporters are more profitable than non-exporters. No evidence for self-selection of more profitable firms into exporting. No evidence for positive effects of exports on profitability. |
| Germany Fryges and Wagner (2010) | 1999 – 2004 | Exports and profitability in manufacturing enterprises | Descriptive analysis; regression analysis; generalized propensity score methodology | Exporters are more profitable than non-exporters, but difference is small; rate of profit tends to increase with export-sales ratio. No evidence for self-selection of more profitable firms into exports. Positive causal effect of exporting on profitability almost over the whole domain of the export -sales ratio. |
| Germany Vogel and Wagner (2010b) | 2003 – 2005 | Exports and profitability in business services enterprises | Descriptive analysis; regression analysis; generalized propensity score methodology | Services exporters are less profitable compared to non-exporters, though difference is small. Evidence for self-selection of less profitable services firms into exports. No positive causal effect of exports on profits. |
| Germany Temouri, Vogel and Wagner (2011) | 2003 – 2007 | Exports and profitability in business services enterprises | Descriptive analysis; regression analysis; propensity score matching | Services exporters less profitable than non-exporters. Self-selection of less profitable firms into exports. No evidence for positive effects of exporting on profits. |

| | | | | |
|---|---|---|---|---|
| Germany<br>Wagner (2011b) | 2003 – 2006 | Exports, imports and profits<br>in manufacturing enterprises | Descriptive analysis;<br>non-parametric tests;<br>Pooled OLS and fixed-effects<br>regressions; robust pooled<br>and fixed effects regressions | No statistically significant and economically large<br>effects of trade on profits. |
| Italy<br>Amendolagine,<br>Capolupo and<br>Petragallo<br>(2008) | 1995 – 2003 | Exports and performance in<br>manufacturing firms | Regression analysis;<br>propensity score<br>matching | Profitability difference between exporters and non-<br>exporters not reported. No evidence for self-<br>selection of more profitable firms into exporting.<br>Evidence for positive effects of exports on profits. |
| Italy<br>Grazzi<br>(2011) | 1989 – 2004 | Trade and profitability | Descriptive analysis; non-<br>parametric comparison of<br>distributions; regression analysis | No evidence for profitability differential between<br>exporters and non-exporters over all; positive<br>relation for some sectors, negative for others. |
| Netherlands<br>Kox and<br>Rojas-Romagosa<br>(2010) | 1997 – 2005 | Exports and performance of<br>manufacturing and services firms | Descriptive analysis; OLS<br>and probit regression | Profitability higher in exporting firms. Evidence for<br>self-selection of more profitable firms into exporting.<br>No positive effects of exporting on profitability. |
| United Kingdom<br>Temouri, Vogel<br>and Wagner<br>(2011) | 2003 – 2007 | Exports and profitability<br>in business services enterprises | Descriptive analysis;<br>regression analysis;<br>propensity score matching | Services exporters do not differ in profitability<br>compared to non-exporters. No evidence for self-<br>selection of more profitable firms into exports. No<br>evidence for positive effects of exporting on profits. |

_____

Table 7:     Micro-econometric studies on international trade and firm survival

_____

| Country Author(s) (year of publication) | Period covered | Topics investigated | Methods used | Important findings |
|---|---|---|---|---|
| Canada Baldwin and Yan (2011) | 1979 – 1996 | Effects of changes in tariffs and real exchange rates on plant death | Probit estimates for exit | Exporters have much lower failure rates than non-exporters but their survival is more sensitive to changes in tariffs and real exchange rates. |
| Chile López (2006) | 1990 – 1999 | Imports of intermediate inputs and plant survival | Probit estimates for exit | Importers are more likely to survive. Exporters are more likely to survive but only if they import intermediate inputs. Exporting itself does not seem to decrease probability of exit. |
| Chile Gibson and Graciano (2011) | 2001 – 2006 | Costs of starting to trade and costs of continuing to trade | Transition probabilities to exit | Importers are less likely to exit than non-importers. |
| Chile Namini, Facchini and López (2011) | 1990 – 1999 | Export growth and factor market competition | Probit and IV-probit estimates for 3-year survival | Importers of intermediate inputs are more likely to survive than non-importers. Exporting firms are more likely to survive than non-exporting firms, but probability of survival decreases with sector-wide export volumes. |
| Denmark Eriksson, Smeets and Warzynski (2009) | 1993 – 2003 | Evidence on exports and imnports by product and origin / destination | Probit estimate for exit | Exporters are less likely to exit than non-exporters. |
| France Görg and Spaliara (2010) | 1998 - 2005 | Financial constraints, exports and firm survival | Probit estimate for exit | Continuous exporters face a higher probability of survival compared to starters, continuous non-exporters and firms exiting the exporting market. |

| | | | | |
|---|---|---|---|---|
| Germany<br>Wagner (2011c) | 2001 – 2007 | Likelihood of survival of firms that do not trade, only export, only import, or export and import | Probit; rare events logit | Strong positive link between firm survival and imports and two-way trade; exporting only does not play a role for probability to exit the market. |
| Italy<br>Amendola et al.<br>(2010) | 2002 – 2008 | Differential effects of firm and industry level variables on likelihood of survival | Probit estimates for exit | Exporting has a very high negative marginal impact on firm exit. |
| Japan<br>Kimura and<br>Kiyota<br>(2006) | 1994 – 2000 | Export, FDI and productivity | Cox proportional hazard model | Exports have positive impacts on firm survival. Exporters face hazard rate that is lower than non-exporters. |
| Spain<br>Esteve-Pérez,<br>Mánez-Castillejo and<br>Sanchis-Llopis<br>(2008) | 1990 – 2002 | "Survial-by-exporting" effect for small and medium sized enterprises (SME) | Discrete time proportional hazard models | Exporting SMEs face a significantly lower probability of failure than non-exporters. |
| Sweden<br>Greenaway,<br>Gullstrand and Kneller<br>(2008) | 1980 – 1996 | Effects of international trade on firms' strategies for industry exit | Descriptive statistics; multinomial logit | Firms which export are less likely to close down. |
| Sweden<br>Greenaway,<br>Gullstrand and Kneller<br>(2009) | 1980 – 1996 | Role of firm and industry characteristics for exit decision of firms | Descriptive statistics; multinomial logit | Firms which export are less likely to close down. |
| United Kingdom<br>Görg and<br>Spaliara<br>(2010) | 1998 - 2005 | Financial constraints, exports and firm survival | Probit estimate for exit | Continuous exporters face a higher probability of survival compared to starters, continuous non-exporters and firms exiting the exporting market. |

| U. S. Bernard and Jensen (2007) | 1992 – 1997 | Determinants of plant closures | Probit estimates for plant death | Exporting is associated with large reduction in probability of closedown. |
|---|---|---|---|---|