

**A survey of empirical studies using transaction  
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by  
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University of Lüneburg  
Working Paper Series in Economics

**No. 342**

June 2015

[www.leuphana.de/institute/ivwl/publikationen/working-papers.html](http://www.leuphana.de/institute/ivwl/publikationen/working-papers.html)

ISSN 1860 - 5508

# **A survey of empirical studies using transaction level data on exports and imports**

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**[This version: June 11, 2015]**

## Abstract:

This paper presents a tabular survey of 146 empirical studies for 39 countries, plus 8 studies for multiple countries, that use transaction level data on exports or imports of firms. I hope this survey is useful for readers who want to get an impression of the huge number of different topics that have been investigated with transaction level data for a large number of countries already; who want to learn whether transaction level data have already been used for a particular (maybe, their own) country, by whom they have been used to investigate which topics, and what the important results found are; who have access to transaction level data and an idea how to use them, and who want to find out whether others pursued the same or a similar topic already; who want to compare results from their own study based on transaction level data to results from other (similar, neighbor) countries and who are looking for suitable studies; who have access to transaction level data and who are looking for studies based on data from other countries that they can replicate with their data to uncover and investigate differences across countries, or to contribute to the unravelling of stylized facts that hold across countries (and time).

## 1. Motivation

When economists discovered that trade is performed by firms, and not by countries or industries, following the pioneering empirical paper by Bernard and Jensen (1995) for the U.S., hundreds of studies looked at firm level data from many different countries to investigate “Who trades? ” and the closely related question “Who trades how much?”. The focus of the early papers in this literature has been on “Who exports? What distinguishes exporters and non-exporters? How are exports linked to firm performance?” with a special view on the links between exports and productivity (see Wagner (2007) for a survey). Later the scope of studies on trade that use firm-level data widened to ask “Who imports? What distinguishes importers and non-importers? How are imports linked to firm performance? ”, and the links between trade and other dimensions of firm performance besides productivity (including profitability, wages, and firm survival) were investigated (see Wager (2012d) for a survey). In this literature a typical data set used is based on either census-type data collected regularly by official statistics or on large comprehensive surveys of firms from other sources. We learned a lot from these empirical studies, and this literature inspired a new branch of theory named the “new new trade theory” with a focus on international activities of heterogeneous firms that was pioneered by Melitz (2003); see Melitz and Redding (2014) for a survey.

A new generation of empirical studies on foreign trade goes one step further by asking not only “Who trades how much?” but “Who trades how much of which goods (or services) with whom?” The data used in these studies are based on records of (legal) cross-border transaction regularly collected by the customs. The unit of observation in these data is a single transaction between economic agents located in two countries, e.g. the export of 15.234 tons of good A with a value of 124,756 Euro from Germany to China. The record of the transaction usually includes

a firm identifier (tax registration number) of the exporting (or importing) firm. Using this identifier information at the transaction level can be aggregated at the level of the trading firm to generate period-firm-product-value-weight-destination (or –origin) data. These data show who trades how much of which good with customers (or suppliers) from which country in a given period (a year, or a month). Products are distinguished according to very detailed classifications, and the recording of value and weight allows the easy calculation of unit values that act as proxy variables for prices or indicators of quality. These transaction data can be linked over time to form panel data. Furthermore, the data can be linked to firm level data that has information on firm characteristics that is not included in the customs data, e.g. balance sheet data and data from regular surveys of the statistical offices.

Compared with the census-type data used in the earlier literature these transaction-level based data allow the researcher to look not only at one extensive margin of trade (participation in exporting, or importing), but at two more extensive margins, the number of goods traded and the number of countries traded with. These margins, and their links with characteristics of the firm and dimensions of firm performance, are investigated in a new and rapidly emerging literature that is surveyed in this paper.

Findings of empirical studies are summarized under seven topics that cover the role of “superstars” in trade; the average number of goods traded and countries traded with; the dynamics of trade in the short run; new insights on the links between firm characteristics and the extensive margins of trade; quality of traded goods and the number of goods and partner countries; evidence on hitherto undocumented types of foreign trade activities; and econometric tests of implications of models of multi-product, multi-destination exporters.

I hope this survey is useful for readers who want to get an impression of the huge number of different topics that have been investigated with transaction level data for a large number of countries already; who want to learn whether transaction level data have already been used for a particular (maybe, their own) country, by whom they have been used to investigate which topics, and what the important results found are; who have access to transaction level data and an idea how to use them, and who want to find out whether others pursued the same or a similar topic already; who want to compare results from their own study based on transaction level data to results from other (similar, neighbor) countries and who are looking for suitable studies; who have access to transaction level data and who are looking for studies based on data from other countries that they can replicate with their data to uncover and investigate differences across countries, or to contribute to the unravelling of stylized facts that hold across countries (and time).

The rest of the paper is organized as follows. Section 2 presents a tabular synopsis of empirical studies by country, topic, and important findings. Section 3 comments on the lessons we learned from this new literature so far. Section 4 concludes with suggestions for future research.

## **2. Empirical studies using transaction level data on foreign trade of firms**

The appendix to this paper includes a table with a tabular survey of 146 empirical studies for 39 countries plus 8 studies that cover multiple countries, that use transaction level data on exports or imports of firms. This survey is limited in two ways. It covers only papers that are written in English, and that use data on cross-border transactions with detailed information on the products traded and the countries of destination or origin. While the first selection criterion is, hopefully, not too restrictive, the second might be considered to lead to an exclusion of important

papers that look at *who trades what with whom* based on data from surveys of firms (like the papers by Lawless (2009) or Iacovone and Javorcic (2010)) or on information derived from records of foreign trade activities that were matched to firm-level survey data (like in Castellani, Serti and Tomasi (2010)). This focus of the survey, however, seems adequate given the now large number of papers that use “true” transaction level data from countries all over the world.

### **3. Lessons learned**

Empirical analyses that use transaction level data for exports and (to a much lesser extent) imports are available for a large number of countries from all over the world. While many papers deal with a singular, special topic, some cover common ground and uncover new results that can be considered as stylized facts that tend to hold over space and time. This section summarizes the findings of studies under seven topics that cover the role of “superstars” in trade; the average number of goods traded and countries traded with; the dynamics of trade in the short run; new insights on the links between firm characteristics and the extensive margins of trade; quality of traded goods and the number of goods and partner countries; evidence on hitherto undocumented types of foreign trade activities; and econometric tests of implications of models of multi-product, multi-destination exporters.

#### **3.1 Exports and imports are dominated by “superstars” trading many goods with many countries**

The top 1 percent of exporters – the so-called ‘export superstars’ – tend to dominate exports, and to cover the lion’s share of all exports. This fact is documented by Freund and Pierola (2012) for 32 countries based on data from the *World Bank Exporter Dynamics Database (EDD)*, and it is found in several other studies for

countries not covered in the EDD (including Germany; see Wagner 2012a). A similar high degree of concentration has been documented for importers in several countries, including Belgium (Muuls and Pisu 2009), China (Manova and Zhang 2009), Germany (Wagner 2012a), Norway (Bernard, Moxnes and Ultveit-Moe 2013) and the USA (Bernard, Jensen and Schott 2009). These superstars trade many products with many countries of destination and origin.

### **3.2 Most firms trade a small number of goods with a small number of countries**

While a few large firms trade a large number of goods with many countries, the bulk of firms export to and import from a small number of countries, and they trade a small number of goods only. This fact is documented for a number of countries, including Belgium (Muuls and Pisu 2009), Denmark (Eriksson, Smeets and Warzynski 2009), France (Eaton, Kortum and Kramarz 2004), Germany (Wagner 2012b), the United States (Bernard, Jensen and Schott 2009) and for Brazil, Chile, Denmark and Norway (Arkolakis and Muendler 2013).

### **3.3 New evidence on the dynamics of trade in the short run**

Transaction level data are used to document new facts on the dynamics of trade in the short run. Short-run dynamics of exports are dominated by the intensive margin; new exporters or firms that stop exporting are much less important for year-to-year changes in exports. Evidence on this is reported for Chile (Álvarez and Fuentes 2011, Álvarez and Sáez 2014), France (Bricogne et al. 2010), Germany (Wagner 2014c), Hungary (Muraközy 2012), Portugal (Amador and Opromolla 2010), Spain (De Lucio et al. 2011), Turkey (Cebeci and Fernandes 2015), USA (Bernard, Jensen, Redding and Schott 2009), and for 38 developing plus 7 developed countries by

Cebeci et al. (2012). Similar results for imports are available for several countries, including Argentina (Gopinath and Neiman 2011), Germany (Wagner 2013b) and Spain (De Lucio et al. 2011).

Using data for Chile, Álvarez, Faruq and López (2010) report that an important fraction of firms start to export new products to new markets each year. Previous experience in exporting a certain product, or exporting to a certain market, increases the probability to export these products to new markets, or new products to the same markets. Again for Chile, Blum, Claro and Horstmann (2013) find that one third of exporters enter into and exit from exporting multiple times, and that most continuing exporters enter and exit specific export destinations multiple times. Rahu (2015) report that in Estonia adding and dropping new products in exports is rife, about half of all firms change their export portfolio annually. Similarly, Buono and Fadinger (2012) find that export relationships are highly dynamic in France, where a large fraction is created and concluded each year. For Hungary, Békés and Muraközy (2012) report that about one third of firm-destination and about one half of firm-product-destination export spells are temporary only. Amador and Opromolla (2010) document frequent switching of products and destinations by firms. Similarly, Damijan, Konings and Polanec (2014) report that in Slovenia the average firm changes about one-quarter of imported and exported product-markets every year. For Spain, Esteve-Pérez, Requena-Silvente and Pallardó-Lopez (2013) find that, while the firm export status is highly persistent, firms' destination portfolio is very dynamic with a median duration of firm-country exporting relationship of two years, but the risk of exiting sharply falls afterwards.

These findings based on transaction level data point to an enormous amount of heterogeneity in the short-run dynamics of exports that is hidden behind the veil of the more aggregate data used in earlier empirical investigations.



### **3.4 New insights on the links between firm characteristics and extensive margins of trade**

Detailed information on the number of goods traded and the number of countries traded with reveal new insights on the links between firm characteristics and the extensive margins of trade. Cases in point include productivity, credit constraints, firm age, innovation, and profitability.

Productivity is not only positively related to export participation, but to the other extensive margins of exports (the number of goods exported, and the number of export destination countries), too. Evidence is reported in studies for a number of countries, including Belgium (Bernard, Van Beveren and Vandebussche 2014), Colombia (Casas, Diez and González 2015), Germany (Wagner 2012c) and Sweden (Andersson, Lööf and Johansson 2008). Similar results are reported for imports to, among others, Belgium (Muuls and Pisu 2009), Germany (Wagner 2012c) and Sweden (Andersson, Lööf and Johansson 2008).

Note that although there is a strong positive link between productivity and the extensive margins of exports Wagner (2013a) reports that German low-productive exporters are not marginal exporters defined according to the number of goods exported or the number of countries exported to. These low-productive exporters are competitive because they export high-quality goods (Wagner 2014a).

As regards credit constraints, it is well known that exporting firms are less financially constrained than non-exporting firms (see Wagner (2014e) for a survey of the literature), and similar evidence is reported in the few studies that look at credit constraints and imports (see Wagner 2015a). Using transaction level data for Belgium, Muuls (2015) reports that firms with lower credit constraints export more products and to a larger number of destinations, too, while this link shows up only for the number of products in imports. Manova, Wei and Zhang (2013) show that in

China financial frictions restrict exporters' product scope, the number of export destinations, and the trade volume within each destination-product market. With German data Wagner (2015d) finds that credit constraints have a negative impact on both the number of goods exported and the number of export destination countries. In a companion paper Wagner (2015a) reports that a better credit rating score is positively related to the extensive margins of import; firm with a better score import more goods and source from more countries of origin.

The positive link between firm age and participation in international trade has been documented before. Transaction level data shed new light on this issue. Bastos and Dias (2013) report that in Portugal the distribution of the number of export destinations and exported products shift progressively to the right with firm age. Similarly, Wagner (2015b, 2015c) shows that in Germany older firms export and import more different goods to and from more different countries.

It is well documented in the literature that innovative firms are more likely to export, Using transaction level data from Hungary Halpern and Muraközy (2012) show that innovative firms export more products to more countries, too.

The links between the extensive margins of trade and firm profitability have been investigated with transaction level data for German firms. Wagner (2014f) reports that profits tend to be larger in firms with less diversified export sales over goods and in firms with more diversified export sales over destination countries. As regards imports, profits are not higher in firms that import more goods and from more countries; the productivity advantages of importers with large extensive margins are eaten up by extra costs related to buying more goods in more countries.

### **3.5 Quality of traded goods and extensive margins of trade**

Transaction level data usually have information on the value of a transaction and on the weight of the goods shipped. By dividing value and weight so-called unit values are computed. While unit values are not a perfect measure for the quality of traded goods, at least if the industry is controlled for at a detailed level of disaggregation, they serve as a suitable proxy variable. As Feenstra and Romalis (2014, p. 477) recently put it: “The unit values of internationally traded goods are heavily influenced by quality.” These unit values have been used to investigate empirically the link between the quality of exported goods and the distance to destination countries. For Germany Wagner (2014h) finds that quality and distance to destination are not positively correlated. Wagner (2014b) reports that in Germany exporters of high-quality goods tend to use high-quality inputs, and they are more profitable (Wagner 2014d).

As noted, unit values are only an indicator for the quality of the products traded. Two studies with data from France recently used the detailed information on the traded products from transaction level data to measure product quality more directly. Duvalaix-Treguer et al. (2015) look at firms that export cheese or cream. They merge the export transaction data with information from a list of firms and products concerned by protected designations of origin (PDO) to investigate the impact of the quality label on firms’ export competitiveness in the cheese and cream industry. They find that PDO labelling has a positive impact on the number of destinations exported to. Martin and Mayneris (2015) merge transaction level data on exports with information from the Comité Colbert list of firms from the French luxury products sector to identify high-end variety exporters and to investigate the relation between quality and margins of exports. They report that high-end variety exporters

do not export to more countries, but export to more distant destinations; in contrast to low end exporters, distance has almost no effect on high-end variety export(er)s.

### **3.6 Evidence on the existence of hitherto undocumented types of trade activities**

Transaction level data reveal the existence of types of trade activities that are hidden in the trade data collected in census-type firm level surveys. Bernard, Van Beveren and Vandebussche (2010) document that a large majority of Belgian firms export products they do not produce – they are engaged in Carry-Along Trade (CAT). These CAT exports are concentrated in the largest and most productive firms. Empirical evidence for CAT is also reported by Abreha, Smeets and Warzynski (2013) for Denmark and by Lo Turco and Maggioni (2013) for Turkey. Damijan, Konings and Polanec (2013) find that in Slovenia on average 70 percent of all exporting firms engage in pass-on trade (POT), i.e. in simultaneous export and import of identical products. The use of POT is increasing in firm size, product diversification, multinational status, firm productivity and profitability.

### **3.7 Econometric tests of implications of models of multi-product, multi-destination exporters**

While theoretical models of internationally trading firms usually consider firms that produce a single good that is exported or not, several models now investigate multi-product firms that may export many goods to many destinations. Bernard, Redding and Schott (2011) develop a general equilibrium model of multi-product, multi-destination firms with heterogeneity in ability across firms and in product attributes within firms. They test core implications of this model with transaction level data from the United States. In line with the model they find that firms exporting many products

also serve many export destinations and export more of a given product to a given destination. Wagner (2012a) takes this model to German transaction level data and, in line with the model, finds that the number of products exported and the number of export destinations are positively and statistically highly significantly related with total exports, exports of the largest product across all markets, and productivity.

This illustrates that transaction level data have the potential to serve as a data base for econometric tests of implications of multi-product models. Furthermore, stylized facts revealed by working with transaction level trade data can inspire theoreticians to build models that fit these newly revealed facts.

### **3.8 Final remarks**

Results from several empirical studies that are summarized in this section demonstrate that transaction level data on exports and imports should be considered as a highly useful addition to the box of tools of trade economists. Many studies illustrate that the value of these data for research can be increased substantially when they are augmented by information on firm characteristics that are not recorded by the customs, including balance sheet data and data from regular surveys by the statistical offices.

## **4. Two suggestions for future research**

The empirical trade literature based on transaction level data grew exponentially over the recent years, and we learned a lot from these papers. However, there is plenty of scope for future research.

First and foremost, we do know much less about the extensive margins of imports, its determinants, and its role in the dynamics of trade, than about the respective margins of exports. Here, evidence for more countries is most welcome. It would be great if a

project that is comparable to the *World Bank Exporter Dynamics Database* (Cebeci et al. 2012) could be realized for imports, too.

Second, many results reported in the literature refer to a single country, or to a very small number of countries, only. This offers plenty of opportunities for replication studies, keeping in mind that ‘the credibility of a new finding that is based on carefully analyzing two data sets is far more than twice that of a result based only on one’ (Hamermesh (2000, p. 376). Hopefully, this survey is helpful to guide interested researchers here.

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## **Appendix**

*(For online publication only)*

## Appendix: Tabular survey of empirical studies using transaction level data on exports and imports

### Country

Author(s) (Year)	Data	Topics	Important findings
<i>Argentina</i>			
Gopinath and Neiman (2011)	1996-2008; universe of import transactions (name of firm, source country, quantity, weight, price, value and HS10 good), matched with firm characteristics for largest firms	Trade adjustment during the Argentine crisis	Small role of extensive margin (entry and exit of firms or of products at the country level); large role of churning of inputs within firms; relative importance of margins and of overall trade adjustment varies with firm size.
Albornoz, Calvo Pardo, Corcos and Ornelas (2012)	2002-2007; all manufacturing exporters; annual value of foreign sales by country of destination	Sequential exporting – entry, survival and/or exit on export destination markets; development of theoretical model and test	Growth of a firm's exports highest early in its first foreign market; new exporters more likely to enter new foreign markets; new exporters more likely to exit a market.
Brambilla, Lederman and Porto (2012)	1998-2000; total value of exports by country of destination at firm level, matched with data from firm survey on various characteristics	Investigation of links between exports, export destinations, and skill utilization	Firms exporting to high-income countries hired more skilled workers than other exporters and domestic firms. No causal effect of exporting per se on skill utilization,
<i>Belgium</i>			
Muuls (2008)	1999-2005; firm exports by value-destination-product; merged with firm characteristics and credit rating score	Interaction between credit constraints and exporting behavior	Firms with higher productivity and lower credit constraints more likely to be exporting; credit constraints important in determining the extensive but not the intensive margin of trade in terms of destinations.

Pisu (2008a)	1996-2004; see Muuls and Pisu (2009)	Extent of within-industry job reallocation from firms with / without involvement in international markets	Shifts in employment between firms having different trading status account for 6 to 30 percent of total job reallocation; effect stronger for large than for small firms.
Pisu (2008b)	1998-2005; see Muuls and Pisu (2009)	Causal effects of exports to different destination countries	Productivity advantage of firms exporting to developed countries appears to be driven solely by self-selection.
Muuls and Pisu (2009)	1996-2004; firm exports and imports by destination/origin and product; merged with firm characteristics	Offering a complete view of the international trading activities of firms	Imports and exports strongly concentrated among largest and most productive firms. Most firms export to and import from small number of countries; same at product level.
Bernard, Van Beveren and Vandebussche (2010)	1998-2005; exports by product and destination plus firm-level characteristics	Examination of multi-product exporters, relation between margins of trade and firm productivity	Large majority of Belgian firms export products they do not produce, i.e. Carry-Along Trade (CAT). CAT exports concentrated in the largest and most productive firms.
Cuyvers, Dhyne and Soeng (2010)	1997-2007; exports and imports by products and country of destination or origin; matched with balance sheet data, data on FDI and data on wages and employment by type of workers	Effects of internationalization on domestic demand for production and non-production workers through foreign trade or outward FDI in high-income and low-income countries	Increasing import shares from low-income countries or investing in those countries significantly reduces demand for low-skilled labor, while it increases demand for skilled labor. Increase in exports raises (reduces) demand for production (non-production) workers, but effects are reversed in case of exports to low-income countries.
Mion and Zhu (2010)	1995-2007; imports by firm-year-product(CN8)-country; matched with balance sheet data	Impact of imports from different origins on firm growth, exit, and skill upgrading	China is different from both other low-wage and OECD countries; industry-level import competition and firm-level outsourcing to China reduce firm employment growth and induce skill upgrading.
Amiti, Itskhoki and Konings (2012)	2000-2008; product (CN8), exports by destination, imports by source country	Exchange rate disconnect – why do large movements in exchange rates have small effects on prices of Internationally traded goods?	More import-intensive exporters have significantly lower exchange-rate pass-through into their export prices, as they face offsetting exchange rate effects on their marginal costs.

Ariu (2012)	1995-2010; very detailed data on transactions of goods and services at month-year-firm-product(service)-country level	Comparison between trade in goods and trade in services	Many facts on trade participation, firms' characteristics, trade margins at the firm level (number of products, number of countries, number of transactions, average transaction size); high degree of concentration; entry, exit and survival in foreign markets; growth strategies and geographic patterns.
Behrens, Corcos and Mion (2013)	2007-2009; exhaustive data on exports and imports by firm-country-product matched with balance sheet Information	Trade collapse in 2008-2009	Belgian exports and imports mostly fell due to smaller quantities sold and unit prices charged rather than fewer firms, trading partners, and products in trade.
Schminke and Van Biesebroeck (2013)	2006-2010; exports by product, value, weight and destination; matched with firm characteristics and information on export assistance received	Success of export promotion in improving export performance, in particular propensity to export	Export promotion increases export propensity; promotion more effective in reaching destinations outside the single market. Experienced exporters benefit on product- and destination extensive margin, and on intensive margin.
Bernard, Van Beveren and Vandenbussche (2014)	1998-2005; data on export transactions plus firm-level characteristics on exports	Examination of multi-product exporters	Exports highly concentrated in few firms. More productive firms export more products to more countries and have higher average product-country export flows.
Muuls (2015)	1999-2007; exports and imports at firm level by value, destination/origin and product (HS8); merged with firm characteristics and credit rating score	Interaction between credit constraints and exports/imports, looking at extensive and intensive margins	Firms with lower credit constraints more likely to export or import, and export and import more. For exports, credit constraints matter for number of products and number of destinations; for imports, only for number of products.
<i>Brazil</i>			
Arkolakis and Muendler (2010)	2000; exports by firm, destination country and HS6-product for manufacturing firms	Documentation of set of regularities for multi-product exporters; development of theoretical model	Few top-selling products account for bulk of firm's exports in a market; number of products per firm in a market similar across markets and positively associated with average sales per product within each market; firms export their highest-sales products across multiple destinations.



Molina and Muendler (2013)	1990-2001; exports by firm, destination country and year; matched with firm characteristics and data for all employees	Firms' preparation for export by hiring of employees with prior experience at other exporters	Expected exporter status leads firms to prepare their workforce by hiring workers from other exporters.
<i>Chile</i>			
Blum, Claro and Horstmann (2009)	2004-2006; matched data on all Chilean exporters with their Columbian importers at the transaction level	Document basic characteristics of the ways trade is intermediated.	At least one of the trading parties is a large international trader. More than half exporters sell to only one importer.
Blum, Claro and Horstmann (2010)	2004-2008; matched data on Chilean importers with their Argentine export partners at transaction level	Provide a broader set of facts on trade intermediaries	Small exporters from Argentina match typically with one large Chilean importer. Import intermediaries specialize in countries.
Àlvarez, Faruq and López (2010)	1991-2001; all manufacturing exporters Export transactions (value, weight, product (HS8) and destination)	Decision to start exporting a new product-market pair	Enormous heterogeneity in terms of number of products and destination countries; important fraction of firms start to export new products to new markets each year; previous experience exporting a certain product, or exporting to a certain market, increase probability to export these product to new markets, or new products to same markets.
Àlvarez and Fuentes (2011)	1991-2001; all manufacturing exporters Export transactions (value, weight, product (HS8) and destination) associated with higher unit values.	Evolution of unit values after export start or introduction of a new product-market combination	Large number of new exporting relationships each year representing small share of total exports; very low survival rates of new exporters; entry generally
Blum, Claro and Horstmann (2013)	1991-2008; export transactions (firm, HS8, destination country, date, weight, quantity, value)	Document and model features of firms' export entry and exit behavior	One third of exporters enter into and exit from exporting multiple times; most continuing exporters enter and exit specific export destinations multiple times; firms re-entering exporting often sell the same product(s) to the same importer(s).

Aisen, Álvarez, Sagner and Turén (2013)	2006-2009; all exporters, monthly information by product (HS8) and destination country	Effect of the financial crisis on extensive and intensive margin of exports	Larger exporters from industries more dependent on overall credit suffered disproportionately more in terms of export growth, but less in terms of entry and exit.
Álvarez and Sáez (2014)	2007-2011; all exporters Monthly information by product (HS8) and destination country; value and weight of traded goods	Recovery of post-crisis exports	Intensive margin accounts for much of the dynamics of exports; large firms and firms with low dependency on external financing increased exports in recovery.
Blyde, Iberti and Mussini (2015)	2009; universe of exports, information on firm, goods (HS8), destination, value, quantity, unit price; matched with information on innovation activities in 2007/8 and other firm characteristics	Relation between innovation and exports	Innovative exporters outperform non-innovative exporters because they sell goods and target markets that reward innovation.
<i>China</i>			
Manova and Zhang (2009a)	2003-2005; firm exports and imports by product and destination/source country at monthly frequency, plus information on firm ownership structure	Establish novel and confirm existing stylized facts about firm heterogeneity in trade	Bulk of trade done by few multiproduct multi-country traders; ownership structure matters for margins of trade; firms frequently exit and re-enter into trade and regularly change their product mix and trade partners; most export growth due to surviving exporters, etc.
Manova and Zhang (2009b)	2005; universe of fob value of firm exports and imports by product (HS8) and destination/source country, plus quantities to construct unit values	Variation in export prices across firms, products and destinations to distinguish between alternative heterogeneous firm models of trade	Firms charging higher export prices earn larger revenues within each destination, have greater worldwide sales, and export to more markets; firms offer higher prices in larger, richer and more distant markets, etc
Mayneris and Pocet (2011)	1997-2007; export flows aggregated by province-year-product-destination	Influence of the proximity to multinational exporters on the creation of new export linkages by domestic firms	Domestic firms' capacity to start exporting new varieties to new markets positively responds to export activity of neighboring foreign firms for that same product-country pair.
Roberts, Xu, Fan and Zhang (2011)	2002-2006; value and quantity of all footwear exporting transactions at 6-digit product level by destination; matched with firm characteristics	How underlying firm heterogeneity on demand and production sides influences long-run performance of exporters	Firm parameters from both demand and cost side of the firm's activities can be retrieved from micro data on firm production and export transactions; firm parameters useful in summarizing differences in firm export patterns across destination markets.

Wang and Yu (2011)	2002-2006; all exports and imports by firm, HS8 product, value, quantity, country of destination / origin, and trade regime (ordinary vs. processing); matched with firm characteristics	Links between firm performance and exports and imports, distinguishing between ordinary and processing trade.	Pure processing two-way traders are the least productive firms; firms that conduct both ordinary and processing trade are the largest, most productive and capital intensive firms; etc.
Fan, Lai and Amber (2012)	2000-2006; universe of exports and imports (HS8 products, value, quantity, country, type of firm), matched with firm characteristics	Relationship between credit constraints faced by a firm and the unit value prices of its exports, and between export prices and productivity	Positive relationship between firm productivity and export prices; tighter credit constraints reduce optimal prices.
Manova and Yu (2012)	2005; universe of trade transactions by firms, HS8-products and destination plus type of trade (ordinary, processing with imports, pure assembly), matched with balance sheet data and other firm characteristics	Role of financial constraints for choice of type of trade regime (ordinary vs. processing trade); consequences for profits	Profits, profitability and value added fall as exporters orient sales from ordinary towards processing trade, and from import-and-assembly towards pure assembly; less financially constraint firms perform more ordinary trade relative to processing trade, and more import-to-assembly relative to pure assembly.
Manova, Wei and Zhang (2013)	2005; universe of trade transactions by firms, HS8-products and destination; information on firm type (state-owned, private, foreign-owned)	Impact of credit constraints on different trade margins	Financial frictions restrict firm entry into exporting, as well as exporters' product scope, number of export destinations, and trade volume within each destination-product market. Foreign ownership mitigates these distortions.
Vannoorenberghe, Wang and Yu (2014)	2000-2006; export by firm-HS8 product, value and quantity, country of destination; matched with firm characteristics	Volatility and diversification of exports	Among small exporters, firms selling to a more diversified set of countries have more volatile exports, while the opposite holds among large exporters.
Yu and Li (2014)	2002-2006; imports by firms and products (HS8, value and weight); matched with firm-level information	Impact of imported intermediate inputs on firms	Firm productivity increases with increased imported intermediate inputs; weaker impact as firms produce more complex products.

Bai, Krishna and Ma (2015)	2002-2006; universe of trade transactions by firms, product (HS8), destination/origin and value; matched with information on firm characteristics	Role of export mode (directly or indirectly via intermediaries)	Demand and productivity evolve more favorably under direct exporting, though the fixed/sunk costs of this option are higher.
<i>Colombia</i>			
Eaton, Eslava, Kugler and Tybout (2007)	1996-2005; universe of exports by firm, product, value and country of destination	Firm-specific export patterns over time (entry and exit into and out of destination markets; revenues from selling there)	Large share of (small) firms enter and exit exports each year; export sales dominated by small number of very large and stable exporters. Successful new exporters from a cohort important after some years. New exporters start in one market and expand gradually.
Tovar and Martínez (2011)	2000-2008; exports by firm (product, value, destination)	Determinants of survival of firm in export market	Market diversification prevails over product diversification while trade network effects are highly correlated to survival of new exporting firms.
Molina and Roa (2014)	1998-2006; for all exporting firms annual information on total value of exports, number of export destinations, number of exported products and exports per destination; matched with firms' financial information and information on banks	Credit elasticity of exports	Access to credit produces a significant increase on a manufacturer's export revenue explained by the positive effect of credit on number of export destinations. Small manufacturers do not seem to benefit from bank credit.
Casas, Díez and González (2015)	2005-2013; annual information about exports (10digit product code, value of exports, country of destination); matched with detailed balance sheet and operational information	Relationship between total factor productivity and exporting decisions	Firms that export to a larger number of destinations and/or a larger number of goods tend to be more productive; no relationship between productivity and type of destination or exported product.
<i>Costa Rica</i>			
Lederman, Rodríguez-Clare and Yi Xu (2011)	1997-2007; all firms with positive exports in the period; export values, products, quantities, destination markets	Role of new exporters in export growth	High rate of firm turnover into and out of exporting each year; exiting and entering firms much smaller than incumbent exporters; new product-firm combinations highly important in the long run.

## Denmark

Eriksson, Smeets and Warzynski (2009)	1993-2003; all import and export transactions by firms (products CN8, value, quantity, country), matched with balance sheet information and data for all employees in the firms	Detailed characterization of firms in international trade	Exporters make up a fairly small fraction of all firms and have positive performance characteristics. Large share of largest exporters in total exports. Median firm exports to two countries; most firms export few products to few countries
Ibsen, Warzynski and Westergaard-Nielsen (2009)	1993-2003; values and quantities of import and export of goods at the firm level by product (CN8) and origin or destination; matched with firm characteristics	Relationship between export and import decisions and employment growth	Imports and exports positively related to employment growth (both finished goods and intermediate goods).
Meinen (2011)	1995-2006; firm level data on exports and imports by market and HS8-product; merged with firm characteristics	Role of destination market and product characteristics for sunk costs of exporting	Sunk costs mainly destination specific even though previous export experience from other markets facilitates entering new markets; sunk costs higher in developed markets and increase in export volume and firm size.
Utar (2012)	1995-2007; textile and clothing industry firms; 8-digit product-firm-destination-year data on exports; matched with firm characteristics and data on individual employees	Analysis of within firms adjustments to intensified low-wage competition due to dismantling of the Multi-fibre Arrangement quota system after China's WTO membership	Significant increase in skill and capital intensity with downsizing in response to heightened competition; firms refocus innovation efforts away from goods where China's competitive advantage increases.
Abreha, Smeets and Warzynski (2013)	2000-2010; universe of firms export and Import transactions (value, weight, quantity; destination/source country; CN8, HS6); further firm level information matched	Macro aspects of trade; Firm participation in exports and imports of trade adjustment; small	Pivotal role of few multi-good multi destination firms in exports; evidence for carry-along trade; small role played by entry and exits of firms or products as margin contribution of newly served export destinations and exported products.
Smeets and Warzynski (2013)	1999-2006; universe of firms export and import transactions (value, weight, quantity; destination/source country; CN8); matched with further firm level information	Relationship between exports, imports and firm productivity taking into account pricing heterogeneity and multi-product firms	Firm level price index to deflate output; comparison of productivity measures with results using industry-level deflator; large productivity premium for only-importers but larger for two-way traders; premia larger when firm-specific price index is used.

Utar (2013)	1998-2006; firm level data on trade (value, country of origin/destination, weight, CN8 product); matched with firm characteristics	Wholesale trade firms and their role in international trade	Export and import premia exist even among wholesale trade firms.
<i>Estonia</i>			
Masso and Vather (2015)	1995-2003; population of exporters, exports by firm, destination, product (CN8); matched with characteristics of firms	Role of different modes of export market entry for effects of exports on productivity	Early stage entry into several export markets or with several products leads to higher growth in productivity, compared with entry into only one foreign market or with only one product.
Rahu (2015)	1995-2011; firm-product-destination level export data; customs data are merged with Business Registry data	Role of initial product export share and product differentiation in survival of trade flows	Adding and dropping new products is rife, about half of all firms change their export portfolio annually. Survival is better if initial export share is larger and exports are more differentiated. Previous experience with foreign markets and different products has positive impact.
<i>France</i>			
Kramarz (1998)	1986-1990; all exports and imports by trading firm (value) by destination or origin, but no information on goods traded; matched with firm and employee information	Relationship between import-export behavior of firms and their labor market outcomes – employment, skill structure, wage structure, within firm inequality, and propensity to separate from workers	Small negative effect of increased imports on employment; changes in skill structure as predicted by trade theory, but small. No relation between wage evolution and trade behavior or individual-level probability of changing firm or losing one's job.
Eaton, Kortum and Kramarz (2004)	1986; exports by firms and country of destination	Establish some key features of the data	Modal exporter ships to only one foreign destination; exports by small fraction of firms that ship widely constitute substantial share of total exports.
Biscourp and Kramarz (2007)	1986-1992; all international trade transactions plus firm level information	Analysis of links between imports, exports, employment, and skill structure of manufacturing firms	Strong correlation between increasing imports, in particular imports of finished goods, and job destruction, most notably destruction of production jobs.

Berman, Martin and Mayer (2009)	1995-2005; balance sheet data combined with firm-level export data (value and volume by CN8 product and destination)	Reaction of exporters to exchange rate changes	High performance firms react to depreciation by increasing their export prices rather than their export volume; reverse is true for low productivity exporters. Probability of firms to enter export market increases after depreciation.
Bas and Strauss-Kahn (2010)	1995-2005; manufacturing firms. Firm characteristics matched with export and import data (products at HS6, countries)	Impact of imported inputs on margins of exports	Higher diversification and increased number of imported inputs varieties have significant impact on firm's TFP and export scope. Effect larger for imports from developed countries with more technological content.
Bricogne, Fontagné Gaulier, Taglioni and Vicard (2010)	2000-2009; exports by firms on monthly basis, matched with financial information from Amadeus database	Large drop in exports during last quarter of 2008 and first quarter of 2009	Drop in exports mainly due to intensive margin of large exporters. Small and large exporters evenly affected when sectoral and geographical specializations are controlled for.
Koenig, Mayneris and Poncet (2010)	1998-2003; exports by firm, year, product (HS8) and destination; matched with firm characteristic	Presence of local export spillovers on decision to start to export and the volume of exports	Evidence of the presence of export spillovers on export decision but not on exported volume; effect stronger within employment areas and declines with Distance.
Eaton, Kortum and Kramarz (2011)	1986; sales by firms and destination markets	Examination of sales by destination; develop theoretical model and estimated it to match moments of the data and use it in simulations	Number of firms selling to a market increases with market size; sales distributions similar across markets; average sales in France rise systematically with selling to less popular markets and to more markets.
Berman, Berthou and Héricourt (2012)	1995-2001; balance-sheet data product-destination-specific export information	Are foreign and domestic sales complements or substitutes?	Exogenous variations in foreign sales are positively associated with domestic sales, even after controlling for changes in domestic demand.
Bourgeon, Bricogne and Gaulier (2012)	1999-2007; export transactions matched with corporate accounts data and data on payment incidents occurring at firm's partners	Analysis of combined effect of financial constraint and trading time on bilateral trade	Trading time amplifies the negative effect of financial restrictions on trade.

Buono and Fadinger (2012)	1995-1999; exports by firms and destination in a year, combined with detailed balance-sheet information	Dynamics of export relationships (shipments by a given firm to a given destination in a given year)	Export relationships are highly dynamic (large fraction created / concluded each year); export values gradually increase as relationships mature; volatile and persistent relationships are found; previous exports to a destination substantially increase firm's probability to export there.
Bernini, Guillou and Bellone (2013)	1997-2007; firm characteristics plus export values, quantities, destination countries and products	Is corporate financial structure a determinant of non-price competitiveness in export markets?	Among illiquid exporters leverage is negatively correlated with quality of their exported goods.
Berthou and Fontagné (2013)	1995-2003; annual export flow values of individual exports by product and destination	How change in trade costs, following introduction of the Euro, affected export margins of firms in relation to export decision, number of products exported, and average sales per product	Firms increase range of exported products and their intensive margin; no evidence that firms increase their participation in the export market.
Corcos, Irac, Mion and Verdier (2013)	1999; imports by firm, origin country and product; by sourcing mode (arm's length vs. intrafirm)	Choice between intrafirm and arm's-length trade in imports	Intrafirm imports more likely in capital- and skill intensive firms, in highly productive firms, and from countries with well-functioning juridical institutions.
Crozet, Lalanne and Poncet (2013)	2007; exports by goods, destination countries, value, weight, matched with balance sheet data	Role of wholesalers in international trade	Wholesalers alleviate the difficulty of reaching less-accessible markets; they help less-efficient firms to supply foreign markets.
Mayer, Melitz and Ottaviano (2014)	2003; firm level data on annual shipments by all exporters by all destinations by products (HS8)	How competition across market destinations affects both a firm's exported product range and product mix	Tougher competition in an export market induces a firm to skew its export sales toward its best performing products.
Berthou and Vicard (2015)	1994-2008; export flows of all firms at monthly frequency (firm-product-country data)	Importance of experience and size of exporters for their growth in foreign markets	Conditional on size, the net export growth of surviving firms progressively declines with experience. Gibrat's law holds for exports. Young exporters are more volatile in export markets.



Duvalaix-Treguer et al. (2015)	2012; exports (value and quantity) by product (NC8) and destination; firms that export cheese or cream. Merged with information from list of firms and products concerned by protected designations of origin (PDO)	Impact of quality label (PDO) on firm export competitiveness in the cheese and cream industry	PDO labelling has positive impact on number of destinations, value of trade and average export unit value; more important when exporting to EU countries.
Martin and Mayneris (2015)	2000-2011; exports (value and volume) at firm – CN8 – product-country level; merged with information from Comité Colbert list of firms from the French luxury products sector	Identification of high-end variety exporters based on list of firms from the luxury sector; relation between quality and margins of export	High-end variety exporters do not export to more countries, but export to more distant destinations; in contrast to low end exporters, distance has almost no effect on high-end variety export(er)s.
<i>Germany</i>			
Stirböck and Kähler (2012)	2004; data on intra-EU exports and imports by firms (products, country of destination/origin), linked to information from the business register	Exploratory analysis of trading activities of firms within the EU	Trade flows positive function of market size; positive association between productivity and imports or exports; trade flows are a negative function of trade barriers.
Wagner (2012a)	2009; exports by firms; value, value of largest product, number of different goods exported, number of destination countries; matched with firm characteristics	Econometric test of implications of theoretical model by Bernard, Redding and Schott (QJE 2011)	Number of products exported and number of export destinations are positively and statistically highly significantly related with total exports, exports of the largest product across all markets, and productivity.
Wagner (2012b)	2009; exports and imports by firm; number of goods exported or imported, number of countries trades with, values of transactions; matched with firm characteristics	Productivity premia for multi-product and multi-country traders from manufacturing industries	Firms that trade many goods or that trade with many countries are much more productive than firms of the same size from the same industry that trade some goods or trade with some countries only.

Wagner (2012c)	2009; exports and imports by firms; number of different goods traded and number of countries traded with; matched with firm characteristics	Differences in productivity distributions of firms with different numbers of traded goods and different numbers of countries traded with in manufacturing industries	The larger the number of goods exported or imported, and the larger the number of countries exported to or imported from, the higher is the productivity of the firm - not only on average, but over the whole productivity distribution.
Wagner (2013a)	2009; exports by firms; number of different goods exported and number of destination countries; matched with firm characteristics	Are low productive exporters marginal exporters in manufacturing industries?	Low-productive exporters are not marginal exporters defined according to the number of goods exported or the number of countries exported to.
Wagner (2013b)	2009-2010; imports by firms; value, number of different goods imported, number of countries or origin	Extensive margins of imports in the great import recovery of 2009/2010	Firms that imported in both 2009 and 2010 are much more important for import dynamics than import starters and stoppers; firms that increased their imports imported on average more goods and from more countries of origin in 2009 than firms that decreased their imports, and they increased both extensive margins of imports, while firms with decreased imports reduced both.
Wagner (2014a)	2009-2010; exports by firms; value and volume of exports for the ten most important exported goods; matched with firm characteristics	Low-productive exporters and quality of exported goods in manufacturing enterprises	Low-productive exporters are competitive because they export high-quality goods.
Wagner (2014b)	2009-2010; exports by firms; value and volume of exports for the ten most important exported goods; matched with firm characteristics	Quality of exported goods and firm characteristics in manufacturing enterprises	Exporters of high-quality goods tend to use high-quality inputs
Raff and Wagner (2014)	2009; exports by firms; number of goods exported and number of destination countries; matched with firm characteristics	Foreign ownership and the extensive margins of exports in manufacturing enterprises	Foreign-owned firms do export more goods to more countries after controlling for firm size, productivity and industry affiliation.

Wagner (2014c)	2009-2010; exports by firms; value, number of different goods exported, number of destination countries	Extensive margins of exports in the great export recovery of 2009/2010	Firms that exported in both 2009 and 2010 are much more important for export dynamics than export starters and stoppers; firms that increased their exports exported on average more goods and to more countries in 2009
	than firms that decreased their exports, and they increased both extensive margins of exports,		while firms with decreased exports reduced both.
Wagner (2014d)	2009-2010; exports by firms; value and volume of exports for the ten most important exported goods; matched with firm characteristics	Quality of exported goods and profitability in manufacturing enterprises	Exporters of high-quality goods tend to be more profitable.
Wagner (2014e)	2009-2010; imports by firms; number of goods imported and number of countries imported from; matched with firm characteristics	Extensive margins of imports and profitability in manufacturing enterprises	Profits not higher in firms that import more goods and from more countries; productivity advantages of importers with large extensive margins are eaten up by extra costs related to buying more goods in more countries.
Wagner (2014f)	2009-2010; exports by firms; value and volume of exports for the ten most important exported goods; matched with firm characteristics	Export diversification and profitability in manufacturing enterprises	Profits tend to be larger in firms with less diversified export sales over goods and in firms with more diversified export sales over destination countries.
Wagner (2014g)	2009-2011; imports by firms; value of imports; matched with enterprise characteristics	Granular nature of imports in manufacturing sector	Imports are power-law distributed, distributions in industries are fat-tailed; idiosyncratic shocks to very large firms important for import dynamics in 2010/2011 but not in 2009/2010.
Wagner (2014h)	2010; exports by firms; value and volume of exports for the ten most important exported goods and ten most important destination countries; matched with firm characteristics and information on distance to export destinations	Quality of exported goods and distance to destination countries in manufacturing enterprises	Quality of exported goods and distance to destination countries are not positively correlated.

Wagner (2015a)	2009-2010; imports by firms; value, number of different goods, number of countries of origin; matched with firm characteristics and credit rating score	Credit constraints and margins of imports in manufacturing enterprises	Better credit rating score is positively related to extensive margins of import – firms with better score have higher probability to import, import more goods and source from more countries of origin. Share of imports in total sales is unrelated to credit constraints.
Wagner (2015b)	2010; imports by firms; number of goods imported and number of countries imported from; matched with firm characteristics	Firm age and margins of imports	Older firms are more often importers, import more different goods, and import from more different countries of origin.
Wagner (2015c)	2010; exports by firms; number of goods exported and number of countries exported to; ten most important countries of exports and value of exports to these countries; matched with firm characteristics and distance to destinations	Firm age and margins of exports	Older firms are more often exporters, export more and more different goods to more destination countries, and export to more distant destination countries.
Wagner (2015d)	2010; exports by firms; number of exported goods and number of destination countries; matched with firm characteristics	Differences in extensive and intensive margins of exports in East and West German manufacturing enterprises	West German firms outperform East German firms at all four margins of exports (propensity to export, share of exports in total sales, number of exported goods and number of destination countries).
Wagner (2015e)	2009-2010; exports by firms; number of goods exported and number of destination countries; matched with firm characteristics and credit rating score	Credit constraints and extensive margins of exports in manufacturing enterprises	Credit constraints have a negative impact on both the number of goods exported and the number of export destination countries.
<i>Georgia</i>			
Martuscelli and Varela (2015)	2006-2012; firm level data on all export transactions; matched with firm characteristics	Determinants of export flow survival (role of firm level characteristics, diversification strategies, and network effects)	Production efficiency, rather than size, boosts export survival chances; firms' diversification strategies matter for prospects of survival; strong evidence of network effects in export survival.

## Hungary

Halpern, Koren and Szeidl (2005)	1992-2001; trade data by firm, product (HS6), value, weight; merged with firm characteristics	Effects of imports on productivity	Positive impact of imports on productivity both statistically and economically significant.
Muraközy and Békés (2009)	1992-2003; data for all trade transactions at the firm-product-destination level	Degree of stability of bilateral trade relationships	Over half of non-zero bilateral trade relationships are of temporary nature, lasting for a short period only and disappearing in an erratic fashion; temporary Trade important for all kinds of firms and products.
Altomonte and Békés (2010)	1992-2003; manufacturing firms export and import transactions (value, weight, quantity; destination/ source country; HS6)	Relation between firms' trading activities (importing, exporting or both) and productivity	Indicators of "trade complexity" correlated with ex-ante productivity of trading firms.
Békés, Muraközy and Haraszosi (2011)	1992-2003; almost universal panel of balance sheet information merged with firm-product-country level customs data	Detailed description of Hungarian trade data and key patterns drawn at the firm and product level	Trade concentration in Hungary slightly higher than in most European countries; foreign ownership and role of foreign firms in trade is higher. Hungarian trade activity broadly matches most open economy evidence.
Halpern and Muraközy (2011)	1992-2003; all exports by firm, product and destination country; merged with firm characteristics	Decomposition of export growth into number of firms, number of markets and products per firm by firm size	Majority of small exporters exit exports after few years, but survivors grow quickly in every dimension. Large exporters grow slowly; macro shocks, destination market and product heterogeneity strongly affect performance.
Békés and Muraközy (2012)	1992-2003; data on all exports at firm-product-destination level; HS6 products	Stability of export spells at firm-destination and firm-destination-product level	About one third of firm-destination and about one half of firm-product-destination export spells are temporary only. Likelihood of permanent trade rises with firm productivity, financial stability, proximity and GDP of destination countries.
Görg, Kneller and Muraközy (2012)	1992-2003; large exporting firms, exports and imports by product, value and weight; matched with firm characteristics	Determinants of survival of products in the export mix of a firm	Characteristics of the product as well as that of the firm matter in export dynamics; firm productivity, product scale and tenure associated with a higher export survival rate.

Halpern and Muraközy (2012)	2003; data on all exports at firm-product-destination level, linked to Community Innovation Survey data for 2002-2004	Link between innovation and exports	Innovative firms more likely to export and export more products to more countries.
Muraközy (2012)	2008-2009; exports at firm-product(HS8)-destination level; matched with firm-level financial statements	Analysis of decline of exports during the financial crisis on 2008-2009 by decomposition of fall of exports into intensive and extensive margins	Only few firms exited from exports; fall of intensive margin responsible for about 80 percent of fall in exports; decline significantly larger for foreign-owned firms than for domestic firms.
<i>India</i>			
Goldberg, Khandewal, Pavnik and Topalova (2009)	1987-2000; import quantity and value by HS6 product	Changes in the composition of imports following 1991 trade liberalization to illustrate the potential scope for previously unavailable inputs to bolster performance of domestic firms	Trade reform spurred imports of important newly available inputs for manufacturing firms from more advanced countries, and relaxed technological constraints faced by firms under import substitution policies.
Goldberg, Khandewal, Pavnik and Topalova (2010)	1987-2000; import quantity and value by HS6 product, matched with firm characteristics	Relationship between decline in trade costs, imports of intermediate inputs, and domestic firm product scope	Substantial gains from trade through access to new imported inputs; lower input tariffs account on average for 31% of new products introduced by domestic firms.
<i>Italy</i>			
Bernard, Grazzi and Tomasi (2011)	2000-2007; all cross-border transactions by Italian firms; annual value and quantity of exports for product-country destination pairs (HS6)	Factors that give rise to intermediaries in exporting and implications for trade volumes	Intermediaries and direct exporters respond differently to exchange rate fluctuations; aggregate exports to destinations with high shares of indirect exports much less responsive to changes in real exchange rate.
Tamagni (2013)	2000-2003; exports and imports by firm (value, weight, HS6 product, destination); matched with firm characteristics and credit rating index	Relationship between financial constraints and exports	Limited access to external capital narrows scale of foreign sales, exporters' product scope and number of trade partners; constraint firms have reduced probability of adding and higher probability of dropping products and destinations.

Costa, Pappalardo and Vicarelli (2014)	2007 and 2010; exports and imports (goods, value and quantity and destination/origin country), matched with firm characteristics	Relationship between forms of internationalization and survival over the financial crisis	Multinational firms show lower resilience during the crisis compared to global or two-way traders
Secchi, Tamagni and Tomasi (2014)	2000-2003; exports and imports by product (HS6), value, weight and destination; matched with firm characteristics and credit rating score	Role of financial constraints in shaping firms' export activities	Limited access to external capital narrows scale of foreign sales, exporters' product scope and number of trade partners.
<i>Luxembourg</i>			
Mangiarotti and Schuller (2010)	2004; firm level data for exports of goods (HS6) by destination country	Descriptive analysis of goods exports	High concentration in exports value; high importance of multi-product, multi-destination exporters; negative relation between number of exporters and number of exported products and export destinations.
<i>Mexico</i>			
Giri, Seira and Teshima (2013)	2004-2010; exports to the U.S. by firm, product, value, price and quantity and year	How did small exporters fare relative to large exporters during the 2008-09 crisis?	Crisis did not make smaller exporters more likely to exit, grow less, or expand their product line less.
<i>Netherlands</i>			
Creusen, Kox, Lejour and Smeets (2011)	2002-2007; countries, products, volumes and prices by firms	Investigation of microeconomic patterns of Dutch exports	Exports are heavily concentrated. Turbulence in extensive export margin quite substantial, mostly among small traders.
Creusen and Lejour (2011)	2002-2008; country, product, value, volume by firms, matched with information on firm level and country level	Export market entry decision of firms and their subsequent growth or market exit	About 5% of exporters are starters or stoppers; many starters increase exports by expanding number of destinations. Firms seem to follow a stepping stone approach for reaching markets further away.

### *New Zealand*

Fabling and Sanderson (2010)	2000-2006; shipment-level goods trade-data at firm level by product and country; matched with firm characteristics	Descriptive analysis with focus on role of novel exporting behavior	Novel market entry is a significant contributor to aggregate export growth; much expansion in trade incremental in nature and risky, experience and scale appear to be key factors in overcoming these risks.
Fabling, Grimes and Sanderson (2012)	2002-2006; exports by goods and countries, matched with firm characteristics	Product and market entry choices of exporters with regard to the next market served	General and specific prior trade experience play important role in determining firms' future export activities, as do export activities of other firms in the local area.

### *Norway*

Moxnes (2010)	1996-2006; export values by firm and destination country per year; matched with firm characteristics	Are sunk costs global or country specific?	Country-specific costs are about three times the magnitude of global costs; international standards harmonization strong positive effects on imported variety in small and remote markets.
Bernard, Moxnes and Ulltveit-Moe (2013)	2005-2010; all exports by firm-year-product-value-quantity-destination plus identity of buyer	Exploring the consequences of joint heterogeneity on the supply side (sellers) and the demand side (buyers); development of theoretical model with heterogeneous exporters and importers	Exports and imports highly concentrated, largest firms play dominant role; substantial variation of importer heterogeneity across markets. Larger sellers reach more customers and have more dispersion in sales across buyers.

### *Peru*

Volpe Martincus and Carballo (2008)	2001-2005; exports at firm-product-destination level; matched with firm characteristics and information on export promotion received	Effectiveness of export promotion activities; links to extensive and intensive margins of firms' exports	Export promotion actions associated with increased exports, primarily along the extensive margin, both in terms of markets and products.
Freund and Pierola (2010)	1994-2007; exports of firms from nontraditional agriculture sector by destination market, goods and value of shipment	Firm entry and survival in exporting, and in products and markets not previously served by any domestic exporter	Significant entry and exit in new markets, but trial and error in new products rare. New products typically discovered by large experienced exporters.



Bernard, Massari, Reyes and Taglioni (2013)	1992-2009; all shipments by month-product-destination country	Uncover size and consequences of partial-year effect of export entry (when a firm does not enter in January but later in the year) on first year sales and growth in a market	Large downward biased observations of level of activity upon entry as well as large upward biased growth rates between year of entry and following year; similar effects for year of exit from the market.
<i>Portugal</i>			
Martins and Opromolla (2009)	1995-2005; all export and import transactions by firms, CN8 product code, value and quantity, country of destination/origin; matched with data for firm characteristic and data for all employees	Effects of firm-level international trade on wages	Firm-level imports as important as exports for wages paid; firms that increase their exports (imports) of high- (intermediate-) technology products tend to increase salaries.
Amador and Opromolla (2010)	1995-2005; universe of export transactions (products (HS4), values, quantities, destination countries) by firms; monthly data	Description of joint destination/product strategies of exporters	High degree of firm heterogeneity; dominant role of multi-product and multi-destination exporters; frequent switching of products and destinations by firms. Intensive margin accounts for most of yearly variation in exports; gross contribution of destination and product extensive margins as important as gross contribution of entering and exiting firms.
Bastos and Silva (2010)	2005; exports by all firms to each of 220 destinations in over 7,500 product categories, linked to information on firm productivity and importing-country attributes	What drives export quality?	Unit values of exports increase systematically with distance and tend to be higher in shipments to richer nations; higher-productivity firms tend to ship greater quantities at higher prices to a given market within product categories; high-productivity, high-quality firms are more able to serve difficult markets.
Mion and Opromolla (2012)	1995-2005; universe of export transactions at the firm-destination-year level; matched with data on characteristics of firms and on all employees in the firms	Role of export experience of managers acquired in previous firms for export performance and wages in current firm	Export experience in previous firms leads to higher export performance of current firm, and to sizeable wage premium for the manager; market specific export knowledge especially important for entry and salaries.

Bastos and Dias (2013)	2005 and 2009; exports and import transactions of firms by product and destination market; matched with firm characteristics	Evolution of export performance over firm live cycle	As firms age, the distribution of employment, export revenue, number of destinations and exported products shift progressively to the right.
Amador and Opromolla (2013)	1995-2005; universe of export transactions (products (HS4), values, quantities, destination countries) by firms; monthly data	Investigation of joint destination/product strategies of exporters	In addition to Amador and Opromolla (2010), the article finds that, while continuing exporters enter new markets mainly by selling old products, new exporters access new destinations mainly by exporting new products.
<i>Russia</i>			
Schmeiser (2012)	2003-2004; exports by product, value, weight and destination	Patterns of export entry and export expansion	Large share of export growth due to incumbent exporters entering new destinations; new exporters enter large countries and destinations with characteristics similar to domestic market.
<i>Slovenia</i>			
Damijan, Kostevc and Polanec (2011)	1994-2003; exports by product (value, quantity) and country, matched with firm characteristics	Differences between new and incumbent exporters	Access to financing may account for an important part of observed differences in the extensive margins of exports between new and incumbent exporters
Damijan, Konings and Polanec (2013)	1994-2008; imports and exports at firm and product level (HS8, value and quantity), matched with firm characteristics and FDI data	Simultaneous export and import in identical products (pass-on trade, POT)	On average, 70% of all exporting firms engage in POT. Use of POT increasing in firm size, product diversification, multinational status, firm productivity and profitability.
Damijan, Konings and Polanec (2014)	1994-2008; imports and exports at firm-product-market level, matched with data on firm characteristics	Effect of net and gross churning in imported varieties of capital and intermediate goods on firms export scope and productivity	Average firm changes about one-quarter of imported and exported product-markets every year, gross churning in terms of added and dropped product-markets almost three times higher. Churning in imported varieties important for productivity growth.

## Spain

De Lucio, Minguez-Fuentes, Minondo and Requena-Silvente (2011)	1997-2007; exports and imports, values and countries by firms	Contribution of extensive (number of trading firms, products, countries) and intensive (surviving trade relationship) margin to changes in exports and Imports	Year-to-year variation in trade flows largely explained by variation in average value of trade flows of existing trade relationships. In the longer run, both margins are important.
Esteve-Pérez, Requena-Silvente and Pallardó-Lopez (2013)	1997-2006; firm level data on export status, volume of exports, exported products, destinations; matched with firm characteristics	Duration of firms' trade relationships by destination and its determinants	Firm export status highly persistent; firms' destination portfolio very dynamic with median duration of firm-country exporting relationship of two years, but risk of exiting sharply falls afterwards.

## Sweden

Andersson, Lööf and Johansson (2008)	1997-2004; exports and imports by firms by product (CN8) and country, value and weight; matched with firm characteristics and information on education of employees	Comprehensive description and analysis of international trading activities of firms	Substantial heterogeneity in terms of number of markets and number of products. Productivity premiums increase in number of markets and products. Two-way traders more productive than firms that only export or import.
Jienwatcharamongkhol (2014)	1997-2006; export value and weight by firm, product (HS8) and destination, matched with firm and destination characteristics	Analysis of effect of distance on export decision and export value at firm-product level for differentiated and non-differentiated products	Homogeneous products more sensitive to distance than differentiated products when controlling for annual shocks and industry heterogeneity. Learning effect from past trade experience.
Gullstrand and Persson (2015)	1997-2007; exports by firm-product-destination (firms from food industry), matched with firm characteristics	Explanation of the empirical puzzle of importance of sunk costs of exports and short survival time of trade-flows	Difference between core and peripheral export markets; firms tend to stay longer in their core markets, while exports to peripheral markets are much less long-term.

## Turkey

Lo Turco and Maggioni (2013)	2005-2009; exports (value and volume) at detailed product level; matched with production data at firm level	Role of Carry-along Trade (CAT) in exports – goods exported but not produced by a firm	Large part of good exports recorded by manufacturing firms are produced by other national actors.
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Cebeci (2014)	2005-2010; exports by destination, value of transaction and year, matched with firm-level information	Evaluation of the role of export destinations on firm performance (low income vs. high income destinations)	Unlike exporting to high-income destinations, exporting to low-income destinations does not result in significantly higher firm TFP and wages.
Demir and Javorcik (2014)	2004-2012; exports by product, destination and financing terms	Choice of payment method in exports (open account, cash in advance, letter of credit) with focus on role of product differentiation	Prevalence of exporter-financed exports increases with institutional quality in importing country; product differentiation reinforces positive effect of institutional quality.
Cebeci and Fernandes (2015)	2002-2011; universe of export transactions (firm identifier, HS12, destination country, value, quantity)	Microdynamics behind export boom from 2002-2008 and strong contraction 2008/2009 and recovery thereafter	Year-to-year aggregate export growth dominated by development in continuous exporters at destination and product intensive margins. High degree of export entry and exit from year to year.
Lo Turco and Maggioni (2015)	2005-2009; exports and import by detailed product, matched with firm level information on production and balance sheet data	Causal effect of importing and exporting on introduction of new products and product scope	Produced exports important in spurring firm product scope and innovation. Importing only reinforces this effect when jointly undertaken with exporting. Exporting and two-way trading foster product quality upgrading.
<i>Uruguay</i>			
Volpe Martincus and Carballo (2010)	2000-2007; firm-level export data by product (HS10) and destination, matched with information on export assistance received	Effect of export promotion on entering new country and product markets	Trade supporting activities have helped firm reach new destination countries and introduce new differentiated products.
Volpe Martincus, Carballo and Graziano (2015)	2002-2011; universe of export transactions, firm ID, HS10 code, customs location, destination country, foreign buyer, transport mode, value, quantity, channel; plus precise information on actual time the transaction took to go through customs	Effects of custom-related delays on firms' exports	Delays have a significant negative impact on firms' exports along several dimensions; effects are more pronounced on sales to newer buyers.

## USA

Bernard, Jensen, Redding and Schott (2007)	1992-2000; all international trade transactions by product, value, quantity shipped, country, transport mode, and identifier of US firm	Descriptive evidence on extensive and intensive margins	International trade is extremely concentrated across firms; trade dominated by few multi-product exporters that export to many countries. Exporting firms share a variety of positive attributes with firms that are importers.
Bernard, Jensen and Schott (2009)	1993 and 2000; all trade transactions by firm-product-country-year and arm's length vs. intra-firm trade; matched with employment data	Descriptive evidence on extensive and intensive margins; role of most globally engaged (MGE) firms that export and import and do so in part with related parties	Trade is concentrated among a very small number of firms; most exporters and importers trade relatively few products with relatively small number of high-income countries; few large multi-product multi-country traders dominate exports and imports. MGE very influential in trade and employment.
Bernard, Jensen, Redding and Schott (2009)	1993-2003; all international trade transactions by U.S. firm, HS10 product, value, date, destination/source country, and arm's length or related party transaction	Descriptive evidence on extensive and intensive margins across partner countries and over time. Response of margins of trade to macroeconomic shock (Asian crisis 1997) with diff-in-diff approach.	Short-run changes in exports largely accounted for by the intensive margin; comparable results for imports. Dominance of the intensive margin in value terms in decline of exports to Asia in the crisis.
Bernard, Jensen, Redding and Schott (2010a)	2002; for each export and import transaction US firm, HS10 product, value, date, destination/source country, and arm's length or related party transaction. For imports identifier for foreign manufacturer or shipper	Extend to which US exports and imports flow through wholesalers and retailers versus "producing and consuming" firms	Pure wholesalers and retailers account for large shares of trading firms but relatively little value; most trade by firms that are producers and that are engaged in whole-sale / retail, too. Differences by product type and market size.
Bernard, Jensen, Redding and Schott (2010b)	1997; import transactions, either arm's length or with related party (intra firm trade); country characteristics matched to data	Product and country determinants of intrafirm trade	Higher revealed product contractibility associated with less intrafirm trade. Increases in governance quality raise probability that foreign affiliates are present but are associated with lower shares of intrafirm trade.
Bernard, Redding and Schott (2011)	1992 – 2004; all U.S. international trade transactions; exporting firm, HS10 product, value shipped, date of shipment, destination country	General equilibrium model of multi-product, multiple-destination firms with heterogeneity in ability across firms and in product attributes within firms. Test of core implications	Firms exporting many products also serve many export destinations and export more of a given product to a given destination.

Kurz and Senses (2013)	1991-2005; exports and imports at firm level by product (HS10), value, and country of destination or origin; matched with firm characteristics	Direction and magnitude of association between firm-level exposure to trade and volatility of employment growth	Relative to purely domestic firms, firms that only export and firms that both export and import are less volatile, whereas firms that only import are more volatile. High degree of heterogeneity across trading firms in terms of duration of time and intensity of trade, number and type of traded products and number and characteristics of trading partners, all important for employment volatility.
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**Multi-country studies**

*Malawi, Mali, Senegal and Tanzania*

Cadot, Iacovane, Pierola and Rauch (2011)	2005-2008 (Malawi and Mali), 2000-2008 (Senegal), 2003-2008 (Tanzania); export flows at transaction level (HS8 or HS10, destination market, value, weight, port used, date)	Determinants of success and survival on an export market beyond the first year	High degree of experimentation at the extensive margin associated with low survival rates; survival probability rises with number of firms exporting the same product to the same destination from the same country, pointing to cross-firm synergies. More diversified firms more likely to survive in exporting.
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*32 countries*

Freund and Pierola (2012)	2004-2008; <i>World Bank Exporter Dynamics Database (EDD)</i> . Universe of export transactions at exporter-product-destination-year level for firms	Role of largest exporters for shaping trade patterns	Top 1 percent of exporters – export superstars - dominate exports, cover about half of all exports on average in the 32 countries (top 10 percent cover 90 percent).
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*38 developing and  
7 developed countries*

Cebeci, Fernandes, Freund and Pierola (2012)	2003-2010; <i>World Bank Exporter Dynamics Database (EDD)</i> . Universe of export transactions at exporter-product-destination-year level of firms	Description of <i>World Bank Exporter Dynamics Database (EDD)</i> reporting exporter characteristics and measures of exporter growth based on firm level customs information by country.-year, country-year-product and country-year-destination	Larger or more developed economies have more exporters, larger and more diversified exporters, and lower entry and exit rates; expansion along intensive margin (exporter size) more important for export growth than entry of new exporters (extensive margin); exit and entry rates highly correlated; high importance of large multi-product firms.
<i>Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Peru</i>			
Fernandes, Lederman and Gutierrez-Rocha (2013)	2005-2009; <i>World Bank Exporter Dynamics Database (EDD)</i> . Universe of export transactions at exporter-product-destination-year level for firms	Assessment of extent of “export entrepreneurship” (advent of new exporting firms, new export products, new export market destinations)	Latin American and Caribbean region appears to be no less entrepreneurial in terms of the extensive margins of exports than comparator countries.
<i>Brazil, Chile, Denmark, Norway</i>			
Arkolakis and Muendler (2013)	2000; Data o firms-destination markets - export products	Comparable results on export participation, destination markets, and export products; comparison with earlier findings from France and USA	Only small number of firms ship to large number of markets; most firms ship to limited number of large markets. At a given destination there are only a few wide-scope and large-sales firms, but many narrow-scope and small-sales firms.

*Costa Rica,  
Ecuador and  
Uruguay*

Carballo, Ottaviano and Volpe Martincus (2013)	2005-2008; data at exporter-product-country-importer level; value and quantity of HS10 to each importing company	Provide a precise characterization of firms' export margins, across products, destination countries, and customers	Number of buyers and distribution of sales across them systematically vary with characteristics of destination markets. Most firms trade with only very few buyers, number of buyers increase with size and accessibility of destinations.
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*Ghana, Mali, Malawi,  
Senegal, Tanzania*

Jaud, Kukenova and Strieborny (2013)	2000-2008; export data at firm-product-destination level (HS8), values and quantities; agri-food products	Impact of financial development on long-term trade using measure of export-related financial needs at product level development.	Finance matters for sustainable export performance, as goods with higher export-related financial needs disproportionately benefit from better financial
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*34 developing countries*

Jaud, Kiendrebeogo and Vezanzones-Varoudakis (2015)	1997-2011; <i>World Bank Exporter Dynamics Database (EDD)</i> . Exported products at HS6-level, diversification measured by firm dynamics, product dynamics and destination dynamics	Implications of financial vulnerability for export diversification in developing economies	Negative and economically large effect of financial vulnerability on export diversification.
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Studies are listed by country covered in alphabetical order and chronologically by publication data within countries; studies covering multiple countries are listed at the end of the table in chronological order. CN refers to the Combined Nomenclature, HS to the Harmonized System of classification of goods.



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