WORKING PAPER

Trading many goods with many countries: Exporters and importers from German manufacturing industries

by

Joachim Wagner

University of Lüneburg
Working Paper Series in Economics

No. 243

June 2012

www.leuphana.de/institute/ivwl/publikationen/working-papers.html

ISSN 1860 - 5508

Trading many goods with many countries: Exporters and importers from German manufacturing industries*

Joachim Wagner

Leuphana University Lueneburg and IZA, Bonn

[This version: June 8, 2012]

Abstract:

In Germany, for the reporting year 2009 transaction-level data on exports and imports of goods have been aggregated at the level of the exporting or importing firm for the first time. In these data the number of goods exported and imported and the number of countries exported to and imported from is reported, together with the values of these cross-border transactions. This paper uses these newly available data for firms from manufacturing industries to uncover new facts and to test theoretical hypotheses of the relationship between a core dimension of firm performance, namely productivity, and the number of goods traded and countries traded with.

JEL Classification: F14

Keywords: Exports, Imports, manufacturing firms, Germany

* All computations were done at the Research Data Centre of the German Statistical Office. I thank Christopher Gürke for preparing the data, running my Stata do-files and checking the results for any violation of privacy. The enterprise level data used are confidential but not exclusive; see http://www.forschungsdatenzentrum.de/nutzungsbedingungen.asp for any details regarding the access to the data.

Author's address:

Prof. Dr. Joachim Wagner
Leuphana University Lueneburg, Institute of Economics, PO Box 2440, D-21314 Lueneburg, Germany

e-mail: wagner@leuphana.de

1. New data on exports and imports of German manufacturing firms

Germany is one of the leading actors on the international markets for goods. According to the *World Trade Report 2011* published by the World Trade Organization it was number three (after China and the United States) in the ranking of countries by the value of both exports and imports in merchandise trade in 2010 (see Word Trade Organization (2011), Appendix Table 3). International trade is of high relevance for the German economy as a whole, for its regions, industries, and firms. Reliable information on international trade activities, therefore, is important for empirical analyses in many areas of economics including business cycles, structural change and economic growth.

Data on total exports and imports, and on exports and imports by goods traded and countries trades with, are published on a regular basis by the German Statistical Office. While these published aggregate data from official statistics are important for a birds-eye view of international activities, disaggregated data for the actors on international markets – the firms trading goods with partners in foreign countries - are needed for any in-depth analyses of the causes and consequences of exports and imports. Empirical studies for Germany that use comprehensive firm-level data from the surveys of the statistical offices hitherto focus on exports from manufacturing firms; only most recently imports have been investigated, too.[1] The firm-level data used in these empirical investigations identify firms that export or import, but they do not cover any information about the goods traded and the countries of destination or origin of the goods. In other words, we know from these data *who* trades *how much*, but not *what* and *with whom*.

[1] For surveys of this literature see Wagner (2011, 2012).

Information on the goods traded internationally and on the countries with which these goods are traded[2] is available from the statistic on foreign trade (*Außenhandelsstatistik*). This statistic is based on two sources. One source is the reports by German firms on transactions with firms from countries that are members of the European Union (EU); these reports are used to compile the so-called *Intrahandelsstatistik* on intra-EU trade. The other source is transaction-level data collected by the customs on trade with countries outside the EU (the so-called *Extrahandelsstatistik*).[3] Data in the statistic of foreign trade are transaction-level data, i.e. they relate to one transaction of a German firm with a firm located outside Germany at a time. Published data from this statistic report exports or imports aggregated at the level of goods traded and by country of destination or origin.

For the reporting year 2009 these transaction-level data have been aggregated at the level of the exporting or importing firm for the first time. For each exporting or importing firm that reported either to the statistic on intra-EU trade, or to the statistic on trade with countries outside the EU, we know from these data, among others, the number of goods exported and imported and the number of countries exported to and imported from.[4] Furthermore, the values of these transactions are known.

[2] Note that in Germany information on international trade in services is compiled by the German Central Bank (*Deutsche Bundesbank*) to build the balance of services trade (*Dienstleistungsbilanz*).

[3] Note that firms with a value of exports to and imports from EU-countries that does not exceed 400,000 Euro in 2009 do not have to report to the statistic on intra-EU trade. For trade with firms from non-member countries all transactions that exceed 1,000 Euro are registered. For details see Statistisches Bundesamt, Qualitätsbericht Außenhandel, Januar 2011.

[4] Note that information for firms with a value of exports to and imports from EU-countries that does not exceed 400,000 Euro in 2009 is not covered in the data (see footnote 3). Small exporters and importers that trade with EU-countries only are therefore underrepresented in the sample.

Using the firms' registration number for turnover tax statistics these data were matched with the enterprise register system (*Unternehmensregister-System*). For enterprises from manufacturing industries this matching made it possible to add information (that is taken from a regular survey of manufacturing firms) on industry affiliation, total turnover and the number of employees.[5] The new data on export and import activities of firms from German manufacturing industries are used in this paper to uncover new facts and to test theoretical hypotheses of the relationship between a core dimension of firm performance, namely productivity, and the number of goods traded and countries traded with.

2. Five facts for exporters and importers from German manufacturing industries

Based on the newly available data for 2009 that is built from transaction-level information five empirical facts are uncovered.

Fact 1: Many firms export and import simultaneously.

Results reported in Table 1 show that many manufacturing enterprises in West Germany and in East Germany[6] are simultaneously active on the international market as exporters and importers. This holds for four in five firms in West Germany and for

Presumably, many of these are firms that trade only one good (or a very small number of goods) with one country (or a very small number of countries).

[5] Preparation of the data set was done inside the research data center of the German Federal Statistical Office by Christopher Gürke.

[6] The economy differs between West Germany and the former communist East Germany even some 20 years after unification in 1990, and this holds especially for exports (see Wagner (2008a) for a detailed analysis). Therefore, all computations were performed for West Germany and East Germany separately.

three in four firms in East Germany. Firm characteristics that distinguish exporters from non-exporters, therefore, often distinguish importers from non-importers, too, and vice versa.

[Table 1 near here]

Fact 2: While many firms trade only a small number of different goods, many firms trade a large number of different goods.

It can be seen from Table 2 that many firms concentrate their export or import activities on a small number of goods.[7] One in four firms trades only up to 5 goods in West Germany and up to 3 goods in East Germany. However, there are many firms in both parts of Germany that trade a large number of different goods, too. In West Germany, some 1,200 firms export more than 300 goods or import more than 200 goods. In East Germany, some 200 firms export or import more than 130 goods. Note that both the number of exported goods and the number of imported goods is on average considerably larger in West Germany than in East Germany.

[Table 2 near here]

Fact 3: While many firms trade only with firms from a small number of countries, many firms trade with firms from a large number of countries.

Like in the case of the number of products traded many firms concentrate their export or import activities on firms from a small number of countries. Table 2 shows

[7] A good is an eight-digit number from the official nomenclature for the statistics of foreign trade.

that one in four firms trades only with firms from up to 6 countries in West Germany and up to 3 countries in East Germany. However, there are many firms in both parts of Germany that trade with firms from a large number of different countries, too. Note that the number of countries exported to is considerably larger in West Germany than in East Germany on average, while the number of countries imported from is of a similar order of magnitude.[8]

Fact 4: Exports and imports are highly concentrated.

While there are thousands of exporting and importing manufacturing firms in Germany, a small share of these firms are responsible for the lion's share of international trade. More than half of total exports and imports in West Germany and East Germany stem from the largest 50 trading firms (see upper panel of Table 3). This high degree of concentration of international trade is found for other countries, too (see World Trade Organization (2008), p. 54); Bernard et al. (2011, p. 10) call it one of the striking feature of international trade data.

[Table 3 near here]

[8] The number of exporters and importers reported in Table 2 differs from the figures reported in Table 1 and between the figures reported for "number of goods" and "number of countries" because trade with certain goods and trade with certain countries are kept secret by request of the trading firms. The value of these confidential transactions is, however, included in the sum of all exports and imports, and it is known that the firm exported and imported (but not what and/or with whom). Therefore, for a small number of traders with a known number of goods traded the number of countries traded with is not known, and vice versa.

Fact 5: Exports and imports are dominated by firms that trade many goods with many countries.

While thousands of firms trade only a small number of goods with firms from a small number of countries, firms that trade many goods with many countries are responsible for the lion's share of both exports and imports. Table 3 shows that the largest traders trade on average a very large number of goods with firms from a very large number of countries. Furthermore, Table 3 reports (in the lower panel) that enterprises that trade 10 or more goods with 10 or more countries have a share of higher that 90 percent in total exports and imports in West Germany while their share in all trading enterprises is less than 40 percent. The figures for East Germany are somewhat smaller but still large.

Fact 5 can help to understand Fact 4. Bernard et al. (2011, p. 10) argue that "(o)ne reason why international trade is so concentrated is that larger exporters not only export more of a given product to a given destination than smaller exporters, but also export more products to more destinations." According to the findings reported here, the same holds for imports.

3. Productivity premia for multi-product and multi-country traders

3.1 Four hypotheses on productivity and firms' international trade activities by number of products and number of countries

What makes the difference between a firm that sales many products and that trades with many countries on the one hand and a firm that trades only some products and that trades only with some countries on the other hand? Economic theory, and results from econometric studies that use micro-level data to investigate the

international trade decisions of firms empirically, point to an important role of 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 (2007) 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 (2011)).

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.

Wagner (2007) 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.

According to findings from this literature on exports and productivity 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 2008b). The reason for this is that there exist additional costs of selling goods in foreign countries. To repeat, 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 firms that export to a larger number of foreign markets have to be more productive than firms 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. This leads to a first hypothesis to be tested with the newly available data for international trade activities of German manufacturing firms:[9]

H1: The number of export markets served by a firm increases with firm productivity.

While the causes and consequences of export and its mutual relationships with productivity are prominent topics in the recent literature on internationally active firms, imports are seldom dealt with. 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, learning about legal rules and regulations for doing business in

[9] For a survey of empirical evidence for other countries (including Belgium, Ireland, Italy, Japan, Slovenia, Spain and Sweden) that is in line with this hypothesis see Wagner (2012).

a foreign country 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.

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. Details aside, the big picture that emerges from this literature can be sketched as follows (see Wagner (2012) for a survey): 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. We have evidence for self-selection

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

If, as is argued above, importing is associated with fixed costs that are sunk costs, because the import agreement is preceded by a search process for potential foreign suppliers, learning about legal rules and regulations for doing business in a foreign country, and acquisition of customs procedures, among others, these sunk cost emerge for each country a firm imports from. This implies that firms that import from a larger number of foreign markets have to be more productive than firms that import from a smaller number of foreign markets only. This leads to a second hypothesis to be tested with the newly available data for international trade activities of German manufacturing firms:

H2: The number of countries a firm imports from increases with firm productivity.

Recently, a new literature started that looks at an alternative measure of the extensive margin of trade besides the number of destination countries for exports or countries of origin for imports, namely the number of products exported and imported, and its relationship to firm performance. Muuls and Pisu (2009) find for Belgium that productivity is also increasing as the number of products exported or imported rises. Similarly, Silva et al. (2010) show that Portuguese firms that export or import a larger number of products are more productive. These relationships are interpreted to be suggestive that fixed costs of trade are incurred for each new product a firm starts to trade internationally.[10] This leads to a third and a fourth

[10] Note that the direction of causality between the number of traded products and productivity is not investigated in these studies.

hypothesis to be tested with the newly available data for international trade activities of German manufacturing firms:

H3: The number of goods a firm exports increases with firm productivity.

H4: The number of goods a firm imports increases with firm productivity.

3.2 Empirical estimates for productivity premia for multi-product and multi-country traders from German manufacturing industries

The four hypotheses outlined above refer to the empirical relationship of firm productivity on the one hand and the number of countries traded with and the number of goods traded on the other hand. While information on the number of goods imported and exported, and on the number of countries exported to and imported from, is available from the statistics of foreign trade, information on firm productivity is not. As stated in section 1, using the firms' registration number for turnover tax statistics the data from the statistics of foreign trade were matched with the enterprise register system (*Unternehmensregister-System*). For enterprises from manufacturing industries this matching makes it possible to add information (that is taken from a regular survey of manufacturing firms) on total turnover and on the number of employees. Based thereon the amount of average sales per employee is computed, and this is the measure of labor productivity used in the empirical investigation of the four hypotheses.

Productivity is measured as labor productivity because information on the capital stock of a firm is not available, so more elaborate measures of total factor productivity cannot be used in this study. Bartelsman and Doms (2000, p. 575) point to the fact that heterogeneity in labor productivity has been found to be accompanied by similar heterogeneity in total factor productivity in the reviewed research where both concepts are measured. In a recent comprehensive survey Chad Syverson (2011) argues that high-productivity producers will tend to look efficient regardless of the specific way that their productivity is measured. Furthermore, Foster, Haltiwanger and Syverson (2008) show that productivity measures that use sales (i.e. quantities multiplied by prices) and measures that use quantities only are highly positively correlated. Therefore, it is argued that labor productivity is a suitable measure for productivity at the firm level.

As a first step in the empirical investigation of the four hypotheses derived above we look at the average labor productivity in firms by number of goods traded and number of countries traded with. To do so, firms are grouped into four categories according to the number of goods and number of countries: Firms that trade only one good or with one country only, firms that trade “a few” goods or with “a few” countries (where “ a few” is defined as two to five), firms that trade “several” goods or with “several” countries (whe “several” is defined as six to nine), and firms that trade “many” goods or with “many” countries (where “many” are defined as ten or more). Results reported in Table 4 are in line with the four hypotheses. Firm productivity increases over the number of goods exported and imported, and over the number of countries exported to and imported from, in West Germany and in East Germany. Productivity differences are large from an economic point of view if the “marginal” traders with only one traded good and one country of destination or origin are

compared to firms from the other groups, especially with “power traders” that trade ten or more goods and with ten or more countries.

[Table 4 near here]

Following the now standard approach to investigate the links between productivity and international trade activities (outlined in Wagner (2007)) the next step of the empirical analysis consists in the estimation of the so-called productivity premia of firms with different numbers of goods traded and different numbers of countries traded with. These productivity premia are computed from the estimated coefficients of dummy variables for firms with 2 - 5, 6 - 9 and 10 or more goods traded (or countries traded with) from an OLS regression of the log of labor productivity on these dummy variables (taking firms that trade only one good or with one country only as the reference group) plus the number of employees (also included in squares) and a full set of 2digit industry dummy variables and a constant. This regression model is not meant to be an empirical model to explain labor productivity at the firm level;[11] the data set used here is not suited at all for such an exercise. The regression model is just a vehicle to test for, and estimate the size of, productivity premia of multi-product and multi-country traders from German manufacturing industries over firms that trade only one good or with one country only while controlling for other firm characteristics that are available in the data, namely

[11] Note that productivity differences at the firm level are notoriously difficult to explain empirically. “At the micro level, productivity remains very much a measure of our ignorance.” (Bartelsman and Doms (2000), p. 586)

firm size and industry affiliation. The premia are reported as percentages, computed from the estimated regression coefficients ß as (exp(ß) – 1)*100.

Results for estimated productivity premia for manufacturing enterprises from West Germany and East Germany by number of traded goods and number of countries traded with are reported in Table 5. All premia are positive, statistically significant at an error level of 5 percent or (usually much) better, large from an economic point of view, and increasing over the number of goods traded and the number of countries traded with. These results are fully in line with the four hypotheses.

[Table 5 near here]

In a robustness check all regressions were estimated using the fully robust MM-estimator (see Verardi and Croux (2009) for details) to take care of the possible role of extreme observations, or outliers. Results are rather similar and lead to identical conclusions (see Appendix, Table A1).[12]

[12] In a further robustness check the empirical models were estimated with the number of products (or the number of countries) plus the squared values of these variables instead of the dummy variables for firms with 2 - 5, 6 - 9 and 10 or more goods traded (or countries traded with). In the OLS regressions the estimated coefficient of the squared term is statistically different from zero at an error level of five percent in one of eight cases only. The coefficients of the number of goods and the number of countries are all positive, but not statically significant at a usual error level for the number of goods imported. Fully robust MM-regressions lead to no significant coefficients for the squared term and to positive and significant estimated premia for the number of goods and countries in all regressions with data from West German firms, while a significant increase in productivity in East Germany is only found for the number of countries imported from. Tables with the results are available on request. The more flexible specification using dummy variables is able to capture the highly non-linear relationship between productivity and the number of goods traded / number of countries traded

4. Conclusions

This paper uses newly available data on the number of goods exported and imported, and on the number of countries traded with, by enterprises from manufacturing industries in Germany. It documents that foreign trade is dominated by firms that trade multiple goods with multiple countries, and that a small number of very large multiple-goods multiple-country exporters and importers play a decisive role in shaping exports and imports of one of the most important actors on the world market for goods. 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.

An open question is the direction of causality between firm productivity and the number of goods traded or the number of countries traded with. Is the productivity premium of multiple-goods multiple-countries traders due to self-selection of more productive firms on more international markets (due to fixed costs that recur for every new good traded and for every new country traded with and that can only be covered profitably by more productive firms) or due to higher learning-by-trading effects when more goods are traded on more markets? We know from the literature on trade and firm performance how to tackle these issues empirically when it comes to investigate the productivity premium of exporters or importers over firms that do not trade internationally (see the surveys by Wagner (2007, 2012)). Application of these empirical approaches, however, needs data for (at least) four years. Therefore, due to the lack of these data for Germany this question has to remain open for several years.

---

with much better than the second-order polynomial specification that imposes a restriction on the functional form of this relation.

References

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

Bartelsman, Eric J. and Mark Doms (2000), Understanding Productivity: Lessons from Longitudinal Micro Data. *Journal of Economic Literature* XXXVIII (3), 569-594.

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., 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., J. Bradford Jensen, Stephen J. Redding and Peter K. Schott (2011), The Empirics of Firm Heterogeneity and International Trade. National Bureau of Economic Research NBER Working Paper 17627, November.

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

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.

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

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.

Kasahara, Hiroyuki and Beverly Lapham (2008), Productivity and the Decision to Import and Export: Theory and Evidence. (CESifo Working Papers 2240). Ifo Institute for Economic Research, Munich.

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

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

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.

Redding, Stephen J. (2011), Theories of Heterogeneous Firms and Trade. *Annual Review of Economics* 3, 77-105.

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

Syverson, Chad (2011), What determines productivity? *Journal of Economic Literature 49* (2), 326-365.

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

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

Wagner, Joachm (2008a), A note why more West than East German firms export. *International Economics and Economic Policy* 5 (4), 363-370.

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

Wagner, Joachim (2011), Exports and Firm Characteristics in Germany: A Survey of Empirical Studies (1991 to 2011). *Applied Economics Quarterly* (in press).

Wagner, Joachim (2012), International trade and firm performance: A survey of empirical studies since 2006. *Review of World Economics / Weltwirtschaftliches Archiv* 148 (2), 235-267.

World Trade Organization (2008), World Trade Report 2008. Trade in a Globalizing World. Geneva: WTO Publications.

World Trade Organization (2011), World Trade Report 2011. The WTO and preferential trade agreements: From co-existence to coherence. Geneva: WTO Publications.

Table 1: Exporter and Importer in German Manufacturing Industries, 2009[1]

	West Germany		East Germany	
Type of enterprise	Number	Share (percent)	Number	Share (percent)
Exporter or importer	12,919	100.00	2,261	100.00
Exporter	11,949	92.49	1,958	86.60
Importer	11,370	88.01	1,945	86.02
Exporter only	1,549	11.99	316	13.98
Importer only	970	7.51	303	13.40
Exporter and importer	10,400	80.50	1,642	72.62

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009, own calculations.

Table 2: Exporter and Importer in German Manufacturing Industries by Number of Goods and Number of Countries, 2009

		Number of firms	Mean	p1	p10	p25	p50	p75	p90	p99
West Germany										
Number of goods	Exporter	11,929	27.8	1	1	3	7	23	68	306
	Importer	11,363	29.3	1	2	5	13	32	67	237
Number of countries	Exporter	11,788	20.7	1	2	6	16	29	46	89
	Importer	11,135	10.18	1	1	3	7	14	22	46
East Germany										
Number of goods	Exporter	1,953	12.31	1	1	2	5	11	28	136
	Importer	1,942	19.8	1	1	3	10	23	46	148
Number of countries	Exporter	1,921	13.7	1	1	3	9	19	33	67
	Importer	1,890	7.95	1	1	3	6	11	17	33

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009, own calculations.

Table 3: Concentration in Exports and Imports by German Manufacturing Enterprises, 2009[1]

Type of enterprise	Share of largest 3 traders in total trade (%)	10	50	100
West Germany				
Exporter	24.7	44.1	57.5	63.3
Average number of goods	1447.7	1225.0	542.24	406.5
Average number of countries	158.0	133.0	101.8	87.4
Importer	23.5	42.1	59.9	66.6
Average number of goods	1096.3	1076.5	473.6	339.6
Average number of countries	95.0	85.1	54.7	47.0
East Germany				
Exporter	17.1	31.3	54.0	64.5
Average number of goods	60.7	86.2	57.3	44.6
Average number of countries	52.7	55.7	38.7	33.5
Importer	26.4	42.0	64.2	74.1
Average number of goods	284.3	220.9	111.3	83.8
Average number of countries	36.7	33.2	23.2	20.5

	Enterprises that trade 10 or more goods with 10 or more countries		
	Number of enterprises	Share in total trade (%)	Share in all enterprises (%)
West Germany			
Exporter	4,678	91.1	39.1
Importer	4,331	93.1	38.1
East Germany			
Exporter	439	67.8	22.4
Importer	565	85.1	29.0

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009, own calculations.

Table 4: Productivity by number of traded goods and number of countries traded with, German manufacturing enterprises, 2009[1]

	West Germany		East Germany	
	Share in all firms (percent)	Productivity (Average sales per employee (Euro))	Share in all firms (percent)	Productivity (Average sales per employee (Euro))
Number of goods exported				
1	14.02	149,347	19.35	136,000
2 – 5	28.51	167,023	36.10	171,004
6 – 9	13.31	179,204	15.11	194,541
10 or more	44.16	210,322	29.44	206,072
Number of goods imported				
1	7.84	138,317	12.46	144,611
2 – 5	20.12	167,658	21.72	155,106
6 – 9	13.34	172,608	14.94	178,493
10 or more	58.70	213,809	50.88	217,166
Number of countries exported to				
1	8.11	148,854	12.70	123,671
2 – 5	15.36	169,513	24.78	176,231
6 – 9	11.21	183,835	13.38	181,316
10 or more	65.32	194,608	49.14	195,151
Number of countries Imported from				
1	10.85	131,406	14.97	114,476
2 – 5	28.19	168,805	30.11	167,748
6 – 9	20.49	196,491	23.39	194,009
10 or more	40.47	229,236	31.53	245,731

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009, own calculations.

Table 5: Productivity premia by number of traded goods and number of countries traded with, German manufacturing enterprises, 2009[1]

	West Germany		East Germany	
	Productivity premium (%)	Significance (p-value)	Productivity premium (%)	Significance (p-value)
Number of goods exported				
2 – 5	11.63	0.000	13.88	0.001
6 – 9	19.72	0.000	22.14	0.000
10 or more	39.10	0.000	34.99	0.000
Number of goods imported				
2 – 5	12.75	0.000	10.52	0.052
6 – 9	25.86	0.000	22.14	0.001
10 or more	49.18	0.000	43.33	0.000
Number of countries exported to				
2 – 5	13.88	0.000	19.72	0.000
6 – 9	25.86	0.000	25.86	0.000
10 or more	46.23	0.000	43.33	0.000
Number of countries imported from				
2 – 5	20.92	0.000	24.61	0.000
6 – 9	43.33	0.000	43.33	0.000
10 or more	68.20	0.000	71.60	0.000

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009, own calculations.

[1] See text for details on the enterprises covered. The reported productivity premia a based on the estimated coefficients of dummy variables for firms with 2 -5, 6 -9 and 10 or more goods traded (or countries traded with) from an OLS regression of the log of labor productivity on these dummy variables (taking firms that trade only one good or with one country as the reference group) plus the number of employees (also included in squares) and a full set of 2digit industry dummy variables and a constant. The premia are computed from the estimated coefficients ß as (exp(ß) – 1)*100. The p-values are based on heteroscedasticity-robust standard error estimates.

Appendix

Table A1: Productivity premia by number of traded goods and number of countries traded with, German manufacturing enterprises, 2009[1]

	West Germany		East Germany	
	Productivity premium (%)	Significance (p-value)	Productivity premium (%)	Significance (p-value)
Number of goods exported				
2 – 5	8.33	0.000	10.52	0.017
6 – 9	18.53	0.000	19.72	0.001
10 or more	36.34	0.000	33.64	0.000
Number of goods imported				
2 – 5	12.75	0.000	13.88	0.009
6 – 9	27.12	0.000	24.61	0.000
10 or more	50.68	0.000	50.68	0.000
Number of countries exported to				
2 – 5	11.63	0.000	10.52	0.049
6 – 9	24.61	0.000	19.72	0.001
10 or more	43.33	0.000	40.49	0.000
Number of countries Imported from				
2 – 5	19.72	0.000	23.37	0.000
6 – 9	41.91	0.000	46.23	0.000
10 or more	69.89	0.000	68.20	0.000

Source: Research Data Center of the German Statistical Office, Foreign Trade Statistics 2009, own calculations.

[1] See text for details on the enterprises covered. The reported productivity premia a based on the estimated coefficients of dummy variables for firms with 2 -5, 6 -9 and 10 or more goods traded (or countries traded with) from an MM-regression of the log of labor productivity on these dummy variables (taking firms that trade only one good or with one country as the reference group) plus the number of employees (also included in squares) and a full set of 2digit industry dummy variables and a constant. The premia are computed from the estimated coefficients ß as (exp(ß) – 1)*100.

Working Paper Series in Economics

(recent issues)

No.242: *Joachim Wagner*: German multiple-product, multiple-destination exporters: Bernard-Redding-Schott under test, June 2012

No.241: *Joachim Fünfgelt* and *Stefan Baumgärtner*: Regulation of morally responsible agents with motivation crowding, June 2012

No.240: *John P. Weche Gelübcke*: Foreign and Domestic Takeovers: Cherry-picking and Lemon-grabbing, April 2012

No.239: *Markus Leibrecht* and *Aleksandra Riedl*: Modelling FDI based on a spatially augmented gravity model: Evidence for Central and Eastern European Countries, April 2012

No.238: *Norbert Olah, Thomas Huth* und *Dirk Löhr*: Monetarismus mit Liquiditätsprämie Von Friedmans optimaler Inflationsrate zur optimalen Liquidität, April 2012

No.237: *Markus Leibrecht* and *Johann Scharler*: Government Size and Business Cycle Volatility; How Important Are Credit Contraints?, April 2012

No.236: *Frank Schmielewski* and *Thomas Wein*: Are private banks the better banks? An insight into the principal-agent structure and risk-taking behavior of German banks, April 2012

No.235: *Stephan Humpert*: Age and Gender Differences in Job Opportunities, March 2012

No.234: *Joachim Fünfgelt* and *Stefan Baumgärtner*: A utilitarian notion of responsibility for sustainability, March 2012

No.233: *Joachim Wagner*: The Microstructure of the Great Export Collapse in German Manufacturing Industries, 2008/2009, February 2012

No.232: *Christian Pfeifer* and *Joachim Wagner*: Age and gender composition of the workforce, productivity and profits: Evidence from a new type of data for German enterprises, February 2012

No.231: *Daniel Fackler, Claus Schnabel,* and *Joachim Wagner*: Establishment exits in Germany: the role of size and age, February 2012

No.230: *Institut für Volkswirtschaftslehre*: Forschungsbericht 2011, January 2012

No.229: *Frank Schmielewski*: Leveraging and risk taking within the German banking system: Evidence from the financial crisis in 2007 and 2008, January 2012

No.228: *Daniel Schmidt* and *Frank Schmielewski*: Consumer reaction on tumbling funds – Evidence from retail fund outflows during the financial crisis 2007/2008, January 2012

No.227: *Joachim Wagner*: New Methods for the Analysis of Links between International Firm Activities and Firm Performance: A Practitioner's Guide, January 2012

No.226: *Alexander Vogel* and *Joachim Wagner*: The Quality of the KombiFiD-Sample of Business Services Enterprises: Evidence from a Replication Study, January 2012

No.225: *Stefanie Glotzbach*: Environmental justice in agricultural systems. An evaluation of success factors and barriers by the example of the Philippine farmer network MASIPAG, January 2012

No.224: *Joachim Wagner*: Average wage, qualification of the workforce and export performance in German enterprises: Evidence from KombiFiD data, January 2012

No.223: *Maria Olivares* and *Heike Wetzel*: Competing in the Higher Education Market: Empirical Evidence for Economies of Scale and Scope in German Higher Education Institutions, December 2011

No.222: *Maximilian Benner*: How export-led growth can lead to take-off, December 2011

No.221: *Joachim Wagner* and *John P. Weche Gelübcke*: Foreign Ownership and Firm Survival: First evidence for enterprises in Germany, December 2011

No.220: *Martin F. Quaas, Daan van Soest,* and *Stefan Baumgärtner*: Complementarity, impatience, and the resilience of natural-resource-dependent economies, November 2011

No.219: *Joachim Wagner*: The German Manufacturing Sector is a Granular Economy, November 2011 [published in: Applied Economics Letters, 19(2012), 17, 1663-1665]

No.218: *Stefan Baumgärtner, Stefanie Glotzbach, Nikolai Hoberg, Martin F. Quaas, and Klara Stumpf*: Trade-offs between justices , economics, and efficiency, November 2011

No.217: *Joachim Wagner*: The Quality of the KombiFiD-Sample of Enterprises from Manufacturing Industries: Evidence from a Replication Study, November 2011

No.216: *John P. Weche Gelübcke*: The Performance of Foreign Affiliates in German Manufacturing: Evidence from a new Database, November 2011

No.215: *Joachim Wagner*: Exports, Foreign Direct Investments and Productivity: Are services firms different?, September 2011

No.214: *Stephan Humpert and Christian Pfeifer*: Explaining Age and Gender Differences in Employment Rates: A Labor Supply Side Perspective, August 2011

No.213: *John P. Weche Gelübcke*: Foreign Ownership and Firm Performance in German Services: First Evidence based on Official Statistics, August 2011 [forthcoming in: The Service Industries Journal]

No.212: *John P. Weche Gelübcke*: Ownership Patterns and Enterprise Groups in German Structural Business Statistics, August 2011 [published in: Schmollers Jahrbuch / Journal of Applied Social Science Studies, 131(2011), 4, 635-647]

No.211: *Joachim Wagner*: Exports, Imports and Firm Survival: First Evidence for manufacturing enterprises in Germany, August 2011

No.210: *Joachim Wagner*: International Trade and Firm Performance: A Survey of Empirical Studies since 2006, August 2011 [published in: Review of World Economics, 2012, 148 (2), 235-267]

No.209: *Roland Olbrich, Martin F. Quaas, and Stefan Baumgärtner*: Personal norms of sustainability and their impact on management – The case of rangeland management in semi-arid regions, August 2011

No.208: *Roland Olbrich, Martin F. Quaas, Andreas Haensler and Stefan Baumgärtner*: Risk preferences under heterogeneous environmental risk, August 2011

No.207: *Alexander Vogel and Joachim Wagner*: Robust estimates of exporter productivity premia in German business services enterprises, July 2011 [published in: Economic and Business Review, 13 (2011), 1-2, 7-26]

No.206: *Joachim Wagner*: Exports, imports and profitability: First evidence for manufacturing enterprises, June 2011

No.205: *Sebastian Strunz*: Is conceptual vagueness an asset? Resilience research from the perspective of philosophy of science, May 2011

No.204: *Stefanie Glotzbach*: On the notion of ecological justice, May 2011

No.203: *Christian Pfeifer*: The Heterogeneous Economic Consequences of Works Council Relations, April 2011

No.202: *Christian Pfeifer, Simon Janssen, Philip Yang and Uschi Backes-Gellner*: Effects of Training on Employee Suggestions and Promotions in an Internal Labor Market, April 2011

No.201: *Christian Pfeifer*: Physical Attractiveness, Employment, and Earnings, April 2011

No.200: *Alexander Vogel*: Enthüllungsrisiko beim Remote Access: Die Schwerpunkteigenschaft der Regressionsgerade, März 2011

No.199: *Thomas Wein*: Microeconomic Consequences of Exemptions from Value Added Taxation – The Case of Deutsche Post, February 2011

No.198: *Nikolai Hoberg* and *Stefan Baumgärtner*: Irreversibility, ignorance, and the intergenerational equity-efficiency trade-off, February 2011

No.197: *Sebastian Schuetz*: Determinants of Structured Finance Issuance – A Cross-Country Comparison, February 2011

No.196: *Joachim Fünfgelt and Günther G. Schulze*: Endogenous Environmental Policy when Pollution is Transboundary, February 2011

No.195: *Toufic M. El Masri*: Subadditivity and Contestability in the Postal Sector: Theory and Evidence, February 2011

No.194: *Joachim Wagner*: Productivity and International Firm Activities: What do we know?, January 2011 [published in: Nordic Economic Policy Review, 2011 (2), 137-161]

No.193: *Martin F. Quaas* and *Stefan Baumgärtner*: Optimal grazing management rules in semi-arid rangelands with uncertain rainfall, January 2011

No.192: *Institut für Volkswirtschaftslehre*: Forschungsbericht 2010, Januar 2011

No.191: *Natalia Lukomska, Martin F. Quaas and Stefan Baumgärtner*: Bush encroachment control and risk management in semi-arid rangelands, December 2010

No.190: *Nils Braakmann:* The causal relationship between education, health and health related behaviour: Evidence from a natural experiment in England, November 2010

No.189: *Dirk Oberschachtsiek and Britta Ulrich:* The link between career risk aversion and unemployment duration: Evidence of non-linear and time-depending pattern, October 2010

No.188: *Joachim Wagner:* Exports and Firm Characteristics in German Manufacturing industries, October 2010

No.187: *Joachim Wagner:* The post-entry performance of cohorts of export starters in German manufacturing industries, September 2010 [published in: International Journal of the Economics of Business, 19 (2012), 2, 169-193]

No.186: *Joachim Wagner:* From estimation results to stylized facts: Twelve recommendations for empirical research in international activities of heterogenous firms, September 2010 [published in: De Economist, 159 (2011), 4, 389-412]

No.185: *Franziska Dittmer and Markus Groth:* Towards an agri-environment index for biodiversity conservation payment schemes, August 2010

No.184: *Markus Groth:* Die Relevanz von Ökobilanzen für die Umweltgesetzgebung am Beispiel der Verpackungsverordnung, August 2010

(see www.leuphana.de/institute/ivwl/publikationen/working-papers.html for a complete list)

Leuphana Universität Lüneburg
Institut für Volkswirtschaftslehre
Postfach 2440
D-21314 Lüneburg
Tel.: ++49 4131 677 2321
email: brodt@leuphana.de
www.leuphana.de/institute/ivwl/publikationen/working-papers.html