LEUPHANA
UNIVERSITÄT LÜNEBURG

Low-productive exporters are high-quality exporters

Wagner, Joachim

Published in:
Economics Bulletin

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Link to publication

Citation for pulished version (APA):
Wagner, J. (2014). Low-productive exporters are high-quality exporters: Evidence from Germany. *Economics Bulletin*, *34*(2), 745-756. http://www.accessecon.com/Pubs/EB/2014/Volume34/EB-14-V34-I2-P68.pdf

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 24. Apr.. 2024

Economics Bulletin

Volume 34, Issue 2

Low-productive exporters are high-quality exporters. Evidence from Germany

Joachim Wagner
Leuphana University Lueneburg

Abstract

A stylized fact from the emerging literature on the micro-econometrics of international trade and a central implication of the heterogeneous firm models from the new new trade theory is that exporters are more productive than non-exporters. However, many firms from the lower end of the productivity distribution are exporters. Germany is a case in point. A recent study reports that these low-productivity exporters are not marginal exporters defined according to the share of exports in total sales, or export participation over time, or the number of goods exported, or the number of countries exported to. This paper documents that low-productive exporters are competitive because they export high-quality goods. The quality of exports is much higher among exporters from the lower end of the productivity distribution than among highly productive exporters.

All computations were done at the Research Data Centre of the Statistical Office of Berlin-Brandenburg in Berlin. The firm-level data used are strictly confidential but not exclusive; see http://www.forschungsdatenzentrum.de/datenzugang.asp for information on how to access the data. To facilitate replications the Stata do-file used is available from the author on request.
Citation: Joachim Wagner, (2014) "Low-productive exporters are high-quality exporters. Evidence from Germany", *Economics Bulletin*, Vol. 34 No. 2 pp. 745-756.
Contact: Joachim Wagner - wagner@leuphana.de.
Submitted: February 06, 2014. **Published:** April 03, 2014.

1. Motivation

Hundreds of empirical studies from countries all over the world that use firm-level data to compare exporting and non-exporting firms report that exporters are more productive than non-exporters of the same size and from the same narrowly defined industry. This positive exporter productivity premium is considered as a stylized fact today (see the surveys by Greenaway and Kneller (2007), Bernard et al. (2012) and Wagner (2007, 2012)). The empirical finding of a positive exporter productivity premium motivated Melitz (2003) to develop a dynamic industry model with heterogeneous firms in which a firm that exports has to have a productivity value that lies beyond some threshold, while firms with a lower productivity serve the home market only (and the least productive firms exit the market). The reason for this productivity threshold that divides exporters from non-exporters is that exporters have to cover extra-costs to serve a foreign market (including cost for finding foreign customers, transportation costs, distribution or marketing costs, costs for personnel with skill to manage foreign networks, or costs to modify products for foreign customers), and only the more productive firms can cover these export-related costs while still being profitable. The Melitz (2003) model has become the workhorse model of a large and growing theoretical literature.

That said, there is empirical evidence that does not fit well into the picture sketched so far: There are exporting firms which are located at the lower end of the productivity distribution and high-productive non-exporting firms. Wagner (2013) documents that in Germany exporters and non-exporters are highly heterogeneous with regard to productivity. Neither low-productive exporters nor high-productive non-exporters are a rare species. Hallak and Sivadasan (2013) document similar evidence for India, the U.S., Chile, and Columbia. There is no such thing as a single cut-off point in the productivity distribution that separates non-exporters and exporters.

For Germany, Wagner (2013) shows that low-productive exporters are not marginal exporters defined according to the share of exports in total sales, or export participation over time, or the number of goods exported, or the number of countries exported to. The hypothesis that the lack of an observed productivity threshold between exporters and non-exporters in German manufacturing industries is due to the fact that low-productive exporters are marginal exporters for which the extra costs of exporting compared to selling on the home market might be considered as negligible, therefore, is not supported by the data.

This points to the need for a closer look at "the rich range of dimensions along which trading and non-trading firms can differ" pointed to in a recent paper by Melitz and Redding (2012, p. 20), two of the most important theoreticians in this area. One of these dimensions is product quality. High product quality is often regarded as a decisive characteristic of goods exported by German manufacturing firms. In a recent annual report on the economic status published by the German Ministry of Economics and Technology it is argued that 40 percent of German exports are investment goods, and that for many of these goods, quality is the most important factor, while demand is comparably price-inelastic (see Bundesministerium für Wirtschaft und Technologie 2011, p. 16). High-quality investment goods that are highly attractive for customers in foreign countries are sold for a high price. This means that comparably low productive firms can make a profit from serving a foreign market after paying the extra costs of exporting if they produce high quality goods.

This paper contributes to the literature by testing for the first time for the existence of a negative relationship between productivity and export quality. To anticipate the most important finding, in the line with the reasoning outlined above the paper demonstrates that low-productive exporters can compete because they export high-quality goods. The quality of

exports is much higher among exporters from the lower end of the productivity distribution than among highly productive exporters.

2. Low-productive exporters and high-quality exporters in German manufacturing industries

2.1 Data and measurement issues

The empirical investigation uses data from two sources. The first source is the regular survey of establishments from manufacturing industries by the Statistical Offices of the German federal states. The survey covers all establishments from manufacturing industries that employ at least twenty persons in the local production unit or in the company that owns the unit. Participation of firms in the survey is mandated in official statistics (see Malchin and Voshage (2009) for details). For this study establishment data were aggregated to the enterprise level to match the unit of observation in the second data source (described below). The survey has information on the number of employees in the firm, total turnover, total exports and detailed industry affiliation.

These data do not cover any information about the goods exported. In other words, we know from these data *who* trades *how much*, but not *what*. Information on the goods traded internationally 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*).[1] 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.

For the reporting years 2009 and 2010 these transaction-level data have been aggregated at the level of the exporting firm for the first time. For each exporting 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 the value and the volume of exports for the ten most important exported goods. 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 the regular survey of manufacturing firms discussed above) on industry affiliation, total turnover and the number of employees. These newly available data are the second source of data used in this paper.

With these data it is possible to investigate the relationship between productivity on the one hand and the quality of goods exported:

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. However, 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 Syverson (2011) argues that high-productivity

[1] Note that firms with a value of exports to 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.

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. Labor productivity is expressed in percentage of the mean value of labor productivity in the 4digit industry to take care of productivity differences across industries due to differences in capital intensity, demand conditions, regulation and trade barriers, among others.

Export quality is not directly observed. Therefore, a proxy variable is used that is defined as the unit value of exports and computed as value of exports (measured in Euro) over quantity of exports (measured in tons). In the data set used here we have information on the value of exports and the quantity of exports for the ten most important products (measured by the value of exports) exported by a firm. For firms that exported more than one good the unit value of exports is the weighted sum of the unit values of the (up to ten) different goods exported, and the weights are the shares of the value of exports of a good in the total exports of the firm of these (up to ten) goods. The unit value of exports is expressed in percentage of the mean value of unit values in the 4digit industry to take care of differences across industries due to the nature of the products (e.g., mobile phones and cement). Furthermore, inside a narrowly defined industry we can expect that a higher unit value is a valid proxy variable for product quality. Under competitive conditions a manufacturer of a specific good can charge a higher price than another firm that produces a very similar good (that is of the same weight) only if the quality of the good he produces is higher.

Given that the East German economy still differs in many respects from the West German economy, especially with regard to exporting (see Wagner (2008)), this study looks at West German and East German manufacturing enterprises separately. All computations are performed for two years, 2009 and 2010. In 2009, the value of German exports of goods declined by 18.4 percent compared to 2008. This was followed by an increase in exports by 18.5 percent in 2010 (Statistisches Bundesamt 2012, p. 414). Therefore, a look at these two very different years can be considered as a robustness check to make sure that the results reported are not specific for a crises or recovery period.

2.2 Empirical findings

The empirical investigation of the relationship between productivity and export quality starts with a description of the distribution of export quality in the deciles of the productivity distribution of West German manufacturing firms. Table 1 and Table 2 report figures for the mean of export quality and the respective values for the first, fiftieth and ninety-ninth percentile of the export quality distribution in the firms in the deciles of the productivity distribution. In both years the mean and median values of export quality tend to decline (though not always monotonically) over the deciles of the productivity distribution from the lower to the higher end of the distribution. Export quality is much larger on average and at the median in low-productive exporting firms (defined as firms from the first to the third decile of the productivity distribution) than in high-productive exporting firms (that are located in the three top deciles of the productivity distribution).

In a second step of the empirical investigation the statistical significance of the difference in means of the export quality between firms from the deciles of the productivity distribution is tested. Table 3 and Table 4 report results of a two-sample t test with unequal variances of H_0: Difference in mean export quality between sample 1 and sample 2 = 0 vs. H_a: Difference in mean export quality between sample 1 and sample 2 > 0, where sample 1 refers to the firms in the decile of the productivity distribution listed in the first column of the table and sample 2 refers to the firms in the decile of the productivity distribution listed in the

first row of the table. A prob-value of 0.05 (or smaller) indicates that the mean export quality in enterprises from the lower decile of the productivity distribution is larger than the mean export quality in enterprises from the higher decile of the productivity distribution at an error level of 5 percent (or smaller). While the t test does not indicate that all differences in means of the export quality between firms from the deciles of the productivity distribution are statistically significantly different from zero and in favor of the export quality of firms from the lower decile of the productivity distribution, this pecking order is found when low-productive exporters from the first three deciles are compared to high-productive exports from the last three deciles.

In a third step of the empirical investigation the focus is not on the difference in the mean values of export quality between firms from various deciles of the productivity distribution but on the difference between the distributions of the export quality as a whole when firms from two deciles of the productivity distribution are compared. Table 5 and Table 6 report results of a Kolmogorov-Smirnov-Test of first-order stochastic dominance of the distribution of export quality for firms from the decile of the productivity distribution listed in the first column of the table over the distribution of export quality for firms from the decile of the productivity distribution listed in the first row of the table. If a reported prob-value is 0.05 (or smaller) this indicates that the distribution of export quality of the less productive firms stochastically dominates the distribution of export quality of the more productive firms at an error level of 5 percent (or smaller). While not all results point to such a pattern of stochastic dominance, the picture is crystal clear for a comparison of low-productive exporters from the first three deciles compared to high-productive exports from the last three deciles of the productivity distribution – low-productive exporters have a higher export quality than high-productive exporters over the whole distribution of export quality.

Results for West German manufacturing firms can be summarizes as follows. Low-productive exporters have a higher export quality than high-productive exporters not only at the mean but over the whole distribution of export quality. These differences are both statistically highly significant and large from an economic point of view – the export quality values are about twice as high, both at the mean and at the median, in the exporting firms from the lowest decile of the productivity distribution than in the firms from the highest decile (see Table 1 and Table 2).

The big picture reported in detail for West Germany here is identical for East Germany; results are available on request.

3. Concluding remarks

The bottom line, then, is that in German manufacturing industries low-productive exporters (which are not marginal exporters defined according to the share of exports in total sales, or export participation over time, or the number of goods exported, or the number of countries exported to) tend to export high-quality goods. This indicates that comparably low productive firms can make a profit from serving a foreign market after paying the extra costs of exporting if they produce high quality goods.

References

Bartelsman, Erik J. and Mark Doms (2000): Understanding Productivity: Lessons from Longitudinal Micro Data. *Journal of Economic Literature* 38 (3), 569-594.

Bernard, Andrew B., J. Bradford Jensen, Stephen J. Redding and Peter K. Schott (2012): The Empirics of Firm Heterogeneity and International Trade. *Annual Review of Economics* 4, 283-313.

Bundesministerium für Wirtschaft und Technologie (2011): Jahreswirtschaftsbericht 2011. Deutschland im Aufschwung – Den Wohlstand von Morgen sichern. Berlin: BMWi.

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.

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

Hallak, Juan Carlos and Jagadeesh Sivadasan (2013): Firms' exporting behavior under quality constraints. *Journal of International Economics* 91 (1), 53-67.

Malchin, Anja and Ramona Voshage (2009): Official Firm Data for Germany. *Schmollers Jahrbuch / Journal of Applied Social Science Studies* 129 (3), 501-513.

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

Melitz, Marc J. and Stephen Redding (2012): Heterogeneous Firms and Trade. NBER Working Paper Series 18652 (forthcoming, Handbook of International Economics, Vol. 4).

Statistisches Bundesamt (2012): Statistisches Jahrbuch 2012. Wiesbaden: Statistisches Bundesamt.

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

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

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

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

Wagner, Joachim (2013): Are low-productive exporters marginal exporters? Evidence from Germany. *Economics Bulletin* 33 (1), 467-481.

Table I: Export quality in the deciles of the productivity distribution, West German manufacturing enterprises, 2009

	Export quality				
	Mean	Std. Dev.	p1	p50	p99
Decile of productivity distribution					
1	151.27	435.74	0.71	57.53	1397.09
2	121.24	234.26	0.62	54.20	1233.80
3	131.96	336.37	0.39	52.27	1674.37
4	102.22	262.25	0.59	45.51	900.49
5	113.43	428.51	0.40	49.11	940.94
6	84.37	197.41	0.38	42.78	710.74
7	93.62	230.40	0.24	40.54	1151.21
8	89.77	466.28	0.28	37.32	637.57
9	82.87	377.01	0.27	33.79	675.62
10	74.66	190.20	0.27	31.18	1020.73

Note: Export quality is defined as the unit value of exports (computed as value of exports over quantity of exports) and measured as a percentage of the average value of the 4-digit-level industry; see text for details. Productivity is defined as total sales over employees and measured as a percentage of the average value of the 4-digit-level industry. Columns labeled p1 – p99 refer to percentiles of the export quality distribution.

Table II: Export quality in the deciles of the productivity distribution, West German manufacturing enterprises, 2010

	Export quality				
	Mean	Std. Dev.	p1	p50	p99
Decile of productivity distribution					
1	140.59	272.17	0.80	66.99	1610.60
2	137.24	360.26	0.81	56.44	1765.81
3	118.73	399.87	1.07	50.18	960.95
4	114.73	364.57	0.69	50.81	1229.01
5	118.14	448.55	0.77	49.14	1179.93
6	95.73	214.43	0.90	49.16	816.31
7	85.31	194.71	0.70	40.51	797.56
8	91.29	275.74	0.62	39.62	848.18
9	74.33	204.09	0.81	36.27	630.69
10	69.79	177.77	0.51	32,73	572.87

Note: Export quality is defined as the unit value of exports (computed as value of exports over quantity of exports) and measured as a percentage of the average value of the 4-digit-level industry; see text for details. Productivity is defined as total sales over employees and measured as a percentage of the average value of the 4-digit-level industry. Columns labeled p1 – p99 refer to percentiles of the export quality distribution.

Table III: Test of equality of means of the export quality between the deciles of the productivity distribution, West German manufacturing enterprises, 2009

Decile of productivity distribution	2	3	4	5	6
1	0.059	0.172	0.005	0.039	0.0001
2		0.785	0.049	0.302	0.0001
3			0.014	0.133	0.0000
4				0.772	0.034
5					0.018

	7	8	9	10
1	0.001	0.002	0.0003	0.0000
2	0.004	0.018	0.002	0.0000
3	0.001	0.006	0.0005	0.0000
4	0.201	0.202	0.068	0.002
5	0.081	0.092	0.030	0.002
6	0.862	0.653	0.449	0.103
7		0.392	0.186	0.011
8			0.335	0.134
9				0.237

Note: The entries in the table are the prob-values of a two-sample t test with unequal variances of H_0: Difference in mean export quality = 0 vs. H_a: Difference in mean export quality > 0 where sample 1 refers to the firms in the decile of the productivity distribution listed in the first column of the table and sample 2 refers to the firms in the decile of the productivity distribution listed in the first row of the table. A prob-value of 0.05 (or smaller) indicates that the mean export quality in enterprises from the lower decile of the productivity distribution is larger than the mean export quality in enterprises from the higher decile of the productivity distribution at an error level of 5 percent (or smaller). For a definition of export quality and productivity see note to Table 1.

Table IV: Test of equality of means of the export quality between the deciles of the productivity distribution, West German manufacturing enterprises, 2010

Decile of productivity distribution	2	3	4	5	6
1	0.418	0.091	0.044	0.090	0.0001
2		0.147	0.087	0.145	0.001
3			0.406	0.487	0.050
4				0.578	0.064
5					0.061

	7	8	9	10
1	0.000	0.0001	0.000	0.000
2	0.0001	0.0007	0.000	0.000
3	0.007	0.031	0.0006	0.0002
4	0.008	0.039	0.0005	0.0001
5	0.011	0.039	0.001	0.0003
6	0.093	0.319	0.004	0.003
7		0.745	0.072	0.015
8			0.032	0.008
9				0.265

Note: The entries in the table are the prob-values of a two-sample t test with unequal variances of H_0: Difference in mean export quality = 0 vs. H_a: Difference in mean export quality > 0 where sample 1 refers to the firms in the decile of the productivity distribution listed in the first column of the table and sample 2 refers to the firms in the decile of the productivity distribution listed in the first row of the table. A prob-value of 0.05 (or smaller) indicates that the mean export quality in enterprises from the lower decile of the productivity distribution is larger than the mean export quality in enterprises from the higher decile of the productivity distribution at an error level of 5 percent (or smaller). For a definition of export quality and productivity see note to Table 1.

Table V: Test for stochastic dominance of the distribution of export quality between the deciles of the productivity distribution, West German manufacturing enterprises, 2009

Decile of productivity distribution	2	3	4	5	6
1	0.161	0.004	0.001	0.000	0.000
2		0.198	0.056	0.016	0.000
3			0.041	0.082	0.000
4				0.374	0.010
5					0.009

	7	8	9	10
1	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000
6	0.504	0.061	0.000	0.000
7		0.187	0.000	0.000
8			0.008	0.000
9				0.170

Note: The entries in the table refer to a Kolmogorov-Smirnov-Test of first-order stochastic dominance of the distribution of export quality for firms from the decile of the productivity distribution listed in the first column of the table over the distribution of export quality for firms from the decile of the productivity distribution listed in the first row of the table. If a reported prob-value is 0.05 (or smaller) this indicates that the distribution of export quality of the less productive firms stochastically dominates the distribution of export quality of the more productive firms at an error level of 5 percent (or smaller). For a definition of export quality and productivity see note to Table 1.

Table VI: Test for stochastic dominance of the distribution of export quality between the deciles of the productivity distribution, West German manufacturing enterprises, 2010

Decile of productivity distribution	2	3	4	5	6
1	0.011	0.000	0.000	0.000	0.000
2		0.050	0.066	0.020	0.002
3			0.525	0.600	0.529
4				0.571	0.282
5					0.370

	7	8	9	10
1	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000
5	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000
7		0.247	0.012	0.000
8			0.113	0.002
9				0.037

Note: The entries in the table refer to a Kolmogorov-Smirnov-Test of first-order stochastic dominance of the distribution of export quality for firms from the decile of the productivity distribution listed in the first column of the table over the distribution of export quality for firms from the decile of the productivity distribution listed in the first row of the table. If a reported prob-value is 0.05 (or smaller) this indicates that the distribution of export quality of the less productive firms stochastically dominates the distribution of export quality of the more productive firms at an error level of 5 percent (or smaller). For a definition of export quality and productivity see note to Table 1.