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Abstract:

This note uses comparable representative data for manufacturing firms from five European countries (Germany, France, Italy, Spain, and the United Kingdom) to investigate the links between firm age and the participation of the firms in export, the share of exports in total sales, the number of countries exported to, and the participation in import. The big picture revealed is in line with the theoretical considerations. Older firms tend to be more often exporters and importers, they export to more different destination countries, and they export a higher share of their total sales in three out of five countries.

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1. Motivation

Reliable empirical evidence on the links between firms' success on international markets and the characteristics of firms is important to inform the design of economic policies that aim to promote international trade, and to guide trade theorists in their attempts to build theoretical models of trading firms that are not at odds with reality. While we have such empirical evidence from a large number of studies and for many countries for some important firm characteristics like firm size, human capital intensity, R&D intensity, product and process innovations, capital intensity, foreign ownership, industry affiliation, and productivity, such evidence is lacking on one other firm characteristic, namely firm age.

This neglect of the role of firm age in empirical models of firms' exports comes as a surprise because we can expect that firm age and export tend to be closely related. David Audretsch (1998, p. 137) points out that "firms are typically created as an experiment to pursue a new idea. If that idea succeeds the firm will tend to grow and create jobs. If that idea is not viable the firm will tend to stagnate and ultimately exit." Although some of these new firms are "born global" firms that head for international markets from the start, typically it takes years before firms eventually export to one foreign market, and then enter other markets progressively. Firms gain expertise in entering new foreign markets from experience and this lowers the fixed costs of entry to any further new market over the next years (see Sheard 2014, p. 536). A similar argument can be made with regard to the number of products exported. If a firm successfully exported one good and learned how to adopt it to the wants of customers or the legal regulations in a foreign market, how to prepare a user manual in a foreign language, how to set up a distribution network etc., this lowers the fixed costs of exporting any other goods, and the firm will start to export

more goods in the years to come. Often firms will start to export to a foreign country that is close to their home country and that has low distance costs (including language barriers, differences in legal systems, or cultural differences), and export to more and more distant destinations after several years of experience only.

Similar arguments can be made with regard to the link between imports and firm age. At any point in time, therefore, firm age and the margins of exports and imports can be expected to be closely linked. Empirical evidence on this link, however, is scarce. As regards exports, in a recent micro-econometric study that uses comprehensive data for manufacturing firms from Germany Wagner (2014a) finds that the probability of exporting, the share of exports in total sales, the number of destination countries and the number of goods exported are higher for older firms. A positive link between firm age and export revenue, number of destination countries, and number of products exported has also been found by Bastos and Dias (2013) in an empirical investigation using Portuguese data. For imports, the only empirical study I am aware of finds that in Germany older firms are more often importers, import more different goods, and import from more different countries of origin (Wagner 2014b).

This note contributes to the literature by using comparable representative data for manufacturing firms from five European countries (Germany, France, Italy, Spain, and the United Kingdom) to investigate the links between firm age and the participation of the firms in export, the share of exports in total sales, the number of countries exported to, and the participation in import. This study keeps 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). To anticipate the most important finding, the big picture revealed is in line with the

theoretical considerations. Older firms tend to be more often exporters and importers, they export to more different destination countries, and they export a higher share of their total sales in three out of five countries.

The rest of the paper is organized as follows. Section 2 discusses the data and measurement issues. Section 3 presents the results of the empirical investigation. Section 4 concludes.

2. Data and measurement issues

The lack of empirical studies on the link between firm age and the margins of exports and imports is at least in part due to the fact that suitable data at the level of the firm that include information on firm age are rare. The empirical investigation in this paper uses the EU-EFIGE/Bruegel-UniCredit dataset (the EFIGE data from now on). This database has recently been collected within the project *European Firms in a Global Economy: internal policies for external competitiveness*. It combines measures of firms' international activities with information on firm characteristics (including firm age) for representative samples of manufacturing firms in seven European Economies (Germany, France, Italy, Spain, United Kingdom, Austria, and Hungary). The cross-section data were collected in 2010 and mainly refer to 2008. A detailed description of the EFIGE data is given in Altomonte and Aquilante (2012). An anonymized version of the EFIGE data is publicly available at www.efige.org.

Information on the age of a firm is not included as a continuous variable in the public use data set. Firm age is reported as either "More than 20 years", or "Between 20 and 6 years", or "Less than 6 years". Given the small number of firms that are classified as less than 6 years old firm age is measured by a dummy variable here that takes on the value of one if a firm is more than 20 years old.

The data includes information on three margins of exports of the firm. The firm is classified as an <u>exporter</u> if it sold abroad some or all of its own products/services directly from home country in 2008. The <u>share of exports in total sales</u> is the percentage of the firm's 2008 annual turnover represented by the export activities from its home country.[1] The <u>number of destination countries</u> indicates to how many countries in total the firm exported its products in 2008 from its home country. Note that there is no information available on the number of different goods exported.

As regards imports the data set has information whether the firm was an <u>importer</u> of raw materials and intermediates in 2008 or not. Unfortunately, no information is available on other margins of imports (imports over total sales, number of countries of origin, number of different products imported).[2]

The data include information on the <u>industry affiliation</u> of the firm. This industry is coded using the NACE-Clio classification, and it is anonymized by replacing this code using a randomly assigned code number that is identical for all firms from a NACE-Clio industry. Therefore, the sector identifier can be used to control for industry fixed effects in empirical models.

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[1] Note that this percentage share is directly asked in the questionnaire and not computed from reported values of exports and turnover. This leads to a large share of answers that seem to be estimates (or, maybe, guesstimates) because nearly 50 percent of all reported shares of exports in total sales are "round" figures (10, 20, 30, …, 90, 100).

[2] There is separate information available whether the firm imported services or not in 2008, but this information is not used here due to the small number of firms that were importer of services. Furthermore, there is information about the percentage of all intermediate goods purchased that were purchased from abroad, but this figure does not include raw materials and is, therefore, not used here.

With these data it is possible to investigate the relationship between the age of a firm and margins of the firm's exports and imports for representative samples of manufacturing firms from five European countries[3] in a strictly comparable way.[4]

3. Results

The empirical investigation uses information on 13,827 enterprises from manufacturing industries in five European countries (Germany, France, Italy, Spain, and the UK) in 2008. Nearly 60 percent of these firms existed already more than 20 years ago; these enterprises are classified as old firms. Table 1 shows that the share of exporters is larger among old firms than among younger firms in each of the five countries. This difference in the first extensive margin of exports – export participation - can be considered to be large from an economic point of view in all countries with the exception of Germany.

[Table 1 near here]

This pattern of a more pronounced export orientation among old firms compared to younger firms does not show up in the extensive margin – the share of exports in total sales – among exporting firms. Table 2 reports the average share of exports in total sales for both age groups in the five countries. These shares are

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[3] Firms from Austria and Hungary are not included here due to the small sample size for these countries.

[4] While firm age is included as a control variable (that is not discussed in any detail) in empirical models for international firm activities in some papers that use the EFIGE data (see Barba Navarett et al. (2011); Altomonte et al. (2012), P. 43ff.; Licio and Pinna (2013), p. 20ff.) the link between firm age and the margins of trade has not been analyzed systematically with these data. See Barba Navaretti et al. (2014) for an analysis of firm age and firm growth based on the EFIGE data.

about the same in Germany, France and the UK and only slightly larger in older firms in Italy and Spain. However, as stated in the discussion of the data in section 2 already, figures on the percentage share of exports in total sales might be fuzzy. This share is directly asked in the questionnaire and not computed from reported values of exports and turnover. This leads to a large share of answers that seem to be estimates (or, maybe, guesstimates) because nearly 50 percent of all reported shares of exports in total sales are "round" figures (10, 20, 30, …, 90, 100).

[Table 2 near here]

The link between firm age and exports is again in line with theoretical considerations for the second extensive margins of exports investigated here, namely the number of destination countries of exports. Table 3 shows that old firms export on average to a considerably higher number of countries than younger firms in all five countries.

[Table 3 near here]

Turning to the link between firm age and imports, Table 4 documents that old firms have a larger propensity to import than younger firms in all five countries. While this difference is rather small in France, it can be considered to be large from an economic point of view in the other four countries considered here.

[Table 4 near here]

The bottom line up to now, then, is that old firms export and import more often, and export to a larger number of countries, while this positive link between firm age and international trade is only found for Italy and Spain when it comes to the share of exports in total sales.

The descriptive evidence discussed so far ignores the fact that firms come from different industries that might differ in the mix of old and young firms due to the history of the industries – there might be more younger firms in industries like the manufacture of computer equipment than in the clothing industry – and due to differences in the "openness" to trade between industries caused by transport costs or legal barriers. The next step, therefore, consists of the estimation of empirical models that test for differences in the intensive and extensive margins of exports and imports between old and younger firms from the five countries after controlling for industry affiliation by the inclusion of industry fixed effects. Results are reported in Table 5. Note that these models are not used to empirically explain the margins, they are just vehicles to estimate the margin premium of old firms.

[Table 5 near here]

The results for model 1 clearly indicate that the probability of participation in exports (the first extensive margin) is statistically significantly higher for old firms in all five countries. The estimated average marginal effects for being an old firm lies between 4.6 and 11.5 percentage points and it can be considered to be large form an economic point of view.

Results for model 2 support in large parts the conclusions drawn from the unconditional comparison of the average share of exports in total sales reported in

Table 2. Old and younger firms from France and the UK do not differ in their intensive margins of exports, while this difference is statistically significant and large from an economic point of view for firms from Italy and Spain. The case of Germany is especially interesting here. While the average share of exports in total sales reported in Table 2 is (marginally) smaller for old firms compared to younger firms, controlling for industry affiliation leads to a statistically significant and large positive premium for old firms of 13 percent.

According to the results for model 3 there is a statistically significant and large premium for old firms in the second extensive margin of exports, the number of destination countries. After controlling for industry affiliation the old firms export to 35 to 48 percent more destination countries than the younger firms.[5]

Results for all countries but France for model 4 show a positive and quite large premium for old firms with regard to the participation in imports. The estimated average marginal effect for being an old firm is between 5 and 10 percentage points after controlling for industry affiliation in Germany, Italy, Spain, and the UK.

4. Concluding remarks

This note uses comparable representative data for manufacturing firms from five European countries (Germany, France, Italy, Spain, and the United Kingdom) to investigate the links between firm age and the participation of the firms in export, the share of exports in total sales, the number of countries exported to, and the participation in import. The big picture revealed is in line with the theoretical

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[5] Results from Kolmogorov-Smirnov tests for differences in the distribution of the share of exports in total sales and for the number of destination countries (that are based on industry-demeaned values) reveal exactly the same patterns. To economize on space, these results are not reported here but are available on request.

considerations. Older firms tend to be more often exporters and importers, they export to more different destination countries, and they export a higher share of their total sales in three out of five countries.

Future empirical research on the determinants of the margins of exports and imports, therefore, should investigate further the role of firm age, ideally using longitudinal data that cover a large time span (and that are not yet available, unfortunately).

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Table 1:   Firm age and participation in exports: Descriptive statistics

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	Firms older than 20 years		Firms 20 years old or younger	
	Number of firms in the sample	Share of exporters (percent)	Number of firms in the sample	Share of exporters (percent)
Country				
Germany	1,812	45.92	1,123	42.74
France	1,915	52.27	1,058	41.21
Italy	1,829	69.87	1,191	58.52
Spain	1,454	56.53	1,378	43.76
UK	1,183	62.21	884	54.19

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Source: Own calculations based on the EFIGE data; all figures are for reporting year 2008.

Table 2:   Firm age and share of exports in total sales: Descriptive statistics

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	Firms older than 20 years		Firms 20 years old or younger	
	Number of firms in the sample	Average share of exports in total sales (percent)	Number of firms in the sample	Average share of exports in total sales (percent)
Country				
Germany	882	31.06	480	31.59
France	1,000	29.56	435	29.74
Italy	1,278	36.81	697	34.22
Spain	882	28.04	603	25.19
UK	763	30.89	479	29.23

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Source: Own calculations based on the EFIGE data; all figures are for reporting year 2008. Only firms
        that exported in 2008 are included in the sample.

Table 3:   Firm age and number of destination countries in export: Descriptive statistics

Country	Firms older than 20 years		Firms 20 years old or younger	
	Number of firms in the sample	Average number of destination countries in export	Number of firms in the sample	Average number of destination countries in export
Germany	823	16.72	470	11.41
France	1,001	12.83	436	8.55
Italy	1,277	13.12	697	9.72
Spain	816	10.47	600	7.19
UK	710	15.65	461	10.82

Source: Own calculations based on the EFIGE data; all figures are for reporting year 2008. Only firms that exported in 2008 are included in the sample.

Table 4:   Firm age and participation in imports: Descriptive statistics

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	Firms older than 20 years		Firms 20 years old or younger	
	Number of firms in the sample	Share of importers (percent)	Number of firms in the sample	Share of importers (percent)
Country				
Germany	1,812	29.03	1,123	24.76
France	1,915	54.83	1,058	52.84
Italy	1,829	36.69	1,191	30.73
Spain	1,454	43.74	1,378	35.05
UK	1,183	52.92	884	43.78

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Source: Own calculations based on the EFIGE data; all figures are for reporting year 2008.

Table 5:   Firm age and margins of international trade: Regression results

Model			1	2	3	4
Dependent variable			Exporter (Dummy; 1 = yes)	Log of share of exports in total sales	Log of number of destination countries of exports	Importer (Dummy; 1 = yes)
Method			Probit	OLS	OLS	Probit
Country						
Germany						
	Old firms	ß	0.046	13.04	47.93	0.051
	(Dummy)	p	0.014	0.042	0.000	0.002
France						
	Old firms	ß	0.107	5.86	37.49	0.017
	(Dummy)	p	0.000	0.416	0.000	0.363
Italy						
	Old firms	ß	0.108	10.10	35.27	0.058
	(Dummy)	p	0.000	0.005	0.000	0.001
Spain						
	Old firms	ß	0.115	25.71	38.32	0.081
	(Dummy)	p	0.000	0.001	0.000	0.000
UK						
	Old firms	ß	0.086	12.31	43.50	0.100
	(Dummy)	p	0.000	0.146	0.000	0.000

Note: Own calculations based on the EFIGE data; all estimates are for reporting year 2008. The reference category is made of firms that are 20 years old or younger. The reported results for model 1 and model 4 are the estimated average marginal effects. For model 2 and model 3 the reported results are based on the estimated regression coefficients that were transposed by calculating (exp(ß) – 1 * 100) to calculate the average percentage difference between old and younger firms. All p-values are based on heteroscedasticity-robust standard errors. All models include a set of industry controls and a constant. Note that model 2 and model 4 are estimated for exporting firms only.

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