Insights from Transaction Data: Norwegian Aquaculture Exports

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Abstract: This paper discusses how transaction data can be used to shed light on trade dynamics in seafood exports, with Norwegian salmon exports as the case. There is a large literature on exports and imports of salmon between countries, but less is known about how the heterogeneity of exporters and importers relates to the aggregate data. We utilize transaction data for all exports of salmon in the period 2010 – 2014, and shows that firms involved in salmon exports holds several of the characteristics that are commonly found in the international trade literature, but differs in some important dimensions. Most exporters of salmon connect to relatively many importers and serves many different destination markets. Short-lived trade relations are shown to account for a large share of export values.

Keywords: aquaculture, export, transaction data

JEL Classification: F10, F14, Q22, Q27

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Financial support from the Research Council of Norway (CT # 233836) is acknowledged.

1. Introduction

Seafood is the world's most traded food product group, as more than 36% of production is traded[1]. Norway is the world's second largest producer of seafood, as well as the leading producer of farmed salmon. The aquaculture industry accounts for 40% (produced quantity) and 70% (production value) of total seafood production in Norway. A significant share of global aquaculture production is subject to international trade (Anderson, 2003; Tveterås et al., 2012; Anderson et al., 2018). That is also true for salmon, creating a global market (Asche, Bremnes and Wessells, 1999: Landazuri-Tveteraas et al., 2018). As trade in salmon continues to grow it becomes important to understand the dynamics that underpin trade. In this paper we set out to shed light on stylized facts that emerges from highly disaggregated trade data. There are several reason for why salmon has become the largest and most successful specie in Norwegian seafood production and trade. The salmon aquaculture industry has been successful in terms of using control over the production process and to facilitate timely and efficient delivery of products in the supply chain targeting valuable markets (Asche et al., 2007; Kvaløy and Tveterås, 2008: Olsson and Criddle, 2008; Asche, Cojocaru and Roth, 2018; Asche and Smith, 2018). As the Norwegian aquaculture industry better tackles capacity problems, controls lice- and disease problems in the production, and the price-level remains profitable, the industry is anticipated to have high potential for future growth.

All trade is activity between firms, and efficient trade in the aquaculture industry is affected by numerous factors that are determined at the firm level, such as efficient logistics (Asche, et. al, 2013), contracts (Kvaløy and Tveterås, 2008; Larsen and Asche, 2011), futures markets (Sollibakke, 2012; Oglend, 2013; Asche, Oglend and Zhang 2015; Asche, Misund and Oglend, 2016; Ankamah-Yeboah, Nielsen and Nielsen, 2017), choice of invoicing currency (Straume, 2014), trade duration (Straume, 2017) and price volatility (Dahl and Oglend, 2014; Asche, Oglend and Kleppe, 2017; Asche, Misund and Oglend, 2019).

[1] There are a number of reasons for why seafood is highly traded. Among the most important is that the resources are often located at very different geographical locations from where most consumers are located (Anderson et al. 2018), also creating fisheries dependent coastal communities (Cojocaru et al. 2019), and the fact that fisheries products are regarded as an industrial product by the WTO, leading to lower tariffs than for most other food products (Asche, Roheim and Smith, 2016). It has also led to imports being very important in many large markets. For instance, the largest seafood importer by value, the U.S., imports more than 90% of the seafood consumed, and salmon is the second most consumed species (Shamshak et al., 2019).

In the 1990's trade economists started to utilize data from individual firms. Interesting topics that has been researched includes characteristics of exporters (Bernard and Jensen, 2004; Bernard et al., 2007), exporters and trade costs (Hornok and Koren, 2015), margins of trade for exports (Lawless, 2010) and the stability of trade relationships (Békés and Muraközy, 2012). The purpose of this paper is to discuss to what extent the main stylized facts that emerges from this literature is valid for exports of fresh farmed salmon from Norway. Our aim is to, through descriptive statistics and simple regressions, shed light on how transaction-level data can uncover trade dynamics that are masked in aggregated trade data.

Lately several papers studying trade in aquaculture and seafood products have utilized transaction-level data[2]. In general, it is a challenging task to gain access to such detailed trade data due to confidentiality issues. For Norway, Statistics Norway has made data anonymous, and granted access to such data for a limited number of research projects. Most existing papers on firm-level export dynamics in aquaculture exports relates to Norway. Larsen and Asche (2011) utilize transaction data to investigate the presence of fixed-price contracts for salmon exports to France. Their findings indicate that about 25 % of exports of salmon from Norway to France are traded using such contracts. Straume (2014) uses similar data to investigate exporters' choice of invoicing currency, and finds that firms use different invoicing strategies to different destination markets. Access to transaction level data makes it possible to study the duration of trade relationships. Asche et al. (2018) and Straume (2017) finds that a surprisingly large share of trade relationships for exports of cod and salmon are remarkably short-lived (only exists for approx. 1 year). Asche et al. (2019) uses transaction-level data to estimate an augmented gravity-model to study how trade costs affects export of salmon from Norway. The findings show that trade chokes off by increased transportation costs and increases with the size of the destination market.

In addition, there exist a price premium for large exporters in more competitive markets. Oglend and Straume (2019) show that pricing efficiency of Norwegian salmon exports varies across destination market characteristics. The form of contract used in the transaction can be used to segment the Norwegian export markets into three types: 1) high-value trade to distant markets, 2) medium-value trade to close high-income markets and 3) lower-value large bulk trades to lower-income close markets. The degree of pricing efficiency is lowest for

[2] See section 2 for a thorough discussion on transaction data.

committed trades over long distances and highest for less committed large bulk trades to close markets. Wagner (2016) provides a survey of other empirical papers using transaction-level data on exports and imports.

Focusing on exports on the firm-destination and firm-firm level for the period 2010 – 2014 enables us to provide new insights into characteristics of Norwegian exporters, destination markets and foreign importers. The findings in this paper shows that exporters of Norwegian salmon holds many of the characteristics that are common for exporters in general, there are tremendous turnover in the number of firms over the period, and especially the number of importers, many of the trade relationships are short-lived and importers makes up an important part of the margins of trade.

The rest of the paper is organized as follows. In section 2, we provide a general description of the data. Section 3 shows how transaction-level data can be used to describe differences between important destination markets for salmon exports. In section 4, we investigate the firm-level dimension in the data and discuss how transaction-level data can be used to shed light on turnover of firms, the stability of trade relationships and detailed margins of trade. Section 5 concludes.

2. Transaction data and descriptive statistics

The data used in this paper corresponds with the data used by Asche et al. (2018, 2019), Straume (2014, 2017) and Oglend and Straume (2019). The data is taken from custom records of all cross-border transactions involving export of fresh-farmed whole salmon[3] in the period 2010 – 2014, collected by Statistics Norway. The unit of observation is a single transaction between an exporting firm and an importing firm and includes all information reported on the customs form. The form records several variables; an anonymous identifier for both firms[4], the statistical value of the shipment (in NOK), the weight of the shipment (in Kilo), an identifier for the destination market, the mode of transportation and the date for the transaction. For the period 2010 – 2014, we observe 480,351 transactions of salmon from 149 different exporters, to 6005 different importers supplying 85 different destination markets.

[3] The exact HS-code is 3021411

[4] The ability to identify the importer is a relatively unique feature of the data provided by Statistics Norway.

Access to identifiers for destination market, exporting firm and importing firm makes it possible to investigate the data in a number of different dimensions, e.g. export at the country-country level, the exporter – country level, the exporter-importer level and the exporter – importer- destination level. Export over these dimensions can be calculated for the overall period, or data can be aggregated into yearly, monthly or weekly observations. In addition, it is possible to use the firm identifier to merge the custom data with balance sheet data for the exporting firms. Access to transaction specific statistical value, and size of shipment, makes it easy to calculate unit values per shipment. Table 1 below provides some descriptive information on the number of exporters, importers, destination markets and export value over the period.

[Insert table 1 here]

From table 1 it becomes evident that the total number of exporting firms and destination markets are relatively stable over the period. We also see that the export value of salmon increases by approx. 46 % from 2010 to 2014. The export value experiences the fastest growth over the last two years in the sample. The number of foreign importers varies substantially more than the number of exporters, and increases by approx. 32 % over the period. We observe a sharp increase of the number of importers between the years 2012-2014. This implies that the average Norwegian exporter also will experience a growth in number of trade relations (firm-to-firm) over the period, as the growth in exporters are much lower. We provide more information on the number of trade relations at the firm level in section 4.

A pure count of the yearly number of exporters, importers and destination markets as in table 1 provides a static overview of the variation in firms and destination markets. However, transaction-level data makes it possible to unmask the degree of dynamics that hides behind these numbers. In table 2, we show that number of entries and exits of firms and markets in the period.

[Insert table 2 here]

Even though the total number of exporters are more or less equal in 2010 and 2014 (88 and 89) there are numerous firms entering and exiting in salmon exports over the period. In 2013, we find 23 new entries and 20 exits, so approx. 24 % of the active exporters in 2013 are new

entrants, and approx. 21 % of the exporting firms exits during 2013. Bernard and Jensen (2004) estimates an exit rate of about 6 % for plants exporting food products from the US, while Eaton et al. (2007) reports yearly entry and exit rate of Colombian exporters in the range of 10 % - 17 %. The patterns for entry and exit of firms into salmon exports seems to be quite similar to the findings in Eaton et al. (2007) for some years, and slightly larger for other years. We find entry- and exit rates for importers over 40 % for several years. These numbers indicate a large presence of heterogeneity among importers of fresh salmon. From table 2 we also see that there are some destination markets that enters and exits in the data over the period. This is not surprising, as some destination markets will be more marginal than others. For example, over the period we observe single trades to destinations such as Namibia, New Zealand, Uganda and Tanzania, which are small buyers of fresh salmon from Norway. Finally, we observe little re-entry of firms and markets after an exit has occurred.

3. Transaction data and destination markets

The destination market for salmon exports is recorded in the customs form for each transaction. The number of transactions (shipments) to a destination country varies from one (Argentina, Algeria, Madagascar, Mali, Namibia, New Zealand, Slovakia, Tanzania, Uganda and Zimbabwe) to 56,436 (France). We focus on the 15 largest destination markets in the data, covering 87 % of the total export value over the period. Table A1 in the appendix lists the 15 largest destination markets for each year in the data, as well as for the period in total. We see that for all 5 years the top three destination markets varies between France, Poland and Russia (Denmark comes in at number three in 2014), with import shares varying between approx. 16 % and 8 %. The largest market takes more than 13 % of the export volume each year. The final column in table A1 ranks the destination markets according to total export value over the period. Table 3 below reports these 15 largest markets for the period in total, with some additional descriptive statistics.

[Insert table 3 here]

We see that among the 15 largest destination markets we have countries from Scandinavia, Southern parts of Europe, East-Europe and Asia. We do not find the largest number of exporters to the largest destination market France, which is served by 49 different exporters. As many as 71 Norwegian firms exports salmon to Denmark, the fourth largest destination market at least once over the period, while only 23 firms exports to Japan. This is as

anticipated, as greater distance to the final destination market implies that fewer firms will have sufficient logistical capabilities and established buyer networks to find market entry economically feasible to (Bernard and Moxnes, 2018). France has the largest number of importers. Only approx. 1/9 as many importers serve Finland compared to France. The largest concentration of exporters per importer is found for Finland, we also see that the east European markets have a relative high concentration of exporters per importer. The lowest concentration of exporters per importer are found in Hong Kong. These concentration numbers differ substantially from the findings in Kamal and Sundaram (2016) who studies export of textiles from Bangladesh to the US and finds that US importers on average trade with 20 Bangladeshi exporters.

As anticipated, there exists a price premium to the most distant markets. This can be partially due to higher transportation costs, and partly due to potential differences in quality, as suggested by Alchian-Allen (Allen, 1964). Kilinç (2019) argues that exporters exhibit pricing-to-market behavior and sell high-quality to large and distant markets. The variation in unit values between more geographically distant and closer markets are not large. This indicates that the global market for salmon is largely integrated (Asche et al., 1999)

Bastos and Silva (2010) argues that firms that export to rich destinations tends to gain the highest unit values. In the upper left panel in figure 1 we show how unit values for salmon exports varies with the economic size (measured as total exports to the market) of the destination market. Our findings indicate that there is no significant correlation between these two variables (the p-value of the slope coefficient equals 0.193).

[Insert figure 1 here]

Eaton et al. (2004, 2011), using French firm level data, shows that there is a positive correlation between the number of exporters and the size of the market (in terms of export value). They argue that the elasticity of the slope coefficient is lower than one. In the upper right panel in figure 1, we estimate this correlation for salmon exporters to be positive and significant, similar to the findings in Eaton et al. (2004, 2011). Since our data also includes the number of importers we estimate the same relationship for the number of importers and finds that there is a positive and significant correlation between the market size and the number of importers. This is indicated in the lower left panel of figure 1. Eaton et al. (2004,

2011) find that many exporters only serves a handful of markets, while few exporters serve many markets. Eaton (2004) estimates an elasticity of -2.5 between the number of exporters and the number of markets per exporter. We test this relationship for our data in the lower right panel in figure 1. Our findings do not support the findings in Eaton et al. (2004). We find a positive and significant correlation between the number of exporters and the number of markets per exporter. This result indicates that relatively few exporters of salmon are exclusive to one (or a few) markets, most establish relationships with importers serving several of the major destination markets for Norwegian salmon.

4. Transaction data and firm level dynamics

The large literature on heterogeneous firms has recognized the importance of variation in exporters' characteristics in determining aggregate trade flows. Exporters are known to be larger than non-exporters; they are more productive, pay higher wages and employ more high-skilled workers (Bernard and Jensen, 2004; Bernard et al., 2007; Bernard et al., 2012). The largest exporters are also most likely to export multiple products to multiple destinations (Bernard et al., 2011). For the salmon industry Asche et al. (2013) argue that the larger companies have become relatively bigger over time. Recently a few papers have also started to look at the variation across importers in determining trade flows (Bernard and Moxnes, 2018; Bernard et al., 2018; Carballo et al., 2018). In general, the findings from this literature suggest that large buyers account for a dominant share of exports from large exporters and that most exporters only sell a few products to a few buyers in a small number of destination markets. Bernard and Moxnes (2018) also emphasizes the importance of networks, and the role of importers in estimating trade margins. In this section, we discuss how insights from this recent literature fits with the salmon trade data.

Due to confidentiality issues, we do not rank exporters at the individual firm level, but we group them after size into nine different groups, as shown below in table 4. Exporter group 1-5 contains the five largest exporters (in terms of value) of salmon over the period 2010 – 2014, and so on.

[Insert table 4 here]

The largest group of exporters takes more than 50 % of the export value of salmon over the period. The largest exporters also ships to the largest number of destination markets and has

the highest number of shipments in total. We see that the group of largest firms have a lower average shipment volume than exporter groups with lower shares of total export value. The largest firms may have more advanced supply chains; they ship more frequent in smaller volumes, which can be important to secure demand of high-quality products. The importance of timely delivery of products in international trade is discussed in Hummels and Schaur (2013) who stress time as an important trade barrier. This may in particular be true for products of a perishable nature such as fresh salmon. There is no evidence for a price premium to the largest exporting firms.

We see that the second group of firms takes 22 % of the export value, and these five firms connects to more importers than the firms in group one, though they serve fewer markets. Firms 6-10 have about 39 % of the number of shipments as the firms in the first group and slightly larger average shipment volumes. The second group of firms also obtains slightly higher unit values than the firms in the first group. In total, the ten largest exporters take 74 % of the total export value over the period 2010 – 2014, meaning that the salmon industry shows the common characteristic, that the largest firms takes a disproportional large share of total exports.

The groups of firms that accounts for smaller shares of exports generally connects to fewer importers and supplies fewer markets. They also clearly ship more in bulks than the largest firms do. The most distant destination markets (Japan and Hong Kong) cannot be reached by truck, so supply of salmon to these markets requires transport by air. The last column in table 4 shows how mode of transportation varies between exporters in the different groups. We see that it is the largest exporters that supplies the largest values by air, which is consistent with the lower average shipment volume. We also find a relatively large share of transport by air in the last group, but this group accounts for a small share of total export values. The largest exporters serve the major demand of salmon in the most distant markets.

Transaction data that identifies importers at the firm level makes it possible for us to look at similar statistics for the importers as we did for exporters in table 4. We restrict the sample to the 10 largest importers (out of 6005) and report descriptive statistics below in table 5.

[Insert table 5 here]

From table 5 we see that the 10 top importers take 16 % of the exported value of fresh salmon from Norway. They connect to more than 30 different exporters. There are no large differences in the unit values the firms obtain. We see that the group of the five largest importers receive shipments in bulks of almost double the size of the firms in the second group. The firms in the second importer group serves almost five times as many destination markets as the firms in the first group. For the firms in the first group 100 % of the shipments are by truck, and 99 % of the volume is destined for Poland and Russia. The firms in the second group ships 9 % of the value by air, and serves a variety of markets such as UK, The Netherlands, Poland, France, Lithuania and Japan.

Another puzzling fact that emerged as more firm level data became available was the substantial presence of temporary trade relationships (discontinued relationships) in the data. Standard theories of international trade do not support such empirical findings (Besedes and Prusa, 2006), but assumes that relations are stable as soon as established due to comparative advantages, or sunk cost has been paid in full (Melitz, 2003). Békés and Muraközy (2012) classifies temporary trade relationships at the firm-product-destination level for Hungarian exports as relationships that has a length of three or fewer consecutive years. Permanent trade relationships are classified as relations that runs for at least four consecutive years. Békés and Muraközy (2012) argues that, depending on the level of aggregation, temporary trade accounts for approx. 2-10 % of the export value. Recently Geishecker et al. (2019) finds that in 33 % of export spells in Danish exports at the firm-product-destination level is one-off exports (observed once in a 46-month window). In the Danish data, the one-off export spells accounts for only 0.65 % of the aggregated export value, but up to 17 % at the firm level. There exists no clear theory on how one should classify the stability of trade relationships; both the definition in Békés and Muraközy (2012) and in Geishecker et al. (2019) is "ad-hoc". We choose to classify one-off relations as relations that only last for one year, temporary trades are trade that runs for 2-4 consecutive years, while permanent trades runs for the whole five year period covered by our data. Descriptive statistics for the number of relations and the stability of firm-firm trade relations for export of salmon is reported in table 6 below.

[Insert table 6 here]

We see that the two groups of exporters that covers the ten largest firms form the largest number of trade relations, indicating more complex network structures among the largest exporters than among small and medium-sized exporters. The firm with the lowest number of trade relationships in the second group has thirteen times as many relations as the similar firm in the first group. We see that as exporters becomes smaller in terms of export values they also forms less relations, as an example in group nine there is a total of 38 relations that are only observed with one single transaction each over the whole period.

Turning to value shares in different classifications of lengths of trade relationships in the last three columns in table 6, we see that the firms that belong to group one trades 5 % of the total export value in relations that only lasts one year. This is a substantial value, approx. 2.3 % of the total export of fresh salmon from Norway during the period of interest. This result indicates that even though one-off exports in general accounts for small export values, such relations can be quite important at the product level. There is a large share of one-off exports among the firms in the second group and in the last couple of groups, where export values are low. Geishecker et al. (2019) have several explanations for why one-off trading is a prevalent feature of transaction level data. In the data, there are no information on who initiates the trade relationship. It is not necessarily so that Norwegian exporters actively seek to establish contact with all their partners. Foreign importers may approach Norwegian exporters and initiate a trade for example to compare quality of a perishable product such as salmon delivered from different exporters. According to Geishecker et al. (2019), the disciplines of international business and international marketing have distinguished passive exporters from active exporters for a long time.

Our calculations also confirm that permanent trade relations are important for the ten largest exporters, a total value share of 35 % of salmon exports over the period are traded in permanent exporter-importer relations. Searching for trading partners can be costly, but our results clearly predicts that investment in stable trade relationships at the firm level may be a potentially important margin for export growth in salmon exports.

To underpin the importance of the importer in aggregate salmon exports, access to transaction data represents a unique possibility for quantifying the effect of importers on total export value. Following Bernard and Moxnes (2018) aggregate export value of salmon to a given destination market, x_j, can be decomposed as: $x_j = s_j i_j d_j \bar{x_j}$, where s_j is the number of exporters (sellers), i_j is the number of importers (buyers), d_j is a density term, capturing the

fraction of all possible exporter-importer combinations for country *j* for which trade is positive and $\bar{x}_j$ is the average value per exporter-importer (the intensive margin). The first three terms makes up the extensive margin of trade, but all four terms are commonly referred to as individual margins. We regress the four margins s_j, i_j, d_j and x_j on x_j to quantify the importance of each margin on aggregate salmon exports. Table 7 below presents the results for aggregate exports in 2014 for the full data sample.

[Insert table 7 here]

Given the log-linear structure of the proposed decomposition of export value into the respective margins, the coefficients in table 7 sum to unity. Each coefficient represents the share of overall variation in trade explained by the respective margin (Bernard and Moxnes, 2018). The results show that the number of importers has a substantially larger effect on the variation in total exports than the number of exporters. This finding underpins the importance of the buyer margin in salmon exports. In particular, it indicates that even if large food retail chains are important buyers of salmon in France, for example, it is the large number of intermediaries that supply salmon to processors, restaurants and retailers that are important for creating the large aggregate trade volumes (Guillotreau et. al., 2005). We see that increased price and/or volume in existing trade relationships (the intensive margin) is the major growth component in aggregate salmon exports from Norway in 2014. It can be argued that for the exporters, growth along the importer margin is most sustainable as it implies a diversification of risk. The least desirable growth component is the quantity component of the intensive margin as growth along this margin puts increased demand on existing resources (Bayar, 2018). Norwegian exporters of salmon should be active exporters and seek to establish new connections with foreign importers to enhance the possibility for growth along this margin.

5. Concluding remarks

The aim of this paper has been to show how transaction data on salmon exports from Norway can shed light on trade dynamics that are hidden in more aggregated trade data. The empirical literature that analyzes transaction data is starting to grow, but is still limited to a few countries, and product specific studies are also scarce. Most existing studies of exports at the firm level are related to total exports. In this paper, we discuss firm level issues related to one single product, export of fresh-farmed salmon. Our goal has been to describe the complexity

of exports when disaggregating data to the individual transaction level. Moreover, to examine if the data for salmon exports exhibits similar patterns as is commonly found for aggregate exports.

Our findings reveal that salmon exports are characterized by some of the general patterns, but also that there are important differences in a number of dimensions. A few exporters take a disproportional part of total exports, meaning that a few "superstars" dominate exports. We also find evidence for a positive relation between the number of exporters and the economic size of the destination market. These are both common findings in most existing literature on exports at the firm level. As we are able to identify the importers in the data, we also find that the 10 largest importers take a large share of total exports of Norwegian salmon. They connect to many different Norwegian exporters, and serves several different markets. The top five importers are specialized towards Poland and Russia.

The data also reveals several interesting differences from the common findings in the literature. First, most exporters connect to a relatively large number of importers and exports to many different destination markets. We document a positive link between the number of exporters and the number of markets per exporter. Second, there is no significant price premium to the largest exporters. Third, the share of export value traded in one-off trade relations are remarkably high. Finally, the importer margin in total export are found to be much larger than the exporter margin. Growth in exports are found to be driven largely by the intensive margin, while the consensus in the literature of international trade is that trade primarily grows along the extensive margin of trade. There is a large potential for export growth for firms exporting fresh salmon, and manages to establish solid networks in emerging rich markets such as China and other Asian (African) countries with a growing middleclass.

Access to transaction data for aquaculture exports opens plenty of scope for further research. Researchers should aim to gain more knowledge about the importer margin of exports and its determinants. It would also be of interest to gain more knowledge on how firm-firm networks are established and expands over time in the industry.

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Table 1: descriptive statistics. Export value, exporters, importers and destination markets. 2010 – 2014.

Year	Total export value (billion NOK)	# exporting firms	# importing firms	# destination markets
2010	23	88	2081	67
2011	21	85	2080	66
2012	22	91	2098	66
2013	31	94	2515	69
2014	33	89	2745	71

Table 2: Entry and exits of firms and markets. 2010-2014.

	Exporters			Importers			Markets		
Year	# entrants	# exits	# no re-entry	# entrants	# exits	# no re-entry	# entrants	# exits	# no re-entry
2010	-	16	11	-	949	801	-	6	2
2011	13	15	13	948	885	736	5	7	3
2012	21	20	16	903	813	736	7	7	5
2013	23	20	20	1230	987	987	10	4	4
2014	15	-	-	1217	-	-	6	-	-

Table 3: The 15 largest destination markets. 2010 – 2014.

	# Exporters	Fraction of exporters	# Importers	Fraction of importers	Exporter/ Importer	Average yearly unit value
1. France	49	0.33	575	0.10	0.09	35.00
2. Poland	52	0.35	354	0.06	0.15	35.00
3. Russia	36	0.24	183	0.03	0.20	35.30
4. Denmark	71	0.48	473	0.08	0.15	34.30
5. Spain	37	0.25	451	0.08	0.08	34.90
6. UK	40	0.27	308	0.05	0.13	35.20
7. Netherlands	33	0.22	257	0.04	0.13	35.20
8. Germany	43	0.29	230	0.04	0.19	35.70
9. Italy	39	0.26	324	0.05	0.12	36.00
10. Finland	33	0.22	66	0.01	0.50	33.60
11. Sweden	51	0.34	299	0.05	0.17	35.60
12. Japan	23	0.15	233	0.04	0.10	39.30
13. Lithuania	38	0.26	110	0.02	0.35	34.60
14. Hong Kong	34	0.23	485	0.08	0.07	39.65
15. Ukraine	34	0.23	120	0.02	0.28	36.00
Total	149	1.00	6005	1.00	0.025	35.70

Table 4: Descriptive statistics, groups of exporters. 2010-2014.

Exporter group (firm)	Share of export value	# Markets	# Importers	# Shipments	Average yearly unit value	Average shipment volume	Transport mode (Truck, Air). Share of value.
1. 1 - 5	52 %	73	2,653	277,794	35.25	6,995	89 %, 11 %
2. 6 - 10	22 %	66	2,917	107,674	36.36	7,547	88 % , 12 %
3. 11 - 15	10 %	50	1,065	44,827	37.55	8,132	91 %, 8 %
4. 16 - 20	5 %	42	637	14,472	35.10	12,807	96 %, 4 %
5. 21 – 25	4 %	37	465	11,649	34.60	11,907	99 % 1 %,
6. 26 – 30	3 %	35	436	8,853	35.72	10,058	94 %, 6 %
7. 31 – 40	2 %	31	289	6,075	37.00	13,828	93 %, 7 %
8. 41– 50	1 %	27	224	2,848	33.96	13,131	98 %, 2 %
9. 51 - 149	1 %	53	495	6,159	40.34	5,102	85 %, 15 %
Total	100 %	85	6,005	480,351	35.80	7,674	90 %, 10 %

Table 5: Descriptive statistics, groups of importers. 2010-2014.

Exporter group (firm)	Share of export value	# Markets	# Exporters	# Shipments	Average yearly unit value	Average shipment volume	Transport mode (Truck, Air). Share of value.
1. 1 - 5	10 %	5	33	22,081	35.00	17,544	100 %, 0 %
2. 6 - 10	6 %	23	37	21,681	35.40	9,818	91 %, 9 %

Table 6: Descriptive statistics, firm-to-firm trade relations. 2010 – 2014.

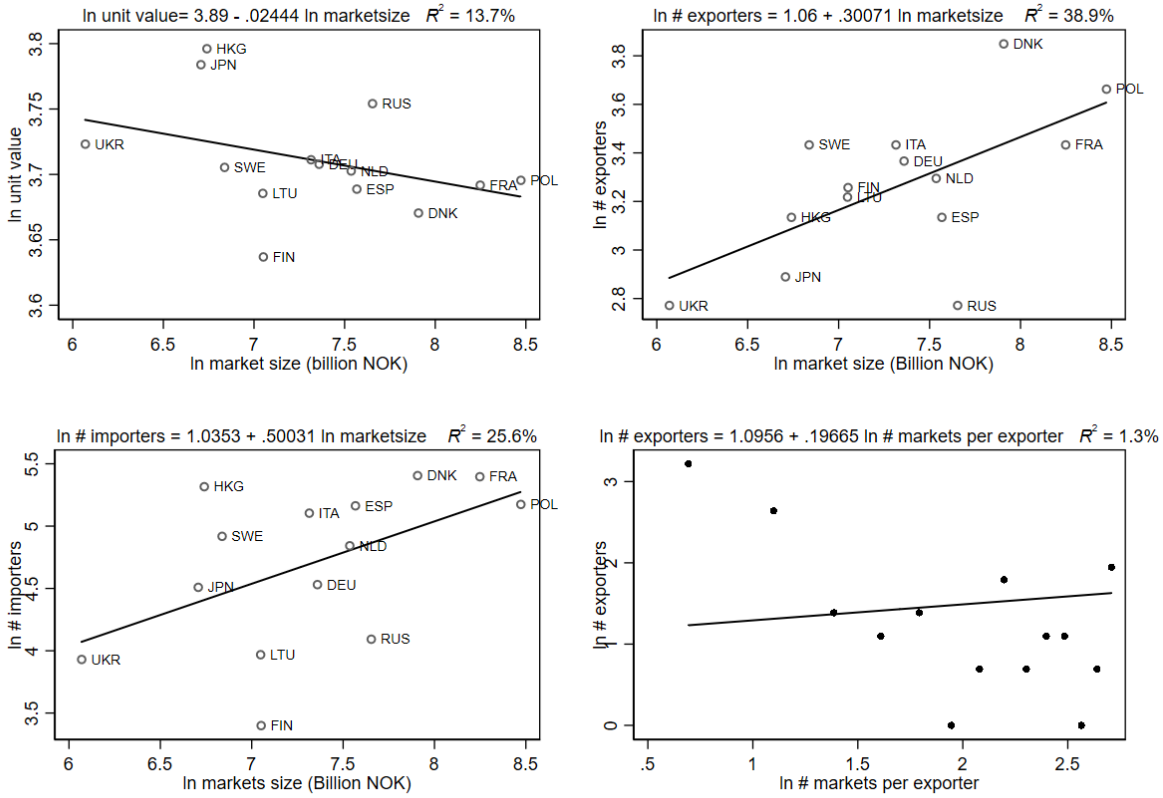
Exporter group (firm)	Average # relations	Min # relations	Max # relations	Value share of one-off relations	Value share of temporary relations	Value share of permanent relations
1. 1 - 5	692	28	1032	5 %	43 %	52 %
2. 6 - 10	792	381	1039	9 %	55 %	36 %
3. 11 - 15	259	127	360	21 %	43 %	36 %
4. 16 - 20	160	15	255	10 %	53 %	37 %
5. 21 – 25	60	45	260	5 %	45 %	50 %
6. 26 – 30	35	3	195	28 %	50 %	22 %
7. 31 – 40	26	4	142	14 %	75 %	11 %
8. 41– 50	24	2	81	31 %	54 %	15%
9. 51 - 149	3	1	50	35 %	58 %	7 %
Total	75	1	1039	9 %	48 %	43 %

Table 7: Decomposition of aggregate export value. 2014.

	Exporters	Importers	Density	Intensive margin
ln export value	0.276***	0.409***	-0.224***	0.539***
	(0.013)	(0.022)	(0.011)	(0.024)
Constant	-2.754***	-4.279***	2.194***	4.839***
	(0.236)	(0.371)	(0.190)	(0.413)
Observations	71	71	71	71
R-squared	0.821	0.825	0.803	0.875

*** p<0.01, ** p<0.05, * p<0.10
Robust standard errors in parentheses.

Figure 1: Firms, unit values and market size. 2014.



Appendix:

Table A1: 15 largest destination markets. Import share in parentheses. 87 % of total export

	2010	**2011**	**2012**	**2013**	**2014**	**2010-2014**
1	France (15.9 %)	France (15.7 %)	Russia (15.3 %)	Poland (14.3 %)	Poland (14.4 %)	France (13.7 %)
2	Poland (13.7 %)	Russia (13.6 %)	France (13.9 %)	Russia (13.0 %)	France (11.5 %)	Poland (13.6 %)
3	Russia (12.4 %)	Poland (12.1 %)	Poland (12.7 %)	France (12.9 %)	Denmark (8.2 %)	Russia (11.7 %)
4	Denmark (10.0 %)	Denmark (9.1 %)	Denmark (7.8 %)	Denmark (7.8 %)	UK (7.0 %)	Denmark (8.5 %)
5	Spain (5.5 %)	Spain (6.1 %)	Spain (5.6 %)	Spain (5.0 %)	Russia (6.3 %)	Spain (5.6 %)
6	UK (4.9 %)	Netherlands (4.3 %)	UK (4.3 %)	UK (4.8 %)	Spain (5.8 %)	UK (5.2 %)
7	Netherlands (4.2 %)	UK (4.2 %)	Netherlands (3.9 %)	Netherlands (4.4 %)	Netherlands (5.0 %)	Netherlands (4.6 %)
8	Germany (3.8 %)	Finland (4.0 %)	Japan (3.8 %)	Germany (4.0 %)	Germany (4.7 %)	Germany (4.0 %)
9	Finland (3.5 %)	Germany (3.8 %)	Italy (3.3 %)	Italy (3.9 %)	Italy (4.5 %)	Italy (3.7 %)
10	Sweden (3.4 %)	Sweden (3.5 %)	Finland (3.3 %)	Finland (3.4 %)	Finland (3.5 %)	Finland (3.5 %)
11	Japan (3.3 %)	Japan (3.5 %)	Germany (3.1 %)	Sweden (2.8 %)	Lithuania (3.5 %)	Sweden (3.1 %)
12	Italy (3.2 %)	Italy (3.2 %)	Sweden (3.0 %)	Japan (2.7 %)	Sweden (2.8 %)	Japan (3.1 %)
13	Lithuania (2.9 %)	Lithuania (2.7 %)	Ukraine (2.7 %)	Lithuania (2.7 %)	Hong Kong (2.5 %)	LTU (2.9 %)
14	Hong Kong (2.9 %)	Hong Kong (2.2 %)	Lithuania (2.7 %)	Vietnam (2.6 %)	Japan (2.5 %)	Hong Kong (2.4 %)
15	China (1.8 %)	Ukraine (1.7 %).	Hong Kong (2.2 %)	Ukraine (2.3 %)	Portugal (1.6 %)	Ukraine (1.8 %)
Total share	91 %	89.7 %	87.5 %	86.3 %	84.5 %	87.2 %