Frequency of export: an additional margin of trade

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Extended Abstract

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Summary

This paper proposes studying export frequency as an additional margin of international trade. While extensive margins of products and destination define the scope of firm's export, export shipment frequency is determined by sale method choice and cost structure of trade technology. We define export shipment frequency as the number of shipments per annum by a firm to a given destination and product. In order to more deeply understand the trade cost structure and sale methods, we estimate gravity models on export frequency and other margins of trade. We use transaction level export data from France. Furthermore, we analyze the reaction of export frequency and average export to the financial crisis of 2008/09.

A new margin

The literature in international trade has emphasized the importance of firm heterogeneity in international trade and the extensive margin of trade, defined as the number of firms as well as the scope of exporters[1]. The extensive margin of trade has been accordingly decomposed into the number of firms exporting and the products and destinations served by firms. This paper proposes studying the behavior of an additional margin, that of export frequency. While extensive margins of products and destination define the scope of firm's export, export shipment frequency is determined by sale method choice and trade technology[2].

Sale method is related to how a firm organizes its presence at a market, including distribution and ownership. Trade technology refers to the cost structure regarding shipments rather than dichotomy of sunk versus per period fixed costs. In the simplest case, the cost of a shipment consists of a fixed cost related the transportation and a variable cost related to the number of items (e.g. containers). The shipment fixed cost may be thought of as administrative cost such as filling in customs documents – an important issue for a great deal of countries. Variable cost of shipments which include per container transportation fees as well as the cost of waiting can be highly non-linear and lead to lumpiness of trade.

When designing an empirical strategy to analyze export frequency on a market, we rely on insights from the transactions demand for cash model of Baumol (1952) and Tobin (1956). Owing to the presence of both transaction fixed cost and variable cost depending on the transaction size, a decision on how frequently to export can be contrasted on the issue of how frequently withdraw cash from the bank. At the same time, export decision is complicated by non-linearity in variable costs, uncertainty and the complexity of buyer-seller relationships.

Our aim in this paper is to quantify the prevalence of this additional margin, study the responsiveness of export frequency to trade cost and demand. We do this by estimating gravity models in cross sections of transaction level export data from France. Furthermore, we analyze the reaction of export frequency and average export to the financial crisis of 2008/09.

We define export shipment frequency as the number of shipments per annum by a firm to a given destination and product. In most firm level datasets, this margin is not directly measurable, but may be approximated by the number of months a firm is active – a strategy we follow. Our data covers monthly exports by French firms during the 2003-2009 period; exports are disaggregated at firm-destination-product level for every month.

Cross section behavior

In order to more deeply understand the trade cost structure, we follow Lawless (2010 CJE) and estimate a cross section gravity model on different margins of export. We extend the Bernard et al (2007 JEP) analysis of gravity and aggregate exports to the new extensive margin of export frequency and the remaining intensive margin of export shipment size.

To reflect heteroskedasticity in data, we use Poisson pseudo maximum likelihood estimator proposed by Santos Silva and Tenreyro (2006). This methodology is consistent with average value of

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[1] For instance, see Eaton et al (2004), Bernard et al (2007), Mayer and Ottaviano (2009)
[2] On explicit modeling of trade technology, see Behrens and Picard (2011) or Kleinert and Spies (2011)

shipment estimation and the number of shipments proxied by the number of non-zero monthly exports – at the firm-destination-product level.

Table 1. Gravity for export frequency (number of months) and average shipment (monthly) value

VARIABLES	(1) average value	(2) FE	(3) export frequency	(4) FE
GDP (log)	0.207***	0.333***	0.076***	0.143***
	(0.026)	(0.000)	(0.003)	(0.001)
Distance (log)	0.090**	-0.071***	-0.014***	-0.078***
	(0.041)	(0.000)	(0.004)	(0.001)
Observations	1,398,155	1,115,787	1,398,155	1,115,787
# of groups		176,534		176,534

Poisson Pseudo Maximum Likelihood estimations for the year 2007. Controls in all regressions: contiguity, common language, colonial relationship, EU, BRIC, North-America dummies. In (2) and (4), fixed effects are product*firm.

Firms adjust to serving larger markets at both margins. PPML results show GDP is positively related to both export frequency and the net intensive margin of shipment size. This is unchanged if we correct for compositional effects due to firm and product selection into export markets (selection is treated in firm*product fixed effect setup).

In regards to export frequency, firms ship more frequently to markets closer to the exporter. This is similar to other extensive margin estimations (Lawless 2010, Bernard et al 2007). As for the intensive margin, we first find a positive coefficient just like Bernard et al. (2007). However, when we correct for selection, the distance coefficient also turns negative and significant. Indeed, the interesting result here is that when looking at the impact of variable transport costs, proxied by distance, selection effects are very important.

We run a number of robustness checks. Our main concern is that the number of months is a noisy proxy of the number of shipments in a given year. While it is a reliable approximation for low frequency exports, it is biased for frequent exporters. To handle this problem, we run truncated regressions and also restrict the dataset to infrequent exporters. We also provide a simulation using product-destination transaction level data from other sources to quantify the magnitude of the bias in our estimates. We also address the issue that distance may be a poor proxy for trade cost at this level, and use data on administrative barriers from the World Bank Doing Business database to disentangle the effect of shipment level fixed and variable costs.

Evidence from 2008/09 crisis

The financial crisis of 2008/2009 has deeply affected world trade, export volumes fell 15-25% in 2009. Evidence to date (e.g. Bricongne et al, 2011) suggests extensive margin explains only a fraction of this decline; it was mainly the value of flows by stable exporters that declined. We consider the 2008-09 crisis as an experiment to assess the impact demand on export behavior. Using this new margin of adjustment we investigate if cost pressures as well as a sudden drop in demand made firms reduce the frequency of trade.

The graph below presents the evolution of various margins between 2002 and 2009. While the number of firms exporting fell by 4% in 2009, the number of products and destinations per firm fell by 1% only. Decomposing the export value, our results suggest that export frequency has only changed marginally during the crisis, and it was the average value per shipment that shrank over 10% in 2009.

Overall this points to the resilience of trade relationships even in the face of a large and unexpected economic shock. This is in contrast with a simple Baumol-Tobin type approach, where, in the presence of transaction fixed costs, a drop in demand would, *ceteris paribus*, lead to less frequent transactions. Therefore, we need to extend the analytical framework. One possible option is endogenous demand as in Hornok and Koren (2011). The other is an explicit modeling of transport technology as in Kleinert and Spies (2011). Indeed, the finding of stable export frequency over the crisis period is in line with evidence of changing transport costs in 2009[3].

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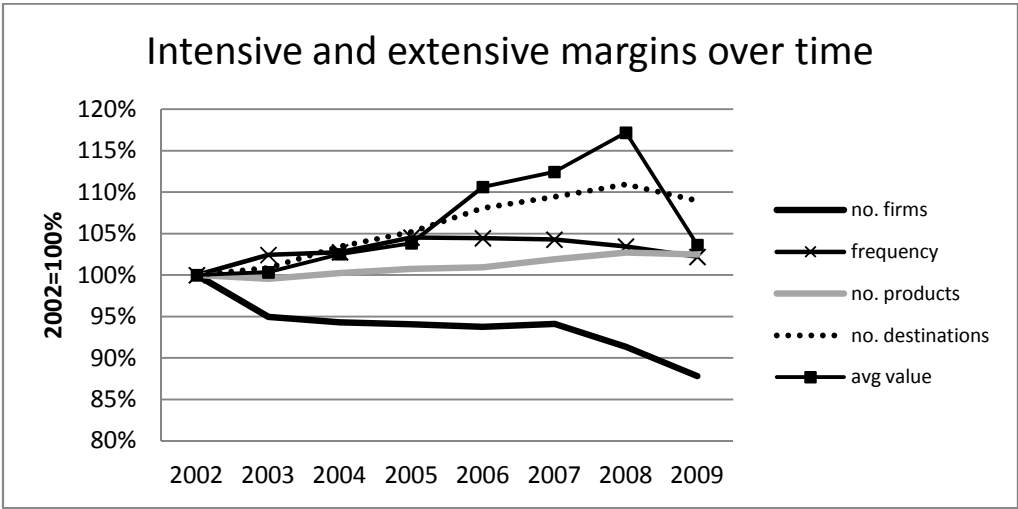
[3] A possible indicator of declining trade cost is the Baltic Dry Index, which measures the average maritime freight cost. The BDI fell more than 50% in 2009 compared to 2008.

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