The Determinants of Firms' Export Conduct: Geographical Location or Productivity?*

Natalie Chen† Dennis Novy‡ Carlo Perroni§ Horng Chern Wong¶

Extended Abstract

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Abstract

We study the relative importance of firm productivity and geographical location within a country for firms' export conduct and performance. We build a trade model in which firms differ in terms of productivity and location and derive testable predictions. Using administrative datasets on the universe of workers, firms, and trade flows from France, we provide empirical evidence consistent with the model's predictions. We show that: (i) the fraction of exporters is declining in the distance of firms' locations to export destinations, and (ii) the difference in productivity and size of exporters compared to non-exporters is increasing in the distance to export markets. We plan to (a) use the model to quantify the relative contribution of productivity and geographical location, (b) investigate the extent to which labor market frictions and local workforce skill composition prevent exporters from locating closer to export destinations, and (c) study the implications for place-based policies aiming to attract high productivity firms.

Keywords: heterogeneous firm, productivity, geography, international trade
JEL codes: F1, F16, D24, R1, R3

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†Department of Economics, University of Warwick. Email: N.A.Chen@warwick.ac.uk
‡Department of Economics, University of Warwick. Email: D.Novy@warwick.ac.uk
§Department of Economics, University of Warwick. Email: C.Perroni@warwick.ac.uk
¶Department of Economics, University of Warwick. Email: Horng.Wong@warwick.ac.uk

1 Introduction

Firms differ enormously in their export conduct and performance (Bernard et al., 2007). Some firms become exporters while others do not. Conditional on exporting, some exporters make larger export revenues and export to more markets than others. On one hand, a large literature explains these facts by showing that firm characteristics, such as size and productivity (Melitz, 2003), are key determinants. On the other hand, a growing literature shows that export performance varies with firms' geographical location within a country (Bellone et al., 2016).

How important are firms' geographical locations, compared to productivity, in determining their export conduct and performance? The answer to this question has important implications for quantifying the gains from trade and for place-based policies that aim to attract high productivity firms (Gaubert, 2018; Fajgelbaum and Gaubert, 2018).

In this paper, we document and study how the relationship between firm characteristics and export conduct varies with firms' geographical locations within a country. We build a trade model in the tradition of Melitz (2003), augmented with geography. The model guides our interpretation of the data. We test the predictions of the model using large administrative datasets that cover the population of workers and firms from France, in addition to the universe of trade flows into and out of France. In the next steps of our analysis, we plan to (a) use the model to quantify the relative importance of productivity and geography in determining firms' export performance, and (b) analyze the role of labor market frictions and the skill composition of the local workforce in preventing firms from relocating closer to export markets.

To see why we expect export conduct to vary with location, consider a simple Melitz (2003) setup in which firms operate in different spatial locations. Suppose that there is an exogenous distribution of firm productivity at each location and that these productivity distributions are the same across locations. Then, given the same distance to export markets (comparing across firms at a given location), firms that are more productive, and thus larger in revenue terms, will be more likely to be exporters, since more productive firms can afford to pay a fixed export cost. However, comparing across locations, firms of similar productivity will be less likely to be exporters the further away they are from export markets. This is because, all else equal, distance from an export market lowers export revenues in that market due to transportation costs. Therefore, the relationship between firm size and export conduct within locations should vary systematically with that location's distance to export markets.

We show that our model can rationalize these expected patterns. The testable predictions from this model include: (i) the proportion of active firms that are exporters at any given location decreases the further away that location is from export destinations; (ii) the average size and productivity of exporters relative to non-exporters increases the further they are located

from their export destinations. We find support for these predictions in our data.

2 A Trade Model with Heterogeneous Productivity & Locations

Our model builds on the workhorse Melitz (2003) model by augmenting it with geography (Redding and Rossi-Hansberg, 2017). Firms differ in both productivity and spatial location.

The representative consumer in a given country i has a constant elasticity of substitution (CES) demand system that aggregates over a continuum of differentiated goods, which has a mass of Ω_i. Denote σ as the elasticity of substitution between goods. The goods market is monopolistically competitive. There is a mass of workers supplying labor inelastically in each country. The labor market is perfectly competitive.

There is a mass of firms M_i in country i, each producing a differentiated variety $\omega_i \in \Omega_i$. Firms produce goods using only labor inputs. Firms draw their idiosyncratic productivity from a cumulative distribution function $G_i(\phi)$. Firms face a domestic transportation cost $\tau^d_{l(i,\omega_i)}$, where $l(i,\omega_i)$ is the location of firm ω_i in country i. If a firm exports, then it incurs a fixed exporting cost $\tau^e_{l(i,\omega_i)j}$, where i is the origin country and j is the destination country. This departure from the Melitz model captures the distance between a firm's location and its export market. In this sense, firms are heterogeneous in their location. Here, we assume that firms' locations are exogenously determined, and that the distribution from which firms draw their productivity is identical across locations. However, we relax these assumptions in an extension of the model.

We obtain the following theoretical predictions from this model. First, we show the fraction of firms that are exporters is decreasing in the distance to export markets. Second, we show that the relative productivity and size of exporters compared to non-exporters is increasing in the distance to export markets.

Below, we show graphically the model's predictions from a parameterized example. Figure 1 displays the fraction of firms who are exporters by distance to export market. Figure 2 shows the relative productivity of exporters compared to non-exporters by distance to their export market. Finally, Figure 3 depicts the average size (revenue) of exporters relative to non-exporters by distance to export market.

The above predictions imply that if a researcher studies the distribution of exporter revenues while abstracting from location, some of the heterogeneity the researcher observes would stem from heterogeneity in location rather than in productivity. Therefore, if one estimates a measure of the degree of productivity dispersion that rationalizes differences across firms in export performance without taking geography into account, one would obtain an overestimate of the true productivity dispersion, though not necessarily a different type of distribution.

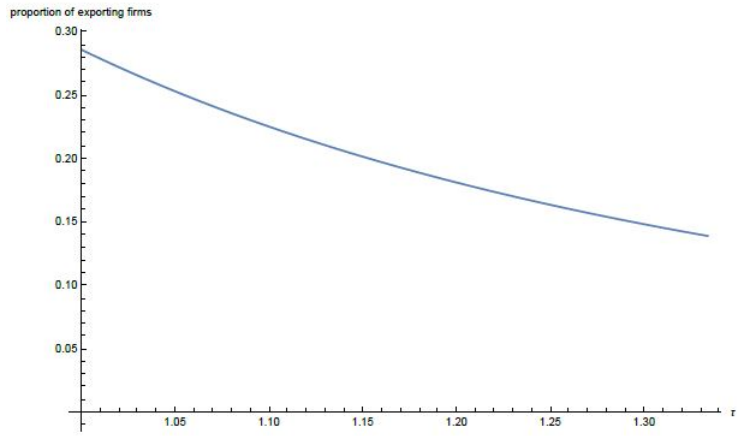

Figure 1: Model: Fraction of firms that are exporters by distance.

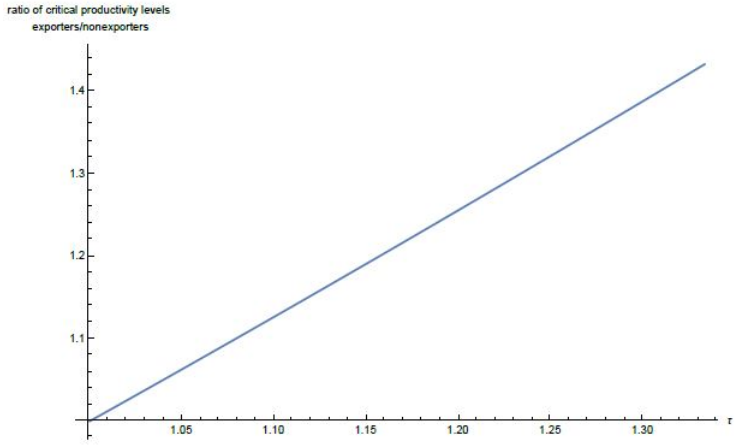

Figure 2: Model: Relative productivity of exporters compared to non-exporters by distance.

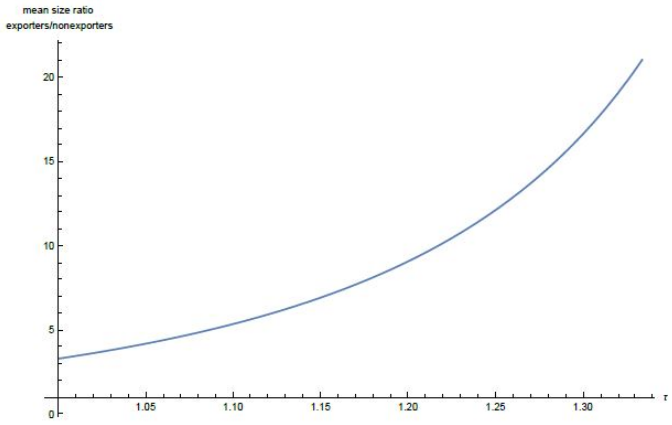

Figure 3: Model: Relative revenue size of exporters compared to non-exporters by distance.

3 Data Description

3.1 Administrative Datasets from France

The data requirements for our analysis are demanding. We require information on firm characteristics, their export conduct, the worker characteristics in firms' locations, and the distance between each firm location and export destination pair. We obtain this information from firm balance sheet data, customs trade flow data, and matched employer-employee panel data from France. We construct distance data between firm location and export destination.

We have access to the *Fichier approché des résultats d'Esane* (FARE), which are firm balance sheet datasets. These data are collected by the fiscal authority of France, *Direction Générale des Finances Publiques* (DGFiP), for tax purposes. They cover the population of firms in France between 2008 and 2014 without firm size restrictions. From these datasets, we obtain information about firms' revenue, employment, and commune codes.

We obtain information about firms' exports and imports at the product-level from trade flow data provided by the customs authority of France. This dataset covers the years 2010 to 2014 and contains detailed information about product prices, units, firm identifiers, six-digit product codes, and import origin or export destination country.

Next, we combine French commune identifiers from the FARE dataset with export destinations from the customs dataset to calculate the distance between each commune-export-market pair. We first obtain the names of the communes associated with a commune identifier and then obtain the corresponding postcode of a given commune. We next obtain the postcode of the capital city of an export destination country. Finally, we calculate the geodesic distance, in kilometers, of each French commune-export-destination pair.

To study the importance of local worker skill composition in preventing firms from locating closer to export markets, we use matched employer-employee datasets, called the *Déclarations Annuelles de Données Sociales* (DADS). These datasets are collected and compiled by the national statistical institute of France, *Institut National de la Statistique et des Études Économiques* (INSEE), also for tax purposes. They contain information at the job level, such as age, gender, earnings, hours, and occupational category. We have access to two DADS datasets. The first is called the DADS Panel. It follows all employed workers in the private sector born in October. The second is the DADS Postes. It contains information on all existing jobs in France. Unlike the DADS Panel, this is not a panel dataset. It is organized in an overlapping structure – each observation appears in the dataset under the same identifier for at most two periods (if the job exists for at least two periods).

3.2 Sample Selection

We restrict firm level observations from the FARE balance sheet data to the manufacturing sector. We do not include French overseas territories. We keep only export destinations in the European Union (EU) and exclude multi-plant and multi-product firms. This is to ensure that our measure of the distance between firm location and export destination meaningfully captures the associated trade costs (for example, transportation costs). Our findings are robust to the inclusion of multi-plant and multi-product firms. We drop observations with invalid firm and export market identifiers. We refer the interested reader to Bergounhon et al. (2018) for a set of important guidelines to cleaning the French customs trade data. The observations of our cleaned sample are at the level of firm and export destination pairs.

For both of the DADS datasets, we focus on workers between the age of 16 to 65, who hold either a part-time or full-time principal job (side jobs are dropped). We keep workers in the following one-digit occupational categories: (a) Top management, such as chief executive officers or directors; (b) senior executives, such as engineers, professors, and heads of human resources; (c) middle management, such as sales managers; (d) non-supervisory white-collar workers, such as secretarial staff and cashiers; and (e) blue-collar workers, such as foremen and fishermen. All 1-digit, 2-digit, and 4-digit occupation codes are harmonized and updated to the latest version provided by INSEE (PCE-ESE 2003). Observations whose hourly wages fall outside three standard deviations of the mean are excluded.

	All Firms	Exporter	Non-Exporter
Average employment size	16	79	10
Average revenue size (in 000's of Euros)	2,623	15,996	1,379
Average fraction of revenue from exports	-	0.21	-
Number of firms	89,135	7,583	81,552
Number of communes	15,874	3,775	15,549
Number of EU export destinations	-	27	-
Number of firm-market observations	2,208,191	-	-

Table 1: Summary statistics for manufacturing firms in 2014.

4 Empirical Analysis

Guided by the model, we now document empirical patterns and compare them to the model's predictions. We first regress the outcome variables of interest on sector-by-region fixed effects

to obtain the residuals:

$$Y_{kjt} = \text{Sector}_{s(k,t)} \times \text{Region}_{r(k,t)} + \epsilon_{kjt}$$

Denote k as the firm, j as the export market, t as the year, s as the four-digit sector, and r as the region. The variable Y_{kjt} represents the natural logarithms of labor productivity (value-added per worker), revenue, employment, or wages. We categorize distances into 10 discrete bins. The distance bins are as follows: 0-300km, 301-600km, 601-900km, 901-1200km, 1201-1500km, 1501-1800km, 1801-2100km, 2101-2400km, 2401-2700km, and 2701km and above. We then compute the within-distance-bin average of the outcome variable of interest using the predicted residuals ($\hat{\epsilon}_{kjt}$), and compare exporters with non-exporters within each distance bin.

Figures 4, 5, and 6 display the proportion of exporters, the difference in (log) labor productivity between exporters and non-exporters, and the difference in (log) sales revenue between exporters and non-exporters by distance bins. These figures are consistent with the model's predictions, illustrated in Figures 1, 2, and 3.

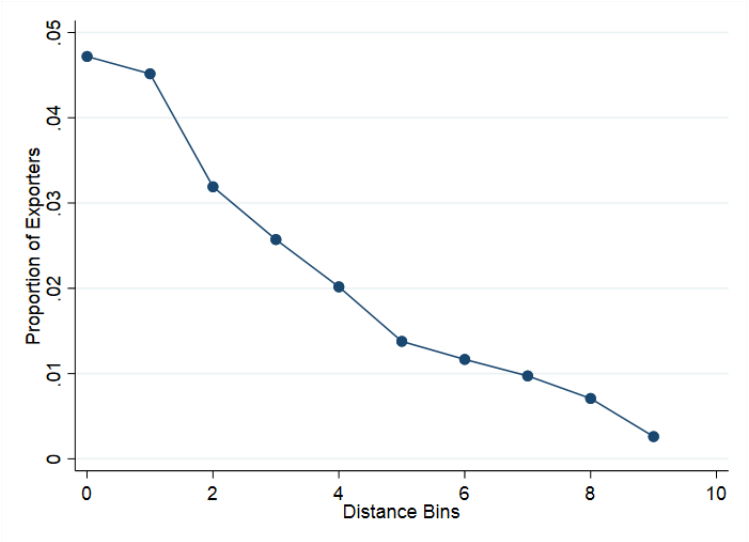

Figure 4: Data: Fraction of firms that are exporters by distance.

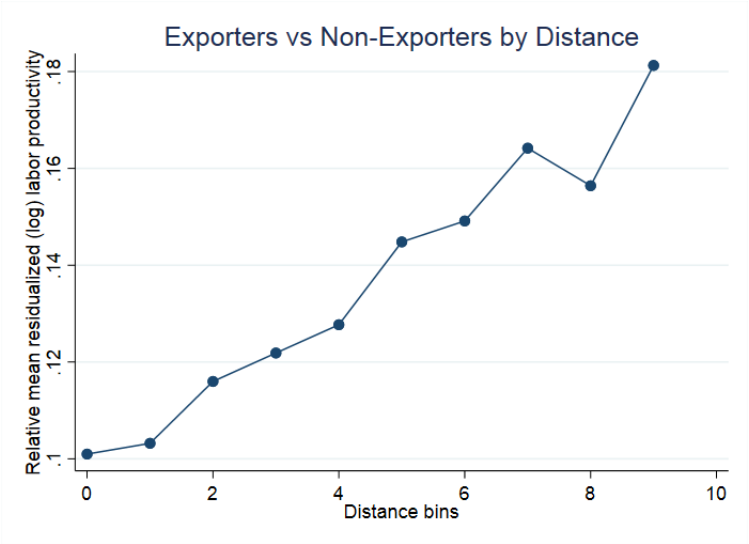

Figure 5: Data: Relative productivity of exporters compared to non-exporters by distance.

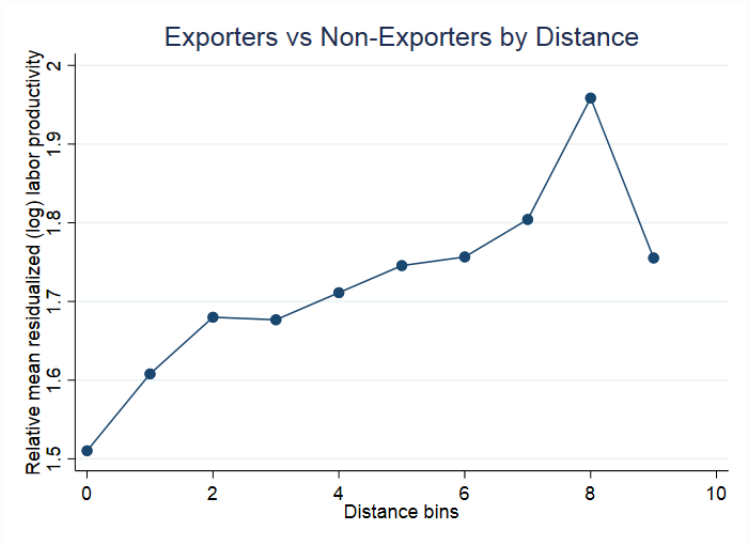

Figure 6: Data: Relative revenue size of exporters compared to non-exporters by distance.

5 Quantitative Results

TBA

6 The Role of Labor Market Frictions & Skill Composition

TBA

7 Conclusion

TBA

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