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How do transport costs affect firms' exports? Evidence from a vanishing bridge☆

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HIGHLIGHTS

- This paper provides rigorous estimates of the impact of transport costs on firms' exports.
- We use customs-based transaction-level data on trade and transport costs.
- In order to address endogeneity concerns, we exploit a "natural experiment".
- Estimates suggest that 1% increase in transport costs results in a 6.5% reduction in firms' export values.
- This effect can be traced back to a reduction in the number and size of shipments.

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ABSTRACT

In this paper we provide estimates of the effects of international transport costs on firms' exports and disentangle the channels of these effects. In so doing, we use a unique dataset consisting of highly disaggregated transaction-level trade and transport cost data and, in order to account for endogeneity, we exploit the exogenous variation in these costs associated with the non-trade related closure of the main bridge connecting two countries.

1. Introduction

A series of papers have shown that international transport costs are an important determinant of trade.[1] The extent to which these costs matter is, however, far less well-established. The reason is twofold. First, accurate product-level data on transport costs are only available for a handful of countries (Hummels, 2007). Second, transport costs are likely to be endogenous to trade (Hummels,

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[1] See, e.g., Harrigan (1993), Hummels (2001), Limao and Venables (2001), Clark et al. (2004), Blonigen and Wilson (2008) and Moreira et al. (2008).

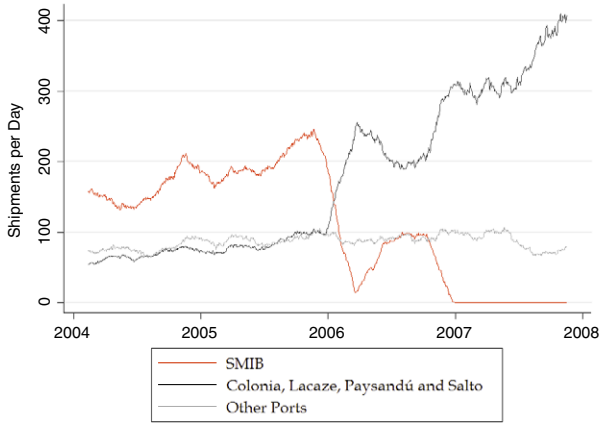

Fig. 1. Evolution of the number of shipments from Argentina to Uruguay: the San Martín International Bridge (SMIB) and other ports.
The figure shows a 30-days moving average of the number of shipments from Argentina to Uruguay through the San Martín International Bridge (SMIB) and other entry ports.
Source: Authors' calculations based on data from DNA.

2010). Possible explanations for costs to vary endogenously with trade include the existence of economies of scale in the adoption of transport technologies better matched to specific products and the market structure of the shipping industry (Hummels and Skiba, 2004; Hummels et al., 2009). While insightful, most existing studies do not tackle both issues together. Further, for similar reasons, evidence on how international transport costs affect firms' exports is even scarcer. Thus, firm-level data on transport costs are virtually inexistent (e.g., Bernard et al., 2006). And, again, endogeneity problems are predictably severe. For instance, anecdotal evidence suggests that larger exporters can negotiate better fares.

In this paper, for the first time to our knowledge, we assess the impact of transport costs on firms' exports while simultaneously overcoming those data and methodological limitations. We use a unique dataset that consists of firm-level import and actual transport cost data covering all manufacturing trade transactions between Argentina and Uruguay over the period 2004–2007. In order to address endogeneity concerns, we exploit the exogenous variation in transport costs associated with the closure of the main bridge connecting these countries due to social protests on environmental matters during this period.[2] According to our estimates, firms' exports decline 6.5% when transport costs increase 1%.

Our paper contributes to an emerging literature that makes use of "natural experiments" to assess the effects of transport costs on trade. Using the gravity model on country-level data, Feyrer (2009) examines how the shock to sea distances induced by the closing of the Suez Canal between 1967 and 1975 affected trade and thereby income. Akerman (2009) investigates the impact of the construction of the bridge linking Copenhagen and Malmö in 2000 on Swedish firms' export outcomes and productivity.[3] Unlike ours, these studies do not use actual transport cost data.

2. The "natural experiment"

In addition to air and fluvial transport, Argentina and Uruguay are connected by three bridges on the Uruguay River. The San Martín International Bridge (SMIB hereafter) connecting Gualeguaychú in Argentina and Fray Bentos in Uruguay is by far the most important from the point of view of bilateral trade. In 2004 more than 50% of total Argentine exports to Uruguay were channeled through this bridge.

Starting in mid-2005, the SMIB began to be blocked as a result of the protests by organized groups concerned with the environmental consequences of the establishment of paper and pulp processing plants on the Uruguayan coast of the Uruguay River. In particular, as consequence of these clearly non-trade related events, the SMIB was inaccessible for several days between November 2005 and April 2006; and, after an impasse in the protest actions during a period of diplomatic negotiations between the countries, it became completely closed to traffic on November 20, 2006 remaining so until June 20, 2010.[4] This had important effects on transport decisions of economic agents. The share of Argentine exports to Uruguay through the SMIB fell to zero after the persistent blockade. Shipments were rerouted from the SMIB to the other two bridges—primarily to that linking Argentina's Concordia and Uruguay's Salto—which implied an increase in the road distance traveled, or there was directly a switch in transportation mode to ship or airplane also with the consequence of higher transport costs (Fig. 1).[5]

3. Data and descriptive statistics

Our main dataset consists of dated transactional data on Uruguay's import values and weights and actual transport costs (freight plus insurance) from Argentina, disaggregated by firm, product (10 digit HS), port of entry, and crucially exporter over the period 2004–2007 from the Uruguayan customs DNA. In addition, we have access to data on Argentine exporters' location (zip code) from the Argentine customs DGA. These data cover all manufacturing trade transactions in this period.

Table 1 characterizes the average Argentine firm exporting manufactures to Uruguay. On average, this firm sells 5 products to 1.5 buyers for approximately USD 150,000. The average share of either export value or shipments across companies that was initially channeled through the SMIB was as high as 60%. After the traffic interruptions, this share declined virtually to zero in 2007. Not surprisingly, average transport costs increased over the period.

4. Empirical approach

Our empirical model of exports is as follows:

$$\ln X_{fpt} = \alpha \ln TC_{fpt} + \lambda_{fp} + \delta_{ft} + \rho_{pt} + \varepsilon_{fpt} \quad (1)$$

where f denotes (Argentine) firm, p product, and t year (i.e., transactional data are aggregated by year). The main variables are X and TC, which represent the f.o.b. export value to Uruguay and the respective transport cost as measured by the ratio between the c.i.f. and f.o.b. export values.[6] The remaining terms of Eq. (1) correspond to control variables: λ_{fp} is a set of firm-product fixed effects that captures, for instance, the firms' knowledge of the market for a given product in Uruguay; δ_{ft} is a set of firm–year fixed effects

[2] We believe that trade between Argentina and Uruguay is an interesting case study. This trade has been virtually free from tariffs now over several years thanks to MERCOSUR. This allows for a cleaner identification of the effects of transport costs relative to a situation in which both tariffs and transport costs are not negligible and have to be bundled together for estimation purposes (e.g. Hummels, 2001; Bernard et al., 2006). In addition, our findings are relevant for a substantial portion of the trading relationships as trade between countries that share a land border such as Argentina and Uruguay accounts for approximately 25% of the world total.

[3] A number of papers examine the impact of domestic transport infrastructure on several economic outcomes (e.g. Baum-Snow, 2007; Michaels, 2008; Banerjee et al., 2012; Donaldson, forthcoming; Volpe Martincus and Blyde, 2013).

[4] See, e.g., MERCOSUR Secretariat (2006), Di Martino (2009), Merlinsky (2008) and Toller (2009).

[5] Cross-border transit disruptions were significantly smaller in the Artigas International Bridge between Colón and Paysandú and especially the Bridge on the Salto Grande Dam between Concordia and Salto (MERCOSUR Secretariat, 2006).

[6] We use mirror values for exports (i.e., Uruguayan imports from Argentine exporting firms).