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Temporary trade and heterogeneous firms

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ABSTRACT

Using Hungarian firm-transaction level export data, we show that about one third of firm–destination and about one half of firm–product–destination export spells are short-lived, or temporary, each year. This is in odds with theories where comparative advantage is stable and market entry costs are sunk. We show how endogenous choice between variable and sunk cost trade technologies can explain the empirical importance and some characteristics of temporary trade. We build a model in which the likelihood of temporary trade depends on productivity and capital cost of the firm as well as well-known gravity variables of destinations. These predictions are borne out by the data; the likelihood of permanent trade, defined by a simple filter, rises with firm productivity, financial stability, proximity and GDP of destination countries.

1. Introduction

Most trade theories predict a stable export activity once comparative advantage justifies it or once the sunk cost of such an activity is paid for. In particular, models of firm heterogeneity building on Melitz (2003) assume the existence of a sunk cost related to the start of exporting. In extensions of the basic model,[1] sunk costs of exports are related to the export of certain products and to certain destinations. As this sunk cost is an investment that can only be recovered from a stable stream of revenues, firms are expected to export a given product to a given destination over a long period of time. In a simple dynamic interpretation of static sunk-cost based trade models, only dramatic shifts in demand or factor prices would lead to a halt of an export project.

However, firms often export their products to a given destination for a short period or in a series of short spells. We will call these unstable relationships temporary trade, while stable trade relationships will be classified as permanent trade. In our data for Hungary, about half the firm–destination–product specific transactions is temporary in nature. Moreover, temporary trade appears at the firm level as well; about a fifth of firms who ever sell abroad will export in a temporary fashion only. Despite their high share in terms of number of relationships, we found that temporary trade transactions are typically much smaller in value than permanent trade; depending on the level of aggregation used, temporary transactions worth about 2–10% of total exports.

This paper aims at putting unstable trade transactions in the limelight and endeavors to reconcile theory with evidence. We show new evidence regarding the pervasiveness of unstable trade relationships and build a simple model to explain the high frequency of temporary trade relationships that we see in the data.

Why do we propose studying temporary trade which accounts for a small fraction of aggregate trade volumes? Our work can help (i) understand patterns in disaggregate trade data, (ii) distinguish between existing trade theories, and (iii) inform policy. First, the high prevalence (i.e. large number) of small and short-lived trade flows has long puzzled the profession (e.g. Eaton et al., 2011), and we offer a simple and intuitive explanation. Second, ignoring the choice of trading technology can lead empirical studies to overestimate the magnitude of sunk costs. Third, trade policy may have to focus on promoting stable relationships as opposed to all export activities.

Using balance sheet and customs transactions data on manufacturing firms in Hungary, we study the stability of export spells at the firm–destination and the firm–destination–product level. We classify each firm–destination trade flow as either permanent or temporary by introducing a simple trade relationship stability filter. Permanent trade is an uninterrupted export spell that is at least four years long, while temporary trade can be either a short spell or a non-continuous export relationship. Temporary trade is not limited to specific industries or markets, and all types of firms trade temporarily over time.

To explain the prevalence of temporary trade flows observed in our data, we build a model of heterogeneous firms, extending the proposition of heterogeneity in entry costs at the firm level or

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[1] Such as Helpman et al. (2004), Chaney (2008) Das et al. (2007), Arkolakis (2010), Eaton et al. (2011), Alessandria and Choi (2007).

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demand at the country level. We model how firms, facing uncertainty in terms of their future productivity, may endogenously choose between two different trade technologies. They may pay a large fee – sunk cost – up-front in return for lower costs later, or pay less now but more in each future period. The endogenous choice between variable- and sunk-cost trade technologies can yield, for some firms and destinations, an equilibrium outcome of temporary trade.

This model is useful as it helps understand the seemingly erratic presence of short spells, and provides an explanation for the small shipments present in cross sectional datasets which were not well understood before. This is important as allowing firms to forgo the sunk cost of trade makes short spells quite understandable — even without assuming very large and frequent productivity shocks. Hence, this model of trade technology choice will both better explain firm export dynamics features presented in the data and offer an alternative to learning models (e.g. Aeberhardt et al., 2009). Furthermore, the model yields a number of predictions which can be matched with evidence from the data. We predict that the likelihood of permanent trade rises with firm performance, proximity and market size of destination countries.

We test the specific predictions of our theory regarding determinants of temporary trade, and find that our empirical results fall in line with the predictions. Using a random effect probit model, we show that the likelihood of temporary trade rises with lower productivity, higher capital cost of the firm, greater distance and larger GDP of destination countries, and that these are in line with our simple model. We extend the analysis to the firm–destination–product level and find that product differentiation increases the probability of a permanent trade relationship. Furthermore, we show that trade liberalization leads to an increase of the extensive margin of both kinds of exporters, and leads to a more positive effect on the intensive margin of permanent exporters.

Our work can also inform how existing trade theories should be confronted with the data. For example, inspired by models which assume that firms will pay an up-front sunk cost that will later be covered by export revenues, several empirical studies have estimated sunk costs of exporting to be significant (Bernard and Jensen, 2004).[2] In fact, studies identifying sunk cost from the different behavior and performance of exporting and non-exporting firms may underestimate the sunk cost as some exporters may have opted for the variable cost trade technology and not paid the sunk cost. Our framework can be used to filter out temporary traders and estimate the model on those firms only that do pay a sunk cost.

Finally, reducing trade costs for a limited period or providing one-off export incentives may only lead to temporary exports without long term positive effects. At the same time, our model suggests that providing incentives in favor of the sunk cost based option is what may generate stable trade flows and long term benefits. This matters for policy, because trade promotion spending often targets small firms and initially small volume export projects.

This paper is organized as follows. In Section 2, we detail our dataset, and present our definition of temporary and permanent trade relationships and describe the prevalence of temporary trade. Section 3 introduces the model that links temporary trade to a choice of trade technology. Section 4 introduces the evidence on temporary trade patterns and an extension to firm–destination–product level is discussed in Section 5. The last section concludes.

[2] In a simulation of their model on French data, Eaton et al. (2011) find that fixed costs take 59% of gross profit in any destination Roberts and Tybout (1997), Lawless (2010), Moxnes (2010). Furthermore, the availability of trading at a temporary fashion without a high up-front fee offers an alternative explanation to why Eaton et al. (2011) find a large number of small transactions in the presence of high estimated sunk costs.

2. Data and description of temporary trade

This section first introduces our proposed trade relationship stability filter. After briefly presenting the dataset, we use our filter to show the prevalence of temporary trade in terms of number of transactions, volume and dynamics over time.

2.1. What is temporary trade?

The study of temporary trade is most closely associated with analyses on short spells in trade. Some recent empirical papers emphasize the importance of short term relationships — mostly at a bilateral level. These relationships are not only characteristics of small markets, like Hungary or Colombia but also of large economies such as the US and Germany. Besedes and Prusa (2006), for example, show that the median duration of exporting a product is between two and four years in the United States. Similarly, Nitsch (2009) shows that the same phenomenon can be observed in Germany — the majority of trade relationships exist for only one to three years. Eaton et al. (2011) look at firm-level trade flows in Colombia, only to find a large importance of one-time exporters. Hess and Persson (2010), looking at the duration of EU imports at bilateral trade data, find that even at national level, a large share of trade relationships are short lived, and some stability in importing a product masks shifts in source countries. Focusing at the product level Bernard et al. (2010) demonstrates that in 1997, about quarter of output by stable (producing at least between 1992 and 2002) firms comes from newly (within five years) added products and another quarter of products will be lost within 5 years.

Instead of looking at the duration of an export spell or churning of products, our aim is to classify each firm–destination trade flow in a year as either permanent or temporary. To do that we introduce a simple *trade relationship stability filter*, which will enable us to analyze the determinants of temporary trade. The filter works as follows.

First let us denote the value of a trade flow by firm i to market k at year t as R_{ik}^{t}. Let $t=t_0$ be the base year in which we would like to classify the active trade relationships, i.e. those firm–destination combinations for which $R_{ik}^{t_0}>0$. For each such i,k combination one can define a spell, $S_{ik}^{t_0}$, which denotes the number of consecutive years, including t_0, for which firm i exported to market k. Thus, if $R_{ik}^{t_0-2}=0$; $R_{ik}^{t_0-1}>0$; $R_{ik}^{t_0}>0$ and $R_{ik}^{t_0+1}=0$, then $S_{ik}^{t_0}=2$. Based on this, we say that firm i exports to market k in a *permanent* way if $S_{ik}^{t_0}>\theta$, and the export flow is *temporary* whenever $S_{ik}^{t_0}\leq\theta$, where θ is a positive integer. In practice, θ may represent a period long enough to include some longer than one year trade flows but short enough not to include stable trade relationships.

While this approach is arbitrary to some extent, we find it quite useful and straightforward. It enables one to classify all trade flows in a cross section, and explain whether a flow is temporary by binary dependent variable methods. We consider this as a more natural framework of analysis than for example modeling the length of the spells with duration models because of three reasons. First, as we will argue in the theory section, temporarily exporting firms may have chosen endogenously a different trading technology than permanent exporters, which motivates a binary rather than a continuous framework with respect to time when modeling trade spells. Second, in duration modeling the choice of the time period is a delicate issue: using all spells within a period, for example, may lead to over-representation of short spells and various truncation problems. Third, the interpretation of the results from our approach is quite straightforward: the marginal effect shows how the probability that the flow is permanent changes when the explanatory variable changes.

In this paper, we will report most results with $\theta=3$, i.e. we require a permanent trade flow to last at least four years. Note that for this exercise to work one needs data for years between $t_0-\theta$ and $t_0+\theta$, because this enables one to be sure whether each flow is at least