

Micro Foundations of Export Dynamics

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Abstract

The responses of industrial exports to real exchange rate changes are notoriously hard to predict. In this paper we investigate whether the predictability problem traces to several micro phenomena that are undetectable with aggregated data. First, firms are heterogeneous, both in terms of their marginal production costs and in terms of the foreign demand schedules they face for their products. Thus in some countries, industries, and time periods, firms may be far from the threshold level of expected returns that would induce them to initiate foreign sales. In others they may be close, and only need a small nudge. Second, firms must pay sunk start-up costs to begin exporting. Hence they are reluctant to repeatedly enter and exit foreign markets, and their current exporting status depends partly upon whether they exported last period. It also depends upon their expectations about the returns from exporting in years to come. Since histories and expectations differ across firms and time periods, aggregate responses to exchange rate changes should differ too.

To quantify the role of these micro phenomena in shaping export responsiveness, we develop a dynamic structural model of exporting behavior that allows for uncertainty, heterogeneous firms, and sunk entry costs. We use 10 years of plant-level panel data from Colombia to fit the model in two stages. First, we model exporting profits as functions of a trend, the real exchange rate, firm-specific characteristics, and a firm-specific, serially correlated error term that picks up shocks to marginal costs and demand. Then, using estimates from this first stage, we estimate sunk entry costs and several other parameters by maximizing the likelihood function for observed export market participation decisions. To evaluate the likelihood function we must solve each firm's dynamic optimization problem year by year, which in turn involves repeated multidimensional integration. We use Rust's (1997) random grid approach to deal with the associated dimensionality problems.

Using the resulting parameter estimates, we quantify the effects of entry costs, regime credibility, and heterogeneity by simulating aggregate export trajectories under alternative exchange rate regimes. Sunk costs and heterogeneity both play a significant role in shaping aggregate responsiveness, but heterogeneity matters most.