Note on Comparison to Modern Trade Framework

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Abstract

In this note we contrast a framework developed in "Trading Across Borders in Online Auctions"to a framework currently adopted in international trade literature (which is developed in Eaton and Kortum (2002) and Melitz (2003). The discussion in this note is based on an answer we prepared to one of the referees' questions.

The framework developed in "Trading Across Borders in Online Auctions" is different from a modern international trade framework, albeit complementary. The focus of trade literature, represented by Eaton and Kortum (2002) or Melitz (2003), is on explaining aggregate (typically manufacturing) trade flows and it necessarily abstracts from many features of individual markets. Our paper is less ambitious in scope because we focus on one particular service market but the payoff is that we are able to model the key economic mechanisms of that market's operation in much greater detail. One implication of this is that some counterfactuals we are able to perform may not be possible in the trade framework and those that are possible may yield implications that differ not only in the magnitude of the effects, but even in their sign.

Let us first contrast some of the assumptions of the two approaches. Our objective in doing so is not to list the differences, which are numerous and often obvious, but to argue that the essence of the identification argument in these two settings is actually somewhat different. Following that, we will discuss the counterfactuals and conclude with some thoughts on calibration of Eaton-Kortum model to our data.

In Eaton and Kortum framework (henceforth, EK framework), there are multiple manufacturing goods produced and desired by buyers (CES preferences across goods). Each good can be

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produced in each country. The cost of producing good j in country i is given by $\frac{c_i}{Z_i(j)}$; $Z_i(j)$ is productivity which is drawn from a Frechet distribution characterized by country-specific location T_i and scale parameter θ which is the same across countries; c_i is a country-specific constant which reflects the cost of labor and of intermediate inputs. Markets are perfectly competitive so the price of good j produced by country i when it is offered in country n is $d_{i,n}\frac{c_i}{Z_i(j)}$ where $d_{i,n}$ captures geographical trade costs. For each good, buyers in country n choose the country to buy it from; goods produced in different countries differ only in price so buyers always buy the cheapest one. The estimation of θ, $\{T_i\}$, and $\{d_{i,n}\}$ exploits the variation in the ratios of trade flows across countries.

The first major difference that arises in the market for programming services that we study is that in the data and in our model buyers do not necessarily choose the cheapest product. This is because sellers differ not only in their productivity/costs but also in quality and buyers consider both quality and price when making their choices. Relatedly, notice that substitutability across sellers is explicitly modeled in the context of our framework.

The second main difference is that the market we study is not perfectly competitive; the competition is at the level of an individual project and usually involves only a small number of sellers which, in combination with private information about sellers' costs, means that sellers charge positive mark-ups in equilibrium. Moreover, programmers choose whether to participate in a given auction, which implies that buyers' choice sets are determined endogenously.

Before proceeding to discuss the implications of these differences in assumptions, we would like to mention the differences in identification strategies used by the two frameworks. The trade framework aims to rationalize data at a relatively aggregate level fitting the trade flows across origin-destination country pairs. Due to the richness of our data we are able to take a more disaggregated approach. Specifically, we compare the probabilities of winning of individual sellers at a given price point and conditional on the market competition. This, in turn, allows us to show that sellers systematically differ in quality even after controlling for the differences in costs. Further, we are able to determine that the country groups differ in the distribution of sellers' quality, the distribution of sellers'costs conditional on quality, and in the distribution of buyers' preferences for quality.

In other words, rather than fitting aggregate trade flows, our primary objective is to rationalize individual sellers' winning probabilities conditional on the set of competitors and prices, their pricing and participation strategies, and buyers' choices conditional on the choice set. Our model is successful in doing so. We then aggregate across auctions and consider the fit to the trade flows only as an ex post check on the performance of our model. We find it reassuring that estimates obtained from disaggregated moments are able to reproduce these features of the data which are not directly targeted in estimation. This gives us confidence that we were successful at modeling this market and can use the estimates for informative counterfactual experiments.

The novel implications of the combination of preferences for quality, imperfect competition, and endogeneity of participation resulting in sorting of coders across auctions are the findings that

we hope to highlight to the readership of the paper, including the scholars using the international trade framework. These features motivate our choice of counterfactual experiments to include in the paper. The trade framework does not permit the resorting of sellers in response to policy changes since the producers are essentially homogeneous conditional on costs. Failing to account for seller heterogeneity may yield misleading conclusions, at least when applied to the markets such as ours. Let us highlight this with an example of policy that is perhaps not particularly realistic but can be implemented in both models allowing us to directly compare the implications.

Specifically, let us consider a policy which restricts participation of foreign sellers in country n's market. A stylized way to model it in EK's setting is to assume that good j produced in country i can be offered in country n only with some probability p. The obvious consequence of this policy is that a fraction of goods will not be purchased at the lowest possible price by consumers in country n who will now pay higher prices for the same products so their welfare will decline. In our setting, where the corresponding policy means that a given foreign seller is able to offer his services in country n only with probability p, the composition of the set of sellers offering their services to buyers in country n changes in response to policy toward higher quality sellers (especially for the foreign sellers but for domestic sellers as well). As a result of the modified competitive environment, the prices increase somewhat while domestic consumers obtain on average higher quality service so that their welfare may not necessarily decline.

Similarly, consider an effect of a country imposing a tariff in EK's framework. This will unambiguously lower total welfare in that country. In our framework, a counterfactual similar in spirit considers a policy that levies a fine on a buyer if he awards a project to a foreign provider while a domestic provider of similar quality is available at a price which exceeds the chosen foreign bid by less than a specified margin. Due to resorting and competition effects we show that this policy can actually generate domestic welfare gains. This has some superficial parallels with the older optimal tariff literature, where a large economy can improve its welfare by imposing a tariff if world prices are very elastic to changes in its demand.

Finally, while this discussion is qualitative, we have also thought carefully about implementing a more quantitative comparison using a version of the EK's model applied to our data. The key difficulty we face is that the standard trade approach is framed around multiple goods which are produced and purchased in each country. Due to our setting studying a single market, a comparable notion is not obvious. This feature is important since the estimation approach in EK is centered around the share of products supplied by country i to country n. The estimation strategy leverages the equality between the share of products supplied by country i to country n (this object is derived from the model) and the share of country n's expenditure allocated to the goods produced in country i (the later object is computed from the data). In EK framework this property arises because consumers' (buyers') preferences are represented by CES utility function. In our setting this property does not hold due to sellers' heterogeneity in quality. Sellers of higher quality are able to charge premium in equilibrium which breaks the relationship between the share of allocations and the share of transaction value.

References

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