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DUSTRIAL ORGANIZATION AND INTERNATIONAL TRADE: HODOLOGICAL FOUNDATIONS FOR INTERNATIONAL FOOD AND AGRICULTURAL MARKET RESEARCH

Ian M. Sheldon and Dennis R. Henderson, editors

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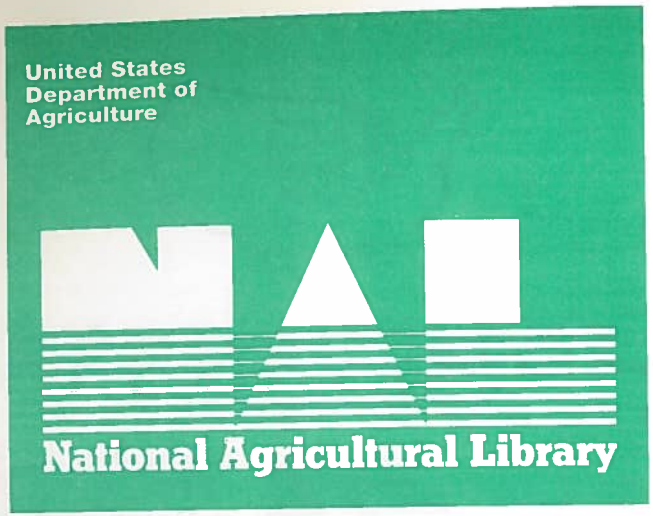

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Discussion: Econometric Analysis of Imperfect Competition and Implications for Trade Research: A Comment

H. Alan Love

Perloff provides a lucid and up-to-date review of econometric techniques for identifying exertion of market power in domestic and international markets. His review goes beyond those of Bresnahan (1989) and of Bresnahan and Schmalensee (1987) by including an interesting discussion of recent dynamic approaches to identifying market power and by distinguishing a number of important considerations in identifying market power exertion in international markets. Knowledge of these techniques adds significantly to the applied researcher's bag of tricks. The dynamic approach provides a closer linkage between underlying game structure and econometric estimation of market power parameters. Distinguishing a number of important issues in modeling market power exertion in international markets focuses attention on points of departure from the standard econometric analysis of domestic markets.

At the risk of being redundant (but given Perloff's rather thorough discussion of the techniques, perhaps redundancy is my destiny in this task), I want to scrutinize a few specific points, paying particular attention to estimation problems. Rather than pointing to any particular works, these comments focus on what I believe to be areas of potential weakness and places where empirical results can easily go wrong. Since I am most familiar with techniques Perloff identifies as modern-static models, and since this is the area that encompasses much of recent applied work, this is the area at which most of my comments are aimed.

Many applied researchers estimate a parameter of market power based on an elasticity representation of the optimality condition MR=MC. For a monopolist, profit is given by:

$$\pi = p(Q).C(Q) \qquad 3.14$$

The resulting first-order condition, written as Lerner's measure, is:

$$L = \frac{p - \frac{\partial C}{\partial Q}}{p} = -\lambda \frac{\partial p}{\partial Q} \frac{Q}{p} = -\frac{\lambda}{\varepsilon} . \qquad 3.15$$

where ε is the elasticity of demand and λ is a parameter indexing market power. Equation (3.10) can be re-arranged as:

$$p = (1 + \frac{\lambda}{\varepsilon})^{-1} \frac{\partial C}{\partial Q} . \qquad 3.16$$

Many applied researchers substitute an existing price elasticity of demand estimate directly into (3.11) and estimate λ and parameters of marginal cost. This practice has a number of pitfalls. First, the log-linear functional form would seem most natural for estimating the demand elasticity used in (3.16). But, as Perloff points out, the market power parameter is not identified when demand is estimated in log-linear form. The two-step estimation process involved in this practice masks the fact that the market power parameter is not identified and, hence, is not estimable.

Second, even if all parameters are econometrically identified, the two-step estimation process, like the one described by Perloff (Section 3.4.1) will result in conditional standard error estimates for the coefficients. While it is possible to obtain unconditional variance estimates, it is rarely done.

Third, two-step estimation results in inefficient parameter estimates. Efficient estimation would necessarily entail simultaneous estimation of demand and Perloff's optimal condition (3.10) with a nonlinear systems estimator like Nonlinear Three-Stage Least Squares, or Full Information Maximum Likelihood. Efficient estimation must take into account cross-equation parameter restrictions, like those in (3.10), and possible cross-equation correlation in errors.

Fourth, if demand parameters used in optimality equation (3.10) are obtained from systems estimators which presume a known market structure (most often perfect competition), resulting parameter estimates of market power may be both biased and inconsistent. Inconsistent parameter estimates arise when there is a discrepancy between the market structure maintained in estimating demand parameters and the market power parameter actually estimated from the optimality condition. While it is possible to avoid any assumption of market structure when estimating demand parameters by using a single equation estimator like Nonlinear Two-Stage Least Squares,

the two-step estimation process would still result in an efficiency loss, and covariance estimates would still be conditional on first-step demand parameters.

Given the potential problems associated with the two-step estimation procedure, the preferred method is to jointly estimate demand and Perloff's optimality condition (3.10) as a system of simultaneous equations. Resulting parameter estimates are consistent and asymptotically efficient. Furthermore, estimated parameter standard errors are unconditional, making hypothesis testing straightforward (Love and Murniningtyas, forthcoming).

Another area where results are susceptible to error is in specification of the demand function. Identification of monopoly/oligopoly market power parameters critically depends on a nonlinear demand specification (or, alternatively, as Perloff points out, a particular cost specification). Hence, successful estimation of the market power parameter depends on a correctly specified and statistically significant nonlinearity in the demand function. This requirement places large demands on the data and on the estimation procedure, particularly since nonlinear parameter estimates can be dramatically affected by a few influential data points. The prudent analyst will want to select nonlinearities based on strong theoretical grounds, not simply to facilitate estimation. In addition, resampling the data using the boot-strap technique, or some other resampling technique, will uncover the small sample properties of estimated coefficients and their sensitivity to possibly influential data points. Estimating small sample parameter variances should be adopted as standard procedure in market power studies.

The third area that requires careful consideration, particularly in modeling international markets, is in the specification of exchange rate effects and marketing costs. Incorporating these influences into the model requires modifying the profit function so that all values are in a common currency and profits are net of marketing costs. For a monopolist selling in a foreign market, profits can be written as:

$$\pi = \beta p(Q)Q - C(Q) - t \cdot Q \qquad 3.17$$

where β is the exchange rate and t is transportation cost per unit shipped.

With these modifications to the profit function, a number of problems may arise. First, currency markets may not be competitive. If imports (exports) of Q are a large share of total country imports (exports), then the importing (exporting) country may manipulate the

exchange rate β to its advantage. Even if the government does not behave strategically, β may be a function of the amount of Q traded if pQ is a very large share of bilateral trade. Both of these problems require special treatment.

Second, measurement of marketing costs, like transportation charges, may be difficult. In the case of a cartel where several exporters are involved, shipping costs from a number of exporting countries to a number of importing countries must be determined. Recent work on the grass-seed industry suggest that market power parameter estimates are sensitive to measurement errors in marketing cost (Love and Lev, 1991).

Finally, little is known about the consequences of various misspecifications of Perloff's optimality equation (3.10). For example, suppose the researcher incorrectly believes that a cartel exists in the international widget market. The optimality equation is set up and parameters are estimated. If the true market structure for widgets is a bilateral monopoly under which major importers of widgets exert monopsony power and exporters exert monopoly power, would econometric results from the originally misspecified model lead to accepting or rejecting the monopoly power of the cartel? To what degree would other coefficient estimates be biased? More generally, what is the ability of these tests to distinguish true market power parameters when the hypothesized structure is incorrect? These are important questions that are yet to be resolved and probably must be addressed in a data-specific context.

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