

New Approach to Scale Market Power in Monopsony by Lau's Hessian Identities

In the "New Empirical Industrial Organization" (NEIO) literature, there are many market power studies in recent years. Following Bresnahan (1982), most NEIO studies estimate monopoly market power exertion from first-order profit maximization conditions using aggregate industry (or country) data. Several studies test for market power such as Ashenfelter and Sullivan (1987), Schroeter (1988), Azzam (1997), Sexton (2000) and Paul (2001).

In contrast, Love and Shumway (1994) suggest a nonparametric approach to test for market power exertion that does not require specifying functional forms for supply or demand. Love and Shumway (1994) extended market power tests from previous studies (Chavas and Cox, 1988; Fawson and Shumway, 1987; Ashenfelter and Sullivan, 1987) in an input market. Love and Shumway (1994) developed a nonparametric deterministic test for monopsony market power using a normalized quadratic restricted cost function with one variable input and one input for which the firm has potential market power. Their nonparametric market power estimates are consistent with actual Lerner index and results indicate that monopsony market power decreases with factor supply elasticity. However there are exceptions where nonparametric market power estimates with technical change and shifting supply are inconsistent with actual Lerner index (Love and Shumway, 1994).

The dual approach is widely used in empirical research because 1) prices are exogenous to the decision maker so that estimates of prices are not under control of the producers; 2) there may be measurement problems with quantities; and 3) more flexible forms can be estimated so that less restrictions are placed on the technology. The dual approach assumes price taking behavior for a profit maximizing firm and cost minimizing firm. The unrestricted profit function contains the same economic information as the indirect cost function (Mas-Colell et al., 1995). Lau (1976) developed a general set of Hessian Identities under perfect competition that permit additional valuable information to be derived from the profit function. Lusk et al. (2002) empirically tested the relationship between the parameters of production function, unrestricted profit function and restricted profit function. However, considering market power using Lau's Hessian identities has not been considered. When there is market power due to monopsony power, duality theory can be still used under certain adjustments. If there is the monopsony power in normalized profit function, how does market power change a monopsony input price? How does a monopsony input price affect an output price? How does the supply elasticity affect results?

The objective of this paper is twofold. First, the study examines monopsony power using Lau's Hessian Identity relationships. Second, the study assesses the performance of the proposed dual approach using Lau's Hessian Identity relationships.

Our approach is completed using four steps: 1) using a production function and an input supply function, optimal input and output quantities are estimated under different input price regimes with output choice determining an input price under monopsony power; 2) estimate restricted and unrestricted profit functions using Lau's Hessian identities; 3) calculate the Hessian elasticities of a production from the restricted and unrestricted profit functions; and 4) compare these elasticities in a monopsony case with different input price regimes to those in a perfectly competitive case.

The data were generated using Monte Carlo simulation techniques (Lusk et al., 2002). Then, we introduced Lau's Hessian identities and estimate dual functions.

In the perfectly competitive case, Lau's Hessian Identities empirically held by the production, the restricted and unrestricted profit functions while when there was market power the inverse supply function that the monopsonist faced was assumed in the monopsony input price case. We found the monopsony input, the other input prices and output price shift by changing market power by comparing monopsony input price case with perfectly competitive case. When we increase the supply elasticity on the input price function which indicates the input price function become a steeper curve, there are several interesting results that: i) first monopsony input price (w_1) have increase, then decreases after the supply elasticity is 3.5, ii) output price decreased then increases its price after supply elasticity is 0.5, iii) another input price (w_4) first increased, then decreases its price after supply elasticity is 0.3, and iv) the other input prices (w_2 and w_3) have decreased their prices with increases supply elasticity. The results are useful for accessing market power by dual approach.

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