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# PRIVATE STRATEGIES, PUBLIC POLICIES & FOOD SYSTEM PERFORMANCE

NEW ESTIMATES OF
WELFARE AND CONSUMER LOSSES
IN U.S. FOOD MANUFACTURING

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WP-39 April 1994

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# NEW ESTIMATES OF WELFARE AND CONSUMER LOSSES IN U.S. FOOD MANUFACTURING

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**ABSTRACT**

In the past 15 years, industrial-organization economists have significantly expanded the range of algorithms for calculating welfare losses due to imperfect competition. We compare eleven empirical estimates of economic losses due to market power in 47 U.S. food manufacturing industries, almost all of them previously unpublished. Each of the studies incorporate different theoretical assumptions about demand conditions, supply conditions, or industry pricing behavior; or they utilize various data sources, time periods, and assumptions about the proper competitive benchmark. The estimates of average allocative losses due imperfect competition range from 0.2 percent to an impossibly high 289 percent of industry output; consumer losses range from 6.0 percent to 816 percent. However, there is a high degree of congruence in the rankings of economic losses due to market power. Hence, from the perspective of antitrust enforcement, the choice of industry targets has not been greatly altered by advances in estimation techniques.

## Introduction

In the beginning was Harberger (1954).

His seminal investigation into the size of welfare losses due to monopoly power has spawned scores of studies, each claiming to incorporate some sort of improvement, that confirm, contradict, or at the least update Harberger's estimate. Harberger's paper is so well known that the geometric representation of the net social welfare loss due to monopoly ($\Delta$ABC in Figure 1) is now known to economists as the "Harberger Triangle."[1]

The studies that followed Harberger's paper focussed on their criticism initially on the number of measurement or data-source issues. Many studies published up through the 1960s confirmed allocative losses almost as low as Harberger's (0.06 percent of GNP), but most of the subsequent responses found considerably higher estimates (some as high as seven percent). Other follow-up studies took the position that even if the Harberger loss was insignificant, a broader concept of losses was the appropriate focus of investigation. In particular, some of the profit rectangle ($\square P_M BAP_C$), conventionally regarded a pure income transfer (changes in equity), was argued to be an additional source of social loss. In addition to various empirical issues, beginning around 1980 the field of industrial organization experienced great progress in oligopoly theory, in the sense that older models were often shown to be special cases of the newer models. These theoretical advances resulted in the

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[1] The triangle also represents "allocative losses" or the "deadweight loss" to society. If marginal costs are rising, the total deadweight loss includes a triangle just below $\Delta ABC$ representing producer losses. Figure 1 is based on the traditional, Marshallian concept of consumer welfare and demand. Hicksian concepts of demand (the compensating and equivalent variations) may be theoretically preferred, but Willig (1976) has shown that Marshallian measures will be bracketed by the two Hicksian variations.

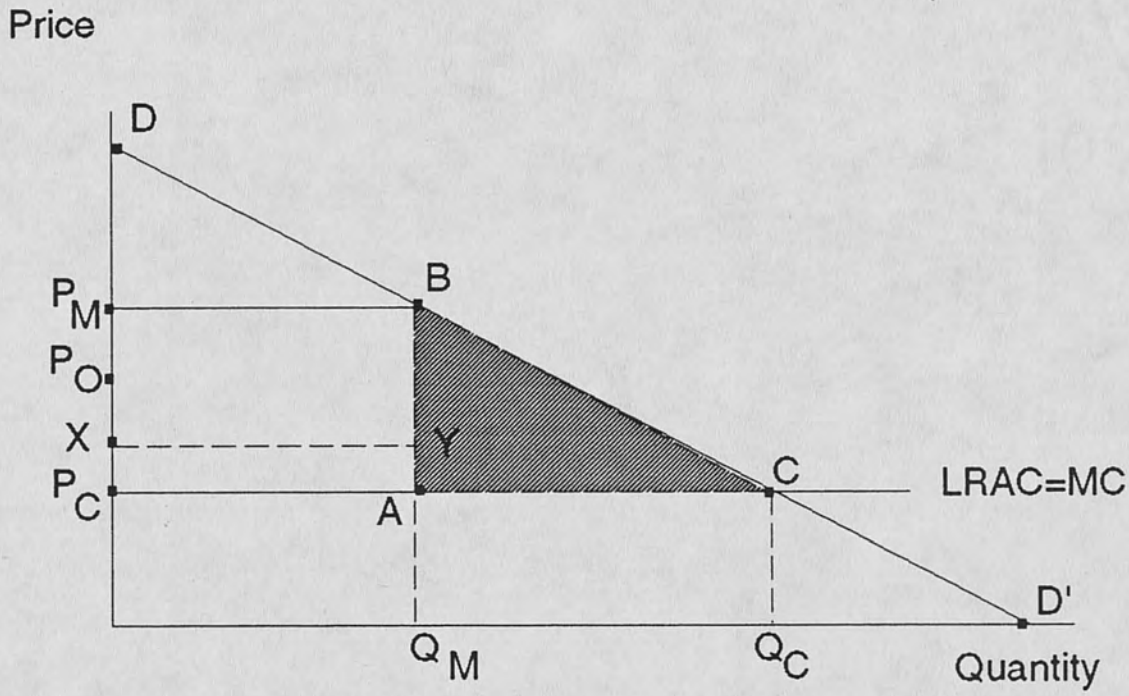


**Figure 1.** Welfare Losses and Income Transfers Due to Monopolistic Pricing.

development of several formulas that permit new empirical estimates of the losses due to market power. These newer approaches may be evolutionary refinements of previous estimates, or they may be radical breaks from the past. Many economists are concerned that the former empirical advances made in industrial organization may be rendered obsolete, discrediting the Bainsian mainstream of industrial organization.

Having accurate estimates of economic losses due to imperfect competition is important for public policy decision making. The allocation of antitrust enforcement effort is closely related to such losses, with efficiency criteria uppermost during some political regimes and equity concerns given greater weight under other political philosophies (Preston and Connor 1992).

This paper examines the impact of the theoretical developments of the 1980s on empirical estimation of economic losses due to market power. The main question addressed is whether the new theoretical approaches produce estimates of welfare losses that diverge from those of the Bainsian tradition, or whether the previous findings may be seen as special cases of the new estimates. Specifically, we are interested in whether eleven cross-sectional estimates of welfare loss and ten estimates of consumer overcharges due to market power in the U.S. food manufacturing industries are sensitive to the following factors:

- alternative conceptual models and their underlying assumptions,
- measurement issues, especially assumptions concerning parametric values,
- types of data employed for testing, and
- time periods.

Of the 21 sets of loss estimates presented in this paper, only three or four were previously published.

The alternative oligopoly models considered in this paper fall into four classes of pricing behavior: monopoly pricing, Cournot pricing, price leadership, and industry-wide oligopoly pricing whose nature is not predetermined by the researcher. Some empirical estimates are derived from predicted Lerner indexes that employ rich specifications of market structure and firm conduct, while others are calculated from formulas containing only two or three variables (numbers of companies, market concentration, and industry demand elasticity). Some estimates assume fixed values for demand or supply elasticities that the researcher defends as reasonable, while other approaches allow these parameters to vary across market observations. Another difference in empirical approaches is the competitive standard employed. While most choose perfect competition, some choose the less precise but possibly more pragmatic "workable" competition. All the estimates developed herein begin with national industry sales concentration data published by the U.S. Bureau of the Census, but some studies adjust these data for the size of geographic markets or the existence of strategic groups of firms within industries. As for data sources, some studies rely on Census price-cost margins, whereas others utilize commercial price data.[2] Moreover, earlier studies tended to draw upon broadly defined, aggregated industry data, whereas more recent studies have employed micro-data sets.[3] Finally, the time periods analyzed include years between 1967 and 1987.

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[2] We did not include structure-conduct studies based on company profit data in our survey of food-manufacturing studies, though there are a few good ones available (see Connor, et al. 1985:Chapter 7).

[3] Harberger's original study examined 73 industries as representative of the whole manufacturing sector. In the food manufacturing studies cited below, some use 43 to 50 four-digit industry observations, while others use more than 100 five-digit food product classes. Two studies were based on samples of hundreds of food products taken from commercial grocery information services that contained more than 50,000 food brands in the universe.

**Harberger Exposed**

The history of estimation attempts may be seen as a progressive loosening of the rigid assumptions embodied in Harberger's study. In order to calculate the area of $\Delta$ABC, he made the following five key assumptions: the demand curve (*DD'*) is linear; marginal costs (MC) are linear and constant; firms in the industry practice perfect (cartel) monopoly pricing; the competitive profit rate equals the observed average profit rate in the manufacturing sector (that is, the competitive price $P_c$=$P_0$ the observed market price, on average); and the absolute value of elasticity of own-price, retail demand ($\eta$) is unity for all industries.[4] Most of the initial criticism of Harberger focussed on measurement issues and examined the sensitivity of Harberger's estimate to changes in data bases, methods of calculation, or competitive benchmarks. However, nearly all subsequent research on welfare losses due to market power has retained one or more of these five assumptions, so they deserve to be examined in some detail:

1. Linear demand. This assumption leads to smaller welfare loss estimates compared to nonlinear demand schedules that are convex to the origin (see Figure 2). Moreover, the demand curve utilized implicitly in most research is the Marshallian (uncompensated) concept, instead of the theoretically preferred Hicksian welfare measures of change in consumer surplus. Only when the income effect of a price change is zero do the three measures coincide (Just, et al. 1982:93-94).

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[4] The formula for the change in net social welfare (DWL) is then

$$DWL = \frac{1}{2}P_c Q_c \eta \left(\frac{P_M - P_c}{P_c}\right)^2.$$

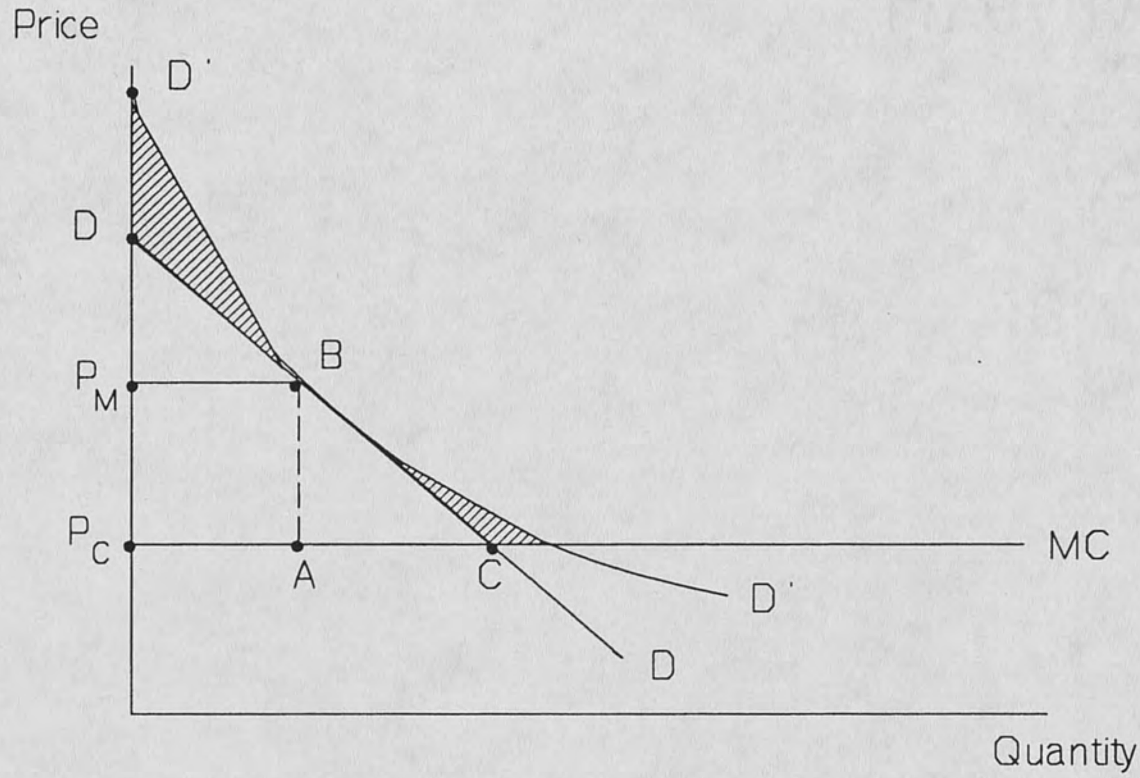


Figure 2. Welfare Losses and Income Transfers, Linear Demand (DD) Compared to Convex Demand (D'D').

Note: Shaded areas show increases in losses when demand schedule is convex compared to linear.

2. Constant marginal cost (MC) curve. One of the most frequent assumptions, widely regarded as "simplifying." But in fact the deadweight loss will vary systematically as $\epsilon$, the MC elasticity, takes positive (diseconomies of scale) or negative (economies of scale) values. Harberger assumed $\epsilon = \infty$, which means that the deadweight loss affects only consumer surplus. Furthermore, by assuming that all firms in an industry have equal marginal costs, products are technologically standardized. The demand and supply assumptions, taken together, assume a market in long-run equilibrium.

3. Effective cartel pricing. This assumption requires a high degree of pricing cooperation based on high seller concentration, blockaded entry, and full, certain knowledge by cartel members about demand and supply conditions. Oligopolies that adopt noncooperative pricing, limit pricing, or price leadership will, *ceteris paribus*, produce different welfare losses than cartels.

4. The competitive standard. Harberger was widely criticized for adopting average manufacturing sector profits as the competitive standard (Scherer 1970, 1980). If sellers earn non-zero economic profits from market power, then by using average profits as the basis of comparison, the analyst is implicitly choosing a price like $P_o$ instead of $P_c$, which will bias the estimated deadweight loss downward (Figure 1). Moreover, because economic profits become capitalized into asset values as "goodwill" by accounting methods, capital costs as stated in financial reports will be higher than their true marginal social costs, thus driving downward calculated returns on investment. On the other hand, reported accounting profits may be too high because of transitory disturbances, high industry risks, or superiority rents.

Finally, using manufacturing profits as a standard biases estimates of economy-wide dead-weight losses downward because profit rates tend to be lower in most other sectors, which have lower capital output ratios. In short, accounting profits may be biased surrogates for $P_c$ or MC. Direct measures of prices or marginal costs should be used when available.

5. Unit demand elasticity ($\eta$=1). This was Harberger's assumption that was the most criticized, partly because it is too low to be consistent with the simple monopoly model. Unless marginal costs are zero, point B in Figure 1 must be in the elastic range of DD$'$ (that is, $\eta>1$). Moreover, most critics found Harberger's assumption about the constancy of $\eta$ across all industries difficult to accept. Because $\eta$ is inversely related to the slope of BC, ceteris paribus, as $\eta$ increases, so does the area of $\Delta ABC$. However, for a given demand curve, the first-order condition for profit-maximization by a monopoly requires that $\frac{P_m - P_c}{P_m} = \frac{1}{\eta}$; that is, the monopoly price wedge and $\eta$ are inversely related.

Scherer (1970) suggested that $\eta$ should be well above unity because of the long-term substitution of outputs among manufacturing industries (e.g., aluminum for steel, petroleum for coal). However, very long-run substitution in the food processing industries occurred mainly by replacement of existing traditional on-farm or residential processing activities (Connor 1982). Industry demand elasticities may be low if cartel members face uncertainty (see Wahlroos 1984) or if entry is not blockaded (Masson and Shaanan 1984). In short, demand elasticities in food manufacturing are likely to be much lower than the levels suggested by Scherer or Harberger.

Finally, a point not noted in this literature is that sellers below the retail level used their industry's *derived* demand curve for decision-making. As is well known, only under very special margin relationships (specifically, constant percentage mark-ups) can derived $\eta$ be the same as the retail $\eta$ at any given output. Otherwise, the derived $\eta$ is less than the retail $\eta$. Reliable estimates of retail food own-price elasticities typically fall in the 0.3 to 0.7 range (Huang 1985), so food *manufacturing* elasticities are likely to be in a lower range.

## Expanded Welfare Loss Concepts

In addition to relaxing Harberger's assumptions, more recent estimates have employed expanded definitions of social loss. Alternative concepts of social loss due to market power follow from a reëxamination of the profit rectangle $P_mBAP_c$ in Figure 1, which is conventionally regarded as a pure income transfer. However, marginal costs can rise from $P_c$ to X on Figure 1 for firms that exercise market power. In this case, the lower portion of the monopoly profits rectangle should be regarded as a social loss with the entire rectangle an upper bound on social losses.

Supracompetitive costs can arise from two sources. First is lax cost controls in the absence of competitive pressures, what Leibenstein (1966) called X-inefficiency. There are many possible sources of X-inefficiency in oligopolies (Franz 1988). A second, perhaps larger source is rent-seeking by firms. Posner (1975) was perhaps the first to argue that the costs of lobbying for regulations or costs incurred to raise barriers to entry should be regarded as socially wasteful. Cowling and Mueller regarded the portion of advertising expenditures by incumbent firms intended to raise entry barriers as a major source of elevated costs.

A second alternative to the Harberger concept of social loss empirical approach takes the position that finding accurate estimates of industry supracompetitive costs due to market power (point X, Figure 1) is too difficult. Instead, the focus is on estimating the trapezoid $P_mBCAP_c$, which is composed of a dead-weight loss and an income transfer from consumers to producers. The entire trapezoid is the consumer loss due to market power.[5]

Justification for this second approach arises from a concern about increasing the inequality of income distribution. Oligopoly pricing is formally the same as an excise tax on consumers. Like tax-incidence analysis, one can calculate the implicit income-redistribution effects of oligopoly pricing. A study by Powell (1987) found that by reducing actual levels of four-firm concentration to 40 percent, income in the top one-sixth U.S. income stratum was reduced by 1.45 percent, but income increased in the other five strata by 0.3 to 0.7 percent. Connor, et. al. (1985) calculated benefits of similar magnitude from demonopolizing the U.S. food manufacturing industries.

## Food Manufacturing Studies

### Bainsian Models

#### Model 1.

Parker and Connor (1978, 1979) were the first to estimate consumer loss due to market power in the U.S. food manufacturing industries. The method used for Model 1 was first

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[5] Alternatively, one may speak of the trapezoid as the upper limit on net social losses, as X can conceivably rise to $P_M$.

developed by Collins and Preston (1968). This method is solidly in the Bainsian cross-sectional tradition of industrial-organization research, i.e., the form of the behavioral model and maintained hypotheses about the signs of the independent variables were drawn *a priori* from received theories of oligopoly and finance (Weiss 1974). Four-digit SIC industry price-cost margins were regressed against the four-firm concentration ratio, advertising intensity, an adjustment for regional markets, industry capital-output ratio, and sales growth. Although the fit of the model was quite good, this approach has several limitations. First, the fact that the sample is drawn from one year (1972) may mean that transitory disturbances other than unexpected shifts in demand have affected the estimates of the regression coefficients. Second, the price-cost margins are overly broad measure of profitability, containing several components of overhead expenses and other central administrative costs. For other criticisms of the cross-sectional, price-cost margin analysis of performance, see Schmalensee (1989).

The Parker-Connor approach employed three of Harberger's assumptions: monopoly pricing, linear demand, and constant marginal costs. However, an average demand elasticity of 0.5 was adopted after a search of the food demand literature. Moreover, Parker and Connor adopted an "effective competition" or "workable competition" standard, not the usual perfect competition standard (Scherer and Ross 1990:52-54). Based on their understanding of the threshold levels of market structure (there is a substantial literature on the critical concentration level), they identified critical levels of concentration, advertising, and geographic markets extent so as to compute the upper level of workable competition in food manufacturing. The workable-competition level of profitability was subtracted from predicted monopoly profits, and a sensitivity analysis was performed. Although informed by previous research, identifying the workable competition standard required judgement by the researcher.

Table 1. Predicted Dead-Weight Welfare Losses Due to Imperfect Market Competition, 47 U.S. Food Manufacturing Industries, 11 Models.

| SIC (1977) | Industry[c] | Estimating Model[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | Percent | | | | | | | | | | |
| 2011 | Meat packing | 0.00 | 0.05 | 0.01 | 0.00 | 0.29 | 0.89 | 14.3 | 0.98 | 24.0 | 0.00 | 0.50 |
| 2013 | Meat processing | 0.08 | 0.06 | 0.02 | 0.04 | 0.13 | 0.39 | 6.3 | 0.42 | 8.6 | 0.00 | 2.85 |
| 2016 | Poultry dressing | 0.00 | 0.18 | 0.08 | 0.01 | 0.42 | 1.28 | 20.4 | 1.47 | ---- | 0.00 | 2.30 |
| 2017 | Poultry and egg processing | 0.00 | 0.18 | 0.00 | 0.00 | 0.42 | 1.28 | 20.4 | 1.47 | ---- | 0.00 | 2.30 |
| | | | | | | | | | | | | |
| 2021 | Butter | 0.02 | 0.06 | 0.00 | 0.00 | 0.17 | 0.51 | 8.1 | 0.54 | 11.7 | 0.00 | 0.21 |
| 2022 | Cheese | 0.03 | 0.17 | 0.27 | 0.01 | 0.40 | 1.22 | 19.4 | 1.37 | 43.1 | 0.01 | 1.32 |
| 2023 | Preserved milk products | 0.01 | 1.25 | 0.57 | 0.04 | 0.48 | 1.46 | 23.4 | 1.68 | ---- | 0.01 | 2.63 |
| 2024 | Ice cream, frozen desserts | 0.05 | 0.93L | 0.60 | 0.01 | 0.14L | 0.42L | 6.7L | 0.45L | 9.8L | 0.00L | 2.08L |
| 2026 | Fluid milk and related | 0.07 | 0.54L | 0.50 | 0.01 | 0.22L | 0.69L | 11.0L | 0.77L | 24.0L | 0.00L | 0.66L |
| | | | | | | | | | | | | |
| 2032 | Canned specialties | 0.78 | 2.08 | 0.74 | 0.22 | 8.57 | 26.26 | 420.1 | ---- | ---- | 0.56 | 0.97 |
| 2033 | Canned fruits and vegetables | 0.07 | 1.34 | 0.18 | 0.06 | 0.98 | 3.00 | 47.9 | 4.00 | ---- | 0.01 | 2.99 |
| 2034 | Dried fruits and vegetables | 0.37 | 1.27 | 0.19 | 0.14 | 1.63 | 4.99 | 79.8 | 7.67 | ---- | 0.03 | 3.17 |
| 2035 | Pickles and sauces | 0.59 | 0.32 | 0.63 | 0.19 | 1.56 | 4.78 | 76.4 | 7.06 | ---- | 0.04 | 3.70 |
| 2037 | Frozen fruits and vegetables | 0.25 | 0.98 | 0.20 | 0.04 | 0.60 | 1.83 | 29.3 | 2.21 | ---- | 0.01 | 3.45 |
| 2038 | Frozen specialties | 0.25 | 1.05 | 0.43 | 0.06 | 0.60 | 1.83 | 29.3 | 2.21 | ---- | 0.01 | 3.45 |

Table 1. (Continued).

| SIC (1977) | Industry | Estimating Model[a] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 2041 | Flour | 0.05 | 0.48 | 0.23 | 0.02 | 3.70 | 11.34 | 181.4 | ---- | ---- | 0.05 | 2.97 |
| 2043 | Breakfast cereals | 2.10 | 2.64 | 1.42 | 0.20 | 22.32 | 68.34 | 1,093.5 | ---- | ---- | 0.71 | 19.51 |
| 2044 | Rice | 0.07 | 0.79 | 1.21 | 0.30 | 1.10 | 3.36 | 53.8 | 4.63 | ---- | 0.02 | 1.82 |
| 2045 | Flour mixes and doughs | 1.20 | 2.85 | 1.05 | 0.08 | 8.88 | 27.20 | 435.1 | ---- | ---- | 0.16 | ---- |
| 2046 | Wet corn milling | 0.00 | 0.25 | 0.54 | 0.00 | 15.48 | 47.41 | 758.5 | ---- | ---- | 0.10 | 0.60 |
| 2047 | Pet foods | ---- | 3.36 | 1.06 | 0.16 | 6.77 | 20.74 | 331.8 | ---- | ---- | 0.16 | 1.37 |
| 2048 | Animal feeds | ---- | 0.36L | 0.00 | 0.00 | 1.23L | 3.75L | 60.1L | 7.34L | ---- | 0.01L | 0.59L |
| | | | | | | | | | | | | |
| 2051 | Bread and cakes | 0.18 | 2.06L | 0.61 | 0.11 | 0.70L | 2.15L | 34.9L | 2.68L | ---- | 0.01L | 6.43 |
| 2052 | Cookies and crackers | 0.66 | 4.62 | 0.66 | 0.15 | 2.34 | 7.18 | 114.9 | 13.63 | ---- | 0.08 | 6.43 |
| | | | | | | | | | | | | |
| 2061 | Raw cane sugar | 0.00 | 0.15 | 0.00 | 0.00 | 17.52 | 53.66 | 858.5 | ---- | ---- | 0.37 | ---- |
| 2062 | Refined cane sugar | 0.07 | 0.48 | 0.11 | 0.00 | 4.16 | 12.75 | 204.1 | ---- | ---- | 0.09 | 2.24 |
| 2063 | Refined beet sugar | 0.01 | 1.17 | 0.11 | 0.00 | 4.16 | 12.75 | 204.1 | ---- | ---- | 0.09 | 2.24 |
| 2065 | Confectionery | 0.53 | 2.15 | 0.36 | 0.08 | 5.44 | 16.67 | 266.7 | ---- | ---- | 0.16 | 2.16 |
| 2066 | Chocolate | 0.56 | 1.97 | 0.60 | 0.13 | 1.23 | 3.76 | 60.2 | 4.92 | ---- | 0.04 | 3.28 |
| 2067 | Chewing gum | 2.39 | 6.98 | 2.08 | 0.91 | 1.81 | 5.56 | 88.9 | 8.51 | ---- | 0.05 | 5.87 |

Table 1. (Continued).

| SIC (1977) | Industry | Estimating Model | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 2074 | Cottonseed oil | 0.00 | 0.13 | 1.49[b]? | 0.00 | 30.98 | 94.88 | 1,518.0 | ---- | ---- | 0.48 | 1.46 |
| 2075 | Soybean oil | 0.00 | 0.08 | 1.49[b]? | 0.00 | 1.82 | 5.58 | 89.3 | 10.09 | ---- | 0.03 | 0.38 |
| 2076 | Other vegetable oils | 0.16 | 0.46 | 1.49[b]? | 0.00 | 0.47 | 1.43 | 22.9 | 1.66 | ---- | 0.01 | 0.85 |
| 2077 | Animal fats | 0.01 | 1.39 | 0.00 | 0.00 | 2.07L | 6.35L | 101.5L | ---- | ---- | 0.02 | 2.95 |
| 2079 | Margarine, cooking oils | 0.58 | 0.80 | 0.81 | 0.38 | 1.28 | 3.93 | 62.9 | 5.56 | ---- | 0.02 | 1.28 |
| | | | | | | | | | | | | |
| 2082 | Beer | 0.88 | 1.06 | 0.67 | 0.36 | 2.98 | 9.14 | 146.2 | 17.70 | ---- | 0.12 | 18.27 |
| 2083 | Malt | 0.00 | ---- | 0.00 | 0.00 | 1.71 | 5.25 | 84.0 | 5.75 | ---- | 0.04 | ---- |
| 2084 | Wine and brandy | 0.32 | ---- | 0.28 | 0.05 | 1.15 | 3.52 | 56.3 | 4.69 | ---- | 0.02 | 9.20 |
| 2085 | Distilled spirits | 1.46 | 6.50 | 0.59 | 0.06 | 12.96 | 39.69 | 635.0 | ---- | ---- | 0.17 | 10.54 |
| 2086 | Soft drinks bottling | 0.96 | 0.85L | 1.68 | 0.09 | 20.66 | 63.28 | 1,012.5 | ---- | ---- | 1.46 | 6.87L |
| 2087 | Flavorings | 0.74 | 11.24 | 0.93 | 0.15 | 42.85 | 131.22 | 2,099.5 | ---- | ---- | 1.61 | 0.27 |
| | | | | | | | | | | | | |
| 2091 | Canned fish | 0.17 | 0.67 | 0.00 | 0.07 | 0.35 | 1.08 | 17.3 | 1.21 | 33.3 | 0.00 | 5.48 |
| 2092 | Frozen fish | 0.00 | 0.48 | 0.17 | 0.00 | 0.07 | 0.21 | 3.4 | 0.22 | 4.1 | 0.00 | 3.12 |
| 2095 | Coffee | 0.86 | ---- | 0.78 | 0.06 | 4.57 | 14.00 | 224.0 | ---- | ---- | 0.09 | 7.56 |
| 2097 | Manufactured ice | 0.00 | 2.15L | 0.00 | 0.01 | 0.31L | 0.95L | 15.2L | 8.19L | ---- | 0.00L | 0.84L |
| 2098 | Pasta | 0.59 | 1.61 | 0.00 | 0.07 | 2.96 | 9.08 | 145.3 | ---- | ---- | 0.06 | 3.03 |
| 2099 | Miscellaneous prepared foods | 0.69 | 2.91 | 0.45 | 0.31 | 1.36 | 4.18 | 66.8 | 3.32 | ---- | 0.10 | 23.15 |
| | | | | | | | | | | | | |
| 20 | Food manufacturing average | 0.16 | 1.09 | 0.45 | 0.11 | 5.15 | 15.77 | 289.1 | 4.41[d] | 19.8[d] | 0.17 | 4.65 |

Table 1. (Continued).

L = Local or regional markets, but study uses uncorrected national concentration data.

---- Undefined or not available.

[a] Model 1: Based on 1972 value of product shipments, from Parker and Connor (1978: Table C.3), unpublished estimates provided by Parker and Connor.

Model 2: Based on 1972 shipments, from Olson and Bumpass (1984), before-tax Harberger losses, unpublished estimates provided by Olson and Bumpass.

Model 3: Based on 1975 shipments, from "Model 14" in Connor, et al. (1985: Table D-4, second column), unpublished estimates provided by Parker and Connor.

Model 4: Based on 1979-1980 price data and 1977 shipments of branded products to food stores only, from Connor and Peterson (1992: Table 1, Equation 1.3), unpublished estimates provided by the authors. This model and the following models use elasticities from Pagoulatos and Sorenson (1986).

Model 5-7: Based on 1982 concentration and product shipments data (Connor 1988: Table 11-4), calculated from formulas for Stakelberg, Cournot, and Collusive price leadership with four leaders and linear demand in Willner (1988).

Model 8-9: Same as models 5-7, except for isoelastic demand and Cournot and Collusive price leadership (Willner 1988).

Model 10: Based on 1982 concentration and shipments, Cournot industry-wide pricing, linear or isoelastic demand, formulas from Willner (1988).

Model 11: Based on 1987 concentration and shipments data, from Bhuyan and Lopez (1983: Table 1).

[b] Alternative model specifications result in point estimates that differ by more than two standard deviations. Therefore, estimated overcharges believed to be unreliable.

[c] Some studies had only one estimate for two combined industries (e.g., 2016 + 2017). These estimates are repeated in the table.

[d] Where defined, these isoelastic estimates are on average 5.6 higher than their linear demand counterparts (Cournot pricing) or 24 times higher (collusive pricing). However, in the majority of industries, isoelastic demand produces infinitely high prices.

Table 2. Predicted Consumer Overcharges due to Imperfect Competition, 47 U.S. Food Manufacturing Industries, Ten Models.

| SIC (1977) | Industry[c] | Estimating Model[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | Percent | | | | | | | | | |
| 2011 | Meat packing | 0.0 | 1.31 | 0.2 | 0.0 | 9.3 | 16.3 | 65.2 | 6.66 | 89.2 | 1.02 |
| 2013 | Meat processing | 5.6 | 0.76 | 3.5 | 3.4[e] | 6.7 | 11.8 | 47.0 | 3.87 | 55.6 | 0.71 |
| 2016 | Poultry dressing | 0.0 | 2.98 | 3.3 | 3.5[e] | 16.7 | 29.2 | 116.7 | 6.27 | ---- | 0.83 |
| 2017 | Poultry and egg processing | 0.0 | 2.98 | 0.0 | 0.0[d]? | 16.7 | 29.2 | 116.7 | 6.27 | ---- | 0.83 |
| | | | | | | | | | | | |
| 2021 | Butter | 3.1 | 1.71 | 2.0 | 0.0[e] | 8.0 | 13.9 | 55.8 | 4.30 | 67.5 | 0.73 |
| 2022 | Cheese | 3.5 | 2.94 | 5.3 | 0.2[e] | 12.6 | 22.1 | 88.2 | 7.23 | 131.3 | 1.70 |
| 2023 | Preserved milk products | 1.7 | 7.92 | 12.0[b]? | 10.1 | 15.1 | 26.4 | 105.5 | 7.66 | ---- | 2.15 |
| 2024 | Ice cream, frozen desserts | 4.5 | 6.84L | 13.6[b]? | 2.7 | 8.7L | 15.3L | 61.1L | 3.33L | 70.9L | 0.59L |
| 2026 | Fluid milk and related | 5.3 | 5.21L | 14.4 | 3.2 | 13.7L | 24.0L | 95.8L | 3.87L | 119.8L | 1.11L |
| | | | | | | | | | | | |
| 2032 | Canned specialties | 17.7 | 10.21 | 19.5 | 23.6 | 169.0 | 295.8 | 1,183.3 | ---- | ---- | 43.23 |
| 2033 | Canned fruits and vegetables | 5.4 | 8.18 | 5.2 | 8.0 | 32.1 | 56.2 | 224.7 | 10.64 | ---- | 3.74 |
| 2034 | Dried fruits and vegetables | 12.1 | 7.94 | 10.1 | 10.8 | 33.9 | 59.3 | 237.2 | 7.24 | ---- | 6.22 |
| 2035 | Pickles and sauces | 15.3 | 3.99 | 16.5 | 12.6 | 39.5 | 69.1 | 276.5 | 16.32 | ---- | 6.48 |
| 2037 | Frozen fruits and vegetables | 10.0 | 6.98 | 8.3 | 7.0 | 22.3 | 39.1 | 153.3 | 7.58 | ---- | 2.53 |
| 2038 | Frozen specialties | 10.0 | 7.26 | 11.8 | 7.7[e] | 22.3 | 39.1 | 153.3 | 7.58 | ---- | 2.53 |

Table 2. (Continued).

| SIC (1977) | Industry | Estimating Model[a] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2041 | Flour | 4.4 | 4.90 | 6.9 | 37.6[c] | 102.9 | 180.0 | 720.0 | ---- | ---- | 12.46 |
| 2043 | Breakfast cereals | 29.0 | 11.49 | 27.9 | 38.4 | 385.7 | 675.0 | 2,700.0 | ---- | ---- | 69.60 |
| 2044 | Rice | 5.1 | 6.29 | 16.6 | ---- | 34.9 | 61.1 | 244.4 | 11.66 | ---- | 4.42 |
| 2045 | Flour mixes and doughs | 21.9 | 11.94 | 22.8 | 24.0 | 210.7 | 368.8 | 1,475.0 | ---- | ---- | 28.53 |
| 2046 | Wet corn milling | 1.2 | 3.56 | 11.7[b]? | ---- | 278.2 | 486.9 | 1,947.5 | ---- | ---- | 43.03 |
| 2047 | Pet foods | ---- | 12.95 | 21.0 | 24.3 | 150.2 | 262.9 | 1,051.7 | ---- | ---- | 23.37 |
| 2048 | Animal feeds | ---- | 4.26L | 5.4 | 0.0 | 55.4L | 9.69L | 387.5L | 14.38L | ---- | 5.16L |
| | | | | | | | | | | | |
| 2051 | Bread and cakes | 8.6 | 10.15L | 14.3 | 16.5 | 19.7L | 34.5L | 138.1L | 8.28L | ---- | 2.78L |
| 2052 | Cookies and crackers | 16.3 | 15.19 | 18.2 | 16.4 | 47.6 | 86.8 | 347.1 | 26.54 | ---- | 9.41 |
| | | | | | | | | | | | |
| 2061 | Raw cane sugar | 0.0 | 2.66 | 0.0 | 0.0 | 418.6 | 732.5 | 2,930.0 | ---- | ---- | 31.40 |
| 2062 | Refined cane sugar | 5.4 | 4.88 | 7.1 | 0.0[d]? | 87.0 | 152.3 | 609.1 | ---- | ---- | 12.82 |
| 2063 | Refined beet sugar | 1.5 | 7.63 | 7.1 | 0.0[d]? | 87.0 | 152.3 | 609.1 | ---- | ---- | 12.82 |
| 2065 | Confectionery | 14.6 | 10.63 | 12.6 | 14.8 | 124.7 | 218.2 | 872.9 | ---- | ---- | 21.53 |
| 2066 | Chocolate | 15.0 | 9.91 | 13.5 | 9.7[e] | 28.2 | 49.3 | 197.1 | 14.00 | ---- | 4.86 |
| 2067 | Chewing gum | 30.9 | 18.69 | 33.3 | 35.1 | 41.6 | 72.7 | 291.0 | 18.98 | ---- | 7.18 |

Table 2. (Continued).

| SIC (1977) | Industry | Estimating Model[1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2074 | Cottonseed oil | 0.8 | 2.49 | 16.5[b]? | 0.0 | 787.1 | 1,377.5 | 5,510.0 | ---- | ---- | 98.10 |
| 2075 | Soybean oil | 0.8 | 2.00 | 16.5[b]? | 0.0 | 47.9 | 83.8 | 335.3 | 20.84 | ---- | 6.28 |
| 2076 | Other vegetable oils | 7.9 | 4.71 | 16.5[b]? | 0.0 | 17.4 | 30.4 | 121.6 | 6.86 | ---- | 1.86 |
| 2077 | Animal fats | 1.8 | 8.32 | 1.2 | 0.0 | 76.9 | 134.6 | 538.6 | ---- | ---- | 8.20 |
| 2079 | Margarine, cooking oils | 15.2 | 6.32 | 18.6 | 23.4 | 36.8 | 64.3 | 257.4 | 13.52 | ---- | 4.12 |
| | | | | | | | | | | | |
| 2082 | Beer | 18.8 | 7.27 | 17.9 | 20.8 | 52.1 | 91.1 | 364.5 | 33.97 | ---- | 10.32 |
| 2083 | Malt | 0.6 | ---- | 0.0 | 0.0 | 43.7 | 76.5 | 306.1 | 13.68 | ---- | 6.53 |
| 2084 | Wine and brandy | 11.3 | ---- | 12.7 | 7.6[e] | 31.0 | 54.2 | 216.7 | 12.65 | ---- | 4.20 |
| 2085 | Distilled spirits | 24.2 | 18.02 | 20.9 | 19.2 | 360.0 | 630.0 | 2,520.0 | ---- | ---- | 41.10 |
| 2086 | Soft drinks bottling | 19.6 | 6.53L | 26.3 | 37.9 | 321.4 | 562.5 | 2,250.0 | ---- | ---- | 85.43L |
| 2087 | Flavorings | 17.2 | 23.71 | 20.7 | ---- | 925.7 | 1,620.0 | 6,480.0 | ---- | ---- | 179.40 |
| | | | | | | | | | | | |
| 2091 | Canned fish | 8.2 | 5.75 | 5.2 | 3.7[e] | 11.2 | 19.6 | 78.6 | 7.00 | 118.9 | 1.04 |
| 2092 | Frozen fish | 0.5 | 4.90 | 3.9 | 0.0 | 4.0 | 7.0 | 28.1 | 3.25 | 32.2 | 0.31 |
| 2095 | Coffee | 18.6 | ---- | 20.1 | 9.7 | 91.2 | 159.5 | 638.2 | ---- | ---- | 12.79 |
| 2097 | Manufactured ice | 0.0 | 10.22L | 0.0 | 3.3 | 18.0L | 31.6L | 126.3L | 0.33L | ---- | 0.65L |
| 2098 | Pasta | 15.4 | 8.96 | 9.7 | 13.3 | 77.0 | 134.8 | 539.0 | ---- | ---- | 10.77 |
| 2099 | Miscellaneous prepared foods | 16.6 | 12.07 | 15.8 | 17.8 | 37.9 | 66.3 | 265.3 | 0.72 | ---- | 10.28 |
| | | | | | | | | | | | |
| 20 | Food manufacturing total | 7.9 | 5.95 | 11.5 | 15.4 | 115.7 | 202.6 | 815.9 | 10.42 | 85.7 | 19.64 |

Table 2. (Continued).

L = Local or regional market, but study uses uncorrected national concentration data.

---- Undefined or not available.

[a] Model 1: Based on 1975 value of product shipments, from Parker and Connor (1978: Table C.3), unpublished estimates provided by Parker and Connor.

Model 2: Based on 1972 shipments, from Olson and Bumpass (1984), before-tax Harberger losses, unpublished estimates provided by Olson and Bumpass.

Model 3: Based on 1975 shipments, from "Model 14" in Connor, et al. (1985: Table D-4, second column), unpublished estimates provided by Parker and Connor.

Model 4: Based on 1979-1980 price data and 1977 shipments of branded products to food stores only, from Connor and Peterson (1992: Table 1, Equation 1.3), unpublished estimates provided by the authors. This model and the following models use elasticities from Pagoulatos and Sorenson (1986).

Model 5-7: Based on 1982 concentration and product shipments data (Connor 1988: Table 11-4), calculated from formulas for Stakelberg, Cournot, and Collusive price leadership with four leaders and linear demand in Willner (1989).

Model 8-9: Same as models 5-7, except for isoelastic demand and Cournot and Collusive price leadership (Willner 1988).

Model 10: Based on 1982 concentration and shipments, Cournot industry-wide pricing, linear or isoelastic demand, formulas from Willner (1988).

Model 11: Based on 1987 concentration and shipments data, from Bhuyan and Lopez (1983: Table 1).

[b] Alternative model specifications result in point estimates that differ by more than two standard deviations. Therefore, estimated overcharges believed to be unreliable.

[c] Some studies had only one estimate for two combined industries (e.g., 2016 + 2017). These are repeated.

[d] Results probably unreliable because same model yields vastly different estimates for 1979, 1890, and 1979-80 combined. Specifically, the predicted percentage Lerner Indexes for 1979 and 1980 were <u>both</u> more than 50% higher (or lower) than the 1979-80 prediction.

[e] Results may be unreliable because predicted Lerner indexes are sensitive to time period. Specifically, <u>one</u> of the years 1979 or 1980 differs by 25% or more from the 1979-80 point estimates.

The Connor-Parker study yielded an average dead-weight welfare loss twice as high as Harberger's--0.16 percent of 1975 food industry value of shipments (Table 1, column 1). The average consumer overcharge, which Harberger did not estimate, was predicted to be 7.9 percent of food-manufacturing shipments (Table 2, column 1). The total consumer loss ranged from 0 (for five industries) to 33 percent (chewing gum).

**Model 2.**

Olson and Bumpass (1984) also performed an analysis the determinants of price-cost margins for the U.S. manufacturing sector. At our request, Olson and Bumpass prepared industry deadweight and consumer overcharge estimates for food manufacturing using a "workable competition" standard based on profits (second column in Tables 1 and 2). Olson and Bumpass assumed monopoly pricing, linear demand, and constant marginal costs; they based their benchmark profit standard on average corporate earnings before taxes and interest, adjusted downward for R&D expenditures and upward for understatement of assets due to historical-cost evaluation. They calculated a Harberger welfare loss as well as a broader estimate of losses akin to the consumer overcharge. The latter estimate uses the Cowling-Mueller method, which counts half of advertising expenditures as X-inefficiency and derives elasticities of demand directly from margins. A contribution of Olson and Bumpass was dealing with transitory disturbances by averaging over a very long period (1967-1981). For all manufacturing, Olson and Bumpass find that the U.S. (Harberger) welfare loss is 0.9 percent of 1972 output and the consumer loss was 3.3 percent. For food manufacturing, the respective estimates are 1.09 and 5.95 percent (second columns of Tables 1 and 2).

**Model 3.**

The second method used by Parker and Connor is their national brand-private label price approach (revised in Connor, et al. 1985). The key assumption in this study (and in Connor and Peterson 1992) is that the competitive benchmark $P_c$ is approximated by highly disaggregated, observed prices of private-label foods. Using the percentage difference between national-brand and private-label prices as a proxy for the Lerner index, which we call a price-price margin, overcomes most of the criticisms of cross-sectional structure-performance studies (Schmalensee 1989). However, the second Parker-Connor approach still incorporates many Harberger assumptions: linear demand, constant marginal costs, monopoly pricing, and a constant price elasticity ($\eta = 0.5$). Welfare losses in food manufacturing in averaged 0.45 percent of 1975 shipments, and consumer overcharges averaged 11.5 percent (third columns of Tables 1 and 2). Total consumer losses were about twice as high as were predicted from Models 1 and 2.

**A Post-Bainsian Model of Differentiated Oligopoly**

**Model 4.**

Connor and Peterson (1992) used a different commercial food price data set to calculate a price-price margin (the Lerner index) and introduced a number of refinements in its measurement, but the concept is essentially the same price-price ratio used by Parker and Connor. However, they relaxed many of the restrictive assumptions of the Harberger method. The major change is that their estimating model is derived from an explicit *structural model of differentiated oligopoly using Cournot pricing*. Gone are the restrictive Harberger assumptions of unitary elasticity of demand, monopoly pricing, and homogeneity of goods. This last assumption in particular seems unrealistic in view of the overarching importance of product differentiation in explaining food-manufacturing competitiveness (Connor, et. al, 1985). Connor and Peterson were careful to include in their model adjustments for regional markets, import competition, and variations in the mix of mass media employed in product advertising. Another major improvement was that empirical, independently estimated elasticities of manufacturers' derived demand that vary across industries are incorporated into the model (Pagoulatos and Sorenson, 1986). The only Harberger assumptions retained by Connor and Peterson were that of constant marginal costs and linear demand.[6]

The Connor and Peterson consumer loss results are shown for the first time in Tables 1 and 2. Consumer overcharges averaged 15.4 percent of 1977 food-manufacturing shipments; the dead-weight losses were virtually at Harberger levels--0.11 percent of shipments. More detailed estimates are shown in Connor and Peterson (1993:Table 3 and 4).

## Price Leadership Models

The models discussed thus far have assumed industry-wide monopoly pricing or Cournot pricing. We are fortunate in having studies of welfare losses due to market power in food manufacturing that examined the sensitivity of estimates to alternative pricing assumptions. Instead of assuming monopoly or Cournot oligopoly pricing, Gisser (1982) presented a model based on the assumption of price leadership. Instead of linear demand,

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[6] Models 3 and 4 used significantly more disaggregated data than previous studies, which aggregated processed foods into 45 to 50 industries. The commercial data sets defined about 400 product classes; each class on average accounted for less than 0.04 percent of U.S. household' disposable income. This tiny share implies that the income effect of a price change due to market power is negligible. Thus, Marshallian welfare losses coincide with Hicksian losses (Just, et al. 1982).

Gisser assumed an isoelastic demand function: $Q = AP^{-\eta}$, where Q is quantity of a homogeneous product, P is price, $\eta$ is the absolute value of elasticity of demand, and A a shift parameter. This demand curve is convex with respect to the origin. On the supply side, the MC curve is linear, and the marginal cost elasticity ($\epsilon$) can be set at any positive value. However, Gisser assumed that both the dominant firm (or the leading firm group) and the price-taking fringe have identical supply elasticities, a convenient but restrictive assumption. In the empirical work, Gisser assumed that $\epsilon=1$ for both groups of firms and that the leading group of price-markers consists of four perfectly colluding firms. Another limiting assumption was that $\eta$ is equal for all industries, the old Harberger assumption.

With $\eta=0.5$, Gisser concluded that the consumer loss due to collusive price leadership was about seven percent, of which the dead-weight loss was 0.9 percent of shipments. If $\eta=1.0$, the dead-weight loss was reduced to 0.5 percent.

In a critical comment on Gisser's model, Willner (1989) applied a similar price leadership model to food manufacturing that rejected certain assumptions of Gisser and relaxes others. First, Willner considered the assumption that both price makers and price takers have identical marginal cost elasticities ($\epsilon$) dubious because it implies that both sets of firms employ identical technologies. He argued that the leaders should be expected to dominate an industry partially because of technological superiority, while the followers are more likely to operate at full capacity just as competitive firms do. He also argued that it is practically a stylized fact that large corporations have horizontal marginal costs. Accordingly, he assumed that $\epsilon=\infty$ for the leaders and $\epsilon=0$ for the followers. Second, Willner took exception to Gisser's assuming constant, and possibly arbitrary $\eta$ values.

Instead, he adopts the empirical estimates of $\eta$ that were used by Connor and Peterson (1992). Third, Willner derives welfare-loss algorithms under three types of pricing behavior by the leading-firm group: collusion (or dominant firm), Cournot-Nash, or the more rivalrous Stackelberg pricing rule.

Using Willner's algorithms we develop five more sets of estimates of economic losses in U.S. food manufacturing. The five models are:

- **Model 5**: Stakelberg price leadership with linear demand,
- **Model 6**: Cournot-Nash price leadership with linear demand,
- **Model 7**: Collusive price leadership with linear demand,
- **Model 8**: Cournot-Nash price leadership with isoelastic demand, and
- **Model 9**: Collusive price leadership with isoelastic demand.

(The sixth possible combination, Stakelberg pricing with isoelastic demand, was shown to be nonexistent.)

The estimates of deadweight social welfare losses for the five price-leadership models are displayed in Table 1, and the corresponding consumer overcharges are shown in Table 2. These estimates are based on formulas that contain only three variables: N (the number of firms in the price-leadership group), CRN (the N-firm concentration ratio), and $\eta$ . Because the smallest CRN statistic available from official U.S. sources is CR4, these estimates implicitly assume that the non-collusive leading-firm group always consists of four firms (N=4). With data from commercial sources, future research would be able to demonstrate the sensitivity of the loss estimates to variation in N, including the dominant-firm case (N=1). A limitation of models 5 to 9 is that the CR4 data were not adjusted for international trade, regional markets, and other factors that affect appropriate market boundaries, though such adjustments have been made by previous researchers. In tables 1 and 2, special symbols are added to warn the readers about poorly defined markets. Finally, although these price leadership models assume product homogeneity, an examination of the elasticities used for calculating the welfare-loss estimates reveals that $\eta$ is relatively low (in absolute value) in food industries with highly differentiated goods (breakfast cereals, alcoholic beverages) compared to industries with more standardized consumer goods (meats, milk, bread). Demand is also extremely inelastic for foodstuffs purchased mainly by food processors for further processing (vegetable oils, flour, and sugar). Thus, product differentiation may be implicitly accounted for in the variation in $\eta$ .

In general, the dead-weight welfare loss estimates from price leadership models are inversely related to $\eta$ (in absolute value). For example, assuming linear demand, the average deadweight welfare loss for U.S. food manufacturing, was an implausibly high 289 percent if the leaders collude; if the leaders are noncooperative Cournot firms, the loss drops to 15.77 percent; with Stackelberg pricing, the loss drops further to 5.15 percent (Table 1). With isoelastic demand schedules, the welfare losses are many times higher; in fact, in most food industries with collusive price leadership, the equilibrium price is *infinitely* high. Of course, the consumer overcharges are higher than the welfare losses estimated (Table 2).

**General Oligopoly Pricing**

**Model 10.**

The final set of estimates in our survey looks at welfare losses under industry-wide general oligopoly pricing (Willner 1988, Willner and Ståhl 1992). Unlike the price-leadership models, every firm in the industry uses the same pricing rule. In the case of

Model 10, all firms are Cournot-Nash oligopolists facing a linear industry demand schedule.[7] Industry elasticities of demand $\eta$ are exogenously estimated separately for each industry (Pagoulatos and Sorenson, 1986). Marginal costs are constant. The data are 1982 Herfindahl indexes of concentration, uncorrected national market, SIC definitions.

**Model 11.**

This model was developed by Bhuyan and Lopez (1993), following closely work by Dickson and Yu (1989). Bhuyan and Lopez offer several alternative oligopoly models, but we will initially describe their "baseline case," which is based on uncorrected 1987 U.S. Herfindahl indexes of concentration (H). The assumptions of Model 11 are the same as for Model 10, except that the degree of industry-wide cooperation is allowed to vary across industries and demand is isoelastic. The conjectural variation elasticity for firm i is $\alpha_i$, and $\alpha_i = s_i + \phi_i(1-s_i)$, where $s_i$ is market share and $\phi_i$ is the cooperation parameter, which usually takes some value between 0 (Cournot) and 1 (monopoly). By assuming $\alpha_i=\alpha$ for all firms, it can be shown that $\alpha=H + \phi(1-H)=\eta \cdot \mathcal{L}$, where $\mathcal{L}$ is the Lerner index. Thus, $\phi$ can be estimated from a computed Lerner index ($\hat{\mathcal{L}}$), $\hat{\eta}$, and H using the formula

$$\hat{\phi} = \frac{\hat{\eta}\hat{\mathcal{L}}-H}{1-H}.$$

Table 1 shows the deadweight welfare loss estimates for Model 10 (which assumes $\phi=0$) and Model 11 (which calculates $1>\hat{\phi}>0$). Because the concentration and elasticities are so similar, the high welfare losses shown for Model 11 may indicate significant degrees

[7]Willner (1988) also derives an algorithm for calculating welfare loss under isoelastic demand, but the estimates are usually only slightly higher than the linear demand case, so they are not reproduced here.

of cooperation exist in most U.S. food manufacturing industries.[8] Table 2 shows the consumer overcharges for Model 10; the much higher overcharges for Model 11 are not computed.

Bhuyan and Lopez (1993) also perform several simulations of the effects on welfare loss due to changes in the extent of cooperation, demand and supply elasticities, and pricing behavior, which we summarize briefly. As expected, as the degree of cooperation increases (as $\phi \rightarrow 1$), so do the estimated welfare losses. There is also some variation in net welfare loss when $\eta$ changes, though not as great as when $\alpha$ changes. For example, when $\eta = 0.5$ for all industries (the Parker-Connor assumption) and $\phi = \hat{\phi}$, the welfare loss is 8.2 percent of sales, but when $\eta = 1.5$ (the Scherer-Ross suggestion), the loss falls to 1.8 percent of sales. Under a wide range of parameters ($1.5 > \eta > 0$, $\infty > \epsilon \geq -2$), pure monopoly gives rise to losses roughly ten times higher than monopolistic price leadership. However, when Cournot pricing is imposed, oligopoly and price leadership generate estimated welfare losses within a narrower range. Specifically, when diseconomics of scale are present, estimated welfare losses from the general oligopoly model are from 30 to 120 percent higher than those of the price leadership model. However, when the MC curve of the leaders is constant or negative, welfare loss estimates are 10 to 50 percent higher under price leadership compared to industry-wide oligopoly.

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8 The 1987 values of H are slightly higher than the 1982 values used for Model 10; five $\hat{\eta}$ are also higher in Bhuyan and Lopez (1983:17) than in Willner (1988). Moreover, Model 11 assumes isoelastic demand, whereas Model 10 assumes linear demand. Finally, $\hat{\mathcal{L}}$ is a rather broad price-cost margin (industry value added less labor costs as a percentage of value of shipments) that assumes $\mathcal{L}=0$ under perfect competition, the implicit competitive standard.

**Comparisons of Results**

Average economic losses due to imperfect competition in the U.S. food manufacturing industries from various studies are summarized in Table 3. It seems clear that the cardinal estimates of welfare losses due to market power are on average quite sensitive to model specification, that is, assumptions about assumptions about pricing behavior and the demand curve. The five price leadership models (5 to 9) yield economic loss estimates that are distinctly higher than the models that assume industry-wide oligopoly pricing (Models 1-4 and 10-11). One feature common to all models is that consumer overcharge estimates far exceed the deadweight welfare loss estimates--by a ratio of about 40 to one on average.

Although average estimates of welfare losses or consumer losses are quite sensitive to model specification and data sources, what about the cross-industry ranking of such losses? Were the Bainsian cross-sectional techniques of the 1960s and 1970s misconceived, superannuated by the theoretical progress of the 1980s? Were the enforcement officials in U.S. antitrust agencies who used, directly or indirectly, performance indicators to choose target industries misled by industrial studies (see Preston and Connor 1992)?

Table 4 suggests that the answer these questions is no. For five quite different analytical methods, there is considerable overlap in the industries with the greatest consumer losses due to market power. Breakfast cereals, confectionery, flour mixes, pet foods, canned specialty items (soups, baby foods, etc.), and most highly differentiated beverage industries appear repeatedly across the five columns. Two models (5 and 10) that assume product homogeneity also list a few producer goods that appear by virtue of extremely low price elasticities (flour, sugar, corn fructose, and cottonseed oil). Yet, on the whole, the greatest losses are attributable to heavily advertised, high-value-added consumer products.

Table 3. Summary of Average Economic Losses due to Market Power in the U.S. Food Manufacturing Industries.

| Empirical Approach | Losses as a Percent of Output | |
|---|---|---|
| | Deadweight Welfare Loss | Consumer Overcharge |
| | Percent | |
| 1. Bainsian model, Census price-cost margins, monopoly pricing[a] | 0.16 | 7.9 |
| 2. Bainsian model, Census price-cost margins, monopoly pricing[b] | 1.09 | 6.0 |
| 3. Bainsian model, price-price-margins, monopoly pricing[a] | 0.45 | 11.5 |
| 4. Price-price margins, differentiated oligopoly, Cournot pricing[a] | 0.11 | 15.4 |
| 5. Stakelberg price leadership, linear demand | 5.15 | 115.7 |
| 6. Cournot-Nash price leadership, linear demand | 15.77 | 202.6 |
| 7. Collusive price leadership, linear demand | 289.1 | 815.9 |
| 8. Cournot-Nash price leadership, isoelastic demand | 4.4+[d] | 10.4+[d] |
| 9. Collusive price leadership, isoelastic demand | 19.8+[d] | 85.7+[d] |
| 10. Industry-wide Cournot pricing, linear or isoelastic demand[c] | 0.17 | 19.6 |
| 11. Industry-wide oligopoly pricing, isoelastic demand | 4.65 | ---- |

---- = Not available.

[a] Uses "workable competition" standard based on critical concentration ratio; assumes linear demand.

[b] Uses benchmark profit rate as competitive standard; assumes linear demand.

[c] Estimates of losses are nearly invariant to the shape of the demand curve (See Table 5).

[d] Most of the industries have equilibrium prices that are infinitely high. When both methods yield frinite estimates, the isoelastic-demand prices are approximately 5 to 50% higher than the linear-demand prices (Cournot case) or 50 to 100% higher (collusive case).

Source: Tables 1 and 2.

Table 4. The 15 U.S. Food Industries with the Largest Deadweight Welfare Losses due to Market Power, by Alternative Analytical Models.

| Model 1: Bainsian Model, Monopoly Pricing, Census Price-Cost Margin | Model 3: Differentiated Oligopoly, Monopoly Pricing, Price-Price Margin | Model 4: Differentiated Oligopoly, Cournot Pricing, Price-Price Margin | Models 5, 6, & 7: Price Leadership, Linear Demand, Elasticity and Concentration Data | Model 10: Industry-Wide Cournot Pricing, Elasticity and Concentration Data |
|---|---|---|---|---|
| Chewing gum | Chewing gum | Chewing gum | Flavorings | Flavorings |
| Breakfast cereals | Soft drinks | Margarine & oil | Cottonseed oil | Cottonseed oil |
| Distilled spirits | Breakfast cereals | Beer | Breakfast cereals | Soft drinks |
| Flour mixes | Rice | Misc. prepared foods | Soft drinks | Breakfast cereals |
| Soft drinks | Pet Foods | Rice | Raw cane sugar | Raw cane sugar |
| Beer | Flavorings | Canned specialties | Wet corn milling | Canned specialties |
| Coffee | Margarine & oil | Breakfast cereals | Distilled spirits | Wet corn milling |
| Canned specialties | Coffee | Pickles & sauces | Flour mixes & doughs | Distilled spirits |
| Flavorings | Canned specialties | Pet foods | Canned specialties | Flour mixes |
| Misc. prepared foods | Beer | Flavorings | Pet foods | Pet foods |
| Cookies & crackers | Cookies & crackers | Dried fruits, vegs., soups | Confectionery | Confectionery |
| Pasta | Pickles & sauces | Cookies & crackers | Coffee | Flour |
| Pickles and sauces | Bread & cakes | Chocolate | Refined sugar | Coffee |
| Margarine | Chocolate | Bread & cakes | Flour | Pasta |
| Chocolate | Ice cream | Soft drinks | Beer | Beer |

Source: Tabls 1.

Note: In each column the 15 industries are listed in descending order of percentage net welfare loss due to market power.

We further analyze economic losses due to market power by correlating the percentage welfare losses in the food industries across the eleven sets of estimates (Table 5).[9] Perhaps the most striking feature of Table 5 is that none of the 55 correlation coefficients is significantly negative; indeed, all but a few are significantly positive coefficients. The analytical approach most strongly associated with the others is Cournot-Nash price leadership (Model 8), and the one most poorly associated with all the others is the"unconstrained" oligopoly pricing model developed by Bhuyan and Lopez (Model 11). Another noteworthy result is that when demand is linear, the price leadership models result in economic losses that are by construction perfectly correlated, irrespective of the pricing rule used by the leaders (Models 5, 6, and 7). Correlations between price leadership models with different demand curves are also quite close to 1.00.

There is also a high association among consumer loss estimates for the four models that use the price-cost or price-price margins approach (Models 1 to 4): the six correlations average 0.60. This is remarkable, given the many differences in time periods, levels of aggregation, proxies for the Lerner index, assumed pricing behaviors, demand elasticities, competitive standards, and a host of other measurement considerations. However, each of the four price-cost or price-price margin models share one characteristic not found in the remaining six methods, namely, a focus on product differentiation. Each of the four methods varies in how it deals with differentiation, from *ad hoc, a priori* justifications (Model 1) to a more formal, theoretically explicit treatment (Model 4). As a group, the four models that incorporate product differentiation (1 to 4) are not highly correlated with the homogenous-

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[9] Correlations of estimates of consumer losses are presented in Table 8 of Connor and Peterson (1993).

product models (5 to 10).[10] The 16 correlation coefficients that compare heterogeneous with homogeneous-product models average only 0.36 (Table 5).

## Conclusion

Our principal finding is that model assumptions and measurement methods do affect the absolute levels of predicted estimates of economic losses due to imperfect competition, but with few exceptions such differences do not much affect the industrial ranking of loss estimates. This is, cardinal estimates vary substantially, but ordinal results very little. The major exception to ordinal convergence is whether the empirical method has explicitly included measures of product differentiation when calculating the Lerner index or Harberger triangle. Of course, our analysis was restricted to the domain of food manufacturing, but we expect that this conclusion may hold for other industries with differentiated products.

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[10] In averaging the coefficients in Table 5 we treat Models 5, 6, and 7 as one observation.

Table 5. Correlations among Estimates of Net Welfare Loss due to Market Power in U.S. Food Manufacturing.

| Model Type | Model | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | Correlation Coefficient (N) | | | | | | | | | | |
| 1. Bainsian, Census price-cost margins, monopoly pricing, workable competition | 1.00 (N=45) | | | | | | | | | | |
| 2. Bainsian, Census price-cost margins, monopoly pricing | 0.64 (N=39) | 1.00 (N=39) | | | | | | | | | |
| 3. Bainsian, price-price margin, monopoly pricing | 0.78 (N=42) | 0.58 (N=35) | 1.00 (N=44) | | | | | | | | |
| 4. Post-Bainsian, price-price margin, Cournot pricing | 0.71 (N=45) | 0.23 (N=38) | 0.65 (N=44) | 1.00 (N=47) | | | | | | | |
| Price Leadership, linear demand: | | | | | | | | | | | |
| 5. Stakelberg pricing | 0.27 (N=40) | 0.53 (N=37) | 0.40 (N=38) | -0.03 (N=42) | 1.00 (N=41) | | | | | | |
| 6. Cournot-Nash pricing | 0.27 (N=40) | 0.53 (N=37) | 0.40 (N=38) | -0.03 (N=42) | 1.00 (N=43) | 1.00 (N=41) | | | | | |
| 7. Collusive pricing | 0.27 (N=40) | 0.53 (N=37) | 0.40 (N=38) | -0.03 (N=42) | 1.00 (N=43) | 1.00 (N=44) | 1.00 (N=41) | | | | |
| Price Leadership, Isoelastic demand: | | | | | | | | | | | |
| 8. Cournot-Nash pricing | 0.51 (N=25) | 0.44 (N=23) | 0.48 (N=23) | 0.47 (N=25) | 0.97 (N=25) | 0.97 (N=25) | 0.97 (N=25) | 1.00 (N=25) | | | |
| 9. Collusive pricing | 0.32 (N=6) | 0.15 (N=6) | 0.34 (N=6) | 0.27 (N=6) | 0.99 (N=6) | 0.99 (N=6) | 0.99 (N=6) | 0.99 (N=6) | 1.00 (N=6) | | |
| Industry-wide Oligopoly: | | | | | | | | | | | |
| 10. Cournot-Nash pricing | 0.34 (N=41) | 0.65 (N=38) | 0.48 (N=39) | 0.06 (N=42) | 0.86 (N=41) | 0.86 (N=41) | 0.86 (N=41) | 0.81 (N=25) | 0.71 (N=6) | 1.00 (N=42) | |
| 11. Unconstrained pricing | 0.56 (N=38) | 0.18 (N=36) | 0.16 (N=36) | 0.34 (N=39) | 0.03 (N=37) | 0.03 (N=37) | 0.03 (N=37) | 0.42 (N=24) | 0.07 (N=6) | 0.07 (N=38) | 1.00 (N=39) |

Note: Estimates based on uncorrected local-market observations and other unreliable estimates are omitted.

Source: Table 1.

## References

Bergson, Abram. On Monopoly Welfare Losses. *American Economic Review* 63(1973): 853-870.

Bhuyan, Sanjib and Rigoberto A. Lopez. Oligopoly Welfare Losses in U.S. Food Manufacturing, selected paper, annual meeting of the American Agricultural Economics Association, Orlando Florida, [revised, unpublished manuscript dated September 20, 1993.].

Caves, Richard E. and David R. Barton. *Technical Efficiency in U.S. Manufacturing Industries*. Cambridge: MIT Press (1990).

Clarke, R. and S.W. Davies. Market Structure and Price-Cost Margins. *Economica* 49(1982):277-287.

Collins, Norman and Lee Preston. *Concentration and Price-Cost Margins in Manufacturing Industries*. Berkeley: University of California Press (1968).

Connor, John M. *Structural Adjustment of the Food Industries of the United States* (AGES820723), ERS Staff Report. Washington, DC: Economic Research Service, USDA (July 1982).

Connor, John M., et al. *The Food Manufacturing Industries: Structure, Strategies, Performance, and Policies*. Lexington, MA: Lexington Books (1985). 45(1978):116-123.

Connor, John M. and Everett B. Peterson. Market-Structure Determinants of National Brand-Private Label Price Differences of Manufactured Food Products. *The Journal of Industrial Economics* 40(1992):157-172.

__________. *New Estimates of Welfare and Consumer Losses in U.S. Food Manufacturing*, Staff Paper SP-18. West Lafayette, IN: Department of Agricultural Economics, Purdue University (December 1993).

Cowling, Keith and Dennis C. Mueller. The Social Cost of Monopoly Power. *Economic Journal* 88(1978):727-748.

Dickson, V.A. Conjectural Variation Elasticities and Concentration. *Economics Letters* 7 (1981):281-285.

Dickson, V.A. and Weiqiu Yu. Welfare Losses in Canadian Manufacturing Under Alternative Oligopoly Regimes. *International Journal Industrial Organization* 7(1989):257-267.

Dixit, Avinash and Nicholas Stern. Oligopoly and Welfare: A Unified Presentation with Applications to Trade and Development. *European Economic Review* 19(1982):123-143.

Franz, Roger S. *X-Efficiency: Theory, Evidence and Applications*. Dordrecht: Kluwer (1988).

Friedland, Thomas S. The Estimation of Welfare Gains from Demonopolization. *Southern Economic Journal.*

Gisser, Micha. Welfare Implications of Oligopoly in U.S. Food Manufacturing. *American Journal of Agricultural Economics* 64(1982):616-624.

__________. Price Leadership and Welfare Losses in U.S. Manufacturing. *American Economic Review* 76(1986):756-767.

__________. Price Leadership and Welfare Losses in U.S. Manufacturing: Reply. *American Economic Review* 76(1989):610-613.

Harberger, Arnold. Monopoly and Resource Allocation. *American Economic Review* (Proceedings) 44(1954):77-87.

Huang, Kuo S. *U.S. Demand for Food: A Complete System of Price and Income Effects*, Technical Bulletin No. 1714. Washington, DC: U.S. Department of Agriculture (1985).

Jenny, Frederic and Andre-Paul Weber. Aggregate Welfare Loss Due to Monopoly Power in the French Economy. *Journal of Industrial Economics* 32(1983):113-130.

Just, Richard E., et al. *Applied Welfare Economics and Public Policy*, Englewood Cliffs, NJ: Prentice-Hall (1982).

Kay, John A. A General Equilibrium Approach to the Measurement of Monopoly Welfare Loss. *International Journal of Industrial Organization* 1(1983):317-331.

Leibenstein, Harvey. Allocative Efficiency vs. "X-Efficiency." *American Economics Review* 56(1966):392-415.

Masson, Robert T. and Joseph Shaanan. Social Costs of Oligopoly and the Value of Competition. *Economic Journal* 94(1984):528-530.

Olson, Dennis O. and Donald L. Bumpass. An Intertemporal Analysis of the Welfare Costs of Monopoly Power. *Review of Industrial Organization* 1(1984):308-323.

Pagoulatos, Emilio and Robert Sorenson. What Determines the Elasticity of Demand? *International Journal of Industrial Organization*, 4(1986):237-250.

Parker, Russell C. and John M. Connor. *Estimates of Consumer Loss due to Monopoly in the U.S. Food-Manufacturing Industries*, Working Paper No. 19. Madison, WI: NC-117(1978).

_________. Estimates of Consumer Loss due to Monopoly in the U.S. Food-Manufacturing Industries. *American Journal of Agricultural Economics* 61(1979):628-39.

Posner, Richard. The Social Cost of Monopoly and Regulation. *J. Political Economy* 83(1975):807-827.

Powell, Irene. The Effect of Reductions in Concentration on Income Distribution. *Review of Economics and Statistics* 69(1987):75-82.

Preston, Warren P. and John M. Connor. An Economic Evaluation of Federal Antitrust Activity in the Manufacturing Industries. *The Antitrust Bulletin* (Winter 1992):969-996.

Saving, Thomas R. Concentration Ratios and the Degree of Monopoly. *International Economic Review* 11(1970):139-146.

Scherer, F.M. *Industrial Market Structure and Economic Performance.* Chicago: Rand McNally (1970).

Scherer, F.M. *Industrial Market Structure and Economic Performance.* (Second Edition.) Boston: Houghton Mifflin (1980).

Scherer, F.M. and David Ross. *Industrial Market Structure and Economic Performance.* (Third Edition.) Boston: Houghton Mifflin (1990).

Schmalensee, Richard. Inter-Industry Studies of Structure and Performance, in *Handbook of Industrial Organization*, Richard Schmalensee and Robert D. Willig (editors). Amsterdam: North-Holland (1989).

Schwartzman, David. The Burden of Monopoly. *Journal of Political Economy* 58(1960):627-630.

Stigler, George J. The Statistics of Monopoly and Merger. *Journal of Political Economy* 64(1956):33-35.

Tirole, Jean. *The Theory of Industrial Organization.* Cambridge: MIT Press (1988).

Wahlroos, Björn. Monopoly Welfare Losses Under Uncertainty. *Southern Economic Journal* 51(1984):429-442.

Weiss, Leonard W. The Concentration-Profits Relathionship and Antitrust, in *Industrial Concentration: The New Learning*, Harvey J. Goldschmid (editor). Boston: Little, Brown (1974).

Willner, Johan. *Some Further Comments About the Welfare Losses Under Price Leadership*, Meddelanden från Ekonomisk-Statsvetenskapliga Fakulteten vid Åbo Akademi, Ser. A:259. Åbo, Finland (1988).

Willner, Johan. Price Leadership and Welfare Losses in U.S. Manufacturing: Comment. *American Economic Review* 79(1989):604-609.

Willner, Johan and Leila Stohl. Where Are the Welfare Losses of Imperfect Competition Large? *European Journal of Political Economy* 8(1992):477-491.

Willig, Robert D. Consumers' Surplus Without an Apology. *American Economic Review* 66 (1976):589-597.

Worcester, Dean A. *Monopoly, Big Business, and Welfare in the Postwar United States.* Seattle: University of Washington Press (1967).

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22. McLaughlin, Edward W. 1991. "The Fresh Company." Cornell University, Ithaca, NY.

23. Connor, John M. and Everett B. Peterson. 1991. "Market-Structure Determinants of National Brand-Private Label Price Differences of Manufactured Food Products." Purdue University, W Lafayette, IN. & Virginia Polytechnic Institute & State University, Blacksburg, VA.

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