

# The Case of Duopoly

Industry structure is not a sufficient basis for imposing regulation.

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The economic literature is filled with different theories of oligopoly and duopoly ranging from perfect collusion to cutthroat price competition. However, many policymakers speak as if concentrated industries are automatically bad and therefore expect government to take action based on market structure alone. Some people have branded concentrated industries as “cozy duopolies” and thus condemn them based on structure without examining any empirical evidence on industry conduct and performance.

In this article we examine duopolies: what factors may be important for competition in these markets and whether these markets can achieve desirable market outcomes. While this article focuses on duopolies—markets in which market shares are exhausted (or nearly so) by two firms—the discussion can be applied easily to somewhat less concentrated markets, including other oligopoly markets.

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## The Problems with Market Structure

The principle rationale for the regulation of market structure is too few competitors, which reduces consumer welfare. The relationship between market structure and market conduct has been explored in different types of studies, including theoretical

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analysis, empirical research, and experimental research. None support the proposition that duopoly, per se, is tantamount to market failure and sufficient grounds for remedial government actions. Simply stated, duopoly is not always undesirable.

**Theoretical research** | The economic theory of market conduct and performance under duopoly market structures is subsumed in a larger literature focused on the economics of “few sellers” or oligopoly. The economic literature addressing the relationship between market structure, conduct, and performance is voluminous. It is generally inconclusive and lamentably bereft of guidance for policymakers faced with decisions about what, if any, elements of market conduct should be constrained by the power of the state.

The problem is not a paucity of theory or modeling efforts. To the contrary, there are literally thousands of theoretical models of oligopoly/duopoly behavior. The problem is the lack of a model that predicts firm behavior in particular contexts and does so with sufficient accuracy and reliability to warrant its being used as the basis for policy decisions about whether, how, and under what circumstances the government ought to intervene and impose economic regulation.

Further, some economic models suggest that even duopolists can produce equilibria approaching, or at, the competitive equilibrium. The Bertrand model, in which each duopolist sets price, can produce almost the competitive equilibrium if the products are close substitutes. The Cournot output-setting model requires relatively few oligopolists to achieve close to the competitive out-



put. Finally, the contestable market theory claims that if both entry and exit are free or unimpeded, even a monopolist would produce the competitive output.

The conclusions of formal models provide clear warnings that they are not intended to be public policy tools. For example, Kennedy School professor F. M. Scherer wrote in the first edition of his popular industrial organization textbook:

Economists have developed literally dozens of oligopoly pricing theories—some simple, some marvels of mathematical complexity. This proliferation of theories is mirrored by an equally rich array of behavioral patterns actually observed under oligopoly. Casual observation suggests that virtually anything can happen.

University of California, Berkeley economist Carl Shapiro likewise writes:

Before embarking on the analysis, it is best to provide the reader with a word of warning[:] ... there is no single theory of oligopoly.... I do not expect oligopoly theory ... to give tight inter-industry predictions regarding the extent of competition or collusion.

After 40 years and thousands of articles in journals of law or economics, Nobel economist George Stigler concluded, “No one has the right, few the ability, to lure economists into reading another article on oligopoly theory without some advance indication of its alleged contribution.” That admonition applies *a fortiori* today. Again, from Scherer, “The most that can be

hoped for is a kind of soft determinism; predictions correct on the average, but subject occasionally to substantial errors.” In summarizing his review of the literature and long litany of the assumptions and outcomes of dozens of oligopoly models, Shapiro calls attention to the forgoing caveat and then concludes, “What we are most in need of now are further tests of the empirical validity of these various theories of strategic behavior.”

**Empirical research** | If economic theory is unhelpful as a guide to policy on oligopoly, so too is the body of empirical research linking duopoly structure with anticompetitive conduct and performance. Two chapters in Elsevier’s *Industrial Organization Handbook*, one by MIT economist Richard Schmalensee and the other by Stanford economist Timothy Bresnahan, expressly consider empirical studies of the relationship between market structure, market conduct, market performance, and consumer welfare. Readers are hard-pressed to come away from the chapters with any categorical or even roughly generally applicable conclusions that might be used to inform policy in, say, the broadband communications context.

Efforts to link market structure with market conduct and performance in matters related to prices and the price-setting process have not been notably successful. Thus, Oxford economist Donald Hay and Oriel College (Oxford) provost Derek Morris, in their popular industrial organization textbook, offer this conclusion to a lengthy review of empirical efforts to establish these linkages:

[T]he relationship between industrial structure and price setting over time remains very unclear.... [I]t is difficult to avoid concluding that, if any such links do exist, they are far from obvious and unlikely to be powerful.... Industrial structure may have an important influence on price procedures ... but it does not seem to play a central role in the pattern of price changes that develops through time.

Similarly, there has been a notable lack of success in establishing a relationship between market structure and profits. Early studies of structure and performance relationships identified links between concentration and profitability. The main thrust of subsequent analysis and results has been to call into question the validity of the early studies. This analysis insists that concentration is only one of several variables (including growth rates, diversification, buyer concentration, technological change, conditions of entry, degree of regulation, cost conditions, capital intensity, and numerous others) influencing profits and that there is no reliable one-to-one link between concentration and profit. A major analytical problem is that the causal relationships between structure and profits and other variables are not clearly established either in theory or by observation. Thus, any correlation between structure and profit does not imply causation.

Empirically validated relationships between market structure and innovation are even more tenuous than for pricing practices and profits. The literature provides no support for believing in general that concentration is a barrier to innova-

tion. Indeed, the contrary is frequently suggested. There is much support for a modified Schumpeterian hypothesis that some market power is needed to assure the optimal rate of technical progress. The literature is vast and complex and not given to easy summary, but it is fair to say that market concentration, market rivalry, and technological opportunity are the key drivers of innovation.

There seems to be consensus on what might be characterized as “competitive oligopoly” wherein competition between a few dominant firms provides the spur and their oligopoly status provides the reward necessary to compensate for, and incentivize, risk taking. Thus, in the words of Georgetown law professor and economist Howard Shelanski:

The comparative performance benefits of oligopoly over monopoly for technological innovation also have empirical support. It is well established in the economic and competition policy literature that the link between market structure and innovation is much less predictable.... But there is reasonably good evidence that neither monopoly nor perfect competition is particularly beneficial for investment in research and development or deployment of new technology.

**Experimental research** | The behavior of oligopolists in general and duopolists in particular has been the subject of considerable interest and analysis by experimental economists who undertake to simulate market behavior with economically motivated and constrained lab participants. A recent survey article by Max Planck Institute scholar Christoph Engel identifies more than 150 published papers in recent years dealing with one or more different experiments designed to test the market behavior (mainly price and quantity of output) of oligopolists—almost always duopolists—under a large and very diverse array of circumstances. This review of the literature found experiments covering more than 500 different parameter constellations.

It is difficult in a short space to do justice to such a detailed review of such a comprehensive and diverse literature, but the main results are easy to state:

- Duopoly behavior is highly circumstantial.
- Performance varies along a continuum bounded by perfect competition and perfect monopoly, but not in predictable ways.
- Many of the experiments had indeterminate outcomes.
- Many of the results were weak and not significant statistically.
- A surprising number of the outcomes were inconsistent with received theory and, indeed, with economic intuition.

### Evidence from Sectors Served by Two Dominant Firms

Duopoly is quite common in the general economy. In the smallest markets, local businesses are often near-monopolies, with

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competition limited by spatial considerations. Monopoly and duopoly are quite common in small- to medium-sized communities and in rural areas in particular. Service provision is often limited to one or two suppliers in such industries as medicine, legal services, specialized retail, motor fuel, etc. These markets illustrate the impact of market size, which limits the number of sustainable competitors.

A small number of sellers—duopoly in particular—is also common in regional and national markets. We have identified various duopolies and the effectiveness of rivalry in them. Specifically, we have searched for evidence of market failures sufficient to warrant substantial government involvement in constraining or obligating market behavior. What we found was that these oligopolies were often characterized by innovation and competition. Below are some of our findings.

**Carbonated beverages** | The carbonated beverage industry is essentially a duopoly with two firms, Coca-Cola Co. and PepsiCo Inc., controlling about 75 percent of the market. In spite of such high concentration, the two firms compete vigorously in a variety of ways.

Coke and Pepsi engage in substantial non-price rivalry, including advertising and competing for product placement and celebrity endorsements. Especially intense rivalry occurs as the two firms try to become the exclusive seller in restaurants, universities, and other such venues. They also compete through introducing new varieties of soft drinks and through promotions to retailers or directly to consumers. For example, between 1997 and 2004, Coke and Pepsi introduced 22 new brands.

Concerning price competition, one study concludes that a merger of the two firms would raise prices by between 16 and 17 percent, suggesting the advantage of duopoly. The price performance of the carbonated beverage market over time has been good. The Consumer Price Index (base of 100 in 1967) for the category of non-alcoholic beverages, which includes carbonated beverages as an important component, was 169 in 2009. That is far below the 214 for all consumer items or the 215 for all food and beverages. This means that the real price of such beverages declined by about 21 percent over the 1967–2010 period. Furthermore, PepsiCo in 2011 decided not to raise prices in spite of rising input prices, choosing to cut earning estimates, presumably because of stiff competition.

**Aircraft (mainframe) manufacturing** | The mainframe aircraft manufacturing industry is a duopoly between U.S.-based Boeing Co. and Europe-based Airbus SAS, a division of the European aerospace firm EADS. The duopoly exhibits a high degree of competitive behavior in spite of difficult entry in part because of learning-by-doing economics.

The two companies engage in vigorous rivalry to obtain the business of the airlines. Airline orders tend to be large and infrequent, so it is important to compete vigorously to try to get the contract. Further, airlines generally want to have the same plane because it is usually efficient and less costly to do so. Training of

crews and maintenance and repair of aircraft are facilitated by such a policy.

The duopoly also competes to a great extent in developing new and improved airplanes. For example, Airbus was the first to make extensive use of composite materials in the 1970s, and in the 1980s it was the first to introduce “fly by wire” census. Boeing was the first to “launch a full-sized commercial aircraft with composite wings and fuselage.” The companies devote a substantial percentage of their revenues to research and development. Airbus in particular has been highly innovative as it has tried to increase its market share. It has also been a relatively low-price firm. It is clear that competition is strong in this market.

**Transparent adhesive tape** | The transparent adhesive tape industry has long been dominated by 3M’s Scotch brand, with a market share in excess of 90 percent as late as the early 1990s. Up to that time, 3M Co. sold only Scotch-brand tape, not offering retailers private-label tape that could be sold under the retailer’s label. Typically, private-label products are lower-priced and more profitable for the retailer than the branded product.

LePage’s 2000 Inc. entered the market in the 1980s, offering both a “second brand” and a private-label tape to compete with Scotch. By 1992, LePage’s had gained 88 percent of private-label tape sales and 14.1 percent of overall transparent tape sales. In response, 3M began offering private-label tape and a “second” brand tape, Highland. The competition offered by LePage’s was clearly instrumental in increasing retailer and consumer choice.

The rivalry between LePage’s and 3M provides clear benefits to society. Had the rivalry provided by LePage’s not been a “thorn in the side” of 3M, there would have been no reason for 3M to have engaged in the behavior it did. Indeed, 3M’s actions to stifle the competition from LePage’s in the form of bundled rebates show the advantages of duopoly and the desirability of maintaining such rivalry.

**Sports** | Professional sports leagues for most of their history have been monopolies. However, when a new league emerged in a given sport, the duopoly resulted in intense competition for players, coaches, and fans.

In most cases, the incumbent league would act as a cartel prior to the entry of a competing league. Team owners would establish rules and other institutions to protect themselves from competing for players. Contract reserve clauses (which bound players to their teams even after their contracts expired), the entry draft, and the lack of free agency for players, coupled with the lack of players’ unions until the 1970s, kept players’ salaries below market value. But this cozy arrangement would be disrupted when a competing league would form. Players suddenly had an option of teams to play for, and bidding wars would break out for the top players. For example, in 1966, just before the American Basketball Association was formed, the incumbent National Basketball Association median salary was \$20,000; by 1971 the median salary had risen to \$90,000.

The emergence of new leagues also benefited fans. New

leagues would compete for market share locally and nationally, resulting in innovations. In many cases, the new league would adopt rule changes or other product improvements in an effort to make their version of play more exciting. For example, the ABA introduced the three-point shot, a more free-wheeling style of play, and a multi-colored basketball, whereas the upstart American Football League introduced the two-point conversion to professional football. Also of benefit to fans, new leagues often place teams in cities that the incumbent league had ignored, or else prompts the incumbent league to do so. For example, the incumbent National Football League expanded to Dallas and Minneapolis when it believed that the AFL was going to place teams in those appealing markets. The rivalry between the leagues led to product improvements and more cities with teams, showing the competitive advantages of a duopoly.

It was during periods of league duopoly that innovation and competition flourished. Appropriate public policy may well be highly skeptical about mergers from duopoly to monopoly.

**Physicians** | Unbeknown to most people, the physicians' services industry is a duopoly. There are two groups of fully licensed physicians, Medical Doctors (MDs) and Doctors of Osteopathy (DOs). The existence of osteopathic physicians, who currently comprise 6 percent of all physicians, has provided substantial benefits to society. The group has filled market niches not satisfied by MDs.

Specifically, MDs emphasized specialization during the 1960s and 1970s, neglecting general or family practice. This void provided an opportunity that DOs exploited. They also practiced in rural areas and small towns where MDs were scarce. DOs have countered the power of MDs in dealing with insurance companies, supported some health initiatives that MDs opposed, pioneered continuing education, and accepted applicants who were discriminated against by MD schools.

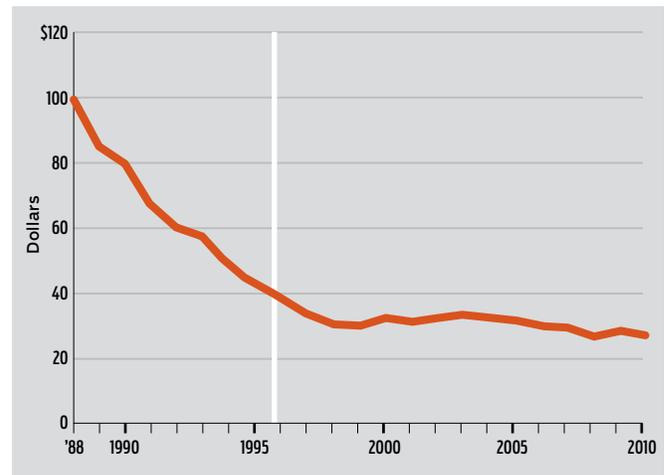
More recently, DOs countered the restriction of output of MDs. MDs were concerned about an impending physicians surplus in the 1970s and 1980s, and encouraged their medical schools to keep the number of graduates constant at about 17,000. Osteopaths took advantage of that policy and increased their output from 1,724 in 1986–1987 to 2,535 in 1995–1996. Had there not been this competition, the current shortage of physicians would have been more severe. This underscores that even a small competitor in a duopoly can compete and benefit society.

**Cellular telephone services** | On April 9, 1981, the Federal Communications Commission decided that wireless telecommunications services would operate as a duopoly, with one license going jointly to the incumbent local Bell Telephone companies (the "B" license) and the other to a competitor (the "A" license). The FCC later revised that policy, auctioning off C, E, and F licenses between 1994 and 1997. This opened up the nation to competition between several cellular carriers.

While the latter increase in competition provided consumers with more choices and the ensuing explosion in subscribers

FIGURE 1

### Real Wireless Local Monthly Bill (Indexed 1988 = 100)



required more spectrum, the evidence suggests that the original duopoly had been competitive. To demonstrate this, we can compare the price decline during the duopoly to the latter period when additional providers entered the market.

Using the annual data available from the business association of wireless providers, CTIA, we determined that the average wireless phone monthly bill, adjusted for inflation, fell by 61 percent from 1988 to 1996—a decline of 11 percent per year. In contrast, during the subsequent period when several more wireless providers began offering service, the average wireless monthly bill, adjusted for inflation, fell just 2 percent per year. (See Figure 1.) Over the earlier period, geographic coverage of cellular service and other dimensions of quality also improved greatly.

The decline in prices reflects, to a large extent, the economies of scale and possibly learning-by-doing achieved by these networks under duopoly. These economies of scale resulted in reductions in per-unit costs for the industry. Because of competition between the two wireless providers, these cost reductions were passed along to consumers in the form of lower prices. Therefore, effective competition can be achieved with a very small number of providers.

### Antitrust Considerations

The Federal Trade Commission and the Antitrust Division of the Department of Justice, which are tasked with enforcing federal antitrust laws, have recognized the importance of examining conduct and performance in an antitrust investigation and do not base public policy solely on industry structure. This policy was formalized in the recently adopted New Horizontal Merger Guidelines, which raised the Herfindahl-Hirschman Index thresholds for various levels of market concentration. Specifically, the revised merger guidelines raise the "unconcentrated" boundary from an HHI of 1,000 to 1,500, essentially implying that a market with about seven firms will be consid-

ered unconcentrated, whereas the previous threshold was more than 10 firms. The “highly concentrated” range now begins with markets of fewer than four firms instead of the previous number of between five and six.

What is most noteworthy about the guidelines is that they consider market structure only as a “guide,” recognizing that a certain structure by itself is not necessarily bad. That is, all the facts must be taken into consideration. Furthermore, the antitrust authorities, as well as the courts, have recognized the rule of reason in dealing with monopoly. The structure of monopoly alone does not constitute the need for regulation or antitrust remedies. Thus, facts concerning not only structure but also conduct and performance are used to decide public policy for a monopoly and the same criteria should be employed with duopolies and concentrated oligopolies.

Illustrative of the concern about duopoly is the now-abandoned proposal to merge baby food maker Beech-Nut, a division of Milnot Holding Corp., with H. J. Heinz Co. The merger would have joined the large, efficient Heinz plant with the well-regarded Beech-Nut brand name, yielding a firm that could compete with industry heavyweight Gerber Products Co., which held a 60 percent market share at the time the merger proposal was announced in 2000. Federal authorities moved to block the merger because it would result in a duopoly. Freed from the would-be competitor, Gerber’s share of the baby food market rose to roughly 80 percent by 2008, while Beech-Nut’s fell to 11 percent and Heinz’s to just 2 percent. This strongly suggests the merger denial was undesirable.

Other evidence from the antitrust experience also suggests that duopolies or highly concentrated industries often compete intensely. The rivalry between Intel and Advanced Micro Devices in computer chips has been so intense that the FTC and European Union have investigated and challenged Intel’s behavior. Again, even a duopoly with a dominant firm can have substantial rivalry. Additionally, the fact that most collusive agreements involve markets with a few firms suggests that, absent such agreements, competition can be substantial in these markets.

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## Conclusion

We have found nothing of consequence to support a case for regulation based only on market structure. Common sense suggests that such regulation should be based on a thorough consumer-welfare-oriented cost-benefit analysis of the conduct and performance of markets and of the well-known infirmities of government efforts to manage competitive processes.

It is important to note that policies that maximize the number of competitors are not necessarily congruent with policies that will lead to greater willingness and ability to compete or incentivize firms to invest. The reasons are well known and related to the relationships between the burden of fixed costs, optimal scale, size of the market, and the number of competitors sustainable in the long run. Where there are substantial economies of scale (that is, where minimum efficient firm size is large relative to the size of the market), where fixed costs are a substantial part of total cost, and where marginal cost is low and below average cost, government should have very little impact on the number of competitors. Its role should be limited to permitting as many as feasible, but it cannot force long-term existence of more competitors than dictated by the relationship between the size of the market and the structure of cost. With respect to the number and concentration of sellers, markets trump regulation. While consumers are in general made better off with more choice, it does not follow that government attempts to force an increase in the number of options will in turn increase welfare in instances where the economics of cost and demand warrant otherwise.

Most economists would agree that the behavior of a given oligopoly or duopoly is indeterminate. That is, multiple outcomes, ranging from those associated with monopoly to perfect competition, are possible. Our work suggests that neither theory nor empirical evidence supports the notion that duopoly or high concentration is per se undesirable. Thus, sound public policy should be based on empirical evidence and not rhetoric. **R**

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