Stanford Law Review

A PROPOSED SOLUTION TO THE PROBLEM OF
PARALLEL PRICING IN OLIGOPOLISTIC MARKETS

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A Proposed Solution to the Problem of Parallel Pricing in Oligopolistic Markets

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INTRODUCTION

This Note seeks to address a systemic and difficult issue in the field of antitrust, namely the problem of proving concerted action for the purpose of price-fixing claims in oligopolistic markets.[1] While antitrust law has been markedly successful in eliminating express cartels,[2] competition policy has been equally noteworthy for its failure to effectively address instances of parallel pricing that may have an economically analogous effect to explicit price-fixing.[3] Though the law has long viewed this shortcoming as an inevitable consequence of market structure, this Note will articulate both a different conclusion and a novel solution.

An oligopoly is a market in which the level of concentration causes firms residing therein to operate strategically.[4] In other words, an oligopolist must factor the expected reaction of its competitors into its first order condition for profit maximization. A firm operating in a monopolized market, or one subject to perfect competition, simply equates marginal revenue with marginal cost in setting price.[5] Doing so in an oligopolized market is not profit-maximizing, however, as the profitability of a given price depends on the price being charged by other firms in the market. This is so because, in selling its goods, a firm will have a *unilateral* impact on the residual demand facing the other firms in the market.[6]

A major, and very interesting, problem arises in the context of such markets, where it may be possible for oligopolists to reach a self-sustaining, supracompetitive equilibrium. Essentially, it may be feasible for a group of firms to reach a collusive outcome without overt acts of detectable

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1. *See, e.g.*, William E. Kovacic, *Antitrust Policy and Horizontal Collusion in the 21st Century*, 9 LOY. CONSUMER L. REP. 97, 97 (1997) ("Three troubling phenomena attend current efforts to attack collusion and will beset future enforcement programs. One is substantial conceptual uncertainty and doctrinal confusion about how to distinguish between lawful unilateral conduct and illegal collective behavior."); Daniel R. Shulman, *Proof of Conspiracy in Antitrust Cases and the Oligopoly Problem*, 4 SEDONA CONF. J. 1, 1 (2003) ("Proof of conspiracy in antitrust cases has become one of the more muddled areas of antitrust law.").

2. *See, e.g.*, ROBERT H. BORK, THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF 263 (1978) (concluding in relation to the per se ban on explicit price-fixing that "[i]ts contributions to consumer welfare over the decades have been enormous").

3. *See, e.g.*, Shulman, *supra* note 1, at 14 ("[F]rom an economic standpoint, supracompetitive pricing achieved by oligopolists engaging in conscious parallelism is equally as abhorrent and destructive of efficiency as is explicit unlawful price-fixing.").

4. *See generally* DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 157-99 (4th ed. 2005).

5. *See id.* at 58, 91.

6. *Cf. id.* at 66-69.

communication. Such tacit collusion results from a "meeting of the minds," whereby competitors recognize that it is in their collective best interests to set price or quantity equal to the collusive level.[7] In such circumstances, application of the antitrust laws becomes challenging. This difficulty emanates from the makeup of the antitrust regime put in place by the Sherman Act.

Section 2 of that Act prohibits firms with monopoly power from improperly maintaining or abusing their dominance.[8] Most firms operating within an oligopoly do so without possessing or exercising such puissance, however. As a result, their unilateral actions cannot be attacked under the Act.

Firms lacking monopoly power can nonetheless be found guilty of violating the Sherman Act under section 1 when they act in concert with their competitors. Accordingly, "contract[s], combination[s,] . . . or conspirac[ies] in restraint of trade" may be held illegal, if unreasonable.[9] Hence, at a theoretical level, concerted action by oligopolists can be reached by section 1. The difficulty, which has so far proven to be prohibitive, lies in demonstrating that oligopolists' parallel pricing is a manifestation of concerted, rather than unilateral, behavior.

The problem is acute and may fairly be characterized as one of the most serious in the field of antitrust law, for the economic consequences of a failure to fill the current "gap" are ominous.[10] This is so as instances of firms pricing in parallel at supracompetitive levels are ubiquitous.[11] The fact that such equilibria are readily observable highlights a continuing flaw in the application of competition law. It shall be seen, however, that finding a solution to the problem is far from straightforward and will inevitably be draped in controversy.

This Note will express an opinion on how an antitrust regime should tackle those cases where self-sustaining, output-restricting equilibria can exist absent overt communication of any kind. This question is especially interesting as the law is currently incapable of reaching such market outcomes, though there have been forceful, and highly controversial, arguments that the law ought to be able to do so in appropriate circumstances.[12]

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7. *See* DON E. WALDMAN & ELIZABETH J. JENSEN, INDUSTRIAL ORGANIZATION: THEORY AND PRACTICE 228 (2d ed. 2001).

8. 15 U.S.C. § 2 (2007).

9. *Id.* § 1; *see, e.g.*, Nat'l Soc'y of Prof'l Eng'rs v. United States, 435 U.S. 679, 690 (1978) (observing that section 1 applies only to prohibit unreasonable restraints of trade); Standard Oil Co. v. United States, 221 U.S. 1, 65 (1911) (noting that "reason was the guide by which the provisions of the act were in every case interpreted").

10. Thomas A. Piraino, Jr., *Regulating Oligopoly Conduct Under the Antitrust Laws*, 89 MINN. L. REV. 9, 12-13 (2004) (arguing that tacit collusion may be more harmful than express price-fixing cartels).

11. *Id.* at 11 ("The high levels of concentration in many U.S. markets today guarantee that tacit collusion will be a continuing problem.").

12. *See* RICHARD A. POSNER, ANTITRUST LAW 94 (2d ed. 2001).

In this regard, Judge Richard Posner has articulated something of a radical view, according to which economic evidence of tacit collusion may in itself lead to a violation of the antitrust laws.[13] It will be shown that such an approach would not be attractive, given that it would perversely cause insolvency in certain markets and lead to inadvertent monopolization in others. Professor Donald Turner, in contrast, has argued that any prohibition of parallel pricing is necessarily improper.[14] Turner's position is characterized by the belief that a ban would require irrational behavior on the part of companies, would effectively compel marginal cost pricing, and would frustrate entry into oligopolistic markets. Yet, it will be demonstrated that these concerns constitute an unsatisfactory foundation for allowing tacit collusion, which is a practice that clearly causes significant societal harm.

This Note seeks to add a new dimension to the Posner-Turner debate, by showing that although Judge Posner's suggestion may be somewhat quixotic, elements of it may nevertheless be successfully employed to achieve a superior outcome. To the extent Professor Turner would believe that prohibition of parallel behavior is inherently inappropriate, it will be shown that he would be mistaken. In short, it will be demonstrated that a suitably moderate version of Judge Posner's approach would carry myriad economic benefits whilst avoiding the concerns advocated by Professor Turner.

The structure of the Note shall be as follows: first, a basic economic framework shall be introduced that will facilitate analysis throughout the remainder of the Note. Second, the current approach taken by the law will be discussed in the context of the rationale supporting the modern rules. Third, Judge Posner's controversial solution will be considered. Last, this Note will attempt to advocate a new approach to the problem of proving tacit collusion.

I. THE ECONOMICS OF OLIGOPOLISTIC PRICING

In order to make the discussion of oligopolistic behavior more concrete, a representative model will be employed throughout the Note. This model will additionally serve as a baseline for the competitive effect of various rules. Accordingly, a numerical example will illustrate the workings of oligopolistic interdependence and the extent to which the ensuing outcome departs from contexts of competition and monopoly. We begin with the simplest form of oligopoly: a duopoly. Assume that two firms, Alpha and Beta, comprise the market. For the sake of simplicity, it shall be assumed that both firms have identical cost and production functions, that there are no fixed costs, and that

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13. *Id.*

14. Donald F. Turner, *The Definition of Agreement Under the Sherman Act: Conscious Parallelism and Refusals to Deal*, 75 HARV. L. REV. 655 (1962).

the industry demand curve is linear.[15] The industry demand curve and market conditions for our model have the following parameters:

$$P = 200 - Q$$
$$MC_A = AC_A = MC_B = AC_B = 20$$

where P = price; Q = quantity; MC = marginal cost; and AC = average cost.[16]

Before applying these figures to various game theoretic models of oligopolistic behavior, we will calculate the outcomes under (1) monopoly, and (2) perfect competition. Doing so will illustrate the effect of those oligopolistic Nash equilibria[17] that are currently beyond the reach of the antitrust laws.

A. *Monopoly*

A monopolist's demand curve is the market demand curve and is, therefore, downward sloping.[18] Consequently, the monopolist can choose between a variety of price levels without having the quantity of its good demanded drop to zero. Like any other firm, the monopolist wishes to maximize its profits. It does so by equating marginal cost (MC) with marginal revenue (MR); that is, it will continue to expand output to the point where the extra cost associated with producing one more unit just equals the incremental revenue brought in by selling that unit.[19] So, the monopolist's profits (π) will increase as the quantity it produces approaches the point where MC = MR, π will peak at MC = MR, and π will decline as the quantity it produces begins to exceed the point of output where MC = MR. Thus, the monopoly price for either Alpha or Beta would be 110 and market output would be 90.[20]

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15. Later, these constraints will be relaxed and more realistic market settings will be considered.

16. Note that this market requires no fixed cost.

17. A Nash equilibrium exists where all players are doing the best they can, *given the choices of the other players*. At this point, no player can unilaterally improve her position by changing strategy. A Nash equilibrium is thus a highly stable outcome. In the oligopoly context, a supracompetitive Nash equilibrium is worrisome, as market prices will not diminish absent entry or other market changes.

18. *See* CARLTON & PERLOFF, *supra* note 4, at 89.

19. *Id.* at 91.

20. Total Revenue (TR) = P * Q
$$TR = P(200 - P) = 200P - P^2$$
$$\pi = \text{Total Revenue (TR)} - \text{Total Cost (TC)}$$
$$\pi = 200P - P^2 - 20(200 - P)$$
$$\pi = 220P - P^2 - 4000$$
Maximize π: $\delta\pi/\delta P = 220 - 2P = 0$

Thus, P = 110 and Q = 90 is the profit-maximizing monopoly price and output.

B. *Perfect Competition*

Under perfect competition, every producer is a price taker; that is, each firm faces a horizontal demand curve and therefore cannot influence the price at which its good is sold by unilaterally reducing its output.[21] Accordingly, marginal revenue always equals price.[22] In order to maximize profit, the firm facing perfect competition will produce at the point where marginal cost equals marginal revenue.[23] As a result, a firm under perfect competition maximizes profit by producing at the point where price equals marginal cost.[24] Thus, the market price under perfect competition would be 20 and market output would be 180.[25]

One can readily see by the stark difference in these figures why competition is typically favored over monopoly. Section 1 of the Sherman Act forbids horizontal price-fixing and output-setting agreements so as to avoid the monopoly outcome. Were Alpha and Beta in our example to enter into a collusive profit-maximizing agreement, they would each produce 45 units at a price of 110. By rendering such agreements illegal per se, antitrust rules cause output to be higher and prices lower than they would be absent such laws.

C. *Oligopolistic Pricing*

Having gained an appreciation for the divergence in market outcomes between competition and monopoly, we now consider how the results of oligopoly may differ. As oligopolists operate and compete on a strategic basis, game theory is a useful economic tool in this context.

A number of competition models exist,[26] but the one employed here to calculate the price and quantity outcomes is based on Cournot economics. The Cournot model predicts that firms will engage in quantity-based competition, each making individual profit-maximizing output decisions based on the assumption of output maintenance by the other firms.[27] Eventually, an equilibrium is reached where the reaction functions of all firms intersect—that is, where the expectations of output maintenance by each firm as to every other holds true.[28]

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21. *See* CARLTON & PERLOFF, *supra* note 4, at 66.

22. *See id.* at 58.

23. *See id.* at 59.

24. *See id.*

25. The profit-maximizing decision is P = MC where P = 200 – Q and MC = 20. Thus, Q = 180 and P = 20 is the profit-maximizing competitive output and price.

26. *See* CARLTON & PERLOFF, *supra* note 4, at 171-80 (discussing the Bertrand and Stackelberg models of oligopolistic competition).

27. *See id.* at 4, at 161-70; JEFFREY M. PERLOFF, MICROECONOMICS 431-40 (2d ed. 2001); WALDMAN & JENSEN, *supra* note 7, at 183-96.

28. This outcome is the result of the questionable assumption of output-maintenance. But it will be noted that the Cournot equilibrium is also a Nash equilibrium, where each

Continuing the foregoing example of duopoly, the issue arises as to how Alpha and Beta would engage in competition. In addressing this question, a distinction may be drawn between single- and repeated-play games. In the former case, the inference is that we ought not to be overly concerned about the ability of oligopolists to tacitly achieve the monopoly outcome. The more realistic, dynamic model compels a different conclusion.

1. *Single-period games*

Where Alpha and Beta enter into a single-period game, each firm wishes to maximize its profit at the end of the period and is unconcerned about any future periods. Unlike in the case of monopoly or perfect competition, they will not do so by producing at the point where MC = MR. Rather, each firm will factor its rival's anticipated reaction into its profit-maximizing decision.

The joint-maximization solution for Alpha and Beta is to enter into an illegal (though, we will assume, undetected) agreement to set price at the monopoly level. Crucially, however, there is an enormous incentive to deviate from the agreement. Alpha and Beta agree to produce 45 units each (that is, half what a monopolist would produce) at a price of 110. Each will thereby enjoy a profit of 4050.[29] If Beta commits itself to charge the price of 110, Alpha has an incentive to undercut Beta—to cheat—and thereby to increase its own profit beyond 4050.

The joint profit-maximizing, cartel price is not, therefore, stable. Employing the Cournot-Nash model introduced above, the equilibrium in this situation will involve price equaling 80 and each firm producing 60 units. This can be calculated by the fact that a Cournot-Nash equilibrium in a duopoly, under a linear demand curve, results in each firm producing one-third of the competitive level of output.[30] Thus, both Alpha and Beta will earn a profit of 3600.[31] It is clear, therefore, that both Alpha and Beta are worse off than they would have been had they both stuck by the agreement.

Game theory demonstrates that the mutually agreed price and quantity do not constitute a Nash equilibrium: neither party is doing the best it can in setting a price equal to the collusive price, given the choice of the other party.

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party is doing its best (in terms of output combination) *given the choice of its opponents*. Under Nash, it is a simultaneous move game of imperfect information. Due to the fact that under the Cournot-Nash equilibrium no party can unilaterally increase its profits given the choice of other parties, it is stable. The Nash assumptions provide a more solid theoretical basis for the equilibrium. For our scenario, if Beta expects a Cournot-Nash reaction on the part of Alpha, entry will occur. Assuming the market demand curve is linear, Beta knows that it will be able to earn supracompetitive profits by producing one-third of the industry's competitive output, and, so, will be able to recoup losses.

29. $\pi_A = \pi_B = P * Q - Q * MC = 110(45) - 45(20) = 4050$.

30. *See* WALDMAN & JENSEN, *supra* note 7, at 187. $Q_A = Q_B = 1/3(180) = 60$. As $P = 200 - Q$, $P = 80$.

31. $\pi_A = \pi_B = 80(60) - 60(20) = 3600$.

Each party's dominant strategy is to defect from the agreement: regardless of whether Beta charges 110 or 80, Alpha will be better off charging 80.[32] Beta reasons the same way. As a result, the Nash equilibrium in this game is for both parties to defect from the agreement. The resulting payoff matrix may be considered as follows (the matrix shows Alpha's profit, then Beta's):

| | | Beta | |
		$P_B = 80$	$P_B = 110$
Alpha	$P_A = 80$	(3600, 3600)	(4556.25, 2025[33])
	$P_A = 110$	(2025,[34] 4556.25)	(4050, 4050)

The key lesson taught by game theory is that collusive agreements in single-period games are likely to be highly unstable. What is the consequence of this from an antitrust perspective? It would appear to be agnosticism with respect to the existence of tacitly collusive equilibria that are equal to the monopoly level. If oligopolists such as Alpha and Beta are predicted to deviate from an express agreement, their chances of succeeding *tacitly* must be even less. This suggests we should not be excessively concerned about tacit collusion in oligopolistic markets. Nevertheless, it must be noted that the Cournot-Nash equilibrium identified above involves price being *considerably higher* than the competitive outcome. An important issue, which will be addressed shortly, is whether this imperfect outcome is nevertheless the best attainable. It will be seen that adoption of Judge Posner's rule would involve the Nash equilibrium coinciding with the competitive result. Interestingly, however, this is not necessarily a desirable outcome.

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32. Consider two scenarios:

Scenario 1: Beta abides by the agreement, charges 110, and produces 45. The *residual* demand curve will be P = 155 – Q.

$\pi_A = P * Q - Q(MC) = (155 - Q)Q - Q(20) = 155Q - Q^2 - 20Q$

To maximize profit: $\delta\pi/\delta Q = 135 - 2Q = 0$

Therefore, Q = 67.5; P = 87.5; and π = 4556.25. As this figure is greater than the profit of 3600 gained by abiding by the agreement, Alpha will defect.

Scenario 2: Beta defects from the agreement, charges 80, and produces 60. Now, the residual demand curve facing Alpha will be: P = 140 – Q.

$\pi = P * Q - Q(MC) = (140 - Q)Q - Q(20) = 120Q - Q^2$

To maximize profit: $\delta\pi/\delta Q = 120 - 2Q = 0$

Therefore, Q = 60. This result demonstrates that equilibrium has been reached, as both firms reach a common price and output decision.

33. If Alpha defects and Beta attempts to charge the monopoly price, it will be unable to sell 45 units. As Alpha offers to sell at 80, the residual demand curve facing Beta will be P = 132.5 – Q. If $P_B = 110$, then $Q_B = 22.5$ and $\pi_B = 110(22.5) - 22.5(20) = 2025$.

34. If Beta defects and Alpha attempts to charge the monopoly price, it will be unable to sell 45 units. As Beta offers to sell at 80, the residual demand curve facing Alpha will be P = 132.5 – Q. If $P_A = 110$, then $Q_A = 22.5$ and $\pi_A = 110(22.5) - 22.5(20) = 2025$.

2. *Multi-period games*

Although the single-period outcome is not perfect, it does involve a Nash equilibrium below the monopoly level. In games where there is more than one period, however, it may be possible for the players to escape the prisoners' dilemma outlined above. This is made feasible through the possibility of detection and punishment.

Take the case of a game in which there is an infinite number of rounds[35] or a game with a limited number of rounds, but where the end is undetermined.[36] In these circumstances, it may be possible for firms to maintain their collusive agreements as the one-period benefit of deviating from an agreement may be outweighed by the future periods where all parties deviate from the agreement.[37] Depending on a number of factors, including each competitor's discount rate, the likelihood of detection, and the punishment strategies employed by the colluding firms, it may be the case that a Nash equilibrium will occur at the collusive level. That is, no party can unilaterally increase its profits—including its future profits discounted to present value—by deviating from the agreement. Let us employ the example of Alpha and Beta to illustrate this:

Starting in period N and moving to infinity (N→∞), Alpha and Beta compete in a duopoly under the same conditions outlined above. In making a pricing decision, each firm can decide to abide by the price-fixing agreement and charge 110 or can deviate from the agreement and charge the single-period, unilateral, profit-maximizing price of 80. Under the conditions of this example, there is a 100% probability of detection should either party "cheat." If Alpha deviates from the agreement and charges 80, Beta will find that it is only able to sell 22.5 units at a price of 110, instead of the 45 units it would have otherwise been able to sell. Detection of cheating is, therefore, guaranteed.

In time period N − 1, then, both Alpha and Beta abide by the agreement, whether tacit or collusive. In period N, both parties must make a choice of whether to continue with the agreement or to defect. Much of the choice will be driven by how each rival expects the other to react in future time periods. If both firms employ a trigger price strategy, one defection from the agreement will result in defection forever.[38] In other words, both firms commit themselves to pricing at the collusive level, but if one ever cheats to increase its profits for

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35. A not unreasonable assumption, given that corporations are endowed with perpetual life absent merger or dissolution.

36. Again, a reasonable assumption.

37. A caveat must first be expressed, however, in relation to a repeated game involving only a limited number of rounds. In this scenario, it is unlikely that the collusive price and quantity level can be sustained as it does not constitute a Nash equilibrium. This is because, when there is a definite end to the game, the equilibrium repeated game strategy may simply consist of repeated plays of the one-shot Nash equilibrium.

38. *See* CARLTON & PERLOFF, *supra* note 4, at 142-44. This tactic is also known as a grim strategy.

a single period, the other will deviate from the agreement forever. If that is the case, either firm will defect in period N if, assuming a constant discount rate:

$$\pi_{N \to \infty}(\text{defect}) > \pi_N(\text{collude}) + \frac{\pi_{N+1}}{(1+i)^1} + \frac{\pi_{N+2}}{(1+i)^2} + \frac{\pi_{N+3}}{(1+i)^3} + \Lambda + \frac{\pi_{N \to \infty}}{(1+i)^{N \to \infty}}$$

where i represents the discount rate for the relevant firm. As N approaches infinity, we assume that profits will remain constant at 3600, following defection. That is, either firm will defect in N if:

$$\pi(\text{defect}) > \pi(\text{collude})$$

Employing this formula, either firm will defect in N if:

$$4556 * 25 + 3600/i > 4050/i$$

Either firm will defect only if its discount rate is greater than 0.1.[39] From this, we can state that colluding constitutes a Nash equilibrium in this market where the discount rate for both Alpha and Beta is less than 0.1. Such a discount rate is within the range identified by economists as being typical of real-life corporations.[40] Accordingly, there is a significant risk that the collusive, monopoly outcome will constitute a stable Nash equilibrium in this context.[41]

Now the consequences from an antitrust perspective are considerably less benign. As corporations operate in multi-period contexts, it is possible that firms will be able to shift the Nash equilibrium from defection to collusion with serious repercussions for antitrust policy.

It is of paramount importance to recognize that the preceding economic analysis holds equally true in both the explicit and implicit contexts. With respect to the latter, Alpha and Beta may be able to reach a mutual understanding via unilateral increases in price, punishment in the form of reduced prices if the foregoing increase is not met, followed by further increases in price. Through such a mechanism, Alpha and Beta in the foregoing example will be able to reach a stable Nash equilibrium at the collusive level. Accordingly, it is as if they had entered into an explicit cartel. The critical distinction, of course, is that such tacit collusion is currently beyond the reach of the Sherman Act.

Interestingly, though, oligopolistic market structure does not require such an outcome. Rather, it facilitates a form of concerted action between incumbent firms by which they may signal and punish one another in order to reach a stable agreement. Importantly, firms may not even succeed in reaching a collusive outcome, so it would be a mistake to think that supracompetitive outcomes are inevitable. A myopic incumbent—that is, one with an unusually high discount rate, assuming rationality—may forego future profits to gain an

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39. Calculated as: $4556 * 25 + 3600/i > 4050/i$. Therefore, $i > 0.098765$.

40. *See* WALDMAN & JENSEN, *supra* note 7, at 238 ("Economists typically assume a discount rate in the range of 5 percent to 10 percent (0.05-0.10) as being reasonable.").

41. The foregoing example should not be taken as implying that this will invariably be the case in all oligopolistic markets.

elevated level of single-period profit;[42] an incumbent firm wishing to maximize market share, as opposed to profits, will not always follow a price leader[43]; and, of course, the firms simply may elect not to tacitly agree to price. This last observation would be particularly pertinent in a context where a legal system prohibited tacit collusion, in which case a firm would elect not to match a competitor's price increase where the risk and consequences of detection by the enforcement agencies were sufficiently grave.

D. *Economic Insights*

From the preceding economic analysis of oligopolistic behavior, the following observations are possible:

First, putting the models of single- and multi-period games together, it becomes strikingly clear that firms operating in a strategically interdependent environment are not compelled by virtue of that environment to act in a particular way. A number of Nash equilibria may emerge, depending on the actions and choices of the incumbent firms. This fact makes clear that firms operating in an oligopoly are not slaves to the market structure in question and that no supracompetitive outcomes are compelled by the oligopoly alone.

It is thus reasonable, at least in theory, to observe that firms may potentially be found to have engaged in some form of genuine agreement when pricing in parallel. Oligopolists do not set price on a unilateral basis—they seek to reach a mutual understanding with their counterparts so as to achieve a monopoly outcome. This process may be construed as an agreement on a number of grounds.

Consider first an analogy with unilateral contracts. When an oligopolist raises price, it does so in the hope and expectation that its fellow market participants will do likewise. This oligopolist's increase in price may be viewed as an offer to maintain that price if its rivals do likewise. Acceptance of the offer and a cognizable agreement follows when rival firms increase their prices to match the raise. Explicit communication is unnecessary. Barometric price leadership[44] of the above sort can also be construed as an agreement through

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42. For instance, management may desire short-term results in order to appease shareholders and to increase their own standing.

43. *See, e.g.*, Louis Kaplow, *Extension of Monopoly Power Through Leverage*, 85 COLUM. L. REV. 515, 550-51 (1985) (noting that modern firms often attempt to maximize sales and growth rather than profits). Where a firm wishes to maximize size, as opposed to profitability, it need only decline to match a rival's price increase, for customers will shift sales from the higher-priced firm to the stable one.

44. Barometric price leadership refers to the process by which one business entity raises price and others subsequently follow. The barometric firm is the one that incites the price increase. When a particular firm becomes regarded as a "price leader," its actions are closely watched—and followed—by competitors. Often, but not always, the price leader will be the dominant firm in the market. *See* Jesse W. Markham, *The Nature and Significance of Price Leadership*, 41 AM. ECON. REV. 891, 892-903 (1951).

the law covering contracts implied-in-fact. Both these grounds—those of unilateral contracts and contracts implied-in-fact—have been judicially recognized as valid theoretical bases for establishing an agreement.[45] Nevertheless, such foundations do not suffice for the purpose of finding an agreement under section 1 of the Sherman Act, as a matter of law.[46]

The grounds for inferring agreement are especially strong where firms attempt to shift the Nash equilibrium from the cheating to the collusive price or quantity levels. Incidences of failed attempts to reach the collusive outcome, frustrated through defection, followed by evidence of punishment, succeeded by further attempts to reach the collusive price level constitute persuasive proof that the firms are acting in concert.

The second important point to take from the foregoing economic examination relates to the magnitude of harm flowing from the legality of barometric price leadership. The extent of antitrust law's failure to reach Nash equilibria arrived at without interaction is markedly obvious in the above circumstances, where output decreases and price increases to the monopoly level. Indeed, from the perspective of allocative efficiency,[47] such an outcome constitutes a complete failure in antitrust policy.[48] The critical question is whether this shortcoming can be remedied.

II. THE CURRENT LEGAL STANDARD

A. *The Courts' Treatment of Oligopolistic Pricing*

U.S. law does not find a violation of the Sherman Act when firms price in parallel without overt communication.[49] Even the most blatant instances of

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45. *See, e.g.*, *In re* High Fructose Corn Syrup Antitrust Litig., 295 F.3d 651, 654 (7th Cir. 2002).

46. *Id.*

47. Allocative efficiency is achieved when the marginal cost of an extra unit equals the marginal benefit derived from its consumption. This situation is Pareto efficient, as the marginal rate of substitution among all consumers will be the same. In such circumstances, societal wealth is maximized. *See, e.g.*, BORK, *supra* note 2, at 91 ("The whole task of antitrust can be summed up as the effort to improve allocative efficiency without impairing productive efficiency so greatly as to produce either no gain or a net loss in consumer welfare."). When the market price increases beyond marginal cost, as in the case of tacit collusion, some consumers who value the relevant products at a level equal to or above the marginal cost to society of producing them will be denied access to them. Allocative and Pareto efficiency will no longer exist. *See, e.g.*, POSNER, *supra* note 12, at 9-32; C. Scott Hemphill, *Paying for Delay: Pharmaceutical Patent Settlement as a Regulatory Design Problem*, 81 N.Y.U. L. REV. 1553, 1556 (2006).

48. *See, e.g.*, Kovacic, *supra* note 1, at 97 ("Enforcement of the Sherman Act has inspired firms to adopt tactics that achieve roughly the same results as a conventional agreement with their rivals while operating outside Section 1's ban on concerted action."); Shulman, *supra* note 1, at 14.

49. *See, e.g.*, Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209, 227 (1993); Theatre Enters. v. Paramount Film Distrib. Corp., 346 U.S. 537, 540-41

barometric price leadership, standing alone, will not amount to a breach of the Act. It has been held that conscious parallelism is a "process, not in itself unlawful, by which firms in a concentrated market might in effect share monopoly power, setting their prices at a profit-maximizing, supracompetitive level by recognizing their shared economic interests and their interdependence with respect to price and output decisions."[50]

Instead, "plus factors" are required to demonstrate that overt agreements were entered into.[51] So, for example, evidence of periodic meetings coupled with demonstrable price increases in parallel has been held to create a genuine issue for trial.[52] Nevertheless, where additional incriminating factors are equally consistent with parallel, but legally unilateral, pricing behavior in an oligopolistic market, no infringement of the antitrust laws will be deemed to have taken place.[53]

B. *Donald Turner's Controlling Rationale*

It is clear that the law's current approach enjoys the support of a majority of practitioners and academic commentators. Why is this so? The answer lies in a highly persuasive article written by Professor Donald Turner, who advanced the argument that tacit collusion is not, and ought not to be, actionable under the antitrust laws.[54] His case stems from four major arguments.

First, Professor Turner makes the powerful point that firms operating in an oligopoly make decisions in an identical manner to how firms make decisions in competitive and monopolistic markets—in a rational, profit-maximizing manner. The only important difference is that firms in an oligopoly simply face one more variable, namely, the anticipated reaction of their competitors.[55] Firms operating in monopolistic or competitive markets are allowed to take all relevant economic criteria into account in making their profit-maximizing pricing or output decisions, so why should firms which happen to find themselves in oligopolistic markets be prevented from doing likewise?[56]

For Professor Turner, the only rational solution is to allow firms to factor their rivals' anticipated reactions into their competitive decisions, and if that means that market prices will be at noncompetitive levels, so be it. After all,

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(1954); Williamson Oil Co. v. Philip Morris USA, 346 F.3d 1287, 1300-01 (11th Cir. 2003).

    50. *Brooke Group*, 509 U.S. at 227.

    51. *See Williamson Oil*, 346 F.3d at 1301; *see also In re* High Fructose Corn Syrup Antitrust Litig., 295 F.3d 651, 654-55 (7th Cir. 2002).

    52. *See, e.g.*, *In re* Flat Glass Antitrust Litig., 385 F.3d 350, 361 (3d Cir. 2004) (holding that evidence of firms getting together, in conjunction with a parallel price increase, suffices to defeat a motion for summary judgment by showing a genuine issue for trial).

    53. *See id.* at 360.

    54. *See* Turner, *supra* note 14.

    55. *Id.* at 665.

    56. *Id.* at 665-66.

monopolists are legally able to restrict output and raise price to the profit-maximizing level.[57] Accordingly, so too should oligopolists be able to set price and output in the way they expect will maximize their profits given the anticipated, though not overtly agreed, reaction of their competitors.[58] It follows naturally from this point, according to Professor Turner, that "there is fair ground for argument that oligopoly price behavior can be described as individual behavior—rational individual decision in the light of relevant economic facts—as well as it can be described as 'agreement.'"[59]

The second argument is that a ban on parallel pricing would prevent entry into oligopolistic markets. Interestingly, Judge Posner not only struggles with this criticism, but views it as constituting a major objection to his approach.[60] Adherents to Professor Turner's perspective note that the proper solution to supracompetitive, oligopolistic pricing is entry.[61] A fundamental tenet of microeconomic theory is that capital will flow to where it will earn the highest return. Since, in theory, firms operating in perfectly competitive markets earn a return exactly equal to the opportunity cost of capital,[62] supracompetitive prices will, by definition, attract entry.[63] Thus, we can expect tacit collusion to be ephemeral. Judge Posner's approach, however, would find an entrant guilty of violating the antitrust laws where its presence is inadequate to bring prices to competitive levels.[64] Such a rule would impair entry in circumstances where its occurrence is socially desirable. After all, why would a firm enter a market where there is an appreciable chance that it would be legally punished for doing so?

Professor Turner's third major argument is that a rule prohibiting parallel pricing behavior in interdependent markets would be tantamount to a rule prohibiting supracompetitive pricing. This would effectively result in the courts being rendered price regulators: "That course is to make the charging of a monopoly price unlawful in and of itself, regardless of the ways in which the power to charge such a price was acquired. I find such an interpretation of the Sherman Act wholly unsupportable."[65]

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57. *See, e.g.*, United States v. Griffith, 334 U.S. 100, 107 n.10 (1948); United States v. Microsoft Corp., 253 F.3d 34, 58 (D.C. Cir. 2001) ("A firm violates [section] 2 only when it acquires or maintains, or attempts to acquire or maintain, a monopoly by engaging in exclusionary conduct as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident." (internal quotation omitted)).

58. Turner, *supra* note 14, at 665-66.

59. *Id.* at 666.

60. *See* POSNER, *supra* note 12, at 98.

61. *See, e.g.*, Dennis W. Carlton et al., *Communication Among Competitors: Game Theory and Antitrust*, 5 GEO. MASON L. REV. 423, 429 (1997).

62. *See* CARLTON & PERLOFF, *supra* note 4, at 60.

63. *See, e.g.*, GEORGE J. STIGLER, THE ORGANIZATION OF INDUSTRY 67 (1968).

64. *See* Carlton et al., *supra* note 61, at 429 (arguing that per se treatment of supracompetitive prices could make entry less attractive).

65. Turner, *supra* note 14, at 668.

This is a powerful objection. Professor Turner is undoubtedly correct in his observation that Congress, in enacting the Sherman Act, did not intend for the judicial system to act as a de facto price regulator, for such would be a function for which the courts are neither equipped nor designed.[66] The natural question to ask is whether a rule punishing tacit collusion would indeed create a situation whereby the courts would be required to monitor adherence to marginal cost pricing by those firms operating in an oligopoly.

Why would we be worried about forcing the courts into a position where they would be charged with monitoring firms' pricing decisions? Aside from the fact that the courts have neither the expertise nor the available time to act as price regulators, it is equally apparent that the financial consequences for firms ordered to set prices at the competitive level are dire. In this regard, Professor Turner states:

> The injunction, if it could be and was ruthlessly carried out, would not only eliminate all monopoly profits whatsoever but force the sellers to endure competitive losses whenever, say, there was a fall in demand. In eliminating all monopoly profits, it would closely resemble what in theory is imposed by public-utility regulation, but public-utility regulation is at least benign enough to attempt to protect regulated industries against losses. Moreover, the practical problems imposed on a court would of course be immense. In many cases marginal cost is either theoretically indeterminate (as in cases of "joint products") or practically indeterminate. Even if approximate costs could be determined to everyone's satisfaction—an heroic assumption if public-utility rate cases are any sign—a court could not reasonably insist on day-to-day or even month-to-month compliance; and a court might well be pressed to permit price stabilization over predictable short-run abnormalities in economic conditions.[67]

In further response to this question, Professor Turner advances what may be regarded as his fourth, and final, major argument: that the courts lack any kind of effective remedy or order by which to enforce the law. In particular, Turner regarded the equitable remedy of injunction as being intrinsically inappropriate in the circumstances: "[T]he injunction would be somewhat more meaningful if it prohibited each defendant from taking into account the probable price decisions of his competitor in determining his own price or output. . . . But such an injunction, read literally, appears to demand such irrational behavior that full compliance would be virtually impossible."[68]

That irrationality forms the crux of Professor Turner's final objection. This point is inextricably tied in with his first major objection that a firm operating in an oligopoly is rationally required to take its competitors' expected reactions into account when setting its price and quantity combination. Professor Turner's focus on the importance of market participants being allowed to do

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66. *Id.* at 669.
67. *Id.* at 670.
68. *Id.* at 669.

what is economically rational for them to do, absent overt communication, forms the foundation of his article. It is a view that underlies both current jurisprudence and the majority of academic commentary.

The law closely reflects these concerns. As currently implemented, it can perhaps best be understood as a manifestation of the principle of the "theory of the second best."[69] In a "first best," though presumably unobtainable, world, parallel pricing behavior could be prevented through application of a pragmatic, straightforward, and, above all else, equitable rule of law. Following Professor Turner's observations, and taking the view that such an equitable and realistic rule is not achievable in practice, the law adopts a "second best" strategy, by which it discourages so-called "facilitative practices."[70] Accordingly, the law expressly prohibits oral communications designed to create, alter, or perpetuate supracompetitive market outcomes,[71] and fosters an environment conducive to entry.

One is inclined to agree with a number of the points raised by Professor Turner. If a rule prohibiting tacit collusion is to be fashioned, then, the pragmatic obstacles highlighted above must be adequately addressed.

C. *The Advantages Associated with Donald Turner's Approach*

The obvious advantage to Professor Turner's treatment of oligopoly pricing lies in his recognition of what many would regard as commercial reality. Many markets in today's world may be characterized as oligopolistic in nature and the incumbent firms that comprise them operate with the goal of maximizing shareholder value.[72] Businesses, large and small, public and private, are typically driven by one major principle—making profit. That goal ought not to be objectionable.[73] It is that motivation which drives competition and innovation. For the same reason that the antitrust laws do not prohibit monopolization arrived at through superior efficiency, effective price

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69. *See generally* Albert Fishlow & Paul A. David, *Optimal Resource Allocation in an Imperfect Market Setting*, 69 J. POL. ECON. 529, 542-44 (1961); R.G. Lipsey & Kelvin Lancaster, *The General Theory of Second Best*, 24 REV. ECON. STUD. 12 (1956).

70. Trade associations, information-sharing agreements, and the like are scrutinized for their content and purpose so as to determine their legality. *See, e.g.*, United States v. Container Corp. of Am., 393 U.S. 333, 336-37 (1969).

71. Evidence of secret meetings, absence of minutes, and so on are viewed with suspicion by courts and will, in many settings, constitute the necessary "plus factors" required by the law to turn mere parallel conduct into concerted action. *See, e.g.*, *In re* Flat Glass Antitrust Litig., 385 F.3d 350, 360-61 (3d Cir. 2004).

72. *See, e.g.*, Henry Hansmann & Reiner Kraakman, *The End of History for Corporate Law*, 89 GEO. L.J. 439, 439 (2001) ("There is no longer any serious competitor to the view that corporate law should principally strive to increase long-term shareholder value.").

73. *See, e.g.*, Mark J. Roe, *The Shareholder Wealth Maximization Norm and Industrial Organization*, 149 U. PA. L. REV. 2063, 2065 (2001) ("Shareholder wealth maximization is usually accepted as the appropriate goal in American business circles.").

competition, or quality competition,[74] so too it may be argued that firms ought not to be condemned for pricing practices that merely take commercial realities into account. A rule requiring otherwise would be, to use the word of Professor Turner, "irrational."[75]

Moreover, Professor Turner's additional concerns—namely, the impossibility of proper judicial enforcement and the problem of entry[76]—appear to be quite valid and are likely to be troubling in any attempted application of a rule punishing tacit collusion. While there is undoubtedly some room for disagreement, it is hard not to recognize an attractive pragmatism contained in Professor Turner's article.

D. *The Shortcomings of Professor Turner's View*

The economic examination conducted above makes markedly clear the allocative inefficiency that would follow from implementation of Professor Turner's recommendations.[77] In many circumstances, prices may be considerably above the competitive level and, particularly in the case of markets characterized by significant barriers to entry, these prices are likely to cause considerable damage to the economy.[78] It follows that a law enacted to reflect Professor Turner's approach will lack effective tools by which to accomplish antitrust law's main objective—the maximization of allocative efficiency—in those frequently encountered circumstances of oligopoly. There would, in effect, be a quite significant "gap" in antitrust law's effective reach. Professor Turner would argue that such a gap is an inescapable consequence of oligopolistic market structure and can only be attacked through merger policies forbidding undue concentration. The modern prevailing view reflects these considerations.

There are, however, a number of foundational reasons to doubt the severity of Professor Turner's concerns. First, Turner's analysis was advanced prior to the advent of modern game theory. The economic analysis above made explicitly clear that firms operating in an oligopoly are not compelled by virtue of that market structure to price at supracompetitive levels. In particular, the economic analysis relating to multi-period games, where the relevant firms sought to shift the Nash equilibrium from the defective price or quantity level to the collusive one, demonstrated that incumbent firms are not slaves to the

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74. Consider the famous comments of Judge Learned Hand in *United States v. Aluminum Co. of America*, 148 F.2d 416, 430 (2d Cir. 1945): "A single producer may be the survivor out of a group of active competitors, merely by virtue of his superior skill, foresight and industry. . . . The successful competitor, having been urged to compete, must not be turned upon when he wins."

75. Turner, *supra* note 14, at 666.

76. *See supra* text accompanying notes 44-55.

77. *See supra* Part I.

78. *See, e.g.*, Shulman, *supra* note 1, at 14.

nature of oligopolistic interdependence. The market will not, in most instances, compel a particular result; rather the firms themselves, by consciously interacting in a manner designed to further their collective profits at the expense of consumers, will determine the market outcome. Aaron Director and Edward Levi, two famous Chicago economists, were particularly adamant about this, noting with respect to conscious parallelism[79] that: "Here it cannot be said that economic doctrine indicates with certainty that there will be collusion among the firms; it cannot be said that there will be inevitably a restriction in production."[80]

This economic observation goes some way toward discrediting a fundamental tenet upon which Professor Turner and his many followers expressly rely: the idea that firms operating in oligopolistic markets are somehow "innocent" by virtue of the fact that they are merely behaving rationally in a market that necessarily requires a noncompetitive outcome. Employing a similar rationale, one could argue that we ought not to condemn express price-fixing agreements, for the relevant firms are acting in an equally rational way—that is, to maximize profit. Yet, for obvious reasons, we decline to permit such agreements and, indeed, make considerable efforts to condemn them in whatever express form they may take.[81] We do this, as a society, by recognizing the fact of improper action taken in concert. In light of the observation that market structure does not compel uncompetitive outcomes, and from analogizing conscious parallelism both with unilateral contracts and contracts implied in fact,[82] it is reasonable to conclude that Professor Turner's fundamental objection is, indeed, surmountable.[83]

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79. The term "conscious parallelism" is synonymous with "tacit collusion" in this Note.

80. Aaron Director & Edward H. Levi, *Law and the Future: Trade Regulation*, 51 NW. U. L. REV. 281, 296 (1956).

81. *See* United States v. Socony-Vacuum Oil Co., 310 U.S. 150, 218 (1940) (holding that price-fixing is illegal per se); United States v. Trenton Potteries Co., 273 U.S. 392, 396-98 (1927) (same); *see also* FED. TRADE COMM'N & U.S. DEP'T OF JUSTICE, ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS 3 (2000), *available at* http://www.ftc.gov/os/2000/04/ftcdojguidelines.pdf ("Types of agreements that have been held per se illegal include agreements among competitors to fix prices or output, rig bids, or share or divide markets by allocating customers, suppliers, territories, or lines of commerce. The courts conclusively presume such agreements, once identified, to be illegal, without inquiring into their claimed business purposes, anticompetitive harms, procompetitive benefits, or overall competitive effects.").

82. *See, e.g.*, *In re* High Fructose Corn Syrup Antitrust Litig., 295 F.3d 651, 654 (7th Cir. 2002).

83. *See, e.g.*, Gregory J. Werden, *Economic Evidence on the Existence of Collusion: Reconciling Antitrust Law with Oligopoly Theory*, 71 ANTITRUST L.J. 719, 773 (2004) ("Were Professor Turner alive today, he likely would continue to argue that unspoken agreements should not be deemed unlawful under Section 1, even though his original rationale for that conclusion has been substantially undercut by developments in oligopoly theory. Oligopoly behavior in one-shot game models is much like that of sellers in a competitive industry, but the same cannot be said of coordinated pricing achieved through

The next major impediment to a rule against tacit collusion relates to the protestation that a rule prohibiting tacit collusion would prevent entry into oligopolistic markets. However, most markets investigated by the FTC or the Department of Justice will have significant barriers to entry associated with them.[84] This diminishes the argument that a rule against tacit collusion would frustrate the effect of entry as the appropriate mechanism by which to attack oligopolistic supracompetitive pricing.

More importantly, to the extent that entry is indeed frustrated, its significance is rendered defunct by Professor Turner's further point that marginal cost pricing will follow a ban on tacit collusion. Were the rule to operate so as to ensure competitive price levels, entry would not be required unless a more efficient firm can profitably set prices lower than the marginal cost of the incumbent firms. Hence, a rule against tacit collusion would not prevent entry by more efficient firms.

Putting aside the irony that one of the prevailing commentators' major concerns would, if true, effectively eliminate another, we will now consider the possibility of courts being compelled to act as price regulators. There are two major points to be made here.

First, if implemented properly, courts would not be required to act as price regulators in assessing whether firms are pricing at marginal cost. Such a task would be evidently beyond their capacity.[85] Instead, courts would be asked to determine whether concerted action has taken place, a matter in which they have ample experience.[86] Second, the application of a rule against tacit collusion is unlikely to effectively compel marginal cost pricing, unless applied in so draconian a fashion as to prohibit all parallel increments in price. Such an application would be unwise, as firms might be driven into insolvency.

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the use of a punishment mechanism.").

84. This is so because markets that do not have significant barriers to entry associated with them are unlikely to be conducive to effective tacit collusion. Any effort by incumbent firms to collude and raise prices will induce entry, thereby effectively eroding and eventually eliminating the supracompetitive pricing. Knowing this, the federal antitrust authorities are unlikely to focus their investigations on markets where the objectionable conduct is apt to be ephemeral.

85. *See, e.g.*, Yankees Entm't & Sports Network, LLC v. Cablevision Sys. Corp., 224 F. Supp. 2d 657, 674 (S.D.N.Y. 2002) ("[D]eterminations of 'reasonable price' made by any court can often be Sisyphean undertakings."); IIIA PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW § 771, at 172 (2d ed. 2002) (arguing that the sort of price regulation undertaken by the regulatory agencies is a task for which the federal courts "are extremely ill-suited").

86. Courts in antitrust cases routinely have to infer concerted action from circumstantial evidence. *See, e.g.*, Monsanto Co. v. Spray-Rite Serv. Corp., 465 U.S. 752, 764 (1984) (permitting antitrust plaintiffs to present "circumstantial evidence that reasonably tends to prove that the [defendant] and others 'had a conscious commitment to a common scheme designed to achieve an unlawful objective'"); Am. Tobacco Co. v. United States, 328 U.S. 781, 810 (1946) (requiring the circumstances to demontrate "a unity of purpose or a common design and understanding, or a meeting of minds in an unlawful arrangement").

Moreover and critically, it can be shown that where there are differences between firms and their cost structures and where, as is the case in most markets, the industry cost curve is U-shaped, the imposition of a rule prohibiting tacit collusion will reach an equilibrium enabling incumbent firms to recover costs. The more efficient firms will be expected by virtue of the rule to expand output and the less efficient firms to produce somewhat less until equilibrium is reached. Where a firm with large market share begins to suffer losses, but is incapable of increasing price because its rivals are, by virtue of the law, unable to follow, then it will have no choice but to restrict output somewhat, which will have the effect of lowering its cost more than its profits.[87]

Thus, it can be appreciated that the current system, while practical and reasonably easy to apply, is more open to criticism than was suggested by Professor Turner in 1962.

III. JUDGE POSNER'S SUGGESTED SOLUTION

Recognizing the deficiencies of the current approach, Judge Posner advocates shedding the conclusion that market structure makes supracompetitive parallel pricing both an innocent and an inevitable consequence of oligopoly.[88] Instead, it is reasonable to observe that a firm in an oligopolistic market does not *have to* increase price above the competitive level. Rather, it *chooses* to, in seeking to maximize profits based on the assumption and expectation that its competitors will do likewise. Thus, according to Judge Posner's view, raising price above the competitive level in an oligopolistic market is sufficient to infer both the level of moral culpability required of any crime[89] and to deduce the existence of concerted action.[90] From here, it is not difficult to establish a breach of section 1 of the Sherman Act.

Judge Posner articulates a price-fixing rule to the effect that any supracompetitive price reached by firms acting in parallel may be capable of constituting an illegal price fix under section 1 of the Sherman Act. The rule, if enacted, would undoubtedly be resented by companies and defense attorneys. From a societal standpoint, however, where the joint maximization solution is to maximize societal utility and achieve Kaldor-Hicks efficiency,[91] a rule

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87. *See infra* Part III.C.

88. POSNER, *supra* note 12, at 55-100.

89. A criminal antitrust violation contains the usual mens rea element required for any criminal conviction—a fundamental principle encapsulated in the Latin phrase *actus non facit reum nisi mens sit rea* (an act does not make a person guilty unless the mind is guilty).

90. *See In re* High Fructose Corn Syrup Antitrust Litig., 295 F.3d 651, 654 (7th Cir. 2002).

91. An outcome is Kaldor-Hicks efficient where the overall societal gain exceeds the sum of all related losses.

prohibiting tacit collusion has many attractive qualities. Judge Posner writes, in pertinent part:

> If the economic evidence presented in a case warrants an inference of collusive pricing, there is neither legal nor practical justification for requiring evidence that will support the further inference that the collusion was explicit rather than tacit.
>
> From an economic standpoint it is a detail whether the collusive pricing scheme was organized and implemented in such a way as to generate evidence of actual communications.[92]

The key feature of Judge Posner's approach is its consequent effect on incumbent firm behavior, whereby it fundamentally frustrates, impairs, and alters the outcomes of oligopolistic games. In essence, it attacks the very feature of what defines oligopoly, namely the interdependence of the firms that comprise it. By assailing the presumed legality of taking into account a rival's likely response in making a profit-maximizing decision, Judge Posner's approach forces firms to effectively make independent decisions.[93]

Two versions of a tacit collusion rule can be differentiated: strict and soft. Judge Posner's advocated rule represents the strict approach, according to which evidence of firms pricing at supracompetitive levels leads, in and of itself, to a violation of the Sherman Act. The standard articulated in this Note, however, is a soft modification of Judge Posner's: it seeks to incorporate the beneficial aspects of his approach whilst avoiding the fatal flaws inherent in the strict standard.

A. *The Example of a Simple Duopoly*

To illustrate Judge Posner's suggested formulation of the law, let us utilize our example of two duopolists, Alpha and Beta. Under a strict application of the rule, one company's increase in price is actionable where the other follows. In essence, an agreement may be inferred as follows: Alpha, by raising its price, makes an offer that it is willing to price at a supracompetitive level if, and for so long as, Beta agrees to also price at that level. Such an offer—that is, a mere price increase—is not actionable under section 1 because it is merely unilateral. Under Judge Posner's approach to price-fixing, however, an illegal section 1 agreement materializes when Beta signifies its acceptance of the offer by raising its price to match that of Alpha. Note that this price increase in parallel is contrary to Beta's short-term self-interest, for it would make a higher profit in the relevant period by undercutting Alpha. This may be deemed action

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92. POSNER, *supra* note 12, at 94.

93. Here Judge Posner's views are completely at odds with those of Donald Turner. *See* Turner, *supra* note 14.

"contrary to single period self-interest" and provides further evidence of a tacit meeting of the minds.[94]

Alpha and Beta's first order conditions for profit-maximization are now fundamentally altered. No longer can either firm attempt to reach a self-sustaining Nash equilibrium[95] by factoring into its profit-maximizing price or quantity decision the anticipated reaction of its competitor. This is because each firm knows that if it sets price or quantity to maximize profits in a manner likely to induce a similar price or quantity decision by the other firm, then both firms will be guilty of a federal crime. Instead, the best either firm can do is presumably to reason as follows:

As I can no longer factor the expected reaction of my rival directly into my profit-maximizing decision, where that reaction will lead my rival to price at the same level as me, I will have to act in a manner partially disregarding that rival. Therefore, I have three choices:

First, I can act as a perfectly competitive firm and set price equal to marginal cost and leave it there for so long as my rival stays in the market, in which case no antitrust claim can possibly arise, though I forego the possibility of earning any supracompetitive profits. My rival can attempt to charge above marginal cost and may be successful in the short run at doing so. Soon, however, my output expansion will take market share away from him. Eventually, my rival will either have to set price equal to marginal cost or exit the market. If my rival exits, I know that I will be legally able to raise price to the monopoly level. Entry is unlikely for every potential entrant will know that, given my prior strategy, I am likely to return price to marginal cost if challenged. I realize, however, that the prospect of my immediate rival being so short-sighted as to allow me to monopolize the market while it enjoys supracompetitive profits on a shrinking volume of sales are extremely remote. I recognize that, by far, the most likely outcome is that my rival will also set price equal to marginal cost. Indeed, the only outcome in a perpetual game where I am doing the best I can given the choice of my opponent is where price equals marginal cost, which is the Nash equilibrium. No other situation is sustainable.

Second, I can set my price somewhere between the monopoly level and the competitive level—that is, somewhere in the range of possible supracompetitive prices—and thereby grant unto myself the possibility of earning supracompetitive profits. I do so, however, at the risk of my rival equaling my price, in which case we will both be found to breach antitrust law. I nevertheless hope that my rival is clever enough to recognize the risk imposed

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94. *See, e.g.*, Nat'l Hockey League Players Ass'n v. Plymouth Whalers Hockey Club, 419 F.3d 462, 475 (6th Cir. 2005) (listing as the first factor in weighing circumstantial evidence of a conspiracy whether "defendants' actions, if taken independently, would be contrary to their economic self-interest").

95. *See supra* note 19.

by law and will, instead, charge a different price. My rival is unlikely to charge a higher price than me because it knows it can make a higher profit by undercutting my price and taking sales away from me. I recognize that whatever supracompetitive price I set will not be stable—for my rival is rendered, by virtue of the law, incapable of matching my price and so creating some sort of sustainable equilibrium. Depending on the extent to which price dictates sales, I may have to drop price soon after my rival undercuts me, lest I suffer a catastrophic loss in market share. I cannot set price equal to my rival for it will be illegal under the antitrust laws if it is above the competitive level.[96] Instead, I will undercut my rival's price. This cut will readily be met by my competitor and a cycle of cuts will continue until price equals marginal cost. The only stable, long-run Nash equilibrium occurs at the competitive level.

Finally, I can set my price equal to marginal cost in the hope that my rival will set its price at a supracompetitive level, in which case I will raise my price to slightly below its price. I recognize that this strategy involves a classic collective action problem, for there is an incentive for each of us to wait for the other to move first. Moreover, regardless of whether he or I go first, the only long-term equilibrium is for both of us to price at marginal cost.

It follows, then, that the only Nash equilibrium in this market, under Judge Posner's proposed rule, is where price equals the competitive level.

The wary reader, however, may recognize that this analysis is missing one important feature: the possibility that the market in question may display decreasing returns to scale in production after a certain level of output.[97] This is a realistic, though complicating, consideration that will be addressed shortly, in terms of the model developed thus far.

B. *The Positive Implications of the Rule*

The foregoing analysis demonstrates that a strict application of Judge Posner's rule would result in price resting at the competitive level, at a Nash equilibrium. As a result, allocative efficiency is achieved and consumer welfare is maximized. Achieving such a result is the ultimate aim of the antitrust laws,[98] so there is clearly much to commend in Judge Posner's approach.

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96. Such an aspect to the rule, it will shortly become clear, would be highly controversial. There are strong reasons both for and against applying it. While it may be suggested that the rule against tacit collusion ought to apply only in cases of (often repeated) positive incremental increases in price, the assumption that the rule will apply to both price increases and decreases (the "strict" variant of the rule) serves an important goal in the immediate example: showing how the rule drives price to marginal cost.

97. An alternative assumption of economies of scale would enhance the severity of the predictions outlined for the three choices available to oligopolists under Judge Posner's rule.

98. *See, e.g.*, Reiter v. Sonotone Corp., 442 U.S. 330, 343 (1979) (stating that the Sherman Act creates a "consumer welfare prescription"); *see also* BORK, *supra* note 2, at 89 (arguing that the sole purpose of the antitrust laws is to promote consumer welfare); Howard

Unfortunately, there are a number of reasons why a marginal-cost-pricing outcome of the above type is undesirable. Before these shortcomings are explored, however, a key operational element of Judge Posner's model must be considered.

1. *Exploring the assumptions of the model*

A critical assumption made in the above analysis requires further treatment, specifically that the rule against tacit collusion ought to apply to price reductions as well as increases. This assumption is counterintuitive and potentially dangerous. The danger may arise in that the law could inadvertently stifle competition and perpetuate a supracompetitive outcome: a firm may be unable to undercut a rival in the hope of increasing sales, lest its rival decrease price to an equivalent level. It would seem that a rule prohibiting one firm from undercutting the price of another and the other following would, in many instances, create perverse incentives.

Yet, there are strong arguments for applying the rule even in those circumstances, as long as the resulting equilibrium is above the competitive level. First, unreservedly permitting firms to reduce price in parallel would provide incumbent firms with ready means by which to defeat the price-fixing rule, for one firm could charge a price so high that it is less profitable than the monopoly price, whereupon the other firm could set price equal to the monopoly price, which the first firm would happily (and legally) reduce price to meet.

Second, such a rule would operate only to defeat the defining feature of Judge Posner's proposed rule, namely, it would frustrate the strong tendency to drive price inexorably to marginal cost. As against that, however, it may prove to be extremely costly for a "price leader" to set price considerably above the monopoly level in the hope that the follower will legally set price at the profit-maximizing level. In doing so, not only may the leader suffer a catastrophic loss in sales, but may further suffer a loss in customer loyalty, the effects of which may long outlast its ensuing reduction in price to the monopoly level.

Still, it is easy to overstate this fear. A leader need not raise price dramatically above the monopoly level to enable its followers to legally set a different price at the profit-maximizing level. Nor, indeed, do the relevant

H. Chang et al., *Has the Consumer Harm Standard Lost Its Teeth?* 1 (MIT Sloan Sch. of Mgmt. Working Paper No. 4263-02, 2002), *available at* http://ssrn.com/abstract=332021 ("[C]onsumer welfare is the fundamental standard for evaluating competitive effects."); William J. Kolasky, Deputy Assistant Att'y Gen., Address Before the Council for the United States and Italy: U.S. and EU Competition Policy: Cartels, Mergers, and Beyond 6 (Jan. 25, 2002) (transcript available at http://www.usdoj.gov/atr/public/speeches/9848.pdf) ("[T]he ultimate goal of any sound competition policy must be consumer welfare, which competition advances through lower prices, higher output and enhanced innovation."). *See generally* Robert H. Lande, *Consumer Choice as the Ultimate Goal of Antitrust*, 62 U. PITT. L. REV. 503 (2001).

companies need to tacitly collude to reach the monopoly price in order to enjoy supracompetitive profits. Instead, one firm could raise price to slightly beyond the collusive level. The second firm could then increase price to the collusive level, which the first would meet. This would lead to a stable, supracompetitive Nash equilibrium, effectively bypassing the proposed rule against tacit collusion.

In response to this objection, however, one might state that the price-fixing rule against tacit collusion ought to be sufficiently flexible so as to catch increases in price that are sufficiently in tandem as to be economically obvious evidence of deliberate action taken in concert. Such a rule would catch Alpha in our example were it to set price at 110 + ε and Beta to follow by setting price equal to 110. Instead, Alpha would be forced to price at a level considerably in excess of 110—an immensely risky strategy.

The solution may be to adopt a rule of law that generally allows parallel decreases in price save in instances where the evidence is unambiguous that the price decrease was actually part of a de facto price *increase*. Formulating such a rule ought not to be excessively difficult and will satisfy the considerations outlined above. Interpreting the rule in that way would moderate the intensity of price cutting implied by the considerations above. Price competition would still be elevated, however, as firms could not increase price in parallel, but could decrease price in parallel. Therefore, price decreases would be apt to become permanent. While this would dissuade firms from decreasing price, the desire to increase profit by undercutting rivals would be expected to result, in the long run, in a steady, downward trend in price. Moreover, and as we shall see, avoiding the severe implications outlined above is likely to be a socially desirable goal.

Why, then, is there any controversy? The economic analysis conducted above suggests that significant allocative efficiency gains can be reaped through a rule prohibiting tacit collusion. The negative implications of the rule will now be considered.

C. *The Negative Implications of the Rule*

The concerns articulated by Professor Turner find clear application in the present example. It is important, now, to explore these problems in the context of the simple duopoly. While the issue relating to frustration of entry would find no application here, there may be teeth to Professor Turner's objection that courts may be forced to become de facto price regulators. In the present case, it is clear that the only equilibrium involves price being set at marginal cost. That being so, and assuming that in practice the rule operates to actually drive prices to marginal cost, it would not be long before lawyers began to realize that they could dispense with the complicated and time-consuming process of proving concerted action through circumstantial proof of consciously parallel behavior. Instead, they could employ an economic showing that if the challenged firms

are pricing above marginal cost, then they must have engaged in tacit collusion, for under this rule there would be no other way for the firms to reach the supracompetitive price. In formulating an antitrust policy, we do not want to mold a price-fixing rule that becomes a de facto marginal cost pricing standard, despite the fact that allocative efficiency would be achieved.

The concerns highlighted in this Part can be further illustrated by considering the model in the case of an industry that may be characterized as a natural monopoly.

1. *Expanding the model of simple duopoly*

Maintaining the example of the duopoly in which Alpha and Beta compete, we now define the market as a natural monopoly due to the fact that marginal cost is always less than average cost. This is significant as marginal cost constitutes the only Nash equilibrium in the presence of the proposed rule. If the rule against tacit collusion is applied strictly, the result may be that Alpha and Beta will not be able set price at or beyond average cost, having been driven by effect of the rule to set price at marginal cost. Let us make this example concrete through the application of some basic numbers:

> Industry demand curve: $P = 200 - Q$
> $FC_A = FC_B = 20$
> $MC_A = MC_B = 0.1$

As a result of the considerable fixed cost and low, though constant, marginal cost,[99] the result is that the long run marginal cost curve is horizontal, but the long run average cost curve is downward sloping.

Applying the rule prohibiting tacit collusion, it becomes evident that Alpha and Beta have a major problem. Their break-even price is 20.1, but the marginal cost of making each extra sale is only 0.1.

This is a major objection to a rule prohibiting tacit collusion. Is there a solution? The only equitable way to apply the proposed rule is to recognize a defense in the case of parallel increases in price where necessary to enable solvency. But such an ostensibly simple defense may become considerably more complicated in application, especially when one considers that profitability is often a poor proxy in determining whether a firm is pricing at the competitive level or not. It may also be the case that grossly inefficient firms would be entitled by virtue of the law to raise their prices in parallel when they ought to exit the market. Applying an exception to the rule to protect against losses is likely to be highly difficult. The only true solution may involve

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99. Such a ratio of marginal-to-fixed cost would not be atypical in the intellectual property industry, where significant up-front expenditures in the form of research and development are required to create a technology, but, once completed, dissemination of the product may entail trivial per-unit cost. In such industries, marginal cost pricing would lead both to insolvency and to the elimination of ex ante incentives to engage in further innovation and research.

looking for some manner in which to apply a rule against tacit collusion that is not so draconian in its application as to necessitate marginal cost pricing.

Marginal cost pricing may also be harmful in contexts outside of the realm of natural monopoly. While it is generally presumed that marginal cost pricing, assuming that fixed costs have been recovered, is socially desirable, there are doubtless many situations where, from a societal standpoint, we would like to permit supracompetitive profits. The typical situation relates to conferring intellectual property rights to encourage innovation. In granting an inventor intellectual property rights to his invention, the government seeks to curtail competition to some degree, in order to provide incentives to innovate. This is particularly appropriate for goods that would become "public goods" in the absence of protection.[100] Were all industries to be subjected to (effective) price regulation leading to zero economic profits, some socially valuable innovations might never materialize.

2. *The problem of marginal application*

The duopoly example, where both firms operated with identical cost functions, made for an easy case for application of a rule against tacit collusion. Application of Judge Posner's proposed rule resulted in the only Nash equilibrium constituting the competitive equilibrium. As a result, allocative efficiency was achieved, though this was shown to be an unsatisfactory outcome in many respects.

Real markets are rarely as straightforward as the duopoly example, however, and it is necessary to consider how applying the rule may become somewhat more difficult in more complicated contexts. Consider a situation in which there are five firms (Alpha, Beta, Delta, Epsilon, and Gamma), all of which operate at different levels of efficiency. This example may now be employed to demonstrate what may be referred to as the problem of marginal application. The relevant monopoly and competitive price levels facing each firm are as follows:

Monopoly Price	Competitive Price
$P_A = 105$	$P_A = 10$
$P_B = 106$	$P_B = 12$
$P_D = 107$	$P_D = 14$
$P_E = 107.5$	$P_E = 15$
$P_G = 125$	$P_G = 50$

A strict application of the rule against tacit collusion may lead to perverse consequences in this example. So too may a liberal application.

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100. *See generally* WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW (2003).

If the rule is liberally applied to prohibit increases in price beyond the least efficient firm's marginal cost only, it can be shown that the Nash equilibrium in this scenario does not lead to the competitive outcome. In this case, each of the five firms has an incentive to raise price in parallel to a level that will maximize their profit subject to the constraint imposed by antitrust law. Depending on how strictly Judge Posner's articulated rule is applied, the equilibrium may be at a price equal to 50, which would be allocatively inefficient. This may not be an entirely negative consequence, however. We have made clear that a rule that effectively requires marginal cost pricing is, on the balance, socially undesirable. Perhaps allowing firms to increase price in parallel to the marginal cost of the least efficient firm is as close a proxy to an efficient solution as we can get. We must be cautious, though, for if the marginal cost of the least efficient firm is high enough, the consequences of allocative inefficiency may become critical. It is not, therefore, a perfect solution.

A literal and strict application of the rule, however, leads to an even worse result. Such a reading of the law would hold Alpha, Beta, Delta, and Epsilon guilty of price-fixing for each raising its price above its marginal cost to 50 in furtherance of the expectation that every other firm will do likewise. Yet, something seems potentially off about this result, for Gamma is pricing at the competitive price level. Moreover, and far more seriously, if we apply the rule literally to disallow pricing equal to the marginal cost of the least efficient firm, then we observe something of a problem in that the resulting dominant strategy for the most efficient firm Alpha is to set price to $12 - \varepsilon$ and to consequently capture all of the market. In period two, Alpha will have a monopoly and may legitimately set price equal to 105, leading to a total failure in antitrust policy. Antitrust law, in an attempt to maximize efficiency, would inadvertently lead to an outcome effectively minimizing it. Of course, one could point out that Beta, Delta, Epsilon, and Gamma may re-enter in period three to avail of these supracompetitive profits, but they would do so knowing that the only resulting equilibrium, given the strict application of the rule against tacit collusion, would be $12 - \varepsilon$. Therefore, they will not enter and Alpha will enjoy a monopoly until a more efficient firm seeks to enter. It hardly need be mentioned that the resulting price equilibrium of 105 is far worse than the price of 50 prevailing in the same industry subject to a looser application of the rule.

These constitute serious objections to Judge Posner's rule. Of course, the first point that must be made is that if these constitute serious obstacles to the adoption of Judge Posner's suggested rule, it must be ascertained whether the law as currently applied would do any better. In this sense, there is every reason to think that the current law would avoid the situation where an oligopoly became a monopoly due to application of a draconian price-fixing rule. It would not, however, be better than a loose application of the rule against tacit collusion which would find price settling at 50.

Fortunately, the severity of the illustrated game is moderated somewhat by two observations. First, the assumption of zero fixed cost and constant marginal

cost (essentially constant returns to scale) is unlikely to be often encountered in the real world. Were such an assumption to hold true in the case of many markets, we would observe a far greater level of monopolization than is encountered in real life. In most markets subject to competition, long-run average cost will be U-shaped, with the result that costs will initially drop, then, following an instant where they are constant, increase as output increases. We shall momentarily seek to apply these considerations to the example outlined above.

Second, the severity of the highlighted example above would be diminished by a principle that parallel pricing ought only be punished in those situations where there is a history of barometric price leadership in a market. In other words, documented evidence of firms repeatedly following a "leader" would be required.

Were the rule to be severely enforced, in violation of these guiding principles, firms would be effectively compelled to set price equal to marginal cost, and despite the potential rewards in the form of allocative efficiencies, there is a danger that the courts would be forced to play the role of reluctant regulator.

By applying a more liberal variant of the rule, the extreme and negative consequences highlighted by the above example would be avoided.

3. *Relaxing the assumption of zero fixed cost and constant marginal cost*

In order to employ the proposed rule against tacit collusion to a more realistic market, assume now that the cost functions of Alpha, Beta, Delta, Epsilon, and Gamma are as follows:

$$C_A(q) = q^2 - 7q + 14$$
$$C_B(q) = q^2 - 5q + 14$$
$$C_D(q) = q^2 - 4q + 14$$
$$C_E(q) = q^2 - 3q + 14$$
$$C_G(q) = 2q^2 - 2q + 14$$

where $C_X(q)$ is the cost of producing the quantity of output, q, for firm X. The market demand curve is now: $P = 20 - Q$.

These cost functions are considerably more realistic, though somewhat more complicated, than the figures used in previous examples to illustrate basic principles of collusion. Specifically, it is generally true that entry into, and maintenance of a position within, a market requires some fixed cost[101] and that average cost will change with the level of output. In this particular example, most firms' cost functions exhibit economies of scale in production as output initially expands, costs then level off, and further increases in output result in

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101. Fixed costs are costs that do not vary with changes in output. Examples include rental of premises, purchase of equipment, interest payments on loans, and so on.

diseconomies of scale. This is a characteristic displayed by many, if not most, markets. The firms' monopoly and competitive prices are as follows:

Monopoly Price	Competitive Price[102]
$P_A = 13.25$	$P_A = 11$
$P_B = 13.75$	$P_B = 11.66$
$P_D = 14$	$P_D = 12$
$P_E = 14.25$	$P_E = 12.33$
$P_G = 14.4$	$P_G = 13$

Once again, it is clear that there is no single monopoly price upon which they can all agree. Therefore, the above-mentioned comments regarding the difficulty of achieving and maintaining collusive agreements in the absence of a single monopoly price hold true here. It should be noted, though, that the competitive price level is potentially misleading in this case, for the "competitive outcome" for each firm occurs where it produces at its marginal cost. However, these marginal costs depend on the level of output. Thus, there is a range of "competitive" prices for each firm.

What are the consequences of applying the rule against tacit collusion liberally under these circumstances? Under a liberal application, price increases by Alpha, Beta, Delta, and Epsilon made in parallel to Gamma's (the least efficient firm at the given level of output) competitive price of 13 would not be actionable. First, it is obvious that allocative inefficiency exists, as we would like each firm to be producing output as close to their respective competitive price levels as possible. Second, it is equally evident that instructing firms to price at a level equal to their marginal cost is considerably more complicated where diseconomies and economies of scale exist, for each firm's marginal cost will differ depending on the quantity being produced when the market clears. Pragmatism, therefore, counsels against formulating a rule dependent on the accurate identification of marginal cost. As allowing firms to set price in parallel up to a level equal to the least efficient firm's marginal cost would necessarily require the ascertainment of that cost, such a rule would be inappropriate.

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102. Marginal cost is the rate of change of cost with respect to quantity. Thus, Alpha's marginal cost may be derived as follows:

$TC_A = q^2 - 7q + 14$

$MC_A = \delta TC_A / \delta q = 2q - 7$

$TR_A = p * q = (20 - q)q = 20q - q^2$

$MR_A = \delta TR_A / \delta q = 20 - 2q$

Maximize π_A at $MC_A = MR_A$: $2q - 7 = 20 - 2q$

$q = 6.75$ and $p = 13.25$

The competitive price level can be determined by setting $MC = p$: $2q - 7 = 20 - q$. Thus, $q = 9$ and $p = 11$.

The other firms' monopolistic and competitive price and quantity levels may be determined similarly.

Do our concerns regarding inadvertent monopolization from application of a strict rule against tacit collusion remain in the case of diseconomies of scale? The point was made that by forcing each firm to price at marginal cost, the end result may be to cause the most efficient firm to gradually monopolize the market. Here, if the five firms are forbidden from moving in parallel from their marginal cost, we would expect each to price at as low a level as is possible and sustainable. Does this mean that Alpha, the most efficient firm at higher levels of output, will monopolize the market as was likely to occur in the case of constant average and marginal costs? The answer is no. As Alpha attempts to continually increase output to take sales away from its less efficient rivals, it will discover that its costs will increase so that, at a certain level of output, its marginal cost will be higher than its competitors. At this point, Alpha will be unable to further increase its market share.

4. *An encouraging result*

A prediction of inadvertent monopolization in this realistic scenario might fairly kill any possibility of implementing a rule against tacit collusion. The result here, however, where it can be shown that the market will settle at a marginal cost equilibrium, is a powerful one. Indeed, it provides considerable insight into how a rule against tacit collusion would likely operate in the real world. In most markets, diseconomies of scale are present beyond a certain level of output. As a consequence, one would expect the imposition of a rule against barometric price leadership to result in a situation whereby the most efficient firm expands its market share until its marginal cost equals that of its competitors. At that point, the market will be in equilibrium and allocative efficiency will exist as all firms will be selling at a price equal to marginal cost. Any attempt by a firm to increase price beyond that level will result in either: (1) the other firms declining to follow and taking market share from the leader due to the slightly elevated market price enabling more sales, even with increasing marginal cost; or (2) the other firms following, but being held liable under section 1 of the Sherman Act for entering into an illegal price fix.

Let us now proceed to illustrate these principles with respect to our hypothetical market. Will Alpha ever monopolize the market? To do so it would have to sell 20 units in period N:

$$\pi = TR - TC = (20 - q)q - (2q - 7)q - 14$$
$$\pi = (20 - 20)20 - 33(20) - 14 = -674$$

That is, to monopolize the market, Alpha would have to suffer a loss of 674, which is a massive figure when one realizes that its monopoly profit for a single period is 31.56.[103] The loss is this high because, at the level of output required to supply the entire market, Alpha's marginal cost is 33, which is three

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103. Calculated by: $\pi = TR - TC = 13.25(6.75) - 6.75(2 * 6.75 - 7) - 14 = 31.56$

times higher than its marginal cost would be under perfect competition.[104] In the original example employed above, where all five firms had constant marginal cost, Alpha's marginal cost would have remained constant as it expanded output to capture all sales. While it would still have suffered a loss had it attempted to increase sales past what it would supply under competition, the extent of those losses would have been dramatically lower. This demonstrates why monopolization is unlikely to be a rational action in a market subject to diseconomies of scale.

Even Alpha—which is the most efficient firm, with the lowest marginal cost of any of the firms at any relevant market output—would suffer such a loss from monopolizing the market that it would need 20.5 future periods of uncontested monopoly, assuming a zero interest rate and constant monopoly returns, to simply *break even*.[105] Unless there were insurmountable barriers to entry, it is inconceivable that entry would not occur when any potential entrant knows that the incumbent simply cannot afford to monopolize the market again. Knowing this ex ante, it is extremely unlikely that any competitor, faced with a rule disallowing it from increasing price in parallel with its rivals, will expand sales to the point where it monopolizes the market.[106] Rather, the efficient competitor will expand output until its marginal cost equals that of its less efficient rivals, so that the market will be in equilibrium. Of course, the more efficient firms will have a slightly greater market share than their rivals, but the extent of any ensuing concentration is unlikely to be worrisome, especially when all firms are constrained by effect of the rule against tacit collusion.

This observation is encouraging from the point of view of applying a rule against tacit collusion. Eliminating the unrealistic assumption of constant marginal cost makes clear that application of the rule will not lead to the perverse result of monopolization in the vast majority of instances. Nevertheless, it does not follow that the predictions of this model are encouraging. Effective compulsion of marginal cost pricing is not in society's best interests. An alternative approach must be sought that will capture much of the allocative efficiency gain demonstrated by this model, while avoiding the result of marginal cost pricing. Such an approach will be explored in the following Part.

It can be concluded, however, that it is best to drop the question of whether to enable firms to set price equal to the marginal cost of the least efficient firm. As inquiring into whether prices are equal to such a level is likely to be prohibitively difficult, it is surely best to disregard any question of defining

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104. Under perfect competition, the quantity produced by Alpha is 9. Thus, its marginal cost is: $2q - 7 = 11$. When Alpha monopolizes the market by fulfilling all demand, it must produce 20 units. Thus, its marginal cost is: $2q - 7 = 2(20) - 7 = 33$.

105. Calculated by: $646/31.56 = 20.5$.

106. Such a move in this example would be tantamount to corporate suicide and would never occur in a real market.

legality of pricing behavior through any kind of assessment of marginal cost. By employing a rule against tacit collusion in an appropriate manner, it ought to be possible to achieve most of the benefits of allocative efficiency implied by Judge Posner's rule, whilst avoiding its associated problems.

IV. THE SUGGESTED SOLUTION

After careful consideration and analysis of economic theory, it is concluded that the law ought to be amended in a manner to reflect the following principles:

1. The fundamental and defining feature of the proposed solution involves analogizing conscious parallelism in an oligopoly with unilateral contract.[107] Doing so will satisfy section 1's requirement of concerted action. By declining to follow the belief that market structure compels or, at least excuses, noncompetitive outcomes, the Sherman Act can be employed in a sufficiently malleable manner as to capture purely tacit price coordination.

2. A further, fundamental principle of the proposed law is that *not all* instances of parallel pricing in oligopolistic markets will constitute illegal tacit collusion. In essence, this Note does not argue for a per se prohibition of coordinated pricing. Instead, parallel price increases arrived at through barometric price leadership are *capable* of satisfying section 1's requirement of concerted action.

3. An equally important component of the advocated approach is that significant barriers to entry into the relevant market be shown to exist. Importantly, this effectively annuls the significance of the oft-articulated objection that a rule against tacit collusion impairs entry into oligopolistic markets. If the rule is applied only in markets where entry is difficult, and if the effect of the rule is to induce enhanced price competition, the result is that the entry issue is rendered somewhat defunct. There is a pragmatic quality to this aspect of the rule, for only in such markets is the economic consequence of tacit collusion likely to be particularly objectionable. Furthermore, significant entry barriers decrease the elasticity of demand[108] facing the incumbent firms and therefore increase the expected gains from collusion.[109] This is relevant in inferring that the firms in question were acting in concert, rather than merely setting prices unilaterally.

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107. *See In re* High Fructose Corn Syrup Antitrust Litig., 295 F.3d 651, 654 (7th Cir. 2002).

108. Elasticity of demand is defined as the percentage change in quantity demanded divided by the percentage change in price.

109. *See, e.g.*, CARLTON & PERLOFF, *supra* note 4, at 93 ("The higher the elasticity of demand, the closer is the monopoly price to the competitive price. Therefore, *the key element in an investigation of market power is the price elasticity of demand*. Where the elasticity of demand is relatively inelastic, a monopoly markup may be substantial . . . ." (emphasis added)).

4. The proposed solution declines to follow the strict approach of Judge Posner, which would involve identifying whether firms in a market are pricing at supracompetitive levels in markets conducive to collusion and, if they are, holding them guilty of tacit collusion.[110] Instead, the rule advocated here requires evidence of a significant incidence, or incidences, of parallel alteration in price. Trivial increments in price ought not to be objectionable unless they are part of a greater pattern of successive price increases which amount to a de facto significant price increase.

5. While analogy with unilateral contracts forms the basis for the establishment of concerted action, in order to avoid the implementation of a de facto marginal cost pricing rule, the law should require further showing of concerted action. Such a showing would not be synonymous with the extraneous "plus factors" employed by the courts today,[111] although they too would suffice. Instead, concerted action for these purposes can be demonstrated by one, several, or all of the following:

(a) A demonstrable history of barometric price leadership, where evidence is readily obtainable that firms have followed each other's price increases on repeated occasions in the past, may suffice to complete the inference of tacit collusion. In essence, it must be shown that the market is one that is ostensibly conducive to parallel pricing[112] and that such parallel activity has been attempted or exercised before. The significance of this factor may be made clear, and brought into force, by Rule 404(b) of the Federal Rules of Evidence,[113] which allows evidence of prior acts in order to prove *intent*. Similarly, evidence of prior incidences of profitable price leadership may be highly relevant and admissible in order to show that defendant firms, in raising their prices this time, were doing so to avail of the profit-making opportunities realized before. In short, such a history diminishes the likelihood of innocent, unilateral behavior and increases dramatically the probability that the firms in question raised price credibly believing that every other firm would raise price with the same expectation as to every firm; in effect, that the firms acted in concert. This aspect to the rule will serve the added purpose of ensuring that an insolvency-producing outcome does not result. Where evidence indicates a trend of repeated instances of price leadership, it is likely that the firms in question are already pricing at a supracompetitive level.

(b) Particularly strong proof of tacit collusion is provided by evidence of oligopolists engaging in the detection of, and disciplinary action against, those firms that decrease price below the collusive price level. This constitutes the strongest case that game theory has to offer that the entities in question are

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110. POSNER, *supra* note 12, at 94.

111. *See, e.g.*, *In re* Flat Glass Antitrust Litig., 385 F.3d 350, 360-61 (3d Cir. 2004).

112. Markets characterized by homogeneous goods, low rates of technological innovation, a limited number of competitors, barriers to entry, and low price elasticity of demand will be especially conducive to tacit collusion.

113. FED. R. EVID. 404(b).

acting in concert. In addition to setting price in the expectation that rivals will do likewise—a valid ground for inferring agreement in itself—the firms in question take the added step of actively policing the implicit agreement and thereby creating a Nash equilibrium at the collusive price level. This, as noted by Gregory Werden,[114] goes a long way to undermining Turner's original observation that firms' actions in oligopolistic markets are unilateral. Evidence of successive, parallel increases in price, followed by an incidence of unilateral price cutting and immediate reaction in the form of financial punishment, succeeded once again by increases in price to the collusive level, will conclusively establish concerted action and illegal tacit collusion. Care must be taken, however, to distinguish such evidence from legitimate price competition, where an act of price cutting may indeed precipitate a form of price war as firms compete for sales. The crucial key to distinguishing the situations, other than through the employment of any relevant extraneous information, lies in establishing a prior pattern of price leadership. If there are signs that the market has been the stage for price leadership in the past, as outlined in (a), then the distinction should become clear.

(c) This Note suggests also that incidences of price setting contrary to self-interest ought to satisfy the requirement of concerted action. Whenever economic evidence can demonstrate that single-period profit would be maximized by setting a lower price than was charged—by showing action contrary to single-period self-interest—then concerted action may be inferred. This rule would apply even where the Nash equilibrium was at the collusive level: indeed, the result of this element of the law would be that the Nash equilibrium in such circumstances would shift to the defective price level. A considerable benefit to this approach would be that price increases from loss-making levels to profitable ones would not be objectionable, thereby avoiding the negative consequences of a marginal cost pricing rule.

6. As a general rule, the law against tacit collusion ought to be applied to prohibit repeated cases of *positive* increments in price. To apply the law in an equally vigorous manner against successive, though negative, changes in price may lead to the perverse outcome of constraining firms to pricing at their current levels, even if they are already at a supracompetitive level. That is, the antitrust laws would render illegal certain forms of price competition. Obviously, such a situation must be avoided. This aspect of the law ought not to be regarded as absolute, however, as literal application may enable firms to readily bypass the rule against tacit collusion. Instead, evidence of a firm decreasing price so as to equal that of a rival should not be regarded as an absolute defense. If the economic evidence satisfies the other criteria enunciated in this Part, and if it be shown that the decrease in price is but a veil to escape the reality of a supracompetitive, de facto price *increase*, then the rule ought to apply with full force.

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114. Werden, *supra* note 83.

7. As a final, though less important, point, it should be recognized in inferring concerted action that parallel movements by an increasingly large number of firms becomes progressively less consistent with unilateral action. Therefore, it ought to be easier to infer concerted action in markets with relatively large numbers of firms moving in parallel than in, for example, a duopoly.

From these considerations, this Note concludes that the law construing section 1 of the Sherman Act should be amended, in a manner consistent with the language of the statute, to enable the *possibility* that tacitly collusive behavior be held to satisfy the requirement of concerted action, even in the absence of any express communication. Such a rule would *not* constitute a per se prohibition on barometric price leadership in oligopolistic markets. That is, not every upward movement in price in parallel by oligopolists would constitute an illegal price fix. In contrast, convincing economic evidence of large, sustained, and unjustified increases in price arrived in circumstances sufficiently clear as to infer agreement will be required.

V. TESTING THE PROPOSED RULE OF LAW

In order to appreciate how the foregoing rule of law would operate in practice, it is useful to briefly apply it to the economic models considered above. The example of a simple duopoly with homogeneous firms actually serves as quite a powerful illustration of the effects of any proposed price-fixing rule. Although unlikely to be encountered in most markets, the consequences of any proposed law are best tested by first bringing them to their logical limit. With this in mind, let us consider first how the rule proposed by this Note would apply in the case of a duopoly and then expand it to a more complicated model.

A. *A Simple Duopoly*

We return once again to the familiar example of Alpha and Beta[115]:

Industry demand curve: $P = 200 - Q$
$MC_A = AC_A = MC_B = AC_B = 20$

We know that under strict application of Judge Posner's rule price equals 20, which is an undesirable outcome for the many reasons outlined above. Under the law as it is currently enforced, in a one-shot game and a multi-period game with a determined end, the equilibrium price will be 80.[116] In those multi-period games where the firms are able to shift the Nash equilibrium to the collusive

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115. Note that this market requires no fixed cost.
116. *See supra* notes 30-34 and accompanying text.

level, the price will be 110.[117] This latter figure is more objectionable than the former, though neither is desirable.

Assuming that Alpha and Beta begin at time period N pricing at the competitive level equal to 20, what is the outcome under this Note's proposed rule of law? First, the appropriate legal standards must be ascertained. Assume that there are absolute barriers to entry into this market, so that a strong application of the rule is immediately triggered. From here, it is necessary to consider the firms' options.

What if Alpha, for example, raises prices to the collusive level of 110 in the hope and expectation that Beta will follow? If Beta accepts this offer by similarly increasing price to 110, will that violate the proposed law? The answer is yes. Noting first the existence of insurmountable barriers to entry, we can proceed to analogize Alpha and Beta's actions to the formation of a unilateral contract. This forms the basis for inferring concerted action. Observation 5(c) of the proposed approach completes the inference. As Beta could have maximized its profits by charging 80, it acted contrary to its "single-period self-interest" by setting price equal to 110. This demonstrates the existence of a tacitly collusive agreement and establishes a violation of the price-fixing rule.

What if Alpha and Beta raise price in similar fashion to 80? This is also a dramatic increase in price and, so, is potentially objectionable under observation 4 if other criteria are met. Neither firm is acting contrary to self-interest in raising price in such a fashion due to the fact that it is the single-period Nash equilibrium. Whether it could be deemed illegal would turn on specific facts: if, prior to period N, Alpha and Beta had engaged in successive acts of attempted price leadership, which although momentarily successful, were ultimately frustrated through price cutting, the history of price leadership will suffice under observation 5(a) in order to prove concerted action. In that case, the parallel increase in price to 80 would be clearly illegal.

Alternatively, had Alpha and Beta previously priced at supracompetitive levels in a recent period, only for one to undercut and the other to punish through marginal cost pricing, and then to increase price in parallel in period N + 1, this would also suffice under observation 5(b) for the purposes of establishing a violation of the rule against tacit collusion.

If time period N was the first time Alpha and Beta began competing together, however, it would prove to be more difficult to hold them liable for tacit collusion under the suggested approach. It would, however, still be possible. The barriers to entry are insurmountable, so the law will be applied strictly. The increase in price is very significant. Analogy can be drawn with unilateral contracts. These factors may allow for a case to be made, though not one as clear cut as those considered above. Knowing this, Alpha and Beta will understand that they would be taking a chance increasing price by such an

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117. *See supra* notes 35-41 and accompanying text.

amount. They know too that by doing so, they are establishing a history of price leadership which will ensure the illegality of any further, significant parallel increases in price.

In the first three scenarios, and perhaps in the fourth as well, Alpha and Beta's best choice is to raise price in small increments from period N. So, in N + 1, they might price to 22; in N + 2 to 24 or 25, and so on. But this is not a riskless strategy and, moreover, there is a legal limit to how far they can continue to raise price. First, each small increment adds to a history of price leadership, rendering each additional price hike increasingly suspect. While a number of small increments will be unequivocally legal under the proposed approach (which is one of its most attractive qualities, for it guarantees both that marginal cost pricing is not required and that firms can escape from possible insolvency-producing price levels), as they increase they may come to be regarded as a de facto price increase under observation 4 of the proposed rule of law. The FTC or Department of Justice could issue a warning in the form of a cease and desist order, which, contrary to Professor Turner's argument, would not demand irrational behavior on the part of Alpha and Beta. Rather, the order would increase the probability of punishment for continuation of tacit collusion and will make each firm more reluctant to follow the leader. As a result, price competition is likely to follow.

Applying the proposed rule of law to what is likely to be the most demanding model highlights the attractive qualities of the suggested approach. Serious exercises of tacit collusion are constrained and, as incentives to undercut prevailing prices will remain and parallel reductions in price are almost invariably exempted from the rule, the positive results would be considerable. Indeed, it follows as a logical observation of the workings of the proposed rule that one of its defining, and highly attractive, characteristics involves the imposition of considerably elevated incentives and opportunities to engage in price competition. This effect will ensure a higher level of allocative efficiency than exists under the current state of the law.

It should be noted, moreover, that few markets—in the absence of governmentally controlled entry—are likely to have insurmountable barriers to entry. Where entry is possible, the enactment of the current rule ensures that it will be facilitated. Firms can enter knowing: (a) the rule will not be applied where evidence of low barriers to entry exists and, failing that, (b) even the strict version of the proposed rule operates to allow modest, parallel increases in price in appropriate circumstances, which ensures a sufficient level of profit to make entry worthwhile.

To ensure that the proposed rule would operate well in practice, nevertheless, we shall look to our more realistic model of five firms, with heterogeneous cost functions and U-shaped cost curves reflecting diseconomies of scale after a certain level of output.

B. *A More Realistic Model*

Once again, we revisit a familiar model, where the cost functions of Alpha, Beta, Delta, Epsilon, and Gamma are as follows:

$$C_A(q) = q^2 - 7q + 14$$
$$C_B(q) = q^2 - 5q + 14$$
$$C_D(q) = q^2 - 4q + 14$$
$$C_E(q) = q^2 - 3q + 14$$
$$C_G(q) = 2q^2 - 2q + 14$$

where $C_X(q)$ is the cost of producing the quantity of output, q, for firm X. The market demand curve is: $P = 20 - Q$.

Recall the positive implication of diseconomies of scale in production for a rule that drives price toward marginal cost—namely that monopolization is not likely to take place by the most efficient firm.[118] This is because the cost of production increases disproportionately once output passes a certain level. In applying the present rule, we hope to stimulate enhanced price competition while also avoiding a requirement of marginal cost pricing. The prediction that firms' outputs shift to roughly equal their marginal costs means that the proposed rule will not operate so as to inadvertently cause undesirable outcomes, such as monopolization or undue concentration.

The following figures are, once again, important:

Monopoly Price	Competitive Price
$P_A = 13.25$	$P_A = 11$
$P_B = 13.75$	$P_B = 11.66$
$P_D = 14$	$P_D = 12$
$P_E = 14.25$	$P_E = 12.33$
$P_G = 14.4$	$P_G = 13$

Applying the proposed rule of law to this scenario, what is the likely result? Of course, tacit collusion in this market is considerably more difficult to achieve in practice than in a duopoly due to the greater number of firms and the differences in those firms' cost functions. Assuming, arguendo, that those difficulties are surmountable, we may proceed in a similar manner to that outlined above.

It may be assumed that the game starts in time period N. Imagine that one of the firms, say Alpha, raises price to the relevant monopoly level of 13.25, since it will lose money after that amount. The other firms raise their prices. This will clearly be found to be illegal for being contrary to each firm's individual, short-term self-interest.

Indeed, it will readily be appreciated that any substantial increase in price in parallel above the competitive level is likely to be objectionable. This will be

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118. *See supra* note 103 and accompanying text.

especially true if the industry prior to period N had a history of price leadership or if the five firms have sought to implement a mechanism of detection and punishment of firms undercutting prevailing prices (which is likely, as maintaining any kind of collusive price level in a market with five firms will, quite probably, require such a mechanism).

Regardless, proving concerted action is considerably easier as the number of firms moving in parallel increases. This is because purely parallel behavior by an increasingly large number of firms becomes progressively more unlikely in the absence of some form of agreement. This is also because deviating from the collusive price is rendered more attractive to each firm, as the chances of being detected are lower, the cost of punishment for the other firms higher, and, most importantly, the damage caused by one firm's defection to the other firms is reduced as the number of other firms rises.[119]

The ultimate effect is that most significant parallel increases in price will be caught and in those cases where there is no prior behavior indicative of a pattern of price leadership or enforcement, the probability of prosecutorial action is likely to be sufficient to discourage the firms from dramatically raising price in parallel. When this latter consideration is added to the intrinsic difficulty in engaging in tacit collusion when there are a relatively large number of firms, the likely result is one of considerable price competition. Here, one would expect, at most, to see modest increases in price taken in parallel. The nature of the market is such that market share will fluctuate as cost changes alter respective sales, but one is unlikely to witness any objectionable level of concentration. Once again, the effect of the rule will be to depress prices, but not so much as to raise the concerns raised by Professor Turner.

It follows from the positive implications of the above-described models that the rule, as described, should be given full force of law so as to remedy the defects in current competition policy and to achieve greater allocative efficiency in those many markets properly characterized as being oligopolistic in nature.

CONCLUSION

It is the final contention of this Note that the imposition of a rule against tacit collusion, implemented in the manner prescribed, would not only do a great service to societal interests as a whole by effectively filling a major gap in current antitrust policy, but would also find relatively straightforward and equitable application.

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119. Furthermore, as Posner argues, this may be due to the fact that not all new sales will be at the expense of other companies. *See* POSNER, *supra* note 12, at 57-58. When one company reduces price, the product will be reduced to below the reservation price of some consumers who will now purchase from the company. *Id.*

At present, society is not given a tool by which to attack tacit collusion, even though evidence of its existence may be explicit and the damage caused by it severe. By enabling private parties and the federal antitrust authorities to challenge the most blatant and damaging acts of tacitly collusive behavior, the result would be a downward trend in price in oligopolistic markets caused by increased incentives for price competition. At the same time, punishment in marginal instances of parallel pricing at prices close to marginal cost, or in markets subject to diminishing long-run average cost, or in instances following shocks to supply or demand, would be avoided. The prevailing law ought to be amended to reflect the considerations discussed in this Note.