

THE OLIGOPOLISTIC PRICING PROBLEM: A SUGGESTED PRICE FREEZE REMEDY

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I. INTRODUCTION

The problem of oligopoly pricing has long challenged both economic and antitrust theory. While economic theory attempts to explain how firms set their prices in oligopoly markets, antitrust theory seeks to construct an effective remedy for what is believed to be a predominant problem of monopolistic pricing. So far these attempts have been only

partially successful. Although economic scholarship has made significant advances in recent years, especially in developing models based on modern game theory learning, we still do not hold conclusive or definite answers on oligopoly pricing. Antitrust theory, for its part, is still struggling in its quest for effective remedies.

In this Article I set forth an antitrust remedy for the oligopolistic pricing problem. This remedy builds on previous work concerning price and quantity freezes, mainly in the context of monopolization by predation. This work, primarily by Williamson and more recently by Edlin, basically suggests that new entry to a monopolistic market would freeze the pre-entry output production level or the pre-entry price of the incumbent monopolist. This would, arguably, encourage new entries by firms as well as more pre-entry output or lower pre-entry prices. In this Article I propose the implementation of a price freeze scheme in oligopoly markets by which an oligopolist that significantly lowers its price would freeze its rivals' prices at their previously higher oligopoly level for a defined period of time. This price freeze scheme, as I will demonstrate, would drive prices downward and create an incentive for oligopolists, in most cases, to set *ex ante* lower prices without any actual activations of the price freeze.

Part II of this Article provides a general background on the problem of oligopoly pricing. Part III presents the theoretical model of the suggested oligopoly price freeze. Part IV presents the detailed implementation scheme of the suggested oligopoly price freeze, in which I try to adapt the theoretical model to actual real-world industries. Part V concludes.

II. OLIGOPOLY BACKGROUND

In this part, I provide a general background on oligopolies. In chapter A, I discuss the main economic theories that try to explain the pricing and output behaviors in oligopoly markets. The review begins with a short description of the non-cooperative one-stage Cournot models. I continue with Stigler's influential cooperative model, which

in many ways changed the way we look at oligopoly pricing and laid the groundwork for some of the modern dynamic game theoretic models. The discussion about repeated game theoretic models will conclude the review of the economic theories. The modern repeated game theoretic models reflect major progress in oligopoly thinking, as they are more likely to represent the realistic interactions in oligopoly markets, in which firms are required to constantly react to each others' decisions. Chapter B reviews the current legal framework, which does not offer an effective remedy for the problem of oligopolistic pricing. Chapter C discusses the two major suggestions for resolving the oligopolistic problem: Posner's economic-evidence approach and the deconcentration approach, as well as each suggestion's major weaknesses.

A. The Oligopoly Pricing Theories

1. The Basic Cournot Model

Cournot's theory¹ shows that if in a homogeneous duopoly each firm chooses its profit-maximizing quantity of output assuming that its rival's quantity is fixed, then the market can reach an equilibrium. According to the rival's fixed output assumption, each firm calculates the quantity it should produce in order to maximize its profit by deducting its rival's fixed quantity from the total demanded quantity. This way each firm obtains its residual demand curve, which sets the firm's price and quantity. Each firm would, in turn, adjust its output, again assuming that the other firm's output remains fixed, and the process would continue until both firms reached the point where they would have no further reason to change their output production levels.

The Cournot model is applicable to any particular number of firms. For the case of n firms (with identical marginal

¹ ANTOINE AUGUSTIN COURNOT, *RESEARCHES INTO THE MATHEMATICAL PRINCIPLES OF THE THEORY OF WEALTH* (Nathaniel T. Bacon trans., A.M. Kelley 1971) (1838).

costs), each firm has a limited degree of market power, which falls with the rise of overall market demand:²

$$\frac{P - MC}{P} = \frac{1}{ne}$$

Where e is the market price elasticity of demand and n is the number of firms.

The model, however, has a major analytical fault; it assumes that each firm expects the other's output decision to be fixed while in fact both are constantly reacting to each other's output decisions,³ which suits a multistage-game rather than a single-stage game. As will be discussed in the continuation of this chapter, the repeated game theory models correct this analytical paradox.

2. The Bertrand Model

The Bertrand model assumes that firms choose the price at which to sell their products, taking as given other firms' prices in the market.⁴ As a result, Bertrand predicted that the price firms charge would be equal to marginal cost assuming that the firms produce homogeneous products. In such a case, the firm that sets the lower price captures the entire market. Therefore, as long as the firms set prices higher than their marginal costs, each can increase its profits by slightly undercutting its rivals. When price equals marginal cost the market reaches its only possible equilibrium.

Introduction of product differentiation changes the outcome of the model. In such a case, a firm that sets a lower price would not necessarily win the entire market demand, as some buyers might prefer the competitor's product. Since

² For the mathematical development of the formula, see FREDRIC M. SCHERER & DAVID ROSS, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 227-29 (3d ed. 1990).

³ See WILLIAM FELLNER, *COMPETITION AMONG THE FEW—OLIGOPOLY AND SIMILAR MARKET STRUCTURES* 57-58 (1965).

⁴ For an excellent description of the Bertrand model see Carl Shapiro, *Theories of Oligopoly Behavior*, 1 *HANDBOOK OF INDUSTRIAL ORGANIZATION* 329, 343-48 (Richard Schmalensee & Robert D. Willig eds., 1989).

each firm's sales may change as it varies its price, given the prices of the other firms, reaction functions may be defined, and the problem acquires characteristics similar to those of the Cournot model. The reaction functions can intersect and create equilibrium, meaning that the firms could set their prices at a level higher than the competitive level, at which point neither firm would be able to increase their profits by changing price.⁵

However, the criticism regarding reaction functions in a one-stage model raised in the context of the Cournot model above is applicable in this case as well.

3. The Von Stackelberg Model

Stackelberg's model is a variation of the Cournot model in which the firms choose quantities but do so sequentially rather than simultaneously. The first to choose its output is the leader, while the second firm is the follower. After both firms have sequentially chosen their outputs, the total output is sold at the market-clearing price.⁶ Stackelberg's modification to the Cournot model is important because it represents situations in which the firms are not identical. It shows that moving first can have an advantage if accompanied by a credible commitment not to change production even when facing new entrants.

4. Stigler's Approach

Stigler has laid the foundations of the modern theory of oligopoly pricing.⁷ He criticized the previous Cournot-based theories, arguing that it is not rational for firms to apply the Cournot non-cooperative strategies if instead they could select strategies that would raise their profits to the

⁵ For the development of the reaction functions see LYNNE PEPALL ET AL., *INDUSTRIAL ORGANIZATION: CONTEMPORARY THEORY AND PRACTICE* 267-70 (2d ed. 2002); see also Shapiro, *supra* note 4, at 347-48.

⁶ HEINRICH VON STACKELBERG, *MARKTFORM UND GLEICHGEWICHT* (Vienna 1934), reprinted in *THE THEORY OF THE MARKET ECONOMY* (Alan T. Peacock trans., 1952).

⁷ George J. Stigler, *A Theory of Oligopoly*, 72 J. POL. ECON. 44 (1964).

monopolistic level. Stigler, therefore, decided to focus on firms' ability to cooperate, concentrating on the various market characteristics that can facilitate such cooperation. Stigler sees oligopoly pricing as a part of the more general economic theory of collusion that varies from a hard-core cartel to "tacit-collusion." The latter is effectuated "by a purely tacit meeting of the minds, a mutual forbearance to carry production to the point where price equals marginal cost."⁸ There are three major factors necessary to form successful cooperation among firms: the ability to reach an agreement, the ability to detect cheating, and the ability to swiftly punish deviators. As a market becomes more concentrated, it becomes easier for the firms to reach an agreement, to detect cheating, and to punish non-cooperative firms. Hence, this approach assumes a positive relationship between market concentration and higher prices. Stigler also identified additional factors, aside from market concentration, which could facilitate cooperation. Among these factors are: the level of the buyer-side concentration; the frequency of purchases; the level of product homogeneity; the level of customers' homogeneity; the transparency of price and other terms; and the prior history of collusion.

Stigler's approach is important to the development of modern repeated dynamic game theories, which try to explain oligopoly pricing. They all rely on the assumption that firms, recognizing their mutual interest in price raising and in high-price-maintaining cooperation, would try to promote such cooperative strategies.

⁸ RICHARD A. POSNER, *ANTITRUST LAW* 60 (2d ed. 2001).

5. Repeated Game Theory Models⁹

a. Basic Theory

Oligopoly firms face a situation that resembles a contest or a game. Each firm has to choose a strategy that will maximize its profits, taking into consideration its rivals' strategies and reactions to the firm's actions. Each firm's profit depends upon its rivals' strategies and therefore the logic guiding each firm's decisions is within the domain of game theory.

The well known "prisoners' dilemma game," represents the basic game theory payoff matrix.¹⁰ The famous paradox of this game is that both prisoners would have been better off, *ex ante*, if they could have reached a binding understanding to cooperate, but nevertheless the "Nash equilibrium" of the game is to deviate.¹¹ The classic prisoners' dilemma game is a

⁹ This subsection is based in part on DOUGLAS G. BAIRD ET AL., *GAME THEORY AND THE LAW* 165-78 (1994); JEAN TIROLE, *THE THEORY OF INDUSTRIAL ORGANIZATION* 239-76 (1988); Shapiro, *supra* note 4, at 356-409; DENNIS W. CARLTON & JEFFREY M. PERLOFF, *MODERN INDUSTRIAL ORGANIZATION* 180-92 (4th ed. 2005).

¹⁰ Suppose the police catch two people suspected of committing a robbery. The prosecutor is unable to prove her case without a confession from either suspect, but she can successfully charge the two with the possession of stolen goods. The suspects are interrogated in separate rooms and are confronted with specific alternatives. If neither confesses, then each will spend one year in prison for the possession of stolen goods. If they both confess, they will each spend four years in prison. If only one of them confesses, then she will go free and the other suspect will receive a ten-year sentence. Viewed purely in terms of self-interest, each suspect is better off confessing, as illustrated in the following payoff matrix:

		Suspect II strategies	
		Do not confess	Confess
Suspect I strategies	Do not confess	-1, -1	-10, 0
	Confess	0, -10	-4, -4

¹¹ In game settings, such as the prisoners' dilemma game, each player's goal is to find her payoff maximizing strategy, taking into account the rival's strategy. To solve the game, the game theorist needs to find the

static, non-cooperative, one-shot-game. However, when the game repeats itself, the players can potentially establish a cooperative strategy that will benefit all. Cooperation comes about as a result of the players' ability to retaliate in the following rounds if one player deviates from the mutually beneficial strategy to make a short-term profit. Consequently, deviating might become an unprofitable strategy.¹²

strategies that solve each player's problem. Such strategies constitute a stable solution if neither player has an incentive to change her strategy, given the rival's strategy. The stable solution is called "Nash equilibrium" after John Nash, who developed the concept. See John Nash, *Non-Cooperative Games*, 54 ANNALS OF MATHEMATICS 286 (1951). The Nash equilibrium is also known as the Cournot-Nash equilibrium, because the solution to the basic Cournot oligopoly model is an example of the equilibrium defined by Nash.

¹² In the case of single independent game, the firms would adopt a low-price strategy even though they would have been better off if they could all choose a high-price strategy. The results of a game that repeats itself a finite number of times yield similar results to that of the single, one-shot game. Each player conjectures the play of the last round, in which neither firm has any concern regarding how its action in the current round may affect future rounds. In the last round, therefore, the firms will play as if they are playing a single, one-shot game and will charge a low price. Given this outcome of the last game, the firms will play the previous round as well as if it is a single, one-shot game and again choose to charge a low price. The same rationale will lead the firms to act in a similar manner in all rounds, including during the first round.

In reality, there is no fixed number of rounds for firms in an oligopoly industry interacting with each other. What actually happens is that the game has a finite number of rounds but the firms do not know exactly how many rounds will be played. The game could be eliminated by an introduction to the market of a new superior product, entry of new firms, government regulation, etc. It is therefore a game of uncertain length. The structure of a game of uncertain length with a fixed probability of ending after each round has a similar structure to that of a game of infinite length. It is an important comparison because in a game with an infinite number of rounds, there is a relationship between the payoffs of one round and the payoffs of future rounds. Unlike the situation of a game with a known finite number of rounds, the oligopoly firms cannot and would not use the backwards deduction. Therefore, if future profits are high enough, they could influence the decision for the current round in favor of cooperation.

b. Supergame Models

We start by discussing the case of infinitely repeated static games; these games are called "supergames."¹³ Generally, the success of firms in maintaining collusive supra-competitive profits depends upon their ability to reach some supra-competitive equilibrium, as well as upon their ability to credibly retaliate against any defection from the scheme.¹⁴ There are supergames in which the firms simultaneously choose their prices, and others in which the firms simultaneously choose their output. Supergames are games with multi-equilibria. At one end of the equilibria-spectrum is the competitive (Bertrand or Cournot) equilibrium, and at the other end the monopoly (price or output) equilibrium. Facing a large number of possible equilibria, the firms have to coordinate in order to reach a "focal point." Probably the obvious way to do so would be to symmetrically choose the Pareto optimal price or output, which is the monopoly equilibrium by all firms.¹⁵

The firms would choose to cooperate as long as the other firms do the same. Once a rival deviates, firms would set their prices or output at the Bertrand or Cournot competitive level forever. These strategies can constitute equilibria if the discount factor of future earnings is sufficiently high, there are only a few firms in the market, and there are short lags to the game. In these cases, the firms share the monopoly profit as long as they cooperate. A firm could earn the maximum monopoly profit if it deviates during one period of the game but then it would earn zero in profits subsequently.

¹³ An infinite horizon is important for the supergame's results, but as analyzed above, similar results could be reached in cases of finite games with uncertainty regarding the end of the game. We should note, however, that this relies on the probability of ending the game being constant over time. Not much is known about the possibility of reaching equilibria in situations in which a time-varying probability of ending the game declines sharply at a specific point in time. See TIROLE, *supra* note 9, at 253.

¹⁴ Shapiro, *supra* note 4, at 357.

¹⁵ This is assuming that the firms have similar cost curves. In cases of asymmetries, coordinating in order to reach an equilibrium price would be extremely more difficult, as will be discussed later on in this subchapter.

This result could formulate tacit collusion among the firms because they would all fear the threat of punishment. Supergames are, therefore, known as "Bertrand/Cournot reversion games."

In repeated games in which firms are not able to perfectly supervise other firms' actions, they have to rely on their own market share's changes and demand to detect deviations. Green and Porter have explored a class of such supergames strategies, which are known as "trigger price strategies."¹⁶ According to a trigger price strategy, the firms would set their prices at the collusive level as long as the other firms in the market did the same. However, when prices fall below a certain level, all firms in the market would set their prices at the Bertrand or the Cournot level (depending if it is a price- or quantity- setting game) for a specific period of time. At the end of the low-price period, the firms would resume cooperation.¹⁷ The literature on repeated games with uncertainty is a valuable extension of the supergame theory and is likely to grow in the future. Its major contribution so far is that it predicts the occurrence of price wars even in states of equilibrium, in contrast to the basic supergame theory, according to which price wars never actually occur.¹⁸

¹⁶ Edward J. Green & Robert H. Porter, *Noncooperative Collusion Under Imperfect Price Information*, 52 *ECONOMETRICA* 87 (1984); Robert H. Porter, *Optimal Cartel Trigger-Price Strategies*, 29 *J. ECON. THEORY* 313 (1983).

¹⁷ Green and Porter have found that there would be no defections from the collusive equilibrium, but that price wars would occur during periods of slump in demand. The firms would know that the low prices are due to weak demand but they would have to activate the punishment because failure to do so would invite future deviations. In another study, Abreu, Milgrom and Pearce have explored repeated games with imperfect monitoring focusing on the frequency of the firms' moves and the information lags. They discovered that more rapid observations of information, even if imperfect, help reveal deviations and hence support collusion. On the other hand, the effect of more frequent moves on collusion is less obvious because more frequent moves increase the possibility of punishment, but also the possibility of deviations. See Dilip Abreu et al., *Information and Timing in Repeated Partnerships*, 59 *ECONOMETRICA* 1713 (1991).

¹⁸ Shapiro, *supra* note 4, at 379.

However, there are two major problems associated with the supergame models. First is the existence of multi-equilibria. If the game is symmetrical, then the firms would gravitate to the monopoly price equilibrium because it would be the Pareto optimal point, but when the game is asymmetrical, it becomes extremely difficult for the firms to reach a mutually agreeable point without formal communication. The second problem revolves around the issue of renegotiation. If we look into the Bertrand and Cournot reversion strategies, the question to be asked is what prevents the firms from renegotiating and raising the price after punishing a deviating firm for some period of time. The possibility of renegotiating weakens the option of retaliation and therefore strengthens the incentive to undercut prices or to increase output.¹⁹

c. Two-Stage Competition and Dynamic Rivalry

Repeated supergames are limited in the sense that previous rounds have no tangible connection to current or future rounds. Any sub-game is identical to the first round, or to any other round, for that matter. In this section, I introduce the idea of a firms' ability to influence the future rounds by making preemptive and strategic commitments. Such moves by any firm have to be very costly to reverse, otherwise the commitment would not be credible. The two-period models have the following structure: "[A] first period decision by one firm has an effect on the environment in

¹⁹ There is beginning to develop an analysis of supergames that takes into consideration the possibility of renegotiation. See Jean-Pierre Benoit & Vijay Krishna, *Renegotiation in Finitely Repeated Games*, 61 *ECONOMETRICA* 303 (1993); Joseph Farrell & Eric S. Maskin, *Renegotiation in Repeated Games*, 1 *GAMES AND ECON. BEHAVIOR* 327 (1989); David G. Pearce, *Renegotiation-Proof Equilibria: Collective Rationality and Intertemporal Cooperation*, (1987), <http://cowles.econ.yale.edu/P/cd/d08b/d0855.pdf>; Eric C. Van Damme, *Renegotiation-Proof Equilibria in Repeated Prisoners' Dilemma*, 47 *J. ECON. THEORY* 206 (1989). This work, however, has not provided a complete and satisfying answer as of yet.

which rivalry is played out in the future, and hence on the subsequent choices made by the firm's rival or rivals."²⁰

The Stackelberg model is probably the most well-known example of a two-stage model. The first mover preempts the follower by making the commitment to produce a large quantity of output. This commitment by the leader guarantees it higher profit during stage two of the game. A strategic investment in inventory can be a commitment, which promotes cooperation, as excess inventory can be used as a threat of retaliation in case of deviations.²¹ Similarly, firms' commitments to agree to "most favored buyer contracts" are also commitments that promote cooperation because these contracts limit the firms' ability to undercut prices. Other two-stage oligopoly games can involve cost-reducing R&D investments, the building of consumers' network, and more.²²

Dynamic rivalry combines the aspects of the supergame's repeated rivalry with the commitment aspects of the two-period games, and therefore it appears to better represent real-world oligopolistic rivalries. These are the most complex games, "but they hold out the most hope of advancing our understanding of oligopolistic rivalry, and currently represent the area of greatest research activity in oligopoly theory."²³ There are several possible strategic variables; I will review the most significant ones in the following subsections.

i. Pricing and Quantity Games

The basic supergame theory assumes simultaneous price or quantity decisions. However, when these variables are

²⁰ Shapiro, *supra* note 4, at 383.

²¹ Julio J. Rotemberg & Garth Saloner, *Strategic Inventories and the Excess Volatility of Production* (Massachusetts Institute of Technology, Working Paper No. 371, 1985); Garth Saloner, *The Role of Obsolescence and Inventory Costs in Providing Commitment*, 4 INT. J. IND. ORG. 333 (1986).

²² See Shapiro, *supra* note 4, at 389-97 for an excellent review of examples of two period models.

²³ *Id.* at 397.

sluggish or if their adjustments involve high costs, they may have a direct effect on subsequent decisions other firms will make. Cyert and DeGroot analyzed the role of production decisions in dynamic game settings of an alternating-move duopolistic quantity game.²⁴ The game was of finite horizon, and assumed perfect information. The results showed that in equilibrium, the firms would produce more than they would have in a finite Cournot game. Maskin and Tirole examined a similar game but with infinite horizon and they also found that the equilibrium of the game would produce a higher quantity than the Cournot output.²⁵ This is due to the fact that the firms, thinking about their future earnings, try to preempt their rival's decision by expanding output, resulting in more output and lower prices.²⁶

In the case of alternating price-setting games, Maskin and Tirole have examined a model for a market with homogeneous products and constant marginal costs.²⁷ They identified multiple equilibria for the game. They proved as examples that both the Edgeworth cycle equilibrium²⁸ and the kinked demand curve²⁹ can be supported as equilibrium for this game. Their basic conclusion was that in contrast to the alternating quantity-setting game, the alternate price-

²⁴ Richard M. Cyert & Morris Degroot, *Multiperiod Decision Models with Alternating Choice as a Solution to the Duopoly Problem*, 84 Q. J. ECON. 410 (1970).

²⁵ Eric S. Maskin & Jean Tirole, *A Theory of Dynamic Oligopoly, III: Cournot Competition*, 31 EUROPEAN ECON. REV. 947 (1987).

²⁶ It should be noted, however, that these results were only established for cases with linear demand and constant marginal costs.

²⁷ Eric S. Maskin & Jean Tirole, *A Theory of Dynamic Oligopoly, II: Price Competition, Kinked Demand Curves, and Edgeworth Cycles*, 56 ECONOMICA 571 (1988).

²⁸ Edgeworth cycle equilibrium is an equilibrium in which firms undercut each other similarly to the Bertrand equilibrium until they reach the marginal cost level. At that point one of the firms raises its price to the monopoly level and the other firm follows suit.

²⁹ Kinked demand curve equilibrium is an equilibrium in which each firm would match any price cut by a rival (and therefore such behavior is unprofitable), but would not match any price increase, so that the first price set by the firms is a rigid price.

setting equilibria would lead to more collusive behavior than in a static pricing game, because the firms recognize that setting higher prices would lead to higher prices by their rivals in the subsequent rounds.

ii. Investment Games

There are several studies examining the effect of capacity investments on pricing strategies. Benoit and Krishna³⁰ and Davidson and Deneckere³¹ looked into a duopoly market in which firms make an initial capacity choice and then compete over prices. They found that firms would choose the Cournot capacity, but then their price equilibria would be higher than the Cournot price. This is due to the fact that the firms must build excess capacity in order to be able to credibly threaten retaliation to those who deviate from the collusive price. Maskin and Tirole have combined the capacity choice games with the alternate price-setting game. They have also found examples in which firms build some excess capacity that they do not intend to use.³²

iii. Intangible Variables

There is room for strategic information manipulation or signaling by the firms in markets with some level of uncertainty regarding market conditions. In the context of information manipulation, the relevant variables will usually be cost and demand parameters.³³ In the context of

³⁰ Jean-Pierre Benoit & Vijay Krishna, *Dynamic Duopoly: Prices and Quantities*, 54 REV. ECON. STUD. 23 (1987).

³¹ Carl Davidson & Raymond J. Deneckere, *Excess Capacity and Collusion*, 31 INT'L. ECON. REV. 521 (1990).

³² Maskin & Tirole, *supra* note 27.

³³ Shapiro reviews a few examples of such manipulations:

In repeated Cournot models with private demand information, for example, we expect more competitive behavior as firms try to send unfavorable demand information to their rivals. With uncertain information about firm-specific costs, we would again expect more competitive behavior than repeated Cournot, as firms

signaling, the firms can "signal" to other firms that they intend to price high in the following periods of the game in order to establish a reputation of being cooperative. In this regard, the work of Kreps et al.³⁴ has proven that even small uncertainty about players' preferences can significantly influence their strategies if the game is repeated a sufficient number of rounds. The explanation for this result is quite simple; each firm that chooses to cooperate is exposing itself to the possibility of lower profits in the short-term because of the risk that its rivals will choose not to cooperate. However, if a firm deviates, it reveals to the other firms that it is not cooperative and thus loses the profit of future cooperation. The incentive to cooperate is greater when the game's horizon is sufficiently long. In such a case, the firms would cooperate for some period of time until the game reaches its final periods. Then the firms would attempt to milk their reputations.

The problem with the reputation approach, as Fudenberg and Maskin³⁵ have shown, is that there are many outcomes that can be sustained as equilibria in games with sufficiently long horizons, high discount factors, and a level of uncertainty regarding rivals' strategies. On the other hand, it is important to note that the reputation models are supported by many experiments that illustrate that collusion could be sustained in long, finite games. One of the most influential experiments is the prisoners' dilemma simulation tournament conducted by Axelrod.³⁶ In this experiment,

attempt to signal their low costs to their competitors. But if a quantity-setting firm is signaling *industry-wide* cost conditions via its outputs, we may have less competitive behavior. And these results would probably be reversed if firms set prices rather than quantities.

Shapiro, *supra* note 4, at 405-07.

³⁴ David M. Kreps et al., *Rational Cooperation in the Finitely Repeated Prisoner's Dilemma*, 27 J. ECON. THEORY 245 (1982).

³⁵ Drew Fudenberg & Eric S. Maskin, *The Folk Theorem in Repeated Games With Discounting or with Incomplete Information*, 54 ECONOMETRICA 533 (1986).

³⁶ ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* (1984).

theorists submitted strategies that were used in a series of two-hundred prisoners' dilemma games. The strategies were engaged against every other strategy as well as against themselves. The strategy that accumulated the largest total payoff was the "tit-for-tat" strategy, according to which the player should cooperate on the first move and on the following moves do whatever the other player did in the previous move. This strategy encourages cooperation while minimizing the likelihood of defections.

d. Concluding Remarks

It is likely that there is no one "correct" repeated game theory model; the models probably complement each other.³⁷ They have helped in identifying some of the key structural characteristics of rivalry and cooperation. Although anything can happen in oligopoly markets, depending upon firms' conjectures about their rivals' strategies, the oligopoly simulations and game experiments provide us with valuable knowledge. They suggest that the relatively simple strategies, which combine cooperative and forgiving behavior with a willingness to retaliate when provoked, provide the oligopolists with effective means for rising above the uncertainty and complexity of concentrated markets towards a price-raising cooperation.

B. The Current Legal Framework

Most antitrust horizontal cooperation cases are dealt with under Section 1 of the Sherman Act.³⁸ Since it requires a

³⁷ TIROLE, *supra* note 9, at 262.

³⁸ 15 U.S.C. § 1 (2000). Another relevant legislation to horizontal cooperation is Section 5 of the Federal Trade Commission Act, 15 U.S.C. § 45, which is broader than Sherman Act Section 1, as it condemns "unfair methods of competition." Additionally, unlike Section 1, Section 5 does not invoke criminal sanctions or damages, and can be used only by the FTC acting in the public interest. Consequently, the FTC has attempted to attack oligopolists' parallel practices under Section 5. The FTC's efforts, however, have not been widely accepted by the courts. *See, e.g., E.I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 139 (2d Cir. 1984) ("[B]efore business conduct in an oligopolistic industry may be labeled 'unfair' within

"contract," "combination," or "conspiracy," it is difficult to target pure oligopoly pricing in which there is no express collusion among the firms. Nevertheless, there have been cases in which the courts have condemned practices short of explicit collusion.

In *Interstate Circuit*,³⁹ Interstate, a major film exhibitor, sent a letter to eight distributors with two demands. First, that the distributors require the exhibitors to charge at least forty cent admission for first-run films, and at least twenty-five cent for subsequent-run films. Second, that the distributors prohibit exhibitors from exhibiting first-run films with other films as double features. The letter sent to each distributor named them all as addressees. The eight distributors followed Interstate's demands. The Supreme Court noted that such an action by the distributors would have made sense only if they acted in concert, otherwise they would have risked losing business and good will.⁴⁰ The Court therefore held that:

[I]n the circumstances of this case such agreement for the imposition of the restrictions upon subsequent-run exhibitors was not a prerequisite to an unlawful conspiracy. It was enough that, knowing that concerted action was contemplated and invited, the distributors gave their adherence to the scheme and participated in it. Each distributor was advised that the others were asked to participate; each knew that cooperation was essential to successful operation of the plan. They knew that the plan, if carried out, would result in a restraint of commerce . . . and knowing it, all participated in the plan.⁴¹

the meaning of Section 5 a minimum standard demands that, absent a tacit agreement, at least some indicia of oppressiveness must exist such as (1) evidence of anticompetitive intent or purpose on the part of the producer charged, or (2) the absence of an independent legitimate business reason for its conduct.").

³⁹ *Interstate Circuit, Inc. v. United States*, 306 U.S. 208 (1939).

⁴⁰ *Id.* at 222.

⁴¹ *Id.* at 226-27.

In *Toys "R" Us, Inc. v. FTC*,⁴² the Seventh Circuit approved the finding of a horizontal conspiracy among toy manufacturers to refuse to sell their toys to discount warehouses. Toys "R" Us ("TRS") informed each manufacturer that it would stop selling that manufacturer's products unless the manufacturer provided TRS with better terms than the discount warehouses received. The manufacturers all knew that TRS had approached the other manufacturers, and each would have lost business if it had agreed to TRS's demand while the others refused it.

According to *Interstate Circuit*, it is not clear whether the Supreme Court had meant to say that an agreement is not required for the proving of Section 1 conspiracy, or whether conspiracy could be inferred from relatively weak circumstantial evidence. In *American Tobacco Co.*, the leading tobacco manufacturers concertedly raised their prices substantially, even though tobacco prices were declining without any economic justification.⁴³ The Supreme Court held that:

No formal agreement is necessary to constitute an unlawful conspiracy. Often crimes are a matter of inference deduced from the acts of the person accused and done in pursuance of a criminal purpose. Where the conspiracy is proved, as here, from the evidence of the action taken in concert by the parties to it, it is all the more convincing proof of an intent to exercise the power of exclusion acquired through that conspiracy. The essential combination or conspiracy in violation of the Sherman Act may be found in a course of dealing or other circumstances as well as in an exchange of words . . . Where the circumstances are such as to warrant a jury in finding that the conspirators had a unity of purpose or a common design and understanding, or a meeting of minds in an unlawful arrangement, the conclusion that a conspiracy is established is justified.⁴⁴

⁴² *Toys "R" Us, Inc. v. FTC*, 221 F.3d 928 (7th Cir. 2000).

⁴³ *American Tobacco Co. v. United States*, 328 U.S. 781 (1946).

⁴⁴ *Id.* at 809-10.

This statement by the Supreme Court does not resolve the ambiguity of the *Interstate Circuit* decision, as it does not specify the amount of evidence necessary to prove collusion either explicit or tacit. However, the approach of most courts is that mere interdependent parallelism does not establish the "contract," "combination," or "conspiracy" required by Section 1,⁴⁵ and therefore price parallelism, even when obviously interdependent, does not violate the antitrust laws.⁴⁶

In order to establish an antitrust violation, the courts have held that in addition to parallel behavior, the presence of some "plus factors" has to be proved. Such factors, other than *Interstate Circuit's* rationality factor, may include: an announcement by one manufacturer to its rivals that it intends to raise its price;⁴⁷ an exchange of price

⁴⁵ See, e.g., *North Carolina v. Chas. Pfizer & Co.*, 384 F. Supp. 265, 283-285 (E.D.N.C. 1974), *aff'd*, 537 F.2d 67 (4th Cir.), *cert. denied*, 429 U.S. 870 (1976) ("While the resolution of this question is always fraught with difficulty, in any view of the matter the parallel pricing actions of [the] . . . defendants must be regarded as strong evidence that no conspiracy existed"); *Levitch v. Columbia Broadcasting System, Inc.*, 495 F. Supp. 649, 674 (S.D.N.Y. 1980), *aff'd per curiam*, 697 F.2d 495 (2d Cir. 1983) ("It must be demonstrated that the parallel decisions were interdependent in order to raise the inference of a tacit agreement.").

⁴⁶ See, e.g., *Japanese Elec. Prods. Antitrust Litigation*, 723 F.2d 238, 304 (3d Cir. 1983) ("While conscious parallel conduct has some tendency suggestive of concert of action, the tendency is so slight that we have held that circumstance, standing alone, to be legally insufficient"), *cert. granted*, 105 S. Ct. 1863 (1985); *United States v. Chas. Pfizer & Co.*, 367 F. Supp. 91, 101 (S.D.N.Y. 1973) ("parallel pricing . . . standing alone, does not indicate price fixing"); *Theatre Enterprises, Inc. v. Paramount Film Distributing Corp.*, 346 U.S. 537, 540 (1954) ("this Court has never held that proof of parallel business behavior conclusively establishes agreement or, phrased differently, that such behavior itself constitutes a Sherman Act offense"); *E.I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 139 (2d Cir. 1984) ("The mere existence of an oligopolistic market structure in which small group of manufacturers engage in consciously parallel pricing of an identical product does not violate the antitrust laws."); see also POSNER, *supra* note 8, at 53-54.

⁴⁷ *Pittsburgh Plate Glass Co. v. United States*, 260 F.2d 397, 401 (4th Cir. 1958), *aff'd on other grounds*, 360 U.S. 395 (1959).

information;⁴⁸ a history of price fixing; and other facilitating practices such as most favored clauses and basing point pricing.⁴⁹

C. Suggested Approaches for Dealing with the Oligopolistic Pricing Problem

In this chapter I review the two leading suggestions for dealing with the problem of oligopoly pricing; Posner's approach and the deconcentration approach. Other, less widespread suggestions, namely by Williamson and Bishop

⁴⁸ The courts have acknowledged the potential harm as well as the potential benefits of the sharing of information. They have therefore made a distinction between specific information regarding specific current and future transactions and general information regarding the past. The information would preferably be disclosed through an intermediate body and would be disclosed to the buyers as well. See *Hartford Empire Co. v. United States*, 323 U.S. 386, 426 (1945); *American Column & Lumber Co. v. United States*, 257 U.S. 377 (1921); *United States v. American Linseed Oil Co.*, 262 U.S. 371 (1923); *Maple Flooring Mfrs. Assn. v. United States*, 268 U.S. 563 (1925); *Sugar Institute v. United States*, 297 U.S. 553 (1936); *United States v. Morton Salt Co.*, 235 F.2d 573, 577 (10th Cir. 1956).

⁴⁹ However, when these practices were implemented in a unilateral manner courts tended not to condemn them. See, e.g., *Du Pont*, 729 F.2d at 140 ("Each [petitioner] acted independently and unilaterally . . . If the petitioners nevertheless were unable to come forward with some independent legitimate reason for their adoption of these practices, the Commission's argument . . . might have some merit"). For a detailed discussion, see William E. Kovacic, *The Identification and Proof of Horizontal Agreements Under the Antitrust Laws*, 38 ANTITRUST BULL. 5 (1993); Philip Areeda & Herbert Hovenkamp, 6 ANTITRUST LAW ¶¶ 1433-34 (2d. ed. 2003); David D. Haddock, *Basing-Point Pricing: Competitive v. Collusive Theories*, 72 AM. ECON. REV. 289 (1982); Dennis W. Carlton, *A Reexamination of Delivered Pricing Systems*, 26 J.L. & ECON. 51 (1983); Jacques-Francois Thisse & Xavier Vives, *On the Strategic Choice of Spatial Price Policy*, 78 AM. ECON. REV. 122 (1988); Aaron S. Edlin, *Do Guaranteed-Law-Price Policies Guarantee High Prices, and Can Antitrust Rise to the Challenge?*, 111 HARV. L. REV. 528 (1997); Jonathan B. Baker, *Vertical Restraints with Horizontal Consequences: Competitive Effects of "Most-Favored-Costumer" Clauses*, 64 ANTITRUST L.J. 517 (1996); Mark T. L. Sargent, *Economics Upside-Down: Low-Price Guarantees as Mechanisms for Facilitating Tacit Collusion*, 141 U. PA. L. REV. 2055 (1993).

will be discussed in Part III as they have an important role in the development and analysis of the model presented by this Article.

1. Posner's Suggested Approach

Posner relies on Stigler's article,⁵⁰ which explains oligopoly pricing as a result of collusion rather than as an unavoidable consequence of the market structure. Posner, therefore, suggests an "economic approach to punishing collusion, both explicit and tacit."⁵¹ There are two steps to the suggested analysis. First, the enforcement agencies would identify the markets in which the conditions could facilitate collusion.⁵² If the search exposes an actual covert conspiracy, the firms would be punished. However, even if such conspiracy is not exposed, Posner, in the second stage of the analysis, suggests demonstrating "through economic evidence the existence of collusive pricing."⁵³ The economic

⁵⁰ Stigler, *supra* note 7.

⁵¹ POSNER, *supra* note 8, at 69.

⁵² The conditions favorable to collusion include: concentration on the selling side, no fringe of small sellers, inelastic demand at the competitive price level, entry takes a long time, buying side of the market is unconcentrated, standard product, non-durable product, all of the principal firms are at the same level in the chain of distribution, price competition is more important than other forms of competition, high ratio of fixed to variable costs, similar cost structures and production processes, demand is static or declining over time, prices can be changed quickly, sealed bidding; markets are local, the degree to which competing firms cooperate with each other in manners not forbidden by antitrust laws, and, finally, the industry's antitrust record. For a discussion regarding the above factors, see *id.* at 69-79.

⁵³ The economic evidence may include: (1) stable market shares; (2) persistent market-wide price discrimination (which could be evidence of the existence of monopoly power); (3) exchange of price information; (4) regional price variations; (5) identical bids for a contract to supply a non standard item; (6) price, output, and capacity changes at the formation of the cartel; (7) industry-wide resale price maintenance; (8) declining market shares of leaders; (9) amplitude and fluctuation of price changes; (10) elastic demand at the market price level; (11) level and pattern of profits; (12) market price inversely correlated with number of firms or elasticity of demand; (13) basing-point pricing; and (14) exclusionary

evidence would be used to establish price fixing rather than to infer the existence of a price fixing conspiracy. Posner believes that if the economic evidence "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."⁵⁴ If the sellers in the market restrict output in the expectation that their rivals would act the same, then there is a "meeting of the minds" even in the absence of overt communication.⁵⁵

Posner's suggested remedies would be injunctive relief and damages. The courts could enjoin the facilitating practices used by firms in oligopolistic markets in order to raise prices such as "basing-point pricing, advance announcement of price changes, and most-favored-nation clauses."⁵⁶ With regard to damages, the Department of Justice ("DOJ") would bring damages suits "with punitive damages available where the violation is concealable" on behalf of the victims of such antitrust violations; the amount of damages would be calculated using the economic evidence necessary for proving the tacit collusion.⁵⁷

There are several significant arguments against Posner's suggested approach. First, Posner's suggestion to use the injunction remedy against the facilitating conduct is problematic because these types of conduct are not purely anti-competitive, and often times could have significant efficiency virtues. An announcement of future price increases, for example, could help distributors and consumers to prepare in advance for the anticipated new price. Second, Posner's approach would deter entry to monopolistic as well as to oligopolistic markets. Such entry would be the result of the supra-competitive profits to be earned in these markets and it would eventually lower prices

practices. For a detailed discussion regarding the economic evidence required according to Posner, see *id.* at 79-93.

⁵⁴ *Id.* at 94.

⁵⁵ *Id.*

⁵⁶ *Id.* at 98.

⁵⁷ *Id.* at 99.

due to the added production. However, according to Posner's approach, these entrants would be exposed to oligopoly pricing damages suits, a fact that could prevent their entry in the first place.⁵⁸ Third, there is an inherent difficulty of proving oligopoly pricing by economic evidence, "given the complex, technical, and often inconclusive, or even equivocal, character of such evidence."⁵⁹ The result could be that "a firm might be subjected to heavy penalty because the economic evidence pointed to the existence of collusion, yet the firm was not colluding."⁶⁰ For example, it would be "difficult to prove tacit collusion in cases of pure price leadership" because it is plausible that one firm just has a "better sense of the market."⁶¹ Fourth, the effectiveness the approach could have is limited given the scarce resources available to the antitrust authorities on the one hand and the complexity of proving oligopoly pricing by economic evidence on the other hand. Finally, Posner's approach would require constant supervision over the prices charged, whether they were competitive or not. The common belief, in this regard, is that the courts and the enforcing agencies are ill-equipped to undertake such an assignment.

2. The Deconcentration Approach

The deconcentration approach suggests the breaking up of the largest firms in concentrated markets. This approach identifies the oligopolistic problem with the distinguished oligopoly market structure. It therefore suggests eliminating the problem by restructuring oligopoly industries. The deconcentration approach was popular among antitrust scholars in the past, led by Kaysen and Turner⁶² and was

⁵⁸ Posner actually acknowledges this problem. *Id.* at 98.

⁵⁹ *Id.* at 99.

⁶⁰ *Id.*

⁶¹ *Id.* at 97.

⁶² CARL KAYSEN & DONALD F. TURNER, *ANTITRUST POLICY—AN ECONOMIC AND LEGAL ANALYSIS* 27 (1959); Donald F. Turner, *The Scope of Antitrust and Other Economic Regulatory Policies*, 82 HARV. L. REV. 1207, 1231 (1969).

even the basis for legislative proposals. The most influential of which was the proposal of the White House Task Force Report on Antitrust Policy (1968), also known as the "Neal Report."⁶³ When introduced, the Neal Report was a mainstream proposal. Today, however, as Posner observes, "it would be regarded, including by its principal authors, as completely off the wall." The main reasons for the change "are the growth of faith in the robustness, the efficiency, and the self-correcting tendencies of the free market and the growth of skepticism about the efficacy of ambitious governmental interventions in the economy."⁶⁴

The deconcentration approach receives much criticism. It is believed that deconcentration would be ineffective and its social costs would exceed its benefits. We should notice first the poor record of previous antitrust divestiture cases.⁶⁵ Secondly, deconcentration would require industries to operate on a lower level of efficiency. If an industry has been concentrated for an extensive period of time while its leading firms charged high prices, then it is probable that the leading firms are more efficient than the other firms. Otherwise, smaller firms would have been successful in increasing production or new firms would have entered the market. The fact that the concentration is stable, in the absence of governmental barriers to entry, indicates that divestiture would injure the efficiency level in such markets.⁶⁶ Finally, the deconcentration proceedings would be enormously complicated and time consuming. They would exhaust the antitrust agencies' resources and, by doing so, would injure general antitrust enforcement. Additionally, because of the long period of time necessary to conclude divestiture, the industry might have gone through significant changes, which would make the divestiture decree obsolete.⁶⁷

⁶³ Reprinted in 2 ANTITRUST L. & ECON. REV. 11 (1968-1969).

⁶⁴ POSNER, *supra* note 8, at 117.

⁶⁵ For antitrust divestiture cases review, see *id.* at 107-11.

⁶⁶ *Id.* at 113-16; ROBERT H. BORK, THE ANTITRUST PARADOX—A POLICY AT WAR WITH ITSELF 193-94 (2d. 1993).

⁶⁷ POSNER, *supra* note 8, at 111.

III. THE SUGGESTED OLIGOPOLY PRICE FREEZE

Oligopoly pricing resembles a repeated prisoners' dilemma game. Each firm has an incentive to moderately lower its price and thus increase its sales at its competitors' expense. However, each firm knows that its rivals would promptly discover such deviation and follow suit shortly. The result would be that each firm would retain its former market share, but the price would be lower.

The marginal time span from the act of deviation to the rivals' retaliation (as we assume is the case in collusive oligopoly markets)⁶⁸ practically eliminates the boxes where one firm has low payoff and the other firms have high payoff in the oligopoly payoff matrix.⁶⁹ It is then easy to understand why firms would hesitate to lower their prices—they would probably lose from such an unrewarding strategy.

The Oligopolistic Payoff Matrix

		Rival	
		Maintain	Deviate
Firm	Maintain	0, 0	N/A
	Deviate	N/A	-1, -1

What this analysis suggests is the need for a change in the game's payoff matrix. The suggested oligopoly price freeze would bring about that change. According to this suggested price freeze, whenever a firm in an oligopoly market makes a substantial price cut, the other firms in that market will be prohibited from lowering their prices for a defined period of time. A firm that decides to deviate from the previous oligopoly price and thus activates the price freeze could earn a significantly higher payoff than its competitors. The deviating firm will win a large share of the market, if not all of it, at the expense of the other firms. This

⁶⁸ See *supra*, Part II.A.4.

⁶⁹ Of course, in reality there could be some extra profit for the deviating firm, but the shorter the lags of the game are, the smaller the extra profit would be, and where firms detect the deviation and react almost instantly, the profit for the deviating firm would be marginal.

will strengthen firms' incentive to deviate from the oligopoly price, and as it will be demonstrated in chapter B of this part, could lead to ex ante lower prices.

Many would by first instinct object to a proposal that suggests limiting firms' ability to compete over prices. After all, price competition is the heart and soul of antitrust policy, which holds as fundamental that competitive markets can best set prices. Firms are supposed to compete by trying to match or beat their rivals' price and quality. As it has been said, to interfere with this dynamic is to interfere with "the central nervous system of the economy."⁷⁰ In principle, charging low prices, which is the primary goal of antitrust, would not seem to qualify as a detrimental act under the antitrust laws, and competition is properly seen as a means to an end of low prices. However, what one has to consider in this regard is that prices in many oligopoly markets are not competitive. They are not competitive because the firms in those markets are not vigorously competing with each other. Paradoxically, limiting firms' ability to react to price cuts by competitors could stir up or enhance competition and bring about lower prices for consumers.

As I will discuss in chapter A of this part, the idea that in some instances limiting the ability to "compete" can, in fact, be pro-competitive has won ground in antitrust in both the contexts of oligopoly markets and of "above cost predatory pricing."⁷¹ In chapter A, I will discuss the relevant proposals, two of which, Williamson's and Edlin's, have considerably contributed to the development of this paper's suggested oligopoly price freeze.

⁷⁰ *United States v. Socony-Vacuum Oil Co.*, 310 U.S. 150, 224 (1940).

⁷¹ The "above cost predatory pricing" is relevant in situations where a monopolist cuts prices in reaction to entry in order to drive the entrant out of the market. In this case, the monopolist's price is above its marginal cost; it either beats the entrant's price or matches it. However, it should be noted that the U.S. Supreme Court in *Brooke* decided that pricing below incremental costs (the Supreme Court did not resolve which measure of costs should be used) is a necessary element of predatory pricing. See *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 222-24 (1993).

In chapter B, I will develop the theoretical model, which will prove the general argument that the suggested price freeze would have the effect of lowering oligopoly prices. In many cases this scheme would drive prices down without activating the price freeze; in some cases firms would deviate from the oligopoly price and thus activate the price freeze, leading to lower prices; and with regard to the final set of cases, in which prices would not decrease, the price freeze would act as a counterbalance to firms' incentives to raise prices even further. Finally, in chapter B, I will discuss the advantages the suggested price freeze has over the other price and quantity control proposals.

A. Previous Price or Quantity Control Suggestions

1. Williamson's Suggested Quantity Control⁷²

Williamson suggested an "output restriction rule," according to which a dominant firm would be prohibited from increasing its pre-entry output for a period of twelve to eighteen months in case of new entry.⁷³ The output restraint period would allow the entrant "to realize cost economies and establish a market identity."⁷⁴ According to Williamson, in order to make such entry less profitable and hence less likely when an output restriction rule is in effect, the dominant firm will have to increase its pre-entry supply level.⁷⁵

Williamson defined a "dominant firm" as one that holds at least sixty percent of an industry to which "entry into the market is not easy." He also included in his definition of a dominant firm collusive oligopolies; and to "new entrants"—expansion of fringe firms,⁷⁶ meaning that whenever a new

⁷² See Oliver E. Williamson, *Predatory Pricing: A Strategic and Welfare Analysis*, 87 YALE L.J. 284 (1977).

⁷³ *Id.* at 296.

⁷⁴ *Id.*

⁷⁵ *Id.* at 300-01, 307-08.

⁷⁶ *Id.* at 292 n. 26 and related text. According to Williamson, collusive oligopoly would have to be a highly concentrated market "in which four or fewer firms account for more than seventy percent of the output"

firm enters a collusive oligopoly market or whenever a fringe firm expands production, the oligopolists will be prohibited from expanding their outputs as a response for a period of twelve to eighteen months. The anticipated result would be that the oligopolists would produce more at the pre-entry stage in order to deter such entry or expansion of production by a fringe firm.

Turner and Areeda criticized Williamson's suggestion regarding collusive oligopoly. They argued that the rule will freeze the oligopolists' production levels in cases of new entries or expansion by fringe firms, but in fact it will protect and enforce the collusive oligopoly output for quite an extensive period of time.⁷⁷ It should be noted that Williamson's suggested rule would not promote an increase in production by one of the *oligopolists*, as it offers protection only to new entry or fringe firms. The added production, therefore, would probably not be significant, while on the other hand it would provide a legal shield for the previous oligopoly lower than competitive production level. In a commentary, it appears that Williamson accepts the criticism and renounces the idea of implementing his suggested rule in oligopolistic markets.⁷⁸

2. Edlin's Suggested Price Freeze⁷⁹

It should be noted first that Edlin's article was the inspiration for this Article and some of his central ideas are implemented here with the appropriate adjustments. Edlin proposed that whenever an entrant, in a substantial entry, charges at least twenty percent less than the monopolist's prevailing price, the monopolist would be prohibited from

Oliver E. Williamson, *Commentary: Williamson on Predatory Pricing II*, 88 YALE L.J. 1183 (1979) 1194.

⁷⁷ Philip Areeda & Donald F. Turner, *Williamson on Predatory Pricing*, 87 YALE L.J. 1337, 1348 (1977-1978).

⁷⁸ Williamson, *supra* note 76, at 1195.

⁷⁹ Aaron S. Edlin, *Stopping Above Cost Predatory Pricing*, 111 YALE L.J. 941 (2002).

responding with any price cut for twelve to eighteen months or until it loses its monopoly.⁸⁰

Edlin's proposal to prohibit incumbent monopolies from reacting to new significant entries, under the condition that the entrant prices at least twenty percent below the preexisting price, was aimed to improve consumer welfare in two possible ways. First, if a monopoly cannot react to entry, then entry will be more likely. In return, the monopoly will have stronger incentives to price low in order to deter entry. Second, if the incumbent's prices are still high enough to invite entry, then firms will enter if they can profitably survive while charging prices twenty percent below the monopoly's current prices. Consequently, firms that otherwise would have been driven from the market with above-cost predation can enter profitably.⁸¹

3. Bishop's Oligopoly Price Schedule Proposal⁸²

Bishop's proposal tries to create conditions in oligopoly markets similar to those of the classic prisoners' dilemma, which argues that when collusion is impossible or illegal, players would choose a conservative risk-averse strategy.⁸³ This would mean, in the context of oligopolies, setting prices at lower, closer to the competitive, levels. Bishop suggested that the law would authorize a governmental agency to

⁸⁰ *Id.* at 945-46.

⁸¹ *Id.* at 946-47, 973-78. For an article criticizing Edlin's proposal see Einer Elhauge, *Why Above Cost Price Cuts To Drive Out Entrants Are Not Predatory—and the Implications for Defining Costs and Market Power*, 112 YALE L.J. 681 (2003). Some of Elhauge's major objections to Edlin's article are not relevant to the proposition of this Article. For example, the issue of what constitutes below- or above-cost price, or what should be the relevant moment of entry, is it the beginning of actually selling the product (in which case the monopoly can lower its price well in advance when the entrant initiate the first steps for producing the product), or the initial moment of preparing for production (in which case the entrant may be left out with a very short period of time where it is protected from the monopoly response to the entry).

⁸² William Bishop, *Oligopoly Pricing: A Proposal*, 28 ANTITRUST BULLETIN 311 (1983).

⁸³ *Id.* at 314-15.

require oligopoly firms "to submit price schedules for the industry's products."⁸⁴ The firms would be required to maintain their submitted prices for an extended period, which would vary according to the industry's conditions. "The essential requirement would be that the period be long enough so that any firm bidding prices substantially higher than the lowest bidder would suffer severe losses—and perhaps bankruptcy."⁸⁵ This mechanism would increase uncertainty and mistrust among the oligopoly firms and would drive prices downwards.⁸⁶ The virtue of the bid-pricing proposal is that "prices are the outcome of a modified market process. Businessmen, not bureaucrats, make the key decisions."⁸⁷

The proposal has several major potential problems. First, there is a dangerous probability that firms will be driven out of the market as a result of the proposal's implementation, and consequently consumers may face monopolistic prices. Second, the fixed long-term prices may cause inefficiency in the face of changing market conditions.⁸⁸ Third, the firms could change product quality to compete with a lower pricing rival, or they could change the product and claim that it is an entirely different product, not subject to the submitted price. The firms could also engage in other forms of non-price competition such as advertising, improved payment terms,

⁸⁴ *Id.* at 315.

⁸⁵ *Id.*

⁸⁶ When an oligopoly firm would face the decision of which price schedule to commit to, it would not know what price its rivals are about to submit. On the one hand, if all firms bid the current high price, then all could continue to earn supra-competitive profits. On the other hand, each firm has to consider "the possibility that at least one of its rivals will bid low, take a moderate profit, and leave the others with serious loss of sales and profits." *Id.* at 316-17. Bishop argues that "where losses or bankruptcy are possible, businessmen will be highly risk-averse," and therefore believes that as a result "[m]uch, if not all, abnormal profit will disappear . . ." *Id.* at 319.

⁸⁷ *Id.* at 316.

⁸⁸ For a more detailed discussion on this point, see *infra*, Part IV.A.1.a.

and so forth.⁸⁹ Fourth, the proposal requires heavy and continuous governmental involvement in coordinating the implementation and in supervising that the price schedules are maintained.

B. The Suggested Oligopoly Price Freeze: The Theoretical Model

This chapter argues that, in principle, the suggested oligopoly price freeze would increase the likelihood of downward deviations by firms from the prior oligopoly price, and it would create an incentive for the oligopoly firms to set lower prices from the beginning in order to discourage deviations. For the sake of proving this argument,⁹⁰ let us assume that the price freeze will only be activated in cases where a firm in an oligopoly market cuts prices substantially below the former oligopoly price. A twenty percent price cut would be the threshold for such substantial price reduction.⁹¹ If one of the firms in an oligopoly market carries out such a price reduction, the price freeze would be activated and the other firms in the market would have to retain their previous prices for a period of six months. The price freeze also includes a quality freeze in the sense that the other firms would not be permitted to increase the quality of their products or to improve terms of payment in order to better compete with the deviating firm. Non-compliance with the

⁸⁹ For a more detailed discussion on this point see *infra*, Parts IV.A.1.c., IV.A.1.d., IV.A.1.e.

⁹⁰ The suggested price freeze's characteristics presented in this part are meant to prove the general argument that it can contribute to more deviations from the oligopoly price and lower prices to begin with. The more detailed version of the suggested price freeze will be presented in Part IV of this Article.

⁹¹ The detailed proposal presented in Part IV of this Article employs a variation of thresholds for activating the price freeze: 10%, 15%, and 20%. Each threshold would have the effect of activating the price freeze but for varied lengths. The ten percent price cut would activate the price freeze for a period of three months, the fifteen percent for a period of four and a half months and the twenty percent for six months. This Part only uses the twenty percent threshold for making the general theoretical argument regarding the effectiveness of the proposed price freeze.

abovementioned restrictions by any of the rival firms would grant the deviating firm an antitrust claim against its rival. Under such a claim, the deviating firm will be entitled to treble damages for any loss of sales caused by the violation of the price freeze.

The requirement for a substantial price reduction, as a prerequisite for the activation of the price freeze, is meant to balance the interest in encouraging deviations from the oligopoly price with the anticipation that such deviation would provide substantial benefits to consumers before it guaranteed the price freeze protection. The requirement for a substantial price cut would also shield competitive markets from potential abuse of the suggested price freeze.⁹²

Correspondingly, the duration of the price freeze period is designed to balance the expected benefit in promoting deviations from oligopoly prices with the potential harm to competition. There is a positive correlation between the price freeze's length and the potential profit generated from the deviation, which increases the incentive to deviate. On the other hand, an excessively extended period of price freeze might drive competitors out of the market, prevent the introduction of improved products, and interfere with firms' responses to changing market conditions.

In the following subchapters, I will present the illustrations that cover the range of possible scenarios resulted from implementing the suggested price freeze. According to the first illustration, in subchapter 1, the first firm to deviate will have more profits than it would have had if the previous oligopoly price had been maintained. In this case, the obvious strategy for the firm is to deviate in order to increase and maximize its profits. According to the second illustration, in subchapter 2, deviation would result in less

⁹² The supposition is that prices in competitive markets are equal to marginal cost. Therefore, firms will not be able to hurt competitors by activating the price freeze without hurting themselves by pricing substantially below their own costs. Additionally, such conduct may already be addressed by the predatory pricing rules. See *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 222-24 (1993); *Matsushita Elec. Indus. v. Zenith Radio Corp.*, 475 U.S. 574 (1986).

profit than maintaining the previous oligopoly price. At first glance it would appear that in this case, the firm's strategy should be to maintain the oligopoly price rather than to deviate from it. However, modern game theoretic analysis, and collusive pricing strategies demonstrate that deviations may still occur even under this illustration, especially if a number of realistic assumptions are added, such as imperfect information and uncertainty with regard to rivals' strategies. In subchapter 3, I argue that in most situations in which deviations are expected to take place, firms will set a lower oligopoly price *ex ante* to minimize the probability of deviations. In these cases, the suggested price freeze will result in lower prices without the price freeze actually having been activated. The third illustration, presented in subchapter 4, covers the scenarios in which deviation is unlikely. Yet, the suggested price freeze would have a positive effect nevertheless in that it would act as a counterbalance to the firms' incentive to raise prices even further. In subchapter 5, I will briefly analyze the advantages of the suggested price freeze over the previous price and quantity proposals discussed in chapter A above.

1. The Case of $B_{(\text{deviation})} > 0$ ⁹³

In the first illustration there are two firms in a homogeneous product market. The firms have identical production functions, face constant marginal costs, and have no capacity constraints. There are three time periods in the illustration. Stage one is the stage before the price freeze scheme becomes effective. In this stage, the price is the current oligopoly price. Stage two is the stage in which the price freeze scheme goes into effect. From that point on, the firms can activate the price freeze by reducing their prices by twenty percent. Stage two lasts for six months, regardless of whether the price freeze was activated by one of the firms or not. We assume that if either firm has chosen to deviate, then it would have done so at the start of stage two, since the

⁹³ The meaning of the variable $B_{(\text{deviation})}$ will be explained later in this subchapter.

factors driving the decision are all in place at that time. In stage two the firms will have only two options: to maintain the stage one oligopoly price or to deviate and activate the price freeze. In principle and in reality, the firms would have another option, which is to reduce their prices before the price freeze scheme becomes effective to prevent the actual activation of the price freeze. However, this subchapter will ignore this possibility as a course of action. Later in subchapter 3, I will demonstrate that in most cases, firms which would have otherwise chosen to deviate, if presented with the option of reducing their prices before the price freeze scheme becomes effective, would choose the latter option instead. In stage three the price freeze period has expired and both firms are free to compete. An important question is whether the firms are allowed to deviate again at some point during stage three. As will be elaborated on in Part IV, the firms would not be able to activate the price freeze again for three months following the expiration of the previous price freeze. For the sake of this illustration, stage three includes all the possible scenarios regarding prices and profits.

Define variables as follows:

C = the marginal cost of the firms (the cost is constant and is the same for both firms);

P_1 = the stage one equilibrium market price. This is the stage before the oligopoly price freeze scheme gets into effect;

P_2 = the stage two equilibrium market price. This is the stage in which the oligopoly price freeze scheme becomes effective and can be activated by either firm. If the price freeze is activated, then we assume that the deviating firm would win the entire market;⁹⁴

⁹⁴ In case that the firm cannot meet the entire market demand, then the proposed oligopoly price freeze would prevent the forming of one single market price. Instead there would be two prices in the market: the significantly lower price of the deviating firm and the former market price of the rival. The assumption that the firms do not have any production capacity constraint is solely for the sake of simplicity. It does not have any

P_3 = the stage three equilibrium market price. In this stage the price freeze period (if the price freeze was activated by one firm significantly deviating from the P_1 oligopoly price) has expired. Although after three months the firms can reactivate the price freeze with another substantial price cut and thus change P_3 (in this illustration P_3 is regarded as an unchanging price). For purposes of this illustration, P_3 can be regarded as the future average price. This way it can include future potential price changes due to either changes in market conditions or future price deviations;

T_1 = the time period of stage one;

T_2 = the time period of stage two (which is six months in our scenario);

T_3 = the time period of stage three;

$D_{(P)}$ = the demand per month in either stage as a function of the lowest price charged;

$\Pi_1 = D_{(P)} (P_1 - C)/2$ = the profit level for the firm and for its rival in stage one;

$\Pi_2 = [\text{option \#1}]^{95} D_{(P)} (P_2 - C)$ or 0^{96} = the profit level for the first firm to deviate from the former oligopoly price, while the other firm has no sales and hence no profits; $[\text{option \#2}]^{97} D_{(P)} (P_2 - C)/2$ = the firm's profit level in the case

effect on the model validity itself. In Part IV.A.2.c, I address the issue of potential production constraint in more detail.

⁹⁵ In such case that one of the firms deviated from the former oligopoly price and activated the price freeze.

⁹⁶ Since in this stage the price freeze can be activated and indeed under this option ([option #1]) it was in fact activated, then according to our assumption, the firm that deviated from the oligopolistic price is providing the entire market output (again assuming that we are dealing with a homogeneous product and no production capacity constraint). Therefore, the other firm sells nothing and hence makes zero profit. However, if we want to be more accurate, we should assume that the other firm is probably losing money because even if it does not produce at all, it still has some fixed expenses (rent, loans, etc.).

⁹⁷ In such case that the price freeze was not activated by either firm.

where the price freeze was not activated by neither firm. We should assume that in such a case $P_2 = P_1$.

Π_3 = the profit level for the firm in stage three. If neither firm has deviated during stage two, then $= D_{(P)} (P_3 - C)/2$. In such case that one of the firms has deviated during stage two, then it is plausible that it would maintain more than fifty percent market share even during stage three.⁹⁸ If one of the firms deviates during stage three, then as in stage two there will be a period of six months where the deviating firm will have the entire market while the other will not have any earnings.

f = the discount factor;

$B_{(deviation)} = (T_2\Pi_2 - T_2\Pi_1) - f(T_3\Pi_1 - T_3\Pi_3) = 0$ = the breakeven point, where the deviation profit equals the discounted deviation loss;

The meaning of $B_{(deviation)} > 0$ is that the deviation and the activation of the price freeze is profitable. In this scenario, the first firm to deviate will earn more money overall than if neither firm had chosen to do so. In order for the deviation to be profitable, the additional revenues generated through the price freeze process in stage two must be greater than the potential losses of a lower price in stage three.

Since our assumption in this illustration is that deviation is profitable ($B_{(deviation)} > 0$), the natural result would be that our firm will choose to deviate in order to maximize its profits. The following payoff matrix reflects the likely resulting scenario. Let us assume that if neither firm deviates from the oligopoly price, then both will earn a total amount of \$5M (this amount includes future revenues discounted to today's dollars). The deviating firm will earn

⁹⁸ In such case that the price freeze was activated by one of the firms, then it is possible and even likely that the firm will maintain some of the additional market share it acquired thanks to the deviation because some of its rival's former customers have switched to the firm's product.

\$6M, and respectively the rival firm will earn \$3M (again, these amounts include future revenues discounted to today's currency). The firms cannot deviate simultaneously. The first one to deviate wins it all.

		Rival	
		Maintain	Deviate
Firm	Maintain	5, 5	3, 6
	Deviate	6, 3	N/A

According to this payoff matrix, the firms share a dominant strategy and a Nash-equilibrium to the matrix. The strategy is to deviate. It is a dominant strategy because if the rival chooses to maintain its previous oligopoly price, the firm would be better off if it deviates and thus increases its profit from \$5M to \$6M. The firm should also deviate if it expects its rival to deviate. This way it could earn \$6M, while maintaining, in this scenario, will only earn it \$3M.⁹⁹ Since in the above example both firms have the same dominant strategy, which is to defect and deviate from the previous oligopoly price, the result will be deviation by one of them (the one that will beat the other), a substantial price cut, and a price freeze for six months. This is a one-shot game because the figures used in this scenario are of total profits, which include all future revenues. Consequently, a

⁹⁹ Another way to look at the payoff matrix is to change the box in which both firms choose to deviate as follows: although it is not feasible for both firms to deviate, if both attempt to do so then each has fifty percent chance of winning the "deviation contest." If both decide to deviate, then each has a fifty percent chance of earning \$6M and a fifty percent of earning only \$3M so in that case the strategy is worth \$4.5M for both firms.

		Rival	
		Maintain	Deviate
Firm	Maintain	5, 5	3, 6
	Deviate	6, 3	4.5, 4.5

cooperation enforcement mechanism is not likely to be established by the firms.

There remains the question of the likelihood of the scenario in which $B_{(deviation)} > 0$. On the one hand, there are six months in which the deviating firm will earn extra profit, but on the other hand, future revenue may be reduced. In this regard it is important to note that even if P_3 is lower than P_1 , Π_3 , the profit level of the deviating firm may still be higher than its profit level in stage one, Π_1 . This is because the benefits from deviating might continue even after the price freeze period and could even be permanent. In many cases we should expect the deviating firm to hold a larger market share in stage three than it had during stage one. The news media will widely cover the deviation and its potential economic implications. The deviating firm will consequently receive free advertising and positive public relations that will improve its good will and reputation, which in turn could inspire more consumers to buy its product. Additionally, the deviating firm is expected to keep at least some of the customers it attracted from its rival during stage two. There are several other factors that we should take under consideration in this regard.

First, the profit from deviating is guaranteed and is in the present, while future earnings are not guaranteed and also need to be discounted. In a dynamic model, the market could be entirely changed by Schumpeterian competitions (by the introduction of an entirely new substitute product), by increases in rivals' efficiency, decreases in barriers to entry, changes in consumer preferences, or cost shifts. This uncertainty makes it rational to discount even further any future profits that might be gained by avoiding the deviation. Second, the deviating firm could use the deviation and the additional sales during stage two to move to a lower long-run cost-efficiency ratio and thus benefit from the economies of scale. The deviation could be a strategic move meant to change the firm's position in the market. The firm would

therefore enjoy a larger share of the market because of its newfound efficiency advantage over its rival. Furthermore, the firm would be better positioned on the learning curve because of the experience it gained in large-scale manufacturing and supplying. Third, the firm's rival could suffer a short-term decline in its production efficiency due to the activation of the price freeze. The rival firm might incur startup costs when it attempts to restart operations after the price freeze has expired; machines could become rusted, and new workers might need to be hired and trained. The rival is expected to recover its efficiency eventually, but until it does so, the deviating firm will enjoy an efficiency advantage.

The final argument of this subchapter is that if even for one firm in the market $B_{(deviation)} > 0$, then the dominant strategy for the other firms (even if their $B_{(deviation)} < 0$) would be to deviate. Assume the following scenario: as before, there are two firms in the market, but this time one of the firms faces lower production costs. At the current oligopoly price, the firm would earn a total discounted amount of \$5M, while the rival would earn \$6M. If the firm deviates it would earn a total discounted amount of only \$4M (because the added sales during stage two would not be sufficient to offset the future reduction in sales during stage three), while its rival would earn a total discounted amount of \$3.5M. If the rival deviates it would earn a total discounted amount of \$7M (for the rival $B_{(deviation)} > 0$), while the firm would earn a total discounted amount of \$3M. The payoff matrix is as follows:

		Rival	
		Maintain	Deviate
Firm	Maintain	5, 6	3, 7
	Deviate	4, 3.5	N/A ¹⁰⁰

¹⁰⁰ Here again, although it is not possible for both firms to deviate, if both attempt to do so then each has a fifty percent of winning the "deviation contest." If both firms decide to deviate then the firm has a fifty percent chance of earning \$4M and a fifty percent chance of earning \$3M,

The firm's preferred result for the matrix is that both firms maintain the current price, but this is not really an option. Since the rival's dominant strategy is to deviate and thus increase its profits from \$6M to \$7M, the firm actually faces only two options. The first is to maintain while the rival deviates, which would earn the firm \$3M. The second option is to try to deviate first and to earn \$4M. Again deviation would be the dominant strategy for both firms.

2. The Case of $B_{(deviation)} < 0$

The meaning of $B_{(deviation)} < 0$ (for both firms in the duopoly) is that deviating would not be the most profitable option for the firms, but rather a mutual maintaining strategy. Such mutual strategy would preserve the previous oligopoly price, which according to the given scenario maximizes the firms' profits. The extra profits for the deviating firm, Π_2 , during stage two will not equal the reduction in revenues during stage three, given the guidelines established above.

At first glance, it appears that according to this payoff matrix, maintaining the previous oligopoly price would be the strategy the firms would employ. However, we already know from the repeated game theory literature discussed in Part II, that often the models do not yield the firms the maximal possible profit. We know that in various circumstances firms cannot establish collusion even if collusion means more profit. Therefore, the mere fact that deviating according to the suggested oligopoly price freeze would limit profits in future rounds, and overall, does not necessarily mean that the firms would not choose to deviate anyway, depending on the type of strategic model the firms apply. In this regard, the case of $B_{(deviation)} < 0$ is more

so the strategy in this case is worth to the firm \$3.5M. The rival has a fifty percent chance of earning \$7M and a fifty percent chance of earning \$3.5M, so the strategy is worth \$5.25M to the rival.

complicated than the case of $B_{(deviation)} > 0$. In the case of $B_{(deviation)} > 0$ we could have applied a one-shot payoff matrix to illustrate the equilibrium solution because the firms needed to make a one-shot unilateral decision that could maximize profit. The case of $B_{(deviation)} < 0$ is more complicated because depending on the strategy employed, it could require repeated interdependent future decisions.

In this subchapter, I will analyze the influence the suggested price freeze could have on the major possible collusive strategies, which include supergames reversion strategies, dynamic rivalry, tacit collusion, and explicit cartel.¹⁰¹ We should note that it is not possible to cover the entire range of game theoretic models known. However, the above models are the major relevant models and their analysis illustrates that the suggested price freeze, on average, would drive oligopolies' prices downward.

a. Supergames Reversion Strategies

In supergames reversion strategies, firms price high until a rival deviates from the collusive price, at which point they will price at the competitive¹⁰² level in all future rounds. In this case we could use the one-shot payoff matrix because this strategy actually involves one unilateral decision (whether to deviate once). According to these strategies, as will be demonstrated shortly, if $B_{(deviation)} < 0$, then firms would usually set the collusive price. We should remember, however, as discussed in Part II, that reversion strategies' major flaw is that they do not explain what would prevent

¹⁰¹ Trigger price strategies are not relevant to this subchapter because they could be applied by firms where firms do not know whether price reductions are due to deviations or due to slumps in demand, while in the case of the suggested price freeze it would be known that one of the firms has deviated.

¹⁰² The Bertrand or Cournot competitive level.

firms from renegotiating a collusive price after the occurrence of a deviation.

Basically, in reversion strategies we compare the extra profit associated with the deviation with the future reduced profit. It is therefore clear that increasing the deviation's profit or lowering the discount factor would work against collusive pricing. This exactly would be the effect of the suggested price freeze on reversion strategies. First, the suggested price freeze has a considerable potential of increasing the profits from deviating due to the price freeze applied on the deviator's rivals. Second, if a firm deviates, it defers the following round's revenue six months into the future and by that lowers the discount factor. Consequently, the suggested price freeze would increase the number of situations in which deviating from the previous oligopoly price is the dominant strategy (because it will increase the number of situations in which $B_{(deviation)} > 0$, for which we know that the dominant strategy would be to deviate).

Nevertheless, there would still be markets in which $B_{(deviation)} < 0$. We will explore firms' incentives in such scenarios, relying on the payoff matrix below. Assume that if neither firm deviates from the oligopoly price, then both will earn the total amount of \$5M discounted to present value. If one firm decides to deviate, it will earn \$4.5M discounted to present value, while the rival will only earn a total of \$2M discounted to present value. The payoff matrix will be as follows:

		Rival	
		Maintain	Deviate
Firm	Maintain	5, 5	2, 4.5
	Deviate	4.5, 2	N/A

Basically, if the firms apply a reversion strategy, then in case of $B_{(deviation)} < 0$, the equilibrium strategy would be to price

high because pricing high is more profitable than deviating and then pricing low during all future rounds. However, I argue that when introducing lifelike markets' characteristics, such as imperfect information and uncertainty regarding rivals' strategies, then firms' strategic decisions can be altered. Suppose, for example, that our oligopoly market consists of four firms instead of two, equal in their market shares and production costs. Each, therefore, holds twenty-five percent of the market. Assume now that our firm, believes that there is a probability of twenty-five percent that each of the rivals would deviate even though for all the firms $B_{(deviation)} < 0$.¹⁰³ It is possible that one of the rivals would act irrationally;¹⁰⁴ the rivals may miscalculate regarding future earnings or rivals' intentions,¹⁰⁵ or just rely on different information than that which the firm possesses. After all, in dealing with real-world markets, we should assume that the firms in it operate with limited information and uncertainty to some degree. It should be noted that the implementation of the suggested price freeze would increase the level of uncertainty because it adds unfamiliar factors to the equation. In situations of uncertainty firms tend to make risk-aversion decisions to prevent heavy losses. It will be difficult for the decision-makers within the firms to know for

¹⁰³ The figure twenty-five percent was chosen randomly simply to make the point that when introducing the element of uncertainty the firms' strategy may be changed. I assume that in some markets the level of uncertainty is lower while in other markets it may be higher.

¹⁰⁴ It is true that the economic approach is based on the rationality assumption. This does not mean, however, that this approach argues that all players are rational all the time and with every decision they make. Rather, it assumes that the majority of people are acting rationally in the majority of situations. See Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551 (1998).

¹⁰⁵ A good example can be a scenario in which one firm invests in building a new manufacturing facility to replace an old one, while its rivals may suspect that it is in fact trying to enlarge its production capabilities in preparation for deviation.

of deviating is worth \$3.7M.¹⁰⁸ Since the value of deviating is higher than the value of maintaining, it would be the preferred strategy for the firm and for its rivals (who would make the same calculation), and hence, under these conditions, we are to expect a deviation in this scenario even though $B_{(deviation)} < 0$.

b. Dynamic Rivalry Models

It is assumed that dynamic game theory models are better representatives of real world oligopoly strategies than supergames reversion models. The models also have the empirical support of experiments conducted by economists. As will be demonstrated shortly, the suggested price freeze will have the effect of lowering prices in markets in which firms apply dynamic rivalry models. To illustrate this argument we will use Axelrod's tit-for-tat strategy.¹⁰⁹ According to the tit-for-tat strategy, firms act collusively in the first round and then follow their rival's previous round's decision. This is a reputation model since the firms try to establish a reputation of being cooperative. Each firm

¹⁰⁸ Calculating the value of the deviation strategy to the firm is slightly more complicated. If the firm decides to deviate, it has a probability of forty-two percent of earning \$4.5M, if none of its rivals also intend to deviate. There is a fifty-eight percent probability that at least one of the firm's rivals intends to deviate. We are to assume that in a situation in which more than one firm tries to be the first to deviate, the likelihood of being the first is equally divided among the number of firms that wish to do so. In our scenario there is a probability of forty-two percent that only one of the rival firms would also try to deviate. Hence the firm has a probability of twenty-one percent of earning \$4.5M (if it wins the deviation contest), and twenty-one percent of earning \$2M. The probability that two of the rival firms would also try to deviate is fourteen percent. Consequently, the firm has a probability of 4.66% of deviating first, earning \$4.5M, and a 9.33% probability of losing the deviation contest earning \$2M. Finally, the probability of all three other rivals attempting to deviate is two percent. Therefore, the firm has a probability of 0.5% of beating the other three, earning \$4.5M, and a probability of 1.5% of losing and earning \$2M. Combined, the strategy of deviating is worth \$3.7M.

¹⁰⁹ See *supra* Part II.A.5.c.iii.

exposes itself during the first round to the possibility that the other firm would deviate and thus to low profit for the first period of the game. This is actually the firms' investment in building their reputations. From the discussion in Part II we know that there are two other relevant factors for establishing cooperation: the length of the game (how many rounds are yet to be played), and how high the discount factor for future earnings is. The tit-for-tat strategy is a good representation of the dynamic rivalry strategies because it possesses certain general characteristics of rivalry, mixed with the incentive for cooperation. It suggests that firms' strategies depend upon their conjectures about rivals' behavior, which largely depend on past interactions in an uncertain environment. It combines the willingness to invest in promoting cooperation with the readiness to retaliate when provoked.

It is quite easy to see how the suggested price freeze would affect such a strategy. First and foremost, the price freeze would make the investment in building reputation much more expensive. If a firm chooses the collusive price while its rival deviates, then it will suffer heavy losses. If a firm previously had to expose itself to one round's potential losses in order to earn the future oligopoly profit, after the implementation of the suggested price freeze, the firm would be exposed to significantly higher potential losses to earn the same supra-competitive profit. Along this vein, we should note that the results of a rival's deviation would be severe to a firm and to its management. Its materialization would be in the hands of the firm's business rivals. No officer wants to be in a position where a rival's mistake could crush his career, especially when the effect such action has on the rival itself is expected to be significantly more moderate.¹¹⁰

With regard to the game's horizon, or in other words, the number of remaining rounds to be played, the suggested price freeze could be seen as a factor that eliminates many of

¹¹⁰ After all, the deviating rival could increase its sales (perhaps even noticeably) during stage two when the price freeze is activated, even though it is expected to experience the market decline in profitability during stage three in the $B_{(deviation)} < 0$ scenario.

the game's rounds. If the price freeze is activated, then the following round will only take place six months into the future and so forth. If so many rounds are eliminated, then as experiments teach us, the probability of cooperation decreases.¹¹¹ Finally, in this case, as it was with the supergame strategies, if one of the firms deviates, then the discount factor will be decreased because the future earnings will be deferred in six months, which again increases the incentive for deviations.

c. Collusive Pricing

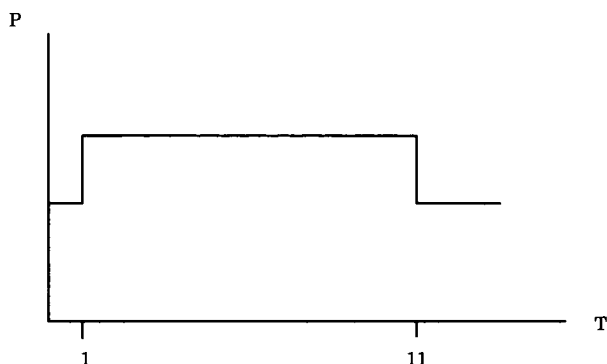
According to Stigler's approach, oligopoly pricing is a matter of collusion among the firms—tacit or explicit.¹¹² In this section I will analyze the effect of the suggested price freeze on explicit cartels and on tacit collusion.

i. Cartel Pricing

Pricing strategy games in cartels are games of finite length in which the length of the game is uncertain. However, as the game continues, the probability for future rounds decreases. This is because cartels are illegal, and as they continue they produce evidence of their existence (meetings, emails, price changes, etc.). Thus, as time passes, the probability of their detection increases. It is therefore a game in which firms have a very low discount factor with regard to the future at some point in time. It is possible that firms can even estimate the length of the game according to previous experience, or from what they learn from other cartels in similar industries. Let us assume for the sake of the argument that a cartel is expected to last for ten years. Let us also assume that the cartel raises the price by fifty percent from the previous competitive price.

¹¹¹ See *supra* Part II.A.5.c.iii.

¹¹² Stigler, *supra* note 7. See also *supra* Part II.A.4.



In such a case, if the suggested price freeze is implemented in the market, then the firms already at the beginning of year one would make the following calculation: since the cartel is expected to break down at year eleven, just prior to year eleven one of the firms will deviate and activate the price freeze. However, if that is the case, then another firm will deviate at year ten and six months, and so forth until we reach the beginning of the game.

We know that cartels are likely to break down when a large order emerges, as Bishop stated: "All admit that the enormous temptation and the natural mistrust inherent in the situation go beyond the point where men can be expected to keep ranks."¹¹³ Therefore, there is a strong probability that the cartel would collapse as consequence of the implementation of the suggested price freeze, which would create a similar temptation for a short-term profit.

It should be noted that since cartels are illegal, the deviating firm might be exposed, by deviating, to criminal and private litigation, which is a counter incentive to deviating. This argument has merit, but we should also consider that by deviating, the firm does not necessarily expose the cartel; it can always argue that the firms applied oligopoly-pricing strategies. Alternatively, the firm could deviate and at the same time confess to the DOJ about the

¹¹³ Bishop, *supra* note 82, at 315.

cartel, which will provide it with amnesty according to the leniency program.¹¹⁴ Finally, it is possible that the cartel will be exposed even if none of the firms deviate, which lowers the weight of the fear from exposure in making the deviating decision.

The firms, however, can avoid this ambiguity simply by making sure that the cartel price would not exceed the level that enables deviations. This would be at a point at which lowering twenty percent of the price would earn no profits. The suggested price freeze, therefore, would either lower the cartel price, or would prevent it from rising above a certain level.

ii. Tacit Collusion Pricing

According to Stigler, firms in oligopoly markets will cooperate in order to raise the price and their profits if the cost of establishing and maintaining cooperation is lower than the added revenue. As discussed in Part II,¹¹⁵ there are three major factors required for the formation of successful cooperation among the firms: the ability to reach an agreement about price, the ability to detect cheating, and the ability to swiftly punish deviations. It is obvious that the suggested price freeze severely undermines firms' ability to swiftly punish deviations. In fact, the firms that choose not to deviate are the ones who will be punished while the deviating firm will earn extra profit during the price freeze period. Additionally, also in the context of collusive pricing, there is significance to the level of profit expected from deviating, as well as to the level of losses expected from a rival's deviation. Again, it is clear that the suggested price freeze will increase both factors; the firm that deviates could earn significantly higher profits, and its rivals will suffer

¹¹⁴ According to the DOJ's leniency policy, the first cartel member to confess—if it is not the leader or enforcer of the cartel and if the DOJ is not aware of the illegal activity—is granted automatic amnesty. *See infra* Part IV.A.2.d.

¹¹⁵ *See supra* Part II.A.4.

significantly higher losses. It is therefore obvious that the suggested price freeze would make collusion less probable.

3. If the Threat or the Possibility of Deviation Were Real, Would Deviations Actually Occur?

When the threat or the possibility of deviation is real, I would argue that firms, in most cases, will lower their prices to a level that minimizes the deviation possibility without actually activating the price freeze. The price freeze might be activated in cases in which P_i is very high or when firms fail to recognize the level of threat or to predict their rivals' actions. Even in these situations, though, the firms are eventually expected to reach a lower price (lower than the stage one price level) at which further deviations are not expected to occur. This is an important argument because it means that administrative costs as well as potential complexities and inefficiencies associated with the activation of the price freeze would thus be avoided.¹¹⁶

The options the firms were given in previous examples were either to maintain the oligopoly stage one price or to deviate by substantially lowering the price. In reality, firms will have another option, which is to lower prices to a point where deviation is no longer the preferred strategy, if such a point exists. In order to learn when firms would choose to ex ante lower their price we need to find the connection between the initial stage one oligopoly price (P_i) and the probability of deviation, which will be defined as p . I argue that generally, the probability of deviations will increase as the stage one price (P_i) rises. This is because the higher P_i is, the higher the likelihood of the emergence of new firms or of governmental intervention, which could drive prices down regardless of whether the firm deviates or not. This

¹¹⁶ See *infra* Part IV.A.

assumption requires a further discount of future earnings as prices go up and hence increases the weight of current profit in the decision of whether or not to deviate and activate the price freeze. We are therefore to assume that such a direct relationship between P_1 and p generally exists. If this is the case, then there must be a specific P_1 which represents the minimal price level at which deviation is expected to occur. Deviation is not expected to occur at any point lower than the aforementioned price, while it will take place at higher prices.¹¹⁷ There will also be cases in which after the implementation of the price freeze there would be no lower equilibrium points, other than the competitive level, as will be further discussed below.

Define variable as follows:

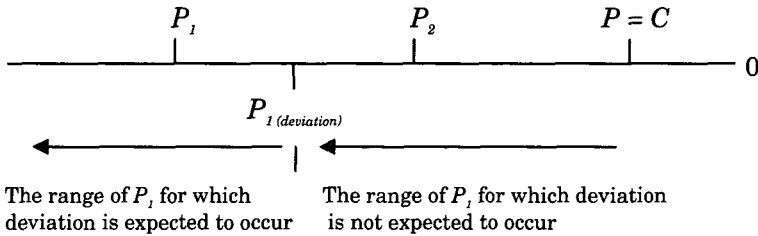
$P_{1(\text{deviation})}$ = the stage one oligopoly price at which a deviation is expected to occur.

We can now explore the relationship between $P_{1(\text{deviation})}$ and the firms' conduct. There are four possibilities:

(a) $P_{1(\text{deviation})} > P_1$ – in this option, deviations are not expected to occur and hence the oligopoly price is not going to drop as a result of the suggested price freeze. This option will be discussed in subchapter 4 *infra*;

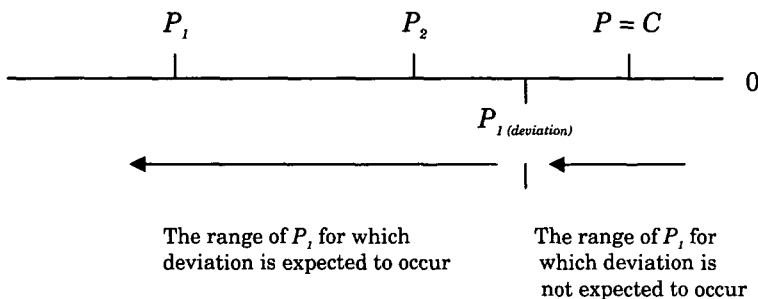
(b) $P_1 > P_{1(\text{deviation})} > P_2$ – in this option, the firms will ex ante lower the stage one price down to $P_{1(\text{deviation})}$ in order to avoid the deviation.

¹¹⁷ Up to the monopoly price.



If the current oligopoly price is P_1 , then the firms know that if the stage one price remains as is, or even if it goes down but it is still above the $P_{1(\text{deviation})}$ then deviation is expected to occur. In the event that deviation occurs, the total market profits would be lower than the total market profits when the price is $P_{1(\text{deviation})}$. Since at that point in time (stage one) the firms do not know which one of them will win the deviation contest, their prospect stage two profit is $T_2\pi_2/n$ (where n represents the number of firms in the market). It is preferable for the firms to set the price at $P_{1(\text{deviation})}$ because then their profits would be higher (since $P_{1(\text{deviation})} > P_2$). No communication or cooperation by the firms is required. Rather, it is sufficient that one firm lowers its price during stage one to $P_{1(\text{deviation})}$. The other firms will follow it immediately. Once the market price is set at $P_{1(\text{deviation})}$, a deviation is no longer expected to occur.

(c) $P_2 > P_{1(\text{deviation})}$ – in this option, theoretically, a deviation or even multiple deviations may occur until the oligopoly gets to a point where the post-deviation price $> P_{1(\text{deviation})}$, which in turn will be $>$ of the expected price following the deviation. In other words, a deviation or multiple deviations may occur until the market gets to the (b) option above.



According to this option, the market profit level at P_2 is higher than at $P_{1(\text{deviation})}$. The firms will get eventually to the $P_{1(\text{deviation})}$, but arguably, may prefer that the process is prolonged as much as possible so that they can enjoy greater profits. The price will decrease because a deviation is expected to occur at the current P_1 level. A further deviation is also expected to take place because even the post-deviation price is higher than $P_{1(\text{deviation})}$, and so forth. When the market gets to the position described in option (b) above, the firms would be better off setting the price at $P_{1(\text{deviation})}$, so, in principle, no further deviations are expected to occur. Even in this scenario, in which a deviation or multiple deviations are expected, the deviations will cease eventually.

Although from the discussion in this subsection so far, it appears that if $P_2 > P_{1(\text{deviation})}$, then deviations are expected, I believe that in reality firms would prefer to lower prices ex ante to avoid these deviations. We should remember that from the rivals' perspective, the consequences of the price freeze activation are severe, and therefore a reasonable management would most likely make a risk averse decision.

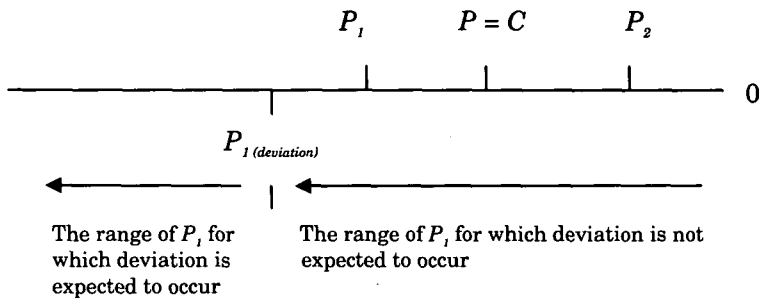
(d) In situations in which there is no $P_{1(\text{deviation})}$, price will fall to the competitive level, which would be the only possible equilibrium. Let us illustrate this with the cartel-pricing example. If we assume that when the cartel price is fifty

percent above the competitive level then deviations are expected to occur, there might be a lower price at which such deviations are no longer expected. Such price could be, for example, the price that if lowered by twenty percent would touch the competitive level. At that price, deviations are not expected to occur because a deviation that could activate the price freeze would earn the deviator zero profit. However, assume also that the price at which deviations are not expected to take place yields the firms profit that is not high enough to justify the risk of being caught and prosecuted. In this case there would be no equilibrium price other than the competitive price. Other such examples could be situations in which the introduction of the suggested oligopoly price freeze would reduce or even completely break down the trust among the oligopoly firms.

$$\begin{array}{c} P = C \\ | \\ \hline 0 \end{array}$$

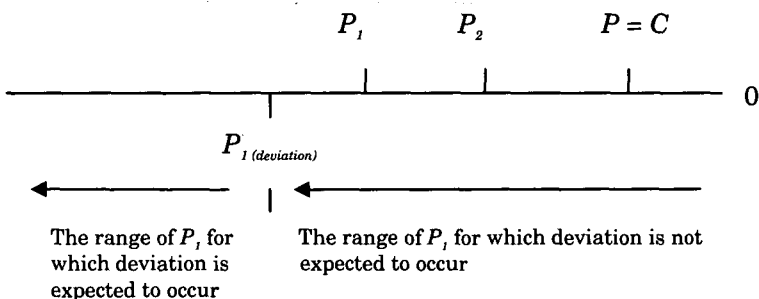
4. Cases for Which Deviation Is Not a Real Threat or Possibility

Although the suggested price freeze will have a noteworthy effect on oligopoly prices, there will also be oligopoly markets in which prices will remain unaffected. In some markets, prices are relatively low and therefore the difference between marginal cost and price is insufficient for a substantial price cut.



Even markets with higher prices may not be affected by the suggested price freeze. As the figure below illustrates, even if P_2 is higher than $P = C$, deviation is not expected to take place, as long as $P_{1(\text{deviation})}$ is greater than P_1 . The level of trust among the firms in the market impacts the value of $P_{1(\text{deviation})}$. In markets in which there is a close bond and trust among the firms, $P_{1(\text{deviation})}$ may be relatively high and therefore the firms will be able to maintain their former oligopoly price. In these markets, the likelihood of a deviation is small and can reach a point where the price will not be affected.

In these markets $P_{1(\text{deviation})} > P_1$:



However, this does not mean that the suggested price freeze would have no impact on prices in such markets. Even with regard to the above markets, the suggested price freeze

will play an important role in preventing price raises. The firms will not be able to raise the price above the $P_{1(\text{deviation})}$ level because when prices reach the $P_{1(\text{deviation})}$ level, the firms will start deviating. The suggested price freeze can therefore be an important counter weight to firms' attempts to raise prices even further.

5. The Suggested Price Freeze Advantages Over the Previous Price or Quantity Control Proposals

Williamson's oligopoly quantity freeze's major fault was that it could have actually helped the oligopolists in enforcing their collusive scheme. The suggested oligopoly price freeze works differently. First, it increases the incentive of the *oligopolists*' rather than *entrants*' or *fringe firms*' incentive to deviate from the previous price, and therefore the effect on the market will be much more significant. According to the suggested price freeze, a deviation would dramatically increase production in the market due to the significantly lower price and therefore it would only make sense for a large firm or a firm that is able to meet a large share of market demand to apply this strategy. Second, price freeze has a significantly higher deterrent effect on rivals potential than quantity freeze. Williamson's quantity freeze could not severely harm the oligopolists; they could still have sold *all* their output, just at a moderately lower price. In contrast, according to the suggested price freeze, the oligopolists would lose a large share, if not all their sales, during the freeze period.

Bishop's price schedule proposal could drive firms out of the market, leaving consumers to face monopolists; it could cause inefficiency in the face of changing market conditions; firms could still engage in non-price competition, which would limit the proposal's effectiveness; and finally, the proposal would require heavy, continuous, and costly governmental involvement. The suggested oligopoly price freeze would not drive firms out of the market because the price freeze period is intended to be significantly shorter

than Bishop's period. Additionally, as will be elaborated on in Part IV, firms with fifty percent or more of the market share will not be permitted to activate the price freeze. With regard to inefficiency in the face of changing market conditions, again, since the suggested oligopoly price freeze period is significantly shorter than Bishop's suggested period this problem will have a lesser effect. With regard to non-price competition, the short freeze period would generally make such competition less effective because changing a product's quality could be expensive and hence unprofitable if applied for a relatively short period of time. Additionally, as I will elaborate on in Part IV, the firms would be prohibited from changing their non-price strategies in response to the activation of the price freeze. With regard to governmental involvement, according to the suggested price freeze, governmental involvement will occur only in deciding in which concentrated markets the price freeze scheme should be implemented. From that moment on, the firms themselves would set the prices and enforce the compliance with the freeze requirements.

Although I believe the suggested oligopoly price freeze has notable advantages over the other price and quantity oligopoly control proposals, it does have inherent and associated problems that need to be addressed. In Part IV, I will discuss its major potential problems and inefficiencies and how it should be crafted in order to successfully deal with them. I will also present the detailed suggested oligopoly price freeze scheme and the manner in which it should be implemented.

IV. THE IMPLEMENTATION OF THE SUGGESTED OLIGOPOLY PRICE FREEZE

In Part III of this Article I presented the theoretical model of the suggested price freeze and its anticipated effects on simplified settings of oligopolistic markets. In this Part, I will present the potential problems and inefficiencies associated with the implementation of the price freeze in real-world markets and will try to develop workable guidelines for its efficient implementation.

This Part will start, in chapter A, with a discussion of the potential problems and inefficiencies associated with the implementation of the suggested price freeze. In this chapter I will also briefly explain how the suggested price freeze should be implemented so that the potential problems and inefficiencies will either not materialize, or, at least, will have only a marginal effect.

The more detailed proposal will be developed in chapters B, C and D of this part. In chapter B, I will present the required characteristics of the oligopoly markets in which the price freeze could be implemented. Chapter C will present the detailed guidelines of the suggested price freeze itself. Chapter D will present the suggested implementation of the price freeze. According to the suggested implementation, the price freeze would be implemented as a remedy in oligopoly markets in which there is evidence showing that prices are above the competitive level, or in markets in which collusive schemes were recently uncovered. Chapter D will then discuss the global vitamins industry of the 1990s as an example for a major industry in which the suggested price freeze could have been successfully implemented.

A. The Potential Problems and Inefficiencies Associated with the Implementation of the Suggested Price Freeze

In the following subchapters, I will elaborate on the potential problems and inefficiencies associated with the implementation of the suggested price freeze. Subchapter 1 will discuss the potential problems and inefficiencies, which are more generally associated with price, quality and quantity regulations, while subchapter 2 will discuss the potential problems and inefficiencies associated more with price or quantity freeze proposals.

1. General Price, Quality and Quantity Regulations' Problems and Inefficiencies

a. Inefficiencies Associated with Changes in

Market Conditions

There are inherent inefficiencies associated with all price regulations in the context of changing market conditions. In general, prices in all markets vary with changing costs, technologies, and demand curves. However, price regulations often set price floors and ceilings for extended periods of time. By prohibiting firms from reacting to these changes by adjusting their prices and quantity, the price regulation might prevent the market from reaching efficient price-quantity equilibria.¹¹⁸ In principle, there is a high potential for inefficiencies when regulating price in competitive markets. This potential is lower when dealing with non-competitive oligopoly markets because prices in oligopoly markets tend to remain stable even through changes in market conditions in order to avoid complicated price renegotiations.¹¹⁹ Furthermore, if a non-competitive oligopoly market experiences reductions in costs or in demand, the firms usually have an interest in maintaining the price rather than lowering it in order to increase their profits.¹²⁰

There are several measures we can take to eliminate or at least minimize this potential problem. First, the price freeze should be implemented only in relatively stable markets, as will be discussed in chapter B. Second, the suggested price freeze period should be relatively short so that the firms can react to the changes shortly after they occur. Third, in cases of dramatic and unexpected changes in market conditions,¹²¹

¹¹⁸ Price regulation of public utilities is a good example: in the 1970s, during a high inflationary period, the regulatory agencies were often slow to adjust prices to increases in input costs, which caused producers to earn a below-normal rate of return. See KIP W. VISCUSI ET AL., *ECONOMICS OF REGULATION AND ANTITRUST* 358 (4th ed. 2005).

¹¹⁹ SCHERER & ROSS, *supra* note 2, at 238-44.

¹²⁰ Unless the previous price under the new market conditions is higher than the monopolistic price. See, e.g., *E.I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 139 (2d Cir. 1984) (firms experienced reduction in demand but nevertheless maintained, and in several occasions even increased, their prices).

¹²¹ Such as the effect the terrorist attacks of September 11, 2001 had on airline prices.

I suggest that the FTC or DOJ be given the power to suspend or annul the price freeze, as will be discussed in chapter C.

b. The Difficulty in Identifying Prices

A major challenge to any price regulation can be found in markets in which there are ambiguities regarding firms' prices. This would be the case whenever the firms vary prices or sell variegated products.¹²² If there is no single unambiguous price, then it is difficult to apply any price regulation. It would also increase uncertainty as well as the number of litigations and their complexity, which would raise the administrative costs associated with the implementation of the price freeze.

To avoid this potential problem, the suggested price freeze would be implemented in markets in which prices are transparent, as will be discussed in chapter B. It should be noted that if prices are not transparent, then the firms would find it difficult to collude in the first place.

c. The Problem of Quality Regulation

One of the major problems associated with the implementation of a price regulation is quality regulation. On the one hand, if the price regulation is not accompanied by a quality regulation, then rivals can compete over products' quality. Additionally, firms could simply change their product and argue that it is actually a new product, not the one subjected to the price regulation. Such improvements or changes would be inefficient because they create different quality-price trade-offs than buyers would have preferred in a free market.¹²³ On the other hand, if the price regulation is

¹²² For example, in the airline industry (which provoked the debate regarding the above cost predation) a seat on a plane is sold at widely disparate rates depending on purchaser identity, advance purchase, Saturday stayovers, restrictions on changes, and the competing demand from customers in all the other cities that fly through that route. See Elhauge, *supra* note 81, at 817.

¹²³ This point is well illustrated in the context of the airline regulation that was highly criticized by Alfred Kahn, the prime architect of its

accompanied by quality regulation, then it might deter genuine innovation. Another problem is that "quality is often more difficult to measure than price."¹²⁴ The problems associated with a quality freeze would be especially notable in dynamic new economy markets, which are characterized by heavy investments in research and development. The quality freeze in such dynamic markets could be significantly more harmful to competition and innovation than the market's higher-than-competitive price. Additionally, firms fearing their rivals' expected wave of product advancements might arguably abuse the suggested price freeze to prevent their rivals from introducing to the market the next generation's products.¹²⁵

To eliminate or at least to minimize this potential problem I suggest that the quality freeze, which will accompany the suggested price freeze, would not include changes that are not *price freeze related*. It means that changes that were being planned prior to the activation of the price freeze would not be affected by it. Additionally, as

reversal. For an extensive discussion about the airline industry regulation and deregulation, see ALFRED E. KAHN, *THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS* vol. II ch. 5 (1988); VISCUSI ET AL., *supra* note 118, ch. 17.

¹²⁴ See Edlin, *supra* note 79, at 986; see also Elhouge, *supra* note 81, at 813 (discussing the airline regulations as an example: "[W]hen airline regulators tried to make their price regulations meaningful by clamping down on nonprice competition, they specified that airlines could only offer 'sandwiches' on international economy flights. Airlines responded with such tactics as putting duck a l'orange on one slice of bread for an open-faced 'sandwich.'"). The problem of supervising quality in the airline industry was more complicated than just "sandwich" supervision because the quality of service encompassed a wide array of elements such as "on-time performance, safety, on-board services, seat width, and luggage handling." Most of these elements were not controlled by airline regulation because it would have been too costly and complicated to do so. The result was that airlines competed vigorously on non-price quality factors. See VISCUSI ET AL., *supra* note 118, at 361-62. It is consequently noticed that, in general, economic regulation has not significantly restricted products' quality or provided services. *Id.* at 362.

¹²⁵ However, we should note that such strategy could postpone the introduction of the new product by a few months and not entirely prevent it.

will be discussed in chapter B, the price freeze would only be implemented in stable markets with homogeneous or standard products in which the level of innovation is relatively low. Furthermore, in many situations it would not be realistic or profitable for the rival firms to initiate quality changes and to implement them within the limited period of the suggested price freeze. The rival firms would also face difficulties in marketing their changed product, because by promoting their improved product, they would expose themselves to antitrust price freeze claims. Lastly, even if rival firms could get away with minor improvements to their products, they would still not be able to offset the significant deviation's effect.

d. Advertising

In principle, if firms cannot compete over prices they can instead compete by advertising more aggressively.¹²⁶ This, I believe, is not a significant problem and therefore does not require any adjustments in the manner the suggested price freeze is crafted. First, the public hype and the media coverage of the deviation and the activation of the price freeze will give the deviating firm a considerable advantage over its rivals in addition to free advertising. To that, of course, we should add that after the significant price cut, the deviating firm's product would be more attractive to consumers. Additionally, in many concentrated markets, the buyers are large sophisticated firms that would not be significantly affected by advertisements.¹²⁷

e. Improved Transactions' Terms

Improving transactions' terms such as with better financing arrangements, or faster delivery could offset the

¹²⁶ There are few major concentrated markets in which advertising is a very important factor in creating and increasing demand. The cigarettes and morning cereals industries are good examples for heavily advertised markets. See SCHERER & ROSS, *supra* note 2, at 250-52, 256-58.

¹²⁷ The global vitamins market is a good example for such a market. It will be discussed in Part IV.D. *infra*.

effect of a price regulation. In the context of the suggested price freeze, rival firms' ability to improve transactions' terms in response to deviations could reduce the incentive to deviate from the oligopoly price in the first place. I therefore suggest that the price freeze should include a payment terms freeze, meaning that the rival firms, following the activation of the price freeze, would be prohibited from lowering prices as well as improving their payment terms. For an elaboration on this issue see the discussion in chapter C.

2. The Specific Price Freeze's Problems and Inefficiencies

a. The Direct Inefficiencies of the Price Freeze

In some situations the market aggregate production costs during the price freeze could be higher than the pre-deviation aggregate production costs because of the upward sloping marginal cost curve. The deviating firm will increase production at its rivals' expense but as of a certain point its production costs would be higher than its rivals' pre-price freeze production costs. Additionally, decreasing production by the rivals during the price freeze and then resuming full production following its expiration could be very costly.

The answer to this problem is that as described in Part III, the suggested price freeze has potential to perform as an "invisible" regulation, meaning that it could lower prices without actually activating the price freeze itself. Deviations would occur if the price were extremely high or when firms miscalculate their rivals' intentions.¹²⁸ Since I suggest that the price freeze is implemented in relatively stable markets, then even if deviations do occur, the markets would eventually get to stable lower equilibrium. In such cases, the inefficiency would be temporal and would be followed by a longer-term added efficiency period.

¹²⁸ See *supra* Part III.B.3.

b. The Potential Problem of Monopolization

Arguably, activating the price freeze could drive rival firms out of the market, leaving the deviating firm as a sole monopolist, which would raise the price to the monopolistic level, to consumers' detriment.

There are several answers to this potential monopolization scenario. First, as will be elaborated on in chapter C, the price freeze period would not be long enough to dissolve rival firms.¹²⁹ Additionally, the suggested price freeze would require a period of time following the expiration of the price freeze in which further deviations would not be allowed.¹³⁰ Consequently, firms would not be able to combine several price freeze periods to eliminate rivals. Second, the oligopoly firms themselves could prevent the monopolization scenario simply by lowering prices *ex ante*.¹³¹ Third, the scenario of monopolization is generally unlikely due to manufacturing constraint. It is usually not plausible for a firm to double, triple or otherwise permanently significantly increase its production capabilities within a very short period of time. This means that the rival firms will not be entirely or permanently driven out of the market.

Another related argument against the suggested price freeze is that it would enable dominant firms to eliminate smaller rivals by pricing below marginal cost. There are several responses to this argument. First, this situation is

¹²⁹ The focus should be on the preservation of the organization and the manufacturing facilities and not necessarily on the ownership, since a rival's bankruptcy would change owners, but the firm would remain a competitor. In other words, the deviating firm would need to destroy its rivals' organizations and manufacturing ability in order to become a monopolist. Causing a change in ownership would not suffice.

¹³⁰ See *infra*, Part IV.C.3.

¹³¹ The suggested price freeze would have the positive effect of changing the oligopoly firms' incentive from raising the price to lowering it. The price freeze would unify the firms' interest with the consumers' in having low prices and would have the oligopoly firms act as the consumers' agents as they lower their prices to avoid the severe consequences of a price freeze.

already addressed by the predatory pricing doctrine.¹³² Second, it is questionable whether firms actually apply this strategy to drive competitors out of the market in order to establish a monopoly position.¹³³ Firms that opted to get involved in below-cost price wars (with or without the protection of the price freeze) would face unappealing obstacles, such as losses during the period in which the predator sells its product at a below-cost price. These losses would be proportionally higher for it than for its rivals, which could simply halt production and thus avoid the losses associated with below-cost sales. In any case, to eliminate this possibility I suggest that firms with over fifty percent of the market share would not be permitted to activate the price freeze, as will be discussed in chapter C.

c. The Potential Problem of Limited Capacity

Theoretically, oligopolists' limited production capacity can affect the efficacy of the suggested price freeze. If the oligopoly firms were currently at their maximum production levels, then they would not deviate because they could not increase sales.

There could be several responses to this problem. First, there is strategic value in maintaining excess capacity in oligopoly markets in order to enforce collusion.¹³⁴ Second, there could be strategies firms could employ to significantly

¹³² Firms that employ predatory pricing strategies to gain or to maintain monopoly power can be found in violation of Section 2 of the Sherman Act. The model predatory pricing claim requires that the alleged predator charges below cost prices to drive its rivals out of the market or to prevent potential entry. When competition is eliminated, the predator would charge a significantly higher price. See *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 222-24 (1993) (identifying the elements required for a predatory pricing claim: (1) below cost pricing; and (2) a dangerous probability of recoupment of the resulting losses).

¹³³ See *Matsushita Elec. Indus. v. Zenith Radio Corp.*, 475 U.S. 574, 589 (1986) (adopting the skepticism of the Chicago School with regard to the plausibility of predatory pricing and concluding that "predatory pricing schemes are rarely tried, and even more rarely successful").

¹³⁴ See *supra* Part II.A.5.c.ii.

increase sales during the price freeze period.¹³⁵ Third, firms could use inventories to increase sales during the price freeze period.¹³⁶ Fourth, firms could simply increase their production capabilities.¹³⁷

d. Legal Consequences as a Deterrent for Activating the Price Freeze

Arguably, oligopoly firms would fear the legal consequences that would result from activating the price freeze. The fear would be that the deviation would signal to the antitrust authorities that the price in the market is above the competitive level and they would take legal actions against the oligopoly firms as a consequence. This could be a valid argument if there were antitrust sanctions to supra-competitive prices. However, in general, oligopoly pricing is not illegal and does not expose the firms to any antitrust sanctions.¹³⁸ Furthermore, in many oligopoly markets it is

¹³⁵ In most industries, for example, firms constantly build and rebuild their production facilities in order to maintain their production ability. Consequently, firms could start rebuilding new factories a few months earlier, or perform maintenance work on old factories to prolong their operation period for several months. This way the firms could earn several months of significantly higher production capability. This would enable the firms to significantly increase sales during a potential price freeze period.

¹³⁶ It is reasonable to assume that oligopoly firms with rigid capacity constraints keep a relatively large inventory in order to be able to respond to market changes as well as to be able to retaliate in case of rivals' price cuts. See SCHERER & ROSS, *supra* note 2, at 269-73; see also Julio J. Rotenberg & Garth Saloner, *The Cyclical Behavior of Strategic Reserves*, 104 Q. J. ECON. 73 (1989).

¹³⁷ In many industries, increasing production capacity does not necessarily take a long period of time. Studies show that a time span of around five months is usually reasonable for that matter. Lloyd Metzler, *Factors Governing the Length of Inventory Cycles*, 29 REV. ECON. & STAT. 7 (1947) (examining the production time including the planning period, noting the actual period necessary to build up additional capacity would therefore be shorter). See also John A. Carlson, *The Production Lag*, 63 AM. ECON. REV. 73 (1973).

¹³⁸ See discussion of the current legal framework with regard to oligopoly pricing *supra* Part II.B.

common knowledge that the price is relatively high, and as will be discussed in Chapter D, the price freeze would be implemented selectively in such markets. So, in that sense, the firms would already be "suspected" of taking collusive measures to increase their profits. Finally, in cases in which prices in the market are high due to criminal cartel, a firm that chooses to deviate and activate the price freeze could do so simultaneously by approaching the antitrust authorities as part of the leniency procedure.¹³⁹

e. Backlogs and Long-Term Contracts

Backlogs and long-term contracts can arguably complicate the implementation of the suggested price freeze. There are two issues that need to be addressed: first, there could be situations in which rival firms extend offers to sell their products at lower prices to potential buyers after the expiration of the price freeze; and second, there could be long-term contracts that cover the price freeze period and in which the price is lower than the public price-list.

I therefore suggest that the price freeze prohibit the rival firms from soliciting business during the price freeze period through the offering of prices lower than their pre-price freeze price, regardless if it is an offer that can be accepted before or after the expiration of the freeze. Continuous contracts at lower prices should not be affected by the suggested price freeze. If rival firms took prior commitments to sell at lower prices, they should be permitted to keep their contractual obligations.

B. Market Definition

From the discussion in the previous chapter, it is clear that there are types of concentrated markets in which the suggested price freeze should not be implemented. These are markets characterized by one or by more of the following: frequent fluctuations in demand or in costs; significant potential avenues for non-price competition; dynamic

¹³⁹ See *supra*, Part III.B.2.c.i.

advances in product quality or production processes; and large-scale transactions with individual specifications. The industries listed below are good examples of industries not suitable for an implementation of the suggested price freeze. These industries include, among others, the crude oil industry,¹⁴⁰ the airline industry,¹⁴¹ dynamic high-tech industries,¹⁴² and the large aircraft manufacturing industry.¹⁴³

¹⁴⁰ The crude oil industry has a volatile history for several reasons. First, energy demand is connected to the business cycle. It rises in times of economic booms and falls with recessions. Second, new oil reserve discoveries can significantly increase the size of known oil reserves. The result would typically be a shock in the form of increase in supply and lower price levels. Third, the geographic concentration of oil reserves in the Middle East subjects the industry to almost constant short-run supply shocks due to the continuous political instability and conflict in the region. Finally, the growth of markets at unexpected rates (such as the growth of markets in the Far East) will result in upward shoots in price. This discussion is based on VISCUSI ET AL., *supra* note 118, at 591-93.

¹⁴¹ In the airline industry, as stated in Part IV.A.1.b. *supra*, there is no unified price for a seat in the plane. It is likely that customers would pay different prices for similar seats on the same flight. So freezing the price at any given time might not be easy. Furthermore, costs may frequently change due, for example, to changes in oil prices, and demand may shift due to seasonal cycles and changes in public preferences. As also previously stated, in Part IV.A.1.c. *supra*, the firms in the industry have found alternative avenues for competition when prices were set according to government regulation.

¹⁴² Dynamic high-tech industries are also not suitable for implementation of the suggested price freeze. In these markets prices change dramatically, frequently, and mostly downward. An activation of the suggested price freeze in these markets could stabilize prices at a higher level than they otherwise would have been. The quality freeze is also unwarranted as it could affect genuine innovation.

¹⁴³ This is a market with only two major manufacturers: Boeing and Airbus. Transactions are often large scale and negotiated individually with the purchasers for price and product specifications. The firms are therefore unlikely to collude on price due to the magnitude of the transactions. In such a market, the suggested price freeze would not work well because prices and product specifications vary for each purchaser. For discussion about the industry's characteristics, see William E. Kovacic, *Transatlantic Turbulence: The Boeing-McDonnell Douglas Merger and International Competition Policy*, 68 ANTITRUST L. J. 805 (2001).

In the following subchapters, I will present and discuss the market characteristics required for efficient implementation of the suggested price freeze. It is important to note that there is a strong correlation between the required market characteristic advocated by this paper and the general market characteristics that are viewed as facilitators of collusion in oligopoly markets. It means that markets that could be subjected to the suggested price freeze are markets that are generally more susceptible to oligopoly collusion and vice versa. This is supported by strong empirical evidence. Over the years, several major studies have been conducted looking into the characteristics of cartelized markets, the leading of which were conducted by Hay and Kelley,¹⁴⁴ Stigler,¹⁴⁵ Dick,¹⁴⁶ Posner,¹⁴⁷ and Connor.¹⁴⁸ These studies, among others, indicate that, in principle, the characteristics listed below play a significant role in facilitating and enabling collusion.¹⁴⁹

1. Market Concentration on the Selling Side

As noted in Part II, economic theory suggests that there is a positive correlation between the vigor of competition and the level of market concentration. The Herfindahl-Hirschman-Index ("HHI") is the most popular and commonly used

¹⁴⁴ George A. Hay & Daniel Kelley, *An Empirical Survey of Price Fixing Conspiracies*, 17 J. L. & ECON. 13 (1974).

¹⁴⁵ Stigler, *supra* note 7.

¹⁴⁶ Andrew R. Dick, *When Are Cartels Stable Contracts?*, 39 J. L. & ECON. 241 (1996).

¹⁴⁷ Richard A. Posner, *A Statistical Study of Antitrust Enforcement*, 13 J. L. & ECON. 365 (1970).

¹⁴⁸ JOHN M. CONNOR, *GLOBAL PRICE FIXING - OUR CUSTOMERS ARE THE ENEMY* (2001) [hereinafter CONNOR I]; John M. Connor, *Private International Cartels: Effectiveness, Welfare, and Anticartel Enforcement* (Purdue University working paper, 2003), available at http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=11506&ftype=.pdf [hereinafter Connor II].

¹⁴⁹ See SCHERER & ROSS, *supra* note 2, ch. 7; CARLTON & PERLOFF, *supra* note 9, at 127-36.

concentration ratio.¹⁵⁰ The FTC and the DOJ use the HHI to measure markets' concentration in their Horizontal Merger Guidelines.¹⁵¹ I suggest that when the antitrust agencies examine markets for the implementation of the suggested price freeze, they focus their attention on highly concentrated markets with HHI of 1800 and above.¹⁵²

2. Barriers to Entry

For the purposes of the suggested price freeze, barriers to entry would include the conditions that increase the length of time required for a new entry to occur at an efficient level. These include the need to raise significant funds, the building of large complex factories, acquiring know-how through a learning curve and so forth. If new entry takes a long time to materialize, then the incumbent oligopoly firms can raise prices without fear of new entry in the short-term that would drive the price downwards. Therefore, a price-raising collusion would be more probable.

3. High Level of Product Homogeneity or Product Standardization

Product homogeneity or product standardization implies that all the significant aspects of the various firms' products are alike. The products are therefore close substitutes for one another. When the products are completely homogeneous they are virtually perfect substitutes. For this reason, competition among the firms is mostly over price, which, in turn, makes collusion easier because there is only one factor

¹⁵⁰ The HHI is calculated by summing the squares of all the firms' market shares. This way, the HHI reflects the weight of the leading firms by giving their market shares a greater significance in the market analysis. The HHI, which adds the sum of the squares of the firms' market shares, ranges from 10,000 in a pure monopolistic market to a number approaching zero in the case of a market composed by numerical small firms.

¹⁵¹ See FED. TRADE COMM'N & DEPT OF JUSTICE, HORIZONTAL MERGER GUIDELINES (1992, rev'd 1997), available at http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html [hereinafter MERGER GUIDELINES].

¹⁵² *Id.*

for the firms to agree upon and only one factor to supervise. Under such circumstances prices tend to be relatively transparent, making the industry suitable for the implementation of the suggested price freeze. Additionally, it would minimize any harmful effects a quality freeze might have. It would also minimize the firms' ability to compete over factors other than price, which would increase the effectiveness of the suggested price freeze.

4. Buying Side of the Market is Un-Concentrated with High Frequency of Small Orders

As the number of buyers increases, and orders are relatively small, frequent and regular, the price in the markets tends to become more transparent, and therefore suitable for the implementation of the suggested price freeze. These characteristics also facilitate coordination among the firms because the incentive to cheat would be smaller due to the small size of the orders, and the inability to conceal deviations.¹⁵³

5. Stable Market Demand

Industries characterized by significant fluctuations in demand are not suitable for the implementation of the suggested price freeze. In cases of price fluctuations, the suggested price freeze might freeze a price at levels higher than those set by the market. Price fluctuations will also make it more difficult for the firms to predict their rivals' conduct, which would increase the number of deviations and activations of the price freeze, along with their inherent

¹⁵³ In order for cheating to be worthwhile, a firm would have to be involved in a large number of transactions in which the price is lower than the agreed upon price. However, in such cases the probability of getting caught increases, because a price cut on a small order transmits as much information as one on a large order. On the other hand, the fewer major buyers, the more difficult it would be to attribute a decrease in sales to cheating by another firm, as the loss can result from a random loss of a specific buyer. In this case cheating also becomes more attractive because a single transaction can bring a large profit.

inefficiencies. We should note, however, that in such industries, in which prices frequently change, price raising collusion is less plausible in the first place.

The suggested price freeze could be implemented in industries characterized by static demand, stable increasing demand, stable declining demand, and by a moderate seasonality in demand. The case of static demand is the simplest. Prices are expected to be relatively stable, which enables collusion on the one hand, but on the other hand, it will enable an efficient implementation of the suggested price freeze. If demand is declining, collusion is relatively simple to achieve. The firms just need to stick to their previous prices, because even if prices were competitive at first, they would generate supra-competitive profits for the firms with the decline in demand. However, the implementation of the suggested price freeze is not without difficulties. As demand declines, theoretically in competitive markets, so will the market price. Hence, if markets are competitive, then the implementation of the suggested price freeze might freeze the price at a level higher than the level set by competition. I therefore suggest that in situations of declining demand the suggested price freeze would be implemented only if price in the market remains at the previous level or increases.¹⁵⁴ In situations in which there is an increase in demand, price freeze implementation can be efficient if the increase is stable so that firms in the markets can make accurate predictions as to future market conditions. However, in cases in which there is an accelerated and significant increase in demand, the firms in the industry will find it more difficult to collude because it will be harder to detect cheating by rivals, and therefore, in such situations implementation of the suggested price freeze will not be required. Finally, in cases of seasonality in demand, implementation of the suggested price freeze would only be advisable when the differences in demand are

¹⁵⁴ Assuming that there are no other reasons for the higher price levels such as costs increases. *See, e.g., E. I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 139 (2d. Cir. 1984) (in which although demand was declining the firms managed to increase their prices).

relatively moderate, and predicted. In such cases markets will experience lower prices during the lower demand season. I therefore suggest that firms would not be allowed to activate the price freeze for some period of time prior to the expected decline in demand.

6. Stable Costs Curves

The faster producers' cost functions are altered and the more unevenly those changes are diffused among the producers, the more difficult it will be for the firms to agree on a mutual benefiting price. The mirror image of an industry characterized by dynamic changes in costs functions is an industry with stable costs structure shared by the firms. The more alike firms in an industry are, the easier it will be for them to collude. Correspondingly, implementation of the suggested price freeze in industries characterized by dynamic changes in costs curves would not be advisable because it might freeze the price at a level higher than the level set by the market, or it might prevent product improvements. Therefore, the suggested price freeze should be implemented only in markets with stable cost conditions. The relevant industries for the implementation of the suggested price freeze are ones in which production, structure, and methods have been fairly consistent for years and are expected to continue similarly. In cases in which an industry transitions from being stable to being unstable, the implementation of the price freeze should be suspended or annulled.

C. The Detailed Suggested Price Freeze

In this chapter I will present more detailed guidelines for the suggested price freeze, including relevant details that need to be set in order for the suggested price freeze to be effective. These guidelines also take into consideration the potential problems and inefficiencies discussed in chapter A of this part and are constructed in a manner such that it minimizes or eliminates them.

1. The Price Freeze

A firm in an oligopoly market in which the price freeze has been implemented that makes a significant price cut of 10%, 15%, or 20% could activate the price freeze. The price freeze would prohibit the other firms in the market from lowering their prices for a period of three months if the price cut is of ten percent, four and a half months if the price cut is of fifteen percent or six months if the price cut is of twenty percent or higher.

The three threshold levels for activating the price freeze will promote an effective implementation thereof in different markets with varied oligopoly pricing levels. It will also ensure that the new lower price in the affected market will be closer to the competitive level. The difference in the time periods would create an incentive for the firms to make more significant price cuts. The DOJ and the FTC in the Horizontal Merger Guidelines consider a price increase of five percent to be "small but significant."¹⁵⁵ I therefore believe that a minimum price cut of ten percent would be significant, while at the same time it would not enable abuse of the price freeze in competitive settings.¹⁵⁶

The advantage of using the ten percent threshold is two-fold. First, it would increase the price freeze's effectiveness in oligopoly markets in which the oligopoly price is only moderately higher than the competitive price. Second, it would cause prices in oligopoly markets, in which prices are relatively high to get to a level closer to the marginal cost

¹⁵⁵ See MERGER GUIDELINES, *supra* note 151, § 1.1. The agencies, however, are aware that the increase in price should be depended "on the nature of the industry," and therefore the agencies "may use a price increase that is larger or smaller than five percent." *Id.*

¹⁵⁶ Firms in competitive markets will not be able to abuse the suggested price freeze because they would still need to make a significant price cut in order to activate the price freeze. Assuming that the price in a competitive market equals marginal cost, then a firm that makes such a price cut will end up losing money with every unit it sells. It is very likely that it would even lose more money than its rivals in this situation because the rivals will limit their production.

after a previous deviation or deviations in which the price cut was more significant.

The length of the price freeze periods balances the attempt to create an incentive for deviations on the one hand, while on the other hand not to injure the rivals' long-term ability to compete. Three to six months is long enough to generate significant profits for deviating firms as well as to impose heavy losses on the rivals. However, it is short enough not to dissolve the rivals' production capacity and organizations.¹⁵⁷ Therefore, the potential for long-term competition in the market should not be affected by the activation of the price freeze.

When dramatic changes in costs or in demand occur, the FTC or the DOJ would suspend the implementation of the price freeze until the market stabilizes.

If dramatic changes in costs or in demand occur, it would not be sensible to prevent firms from adjusting their prices to the new market conditions. If we do not allow the firms to do so, then we might hurt consumers and the industry. The FTC or the DOJ will be responsible for making the decision regarding the suspension of the price freeze.¹⁵⁸

The deviating firm will be required to maintain its product's quality as well as its transactions' terms during the price freeze period.

In order to activate the price freeze, the deviating firm has to lower its prices substantially. However, if the price cut is followed by a product quality reduction or by worsening transactions' terms, then arguably the effective price cut might not qualify as a substantial one, sufficient for activating the price freeze. Therefore, to avoid any "quality adjustments" the deviating firm would be required to

¹⁵⁷ The suggested price freeze periods are significantly shorter than the twelve to eighteen month period suggested by Edlin in the above cost predation context and by Williamson. It is also significantly shorter than the period suggested by Bishop.

¹⁵⁸ This way we will not increase the level of uncertainty or administrative costs because every firm could have its own views as for what constitutes a dramatic change.

maintain its product's quality and transaction' terms throughout the price freeze period.¹⁵⁹

Firms with fifty percent market share or more of the market production capacity will not be permitted to activate the price freeze.

The fifty percent market share threshold would minimize the possibility of dominant firms gaining additional long-term market power. Market share is a central indicator (although not the sole indicator) of monopoly power.¹⁶⁰ The threshold of fifty percent market share prevents large firms, which are short of monopoly power¹⁶¹ from activating the price freeze and applying it to their smaller rivals. It may be argued that the fifty percent market share provision reduces the level of certainty associated with the implementation of the suggested price freeze in cases in which firms hold around fifty percent market share. The response would be that antitrust litigation and administrative decisions usually revolve around the question of whether a firm holds market

¹⁵⁹ Edlin, in his above cost predation price freeze, suggested applying quality adjustments to determine whether the entrant (in the above cost predation context) has offered a twenty percent "quality-adjusted discount." These quality adjustments are significant enough that a twenty-five to forty percent price difference only "probably" qualifies as a twenty percent discount. Edlin, *supra* note 79, at 982. The problem, as Elhauge points out, is that introducing this vague assessment of quality adjustments will eliminate the supposed administrative simplicity associated with a fixed and well defined level of what should be considered as a substantial price cut. Elhauge, *supra* note 81, at 817.

¹⁶⁰ Another crucial factor is barriers to entry. This requirement is already dealt with by selecting only markets with significant barriers to entry on which the price freeze could be implemented. See *supra* discussion at Part B.2.

¹⁶¹ From courts' decisions it seems that in general there is a supposition that firms holding less than fifty percent of the market share do not hold a monopoly power. See, e.g., *Blue Cross & Blue Shield United of Wisconsin v. Marshfield Clinic*, 65 F.3d 1406, 1411 (7th Cir. 1995) ("50 percent is below any accepted benchmark for inferring monopoly power from market share . . ."), *cert. denied*, 516 U.S. 1184 (1996); see also *U.S. Anchor Mfg. v. Rule Indus.*, 7 F.3d 986, 1000 (11th Cir. 1993) ("we have discovered no cases in which a court found the existence of actual monopoly established by a bare majority share of the market").

power. If the firm holds market power, then it would be forbidden from applying specific business strategies. The margin of mistake is narrow and its potential consequences are severe. Market power, as a concept, is much murkier than a relatively clear-cut provision, which deals with a well-defined market share threshold. Therefore, even though there is an added element of uncertainty to the price freeze's implementation with the fifty percent market share threshold, it is still considerably less vague than the so common "market power" requirement.

Once the deviating firm has activated the price freeze, it would be prohibited from raising its price until the expiration of the price freeze period.

Since the price freeze has the potential of harming competitors in the short-run, allowing deviating firms to raise prices during the price freeze period would enable them to abuse it. A firm could cut its price and activate the price freeze, and then raise its price once its rivals took the measures necessary to minimize their losses. Even if the price freeze expired the moment the deviating firm raised its price, the rivals could need additional time to resume their previous production efficiency. This would give the deviating firms an advantage without promoting consumers' interests.

The deviating firm would have an antitrust claim against any rival firm that does not follow the price freeze's requirements. The deviating firm, in such a case, would be entitled to treble damages for its loss of revenues during the price freeze period.

To enforce the price freeze, deviating firms would be entitled to treble damages in such case that their rivals do not oblige with the price freeze's requirements. The rival firms would compensate the deviating firm for the treble loss of the amount the deviating firm would have earned had the price freeze been maintained. The treble damages provision creates the deterrence required to assure adherence with the price freeze. In order for the rival firms to be able to compete with the deviating firm's price during the price freeze period they would have to improve their payment terms, product quality, or give discounts to a large number of purchasers. It

would therefore be practically impossible for the rival firms to conceal such conduct. The risk of compensating the deviating firm in the amount three times greater than its actual loss and the high probability of being detected make any attempt to violate the price freeze an unprofitable strategy.

The oligopoly price freeze would not provide an injunction remedy to the deviating firm or to the rival firms.

An injunction remedy would not be suitable for the suggested price freeze. Since the price freeze period is meant to be of short duration, injunctions would not be effective. Even speedy trial proceedings are expected to last at least several months from their initiation and until a decision is rendered, a fact that would make such decision obsolete.

2. The Quality Freeze

Once the price freeze is activated, the rival firms would be prohibited from improving their product during the price freeze period. However, the rival firms would be permitted to go ahead with changes that were planned prior to the activation of the price freeze and those that were planned to be implemented during the price freeze period.

The product quality freeze is necessary to preserve the advantages of the price freeze; otherwise, rivals could retaliate for the deviation by increasing their product's quality. However, in order not to deter genuine innovation, the quality freeze would not affect general, unrelated improvements. In principle, it is difficult to measure quality, but since the suggested price freeze would only be implemented in markets with standard or homogeneous products, detecting quality changes will be relatively simple.¹⁶² Additionally, for the quality change to be effective in attracting new buyers, the rival firms would have to advertise it, but by doing so they would be exposed to antitrust damages suit by the deviating firm.

¹⁶² For example, in the case of chemicals, quality change could either be by inserting another component or by bringing the product to a higher level of purification. Such changes are easy to measure and to detect.

In order not to affect efficient innovation, the suggested price freeze would be applied only to quality changes that are a direct result of the deviation and the activation of the price freeze. The rival firm would have to bring the evidence and to prove that the quality change is not price freeze related.¹⁶³ With regard to product changes that arguably create a new product, the product would be subjected to the price freeze only if the product is covered by the price freeze's product market definition. Although product market definition is a rather complicated matter, it is an essential part of most antitrust cases.

3. The Deviation Process

The antitrust agencies will create a "deviation bidding website" for industries subjected to the price freeze scheme. Firms that wish to make a significant price cut and to activate the price freeze would submit their price cut to the bidding website. The submission would include the percentage of the price cut and the names of the rival firms subjected to it. The submission of the bid would be confidential. At the end of the following business day, the bid would become public and effective. In case there were multiple bids, the firm with the highest bid in terms of price cut percentage will win the bidding contest.

¹⁶³ In situations in which litigation arises because of the product improvement, the question of fact—whether the improvement was a result of the price freeze or whether it was unrelated—would be relatively easy to solve. The process of planning product improvement in large firms and large scales of production has to leave an obvious trace of evidence, including internal e-mails, board decisions, board meeting minutes, correspondence with outside contractors, and so forth. Additionally, since firms would know that they are operating in a market subject to the price freeze scheme, they would make sure that discussions regarding product changes were well documented. In any case, even the above question of fact can be avoided in most cases, since changes that are not price freeze related will remain in effect after the price freeze expires, while price freeze related changes will not. After the price freeze expires firms would return to the optimal quality and costs characteristics of the products. So as a rule of thumb, the deviating firm would know that a change was price freeze related if it was reversed once the freeze expired.

I suggest that a contested deviation would be held in a manner that resembles a bidding process. The bidding would be secret; the rival firms would not even know that such bid was submitted. This way, the firms would have to make individual decisions as to whether or not to submit a price cut. At the expiration of the following business day the results would become public and the price freeze effective. The deviating firm would be required to lower its price according to its submitted bid and the rival firms' price would be frozen. The process would create the incentive for firms to make the largest price cut they can. This way, if deviations occur, they might be even more than twenty percent and could drive prices closer to the competitive price level. The antitrust agencies' involvement would be strictly technical and they would have no active or substantive role in the process.¹⁶⁴ In an uncontested deviation scenario, the deviation process is fairly straightforward. When the bid becomes public, the deviating firm would cut its price and the rival firms' prices would be frozen.

Firms will not be permitted to reactivate the price freeze during the three months following the expiration of the price freeze.

In order to prevent monopolization we should not permit consecutive deviations, which could arguably drive rivals out of the market. Additionally, not permitting consecutive deviations would enable rival firms to resume full production and to retain their pre-deviation production efficiency. Furthermore, it would allow the market to reach a new price equilibrium. It is important that the price freeze is only activated in a state in which the market price is in

¹⁶⁴ For clarification, the antitrust agencies would have no role in deciding or advising with regard to which firm has won the deviation contest in cases of disputes. A deviation dispute may arise if firms have contrasting views with regard to the winning bid. In such cases, they would have to bring an antitrust suit at the end of the price freeze period claiming that the price freeze was violated. The winning firm would then be entitled to treble damages for the loss of revenues during the price freeze period.

equilibrium, because otherwise the protection the deviating firm receives may not be justified.¹⁶⁵

4. The Rival Firms' Remedies

The Rival firms would have an antitrust claim against the deviating firm for damages if the deviating firm did not follow the price freeze's requirements. This, however, does not include minor or sporadic acts of noncompliance.

To prevent the abuse of the suggested price freeze by deviating firms,¹⁶⁶ this provision will expose firms that activate the price freeze in bad faith to the full extent of the losses caused to their rivals.

5. New Entry

New entrants will not be able to activate the price freeze, and correspondingly, an activation of the price freeze would not affect new entrants entering the market during the price freeze period.

The suggested price freeze should promote competition among the *incumbent oligopoly firms* and therefore should not affect new entrants. Allowing entrants to activate the price freeze creates unnecessary complications. First, the entrant does not have a previous price from which it could make a price cut. Second, establishing the moment of entry

¹⁶⁵ A numerical example can be useful for the understanding of this argument. Assume a market with two equal firms; firm A and firm B. Both firms sell their product at \$100 per unit during stage one. Firm A cuts its price to eighty dollars per unit and activates the price freeze. In this case the price freeze protection is warranted because consumers enjoy a significantly lower price. Assume now that six months later, as the price freeze period expires, firm B cuts its price from \$100 per unit to seventy-nine dollars per unit. If this price cut would activate the price freeze then Firm B would end up enjoying its protection, when in fact the consumers enjoy only a moderately lower new price (seventy-nine dollars compared to eighty dollars). Such a minor price cut does not justify an activation of the price freeze.

¹⁶⁶ This would occur if, for example, if the deviating firm raises its price prior to the expiration of the price freeze period after the rival firms have already taken the necessary measures to reduce production.

is one of the major difficulties of the proposed price and quantity freezes in the context of "above cost predation."¹⁶⁷

New entrants should not be affected by an activation of the price freeze for two main reasons. First, we are assuming that there are significant barriers to entry in oligopoly markets. Therefore, it would not be plausible, in most scenarios, for a new entrant to initiate, plan, organize, and implement entry during the price freeze period. If a significant entry occurs, it was probably planned prior to the activation of the price freeze, and therefore should not be affected by it. Second, an activation of the price freeze would probably not attract new entries to the market by itself because the price would be significantly lower during the price freeze period than the previous oligopoly price.

D. The Suggested Price Freeze's Implementation

This chapter will present the suggested legal framework for the implementation of the oligopoly price freeze and will discuss a major industry in which the suggested price freeze could have been implemented. According to the suggested legal framework, the antitrust agencies would apply to the courts to implement the oligopoly price freeze on suitable well-defined industries. First, the agencies would be required to convince the court that the market under review meets the criteria set forth in chapter B of this part. Second, the agencies would be required to bring evidence showing a reasonable probability that the oligopolists managed to raise prices above the competitive level. These steps would be sufficient for the implementation of the suggested oligopoly price freeze in the relevant markets. The agencies would not be required to prove any illegal conduct, agreement, or any type of collusion by the oligopolists. Additionally, I suggest

¹⁶⁷ If an entrant could activate the price freeze only upon actual production, then the rival firms would be able to lower their prices during the time in which the entrant builds its production capacity. If the incumbent prices would be frozen when the entrant starts building its production capability, then the price freeze would probably expire before actual manufacturing begins. See Elhauge, *supra* note 81, at 688, 809-12.

that the price freeze could also be implemented in markets that meet chapter B's criteria: markets in which there is a tendency toward price raising collusion, or markets in which such collusion was just recently uncovered. In such cases, the price freeze could be implemented without evidence indicating current high prices.

Once the suggested price freeze is implemented in a specific industry, I suggest that the firms should not be allowed to activate the price freeze for a few months. This way the firms would be able to set their prices at lower equilibria before actual deviations could occur. Consequently, prices would reach their new equilibria according to Part III of this Article, with minimal actual activations of price freezes.

In cases in which, after implementing the price freeze, the industry experiences significant changes which make it unsuitable for the implementation of the price freeze, the antitrust agencies will be authorized to suspend or annul the price freeze's implementation. This is yet another advantage of the suggested price freeze, as it does not have a permanent effect on markets and can be easily revoked.

In the following subchapters I will analyze the vitamins industry, in which the suggested price freeze could have been implemented according to the suggested legal framework.

1. The Vitamins Cartel

a. The Industry

In general, vitamins have a wide variety of uses as additives to human and animal diets and in skin and healthcare products. The various vitamins are not substitutes for one another.¹⁶⁸ There are various types of reactions for synthesizing vitamins depending on the manufacturers' raw materials, equipment, or technologies. The expertise required to master synthesis processes,

¹⁶⁸ European Commission decision of Nov. 21, 2001, 3 (Case COMP/E-1/37.512 – Vitamins) [hereinafter EC Decision].

comprised of multiple stages of reactions, may take decades for a manufacturer to acquire. Consequently, there are significant technological barriers to entry in many bulk vitamin industries.¹⁶⁹ The vitamin industry of the 1990s could be described as mature. In the mid 1990s, the average rate of volume growth worldwide for all vitamins was 2.4% per year, with no significant scientific or technological breakthroughs in those years.¹⁷⁰ Demand was highly inelastic, as only about five to six percent of the retail price of the end product was attributed to the cost of raw vitamins. The rest was attributed to the costs of advertising, packaging, assembling, and distribution.¹⁷¹

For the purposes of this subchapter I will focus on the industry and on the cartel of vitamins A and E during the 1990s.¹⁷² The leading producers of vitamin A were three European manufacturers: Hoffman-LaRoche ("Roche") with forty percent global market share, BASF with thirty-two percent global market share, and Rhone-Poulenc (now Aventis but I will continue to refer to it as Rhone-Poulenc because it took part in the cartel) with twenty-three percent global market share. Together the three firms held ninety-five percent of the global market, which had a concentration ratio of 3162 HHI.¹⁷³ The leading producers of vitamin E were Roche with forty percent global market share, BASF with twenty-four percent global market share, Rhone-Poulenc with twelve percent global market share, and Eisai, a Japanese manufacturer, with eleven percent global market share. Together the four firms held eighty-seven percent of the global market, which had a concentration ratio of 2458 HHI.¹⁷⁴

The vitamin global market was estimated as a \$3.7 billion industry per year in 1995, while the U.S. and Western-

¹⁶⁹ See CONNOR I, *supra* note 148, at 281-82.

¹⁷⁰ *Id.* at 283.

¹⁷¹ *Id.* at 294.

¹⁷² Over half of all vitamins sales during the operation of the cartel were of vitamins A and E. EC Decision, *supra* note 168, at 4.

¹⁷³ CONNOR I, *supra* note 148, at 291.

¹⁷⁴ *Id.*

European markets probably accounted for one quarter each. Vitamin E's global market was estimated as a \$1.087 billion industry per year in 1995 and Vitamin A's global market was estimated to be a \$574 million industry per year.¹⁷⁵ The growth of global market demand during the 1990s was stable for both vitamins and ranged around two to three percent per year.¹⁷⁶ Finally, consistent with cartel theory, the degree of buyer concentration was low. The buyers were thousands of feed manufacturers, food processors, and chemical wholesalers. The four major direct purchasers accounted for less than twenty percent of the global market.¹⁷⁷

b. The Cartel

The Vitamins Cartel is probably the most notorious global cartel, which involved a variety of vitamins.¹⁷⁸ Roche, BASF, and Rhone-Poulenc entered the cartel agreement regarding vitamins A and E in September 1989. Eisai joined the vitamin E cartel at around January 1991. The four producers continued their collusion until February 1999.¹⁷⁹ The firms fixed market shares, agreed on price increases, specified target prices, and monitored their sales allocation. Prices were usually raised in increments of five percent initiated by Roche. Occasionally, the firms discussed large individual customers separately, and agreed on prices and the quantity each firm would supply. In late 1997, it was publicly reported that the DOJ was investigating possible criminal violations of Section 1 of the Sherman Act in the vitamins industry. In the late 1990s, Rhone-Poulenc approached the DOJ to participate in its corporate leniency program at which stage it exposed and provided the details about its operations to avoid criminal antitrust sanctions.

¹⁷⁵ *Id.* at 293-95.

¹⁷⁶ Connor II, *supra* note 148, at 10.

¹⁷⁷ *Id.* at 9-10.

¹⁷⁸ Including biotin, folic acid, and vitamins A, E, B1, B2, B5, B6, and vitamin C.

¹⁷⁹ EC Decision, *supra* note 168, at 60.

It is estimated that the cartel raised the average price of vitamin A in the European Community from around €38.8 per kg. in 1990 to €54.5 in 1998, a forty percent increase. Vitamin E's average prices in the European Community rose from €18.6 per kg. in 1990 to €31.1 by 1998, an increase of over sixty-seven percent.¹⁸⁰ In the United States, pre-cartel vitamin A's prices were around \$30 per kg. By the end of the cartel's period of operation, list prices for liquid vitamin A had almost tripled, while dry vitamin A's price was sixty-two percent above the pre-conspiracy price. Vitamin A's average price in the United States during the cartel rose by sixty to seventy percent.¹⁸¹ Pre-cartel vitamin E's prices were around twenty-one to twenty-two dollars per kg. They rose by about eighty-eight percent by the end of the cartel period to around thirty-eight to thirty-nine dollars. The average vitamin E's price in the United States rose by fifty-five to sixty-five percent.¹⁸² After the cartel was uncovered, the firms (other than Rhone-Poulenc) agreed to pay multimillion-dollar fines to the DOJ. They also had to pay fines to Canadian and European Union competition authorities. The fines were substantially larger than those collected for previous cartels.¹⁸³

¹⁸⁰ *Id.* at 5.

¹⁸¹ CONNOR I, *supra* note 148, at 331.

¹⁸² *Id.*

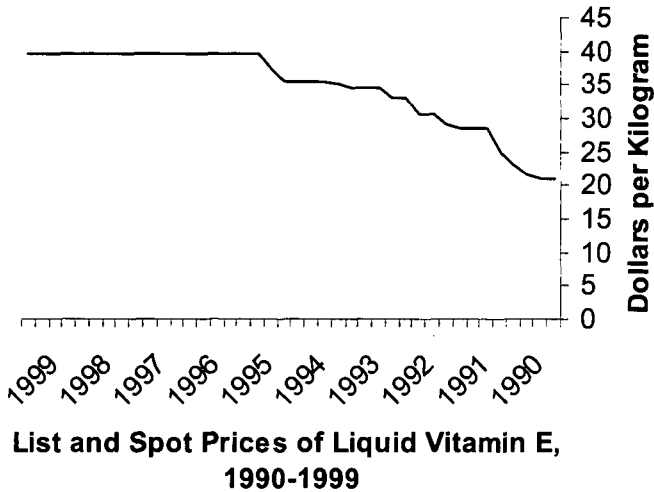
¹⁸³ The largest U.S. fines (for all vitamins cartels) were \$500 million for Roche, \$225 million for BASF, \$72 million for the Japanese company Takeda (which did not take part in the vitamins A and E cartels), and \$40 million for Eisai. Two Roche executives were sentenced to jail. The biggest Canadian fines were \$48 million (Canadian) for Roche, \$18 million for BASF, and \$14 million for Rhone-Poulenc. The major European fines were €462 million for Roche, €296.16 million for BASF, €37.06 million for Takeda, and €13.23 million for Eisai. Private antitrust settlements collected additional amounts from the cartel members. See EC Decision, *supra* note 168, at 74; Harry First, *The Vitamins Case: Cartel Prosecutions and the Coming of International Competition Law*, 68 ANTITRUST L. J. 711, 712-22 (2001).

c. The Implementation of the Price Freeze in the Vitamins Industry

The vitamin industry of the 1990s meets the criteria set forth in chapter B above. The market was concentrated on the selling side, there were barriers to entry, the product was homogeneous, the buying side was un-concentrated, and the demand was stable, as was the firms' cost structure. According to the suggested legal framework, the DOJ or the FTC could have approached the courts and asked for the implementation of the suggested price freeze on the firms who participated in the cartel (assuming that market conditions have not changed since the break-up of the cartel).

The suggested price freeze could have also been implemented at a much earlier date, well before the unlawful cartel agreement was uncovered. In future situations similar to the vitamins cartel, the price freeze could be implemented in the industry at the initial stages, when prices rise without any exogenous justifications for the increase. The graph below illustrates the implementation in such situations. The graph presents the price increases of vitamin E throughout the cartel period. It is noticeable that the price freeze could have already been implemented in the industry around 1992 after the significant increase in price. Such implementation could have prevented the further increase and perhaps could have even driven the price downward. It should be noted that the same is also applicable with regard to the vitamin A industry.¹⁸⁴

¹⁸⁴ For graphs illustrating the price increase for other vitamins see CONNOR I, *supra* note 148, at 321-30.



V. CONCLUSION

The problem of oligopolistic pricing has been a major antitrust challenge for decades and will probably continue to be one in the future. It appears that the various proposals to deal with this problem do not successfully meet the challenge. On the one hand, the proposals could have various degrees of efficiency potential in some oligopoly markets. On the other hand, however, the proposals could have damaging effects on other oligopolistic as well as competitive industries. Additionally, we should consider the heavy administrative costs associated with the proposals. Since the potential of enhancing efficiency does not appear to be greater than the potential of damaging effects and costs, the proposals have not been implemented.

The suggested oligopoly price freeze advocated by this Article does not offer a comprehensive solution to the oligopoly problem. It does not claim to be able to bring prices in every concentrated market the entire way down to the competitive level. What the suggested price freeze offers is the potential for lowering prices, possibly significantly, in

many concentrated markets, and it appears to operate best in markets that are the most susceptible to collusive behavior. I believe that the costs and potential inefficiencies associated with its implementation are not great and will not offset its contribution to consumers and the general welfare. It is not expected to affect competitive industries in which firms will not be able to significantly lower prices to activate the price freeze. The firms themselves will set prices rather than a governmental agency, and overall, administrative involvement will be relatively minor. Perhaps the most significant aspect of the suggested price freeze is that it is expected to perform as an "invisible" remedy. In most cases it will drive prices down *ex ante*, without any actual activations of the price freeze. Therefore, the potential problems and inefficiencies associated with its implementation should be considerably discounted. Additionally, in markets in which the suggested price freeze would not lower prices, it would not have any other negative effect or associated costs.

It is likely that there could be other reasonable ways for implementing an oligopoly price freeze. In this Article I have tried to present a workable scheme, but it by no means pretends to address all possible problems and inefficiencies of the system. I do hope and believe that this proposal could set the basis for future debate, analysis and improvements. I believe that the idea of implementing a price freeze in oligopoly markets has potential and that this Article could be an important step towards its actual materialization.