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PRICE ADJUSTMENT IN LONG-TERM CONTRACTS

VICTOR P. GOLDBERG*

Professor Goldberg provides a framework for analyzing price adjustment in private contracts, arguing that long-term contracts result from businesses seeking the benefits of cooperation, not avoiding risk as usually assumed. Professor Goldberg, an economist, examines incentives for price adjustments in long-term contracts and the variety of price adjustment methods available. He concludes by applying his framework to *Alcoa v. Essex*.

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I. INTRODUCTION

After parties enter into a contract, changed circumstance might result in one of them being dissatisfied with the price. Anticipating this, the parties could include a price adjustment mechanism in the agreement. If the mechanism is imperfect, some dissatisfaction will remain. This dissatisfaction may result in litigation with the dissatisfied party asking the court either to excuse performance or revise the contract

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price. For example, large changes in fuel prices since 1973 generated considerable litigation.¹

In this paper, I suggest a framework for analyzing price adjustment in private contracts. Contrary to most economists and lawyers, I argue that price adjustment problems have little to do with attitudes toward risk. Rather, the problems are those suggested by the "relational exchange" approach to contracts.² This argument will be developed in Part II.

A court faced with a claim of changed circumstance must deal with two questions. Is the change sufficient to justify relief, and, if so, what relief should be granted? The court could void the contract and discharge the obligation of the loser, revise the price term as German courts often do,³ or recognize a duty to renegotiate in good faith, as proposed by my colleague, Richard Speidel.⁴

Contracting parties sometimes invite the courts to rewrite explicit price terms by including open-ended language. Force majeure clauses, for example, are boiler plate terms which discharge performance under conditions that are not always clearly defined. More importantly, long-term contracts sometimes provide for price adjustment to prevent a

1. See *Iowa Elec. Light & Power Co. v. Atlas Corp.*, 603 F.2d 1301 (8th Cir. 1979); *In re Westinghouse Elec. Corp. Uranium Contracts Litigation*, No. 235 (E.D. Va. Oct. 27, 1978) (bench opinion); and *Missouri Public Service Co. v. Peabody Coal Co.*, 583 S.W.2d 721 (Mo. App.), cert. denied, 444 U.S. 865 (1979). For a discussion of litigation of natural gas contracts, see also *A Stunning Challenge to the Sanctity of Contracts*, BUS. WK., August 22, 1983, at 76-77.

2. See Goldberg, *Relational Exchange: Economics and Complex Contracts*, 23 AM. BEHAVIORAL SCIENTIST 337 (1980); Macneil, *Adjustment of Long-Term Economic Relations Under Classical, Neoclassical, and Relational Contract Law*, 72 NW. U.L. REV. 854 (1978); and Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J. LAW & ECON. 233 (1979).

3. See Dawson, *Judicial Revision of Frustrated Contracts: Germany*, 63 B.U.L. REV. 1039 (1983) [hereinafter cited as *Frustrated Contracts: Germany*]; Dawson, *Judicial Revision of Frustrated Contracts: The United States*, 64 B.U.L. REV. 1 (1984) [hereinafter cited as *Frustrated Contracts: United States*].

4.

Assume that after changes occur which upset the balance struck ex ante in a long-term contract, the disadvantaged party initiates negotiations and ultimately proposes an adjustment in the price term. What should the advantaged party do? Under . . . traditional contract law, he may refuse to negotiate or adjust without legal consequences. No duties are imposed upon the advantaged party in the ex post bargaining process. This result is, in my judgment, unsound. At a minimum, the advantaged party should have a legal duty to negotiate in good faith. At a maximum, he should have a legal duty to accept an 'equitable' adjustment proposed in good faith by the disadvantaged party. Breach of these duties constitutes improper conduct in the ex post bargaining setting and justifies appropriate judicial remedies, including a court-imposed price adjustment.

Speidel, *Court-Imposed Price Adjustments Under Long-Term Supply Contracts*, 76 NW. U.L. REV. 369, 404-05 (1981).

"gross inequity", the nature of which is left undefined.⁵ The decisions to discharge or adjust could be left to the courts or assigned to a party other than the courts, an arbitrator, for example.

Part III focuses on *Alcoa v. Essex*—the only example of an American court revising the contract price in a long-term supply contract.⁶ I am interested in what the parties were trying to accomplish, why the contract worked poorly, and the court's analysis of these issues. I am not particularly concerned with whether the decision was correct, but for what it is worth, in my opinion the court should not have revised the contract.

Part IV considers general problems confronting courts or arbitrators resolving price adjustment disputes. Concluding remarks follow in Part V.

II. THE ECONOMICS OF PRICE ADJUSTMENT

Economists commonly invoke risk aversion in analyzing contracts.⁷ It is an "easy" explanation and it is tempting to end the search

5. Some gross inequity clauses I have seen have included a definition of what constitutes a gross inequity (for example, a contract price more than $X\%$ away from a specified published price). However, others have been silent on this.

Gross inequity clauses are commonly used in long-term contracts. Of the 21 long-term coal contracts analyzed by Paul Joskow, 13 included gross inequity clauses. Joskow, *Vertical Integration and Long Term Contracts: The Case of Coal-Burning Electric Generating Plants* 1 J. OF L., ECON., & ORG. 33 (1985). The typical duration of Joskow's contracts was 35 years. For an example of a shorter coal contract (ten years) which included both an arbitration and gross inequity clause, see *Georgia Power Co. v. Cimarron Coal Corp.*, 526 F.2d 101 (6th Cir. 1975), cert. denied 425 U.S. 952 (1976).

6. *Aluminum Co. of America v. Essex Group, Inc.*, 499 F. Supp. 53 (W.D. Pa. 1980). "... the *Alcoa* opinion is a lonely monument on a bleak landscape, the only instance in which an American judge has tried to dictate entirely different substantive terms (in this instance the price) in a contract that was still being actively performed. This may explain why so much attention has been given to the frustrated venture of a single trial judge whose fancy was unusually free." *Frustrated Contracts: United States*, supra note 3, at 35.

Nanakuli Paving & Rock Co. v. Shell Oil Co., Inc., 664 F.2d 772 (9th Cir. 1981), is arguably another case in which the court revised the price term. However, in that case the revision was not explicit but was couched in terms of interpreting the meaning of the price term, given that during the life of the contract the parties had already modified the price in a manner apparently inconsistent with the contract language.

7. See A.M. POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 57-63 (1983); Harris & Raviv, *Some Results on Incentive Contracts with Applications to Education and Employment, Health Insurance, and Law Enforcement*, 68 AM. ECON. REV. 20 (1978); Polinsky, *Risk Sharing Through Breach of Contract Remedies*, 12 J. LEGAL STUD. 427 (1983); Perloff, *The Effects of Breaches of Forward Contracts Due to Unanticipated Price Changes*, 10 J. LEGAL STUD. 221 (1981); Posner & Rosenfield, *Impossibility and Related Doctrines in Contract Law: An Economic Analysis*, 6 J. LEGAL STUD. 83 (1977).

at that point.⁸ For example, in his analysis of the *Westinghouse* case, Paul Joskow asked: "Why would somebody buy a long-term fixed price contract other than to insure against fluctuations in the price of uranium?"⁹ There are, I suggest, a lot of reasons, but risk aversion provides a convenient excuse for not bothering to look.¹⁰

The recent paper by Jeffrey Perloff¹¹ provides a good example of how risk aversion can lead one astray. Perloff asks whether it might ever be desirable for a court to excuse a party from performing a contract because of a price increase between the date of contract formation and contract performance. He concludes that discharging the contract might increase social welfare in certain circumstances.

His analysis focuses on a contract for the future delivery of a fungible commodity. The seller (a farmer) is assumed to be risk averse, while the buyer is assumed to be risk neutral. The price at the delivery date is uncertain as is the quantity that the farmer will actually produce. (As is customary in economic modelling, the means of the distributions of price and output are presumed to be known.) Social welfare in this model depends only upon the variance of the seller's income since the expected income cannot be influenced by the variables under the seller's control. (Trust me.) The smaller the variance, the greater is the social welfare. Perloff demonstrates that it is possible that discharging a contract because the price change exceeds a certain level could reduce the variance in the seller's income, and therefore increase social welfare, if the market price and the level of output were negatively correlated.

The model is clever and, I think, elegant. But does it really have anything to do with the question? As Perloff notes,¹² analytically it does not matter whether the price limits are imposed by the parties in their initial contract or by the courts. But that leaves us with the obvious question: if the parties cared about the matter, why would they leave it to the courts to fill in the blank term? After a century or so of experience with courts not discharging such contracts, one would expect to see some evidence of a private response. It is hard to believe that this problem would be too costly for the private sector to handle (with standardized terms or mechanisms devised by trade associations), yet still be solvable by courts.

8. While it is an easy explanation it quickly leads the analyst into some hard mathematics. My objection stems in part from the large increased costs of incorporating risk aversion into the analysis given the miniscule benefits.

9. Joskow, *Commercial Impossibility, the Uranium Market and the Westinghouse Case*, 6 J. LEGAL STUDIES 119, 173 (1977).

10. In his recent study of long-term coal contracts, Joskow has focused on these other reasons. See Joskow, *supra* note 5.

11. See Perloff, *supra* note 7.

12. *Id.* at 228.

Moreover, Perloff focuses on forward contracts for homogeneous commodities in thick markets. If the seller breaches, the buyer simply buys elsewhere at the market price. These contracts are probably the least interesting as far as price adjustment is concerned. Even in Germany, where courts "seem to assume that the rewriting of frustrated contracts is so beneficial that hesitancy on their part is not needed,"¹³ courts will virtually never overturn a contract because of an increase in the market price of a standardized commodity.¹⁴

A. The Benefits of Price Adjustment

Business firms have ample incentives to include some form of price adjustment mechanism in their contracts even if both parties are risk neutral. Firms do not generally enter into multi-year contracts because of their concern for the future course of prices. Rather, they enter into the agreements to achieve the benefits of cooperation. Having entered into such an agreement, the parties have to make some decision regarding the course of prices during the life of the agreement. That is, price adjustment will probably be ancillary to the main purposes of the agreement.

Price adjustment can be difficult and costly. Why then bother? Why not simply establish a price or a schedule of prices for the duration of the agreement? I will suggest four reasons that might lead business firms to consider using some form of price adjustment. First, if the contract concerns a complex product that will be continuously redefined during the life of the contract, a price adjustment mechanism can price the "amendments" to the original agreement. Examples include cost-plus pricing of sophisticated defense hardware and complex construction projects.¹⁵ Second, to properly coordinate their behavior, the parties want correct price signals. If the price of an input were below the market price (and if the buyer could not resell at a price greater than the contract price) the buyer would have an incentive to use "too much" of the input. Since this should be anticipated at the formation stage, the costs of poor coordination are borne by both parties. This is a pure "moral hazard" problem akin to an insured person consuming too much health care because the post-insurance price is too low.¹⁶

13. See *Frustrated Contracts: United States*, *supra* note 3, at 23.

14. See *Frustrated Contracts: Germany*, *supra* note 3, at 1079.

15. For an elaboration on this point, see Goldberg, *Regulation and Administered Contracts*, 7 BELL J. OF ECON. 426 (1976).

16. See Pauly, *The Economics of Moral Hazard: Comment*, 58 AM. ECON. REV. 531 (1968).

Two other reasons are, analytically at least, more interesting: reduction of pre-contract search and post-agreement jockeying. In both these explanations, the success of price adjustment depends upon its ability to reduce the variance of outcomes. The reduced variance is not, however, valued directly. Rather, it enables the parties to curtail mutually harmful behavior, thereby increasing the value of the agreement to both parties.

A contract establishes gains to be divided between the parties; a fixed-price contract determines the distribution of these gains. The parties could attempt to increase their share of the gains before signing the contract by improving their information on the future course of costs and prices. The more they each spend on this search, the smaller the pie. *Ceteris paribus*, the larger the variance of the outcomes, the more resources would be devoted to this effort. The parties, therefore, have an incentive to incorporate into the initial agreement a device that would discourage this wasteful searching. Price adjustment mechanisms can do precisely that by reducing the value of the special information. This argument applies even for standardized commodities sold in thick markets.

If after the firms enter into a long-term agreement the contract price fails to track changing market conditions, the loser will be reluctant to continue performance. It could breach and suffer the legal and reputational consequences, but other, less severe, alternatives to willing compliance exist. A buyer could, for example, insist upon strict compliance with quality standards. The aggrieved party could read the contract literally—"working to the rules" as in labor disputes or in centrally planned economies. This is a variation on the pure moral hazard story. The incorrect price induces the aggrieved party to expend resources in attempting to renegotiate the terms of the agreement. The costs can arise directly from the effort to renegotiate or indirectly through strategic bargaining. That is, the loser might threaten to engage in acts which impose costs upon the other party but do not constitute a legal breach. These costs are a result of the failure to coordinate behavior in the face of changed circumstances. These costs would be unimportant if the parties had easy access to market alternatives; *ceteris paribus*, the more isolated from alternatives the contracting parties are, the more significant are the potential losses from poor coordination.¹⁷ Again, to the extent that the parties can anticipate these problems at the formation stage, the value of the exchange is reduced. If the probability of wasteful behavior increases as the divergence between contract price

17. See Goetz & Scott, *The Mitigation Principle: Toward a General Theory of Contractual Obligation*, 69 VA. L. REV. 967 (1983).

and the opportunity cost of the aggrieved party widens, price-adjustment rules which narrow the gap become increasingly attractive.

B. The Mechanics of Price Adjustment

The easiest way to adjust the price is to index. But what should the parties be indexing? The overall price level? Input costs? Market price? Ideally the parties would index the market price. The payoff from indexing, after all, is from the reduction in the divergence between the contract price and the market price. However, practical exigencies usually lead parties to index other prices as proxies. Indeed, in a long-term contract there often is no unique external market price. The implications of this fact will become clearer in the discussion of *Alcoa v. Essex* below.

Cost changes will be a reasonably good proxy for changes in the market price if demand does not fluctuate too much or if industry supply is very elastic. However, changes in input prices are not necessarily the same as changes in input costs. If the relative prices of inputs change, the firm has an incentive to alter factor proportions to take advantage of the new price relationships. Also, if factor productivity changes, the connection between input prices and costs deteriorates. Nevertheless, indexing to input prices is common.¹⁸

While indexing would be the easiest price adjustment mechanism to implement, it has the obvious disadvantage of tracking changing conditions imperfectly. The poorer the correlation between the index and what it is supposed to be tracking, the less attractive it will be. Another relatively simple mechanical rule is permitting one party to solicit outside offers with the other party having the right of first refusal. This allows better tracking of that party's opportunity cost, but it discourages making relation-specific investments. That is, the direct costs of price adjustment would be low, but the indirect costs of discouraging entering into a long-term relationship in the first place might be quite high. Cost-plus pricing tracks cost changes more closely, but is more subject to manipulation; it also gives the seller poorer incentives to control costs, and requires that the parties devote more resources to monitoring performance.

Negotiation is, of course, always an option. Even if the contract explicitly utilizes one of the methods mentioned in the previous paragraph or unambiguously states that the contract is a fixed price agree-

18. See Goldberg & Erickson, *The Economics of Long-Term Contracts: A Case Study of Petroleum Coke* (1984), (unpublished manuscript). One component of the contract price was indexed to input prices in *Alcoa*.

ment, one party could propose that the price be renegotiated. The contract price, the clarity of the legal rule, and the costs of invoking the legal rule provide the background against which the renegotiation might take place.

Renegotiation allows use of accurate, current information in revising the contract; but reopening the contract could result in cost-generating strategic behavior, especially if one of the parties is vulnerable to the threat of nonrenewal. Renegotiation is not a zero-sum affair with one side's gains offset by the other's loss. In exchange for an increased price, for example, a seller could offer a contract extension and the prospect of not working to the letter of the contract. (A threat, after all, is just a promise with the sign reversed.)

The contract could explicitly establish the conditions under which renegotiation is to take place. It could require renegotiation at fixed intervals or have it triggered by specific events (for example, a rise in a price index of more than 20%). Gross inequity clauses call for renegotiation if the contract price is too far out of line, but typically do not spell out the criteria for determining when a gross inequity exists. The parties could agree to renegotiate in good faith and determine what would happen if the negotiations break down. The failure to negotiate a new price could result in continued performance at the current price, termination, mediation or arbitration, and so forth.

There are, in sum, a lot of mechanisms available for adjusting price within a long-term contract. All are imperfect. Their relative costs and benefits will determine which, if any, the parties should choose.¹⁹

III. ALCOA V. ESSEX

A. The Facts

In 1967, Alcoa and Essex entered into a twenty year agreement in which Alcoa agreed to convert Essex's alumina into molten aluminum at Alcoa's Warrick, Indiana plant.²⁰ Essex purchased its alumina from an Alcoa subsidiary under a second long-term contract. The trial judge insisted that the two contracts were separate and that by design Alcoa's left hand did not know what the right hand was doing.²¹ After conversion the molten aluminum would be loaded into crucibles owned by Essex and taken by truck to Essex's nearby fabricating plant built specifically to receive it. The contract was for 50 million pounds per year

19. For examples of different price adjustment mechanisms and the determinants of their relative efficacy see Goldberg & Erickson, *supra* note 18.

20. The facts in this section of the article are synthesized from the decision and the briefs.

21. I confess to being suspicious.

and included options for three additional blocks of 25 million pounds each. (By 1973, the parties had deleted the last two blocks.) Hence, the contract quantity at the time the litigation arose was 75 million pounds per year.

The initial contract price was 15 cents per pound, composed of a "demand charge" of five cents per pound,²² and a "production charge". The latter included a fixed component of four cents per pound (which was the "profit" on the plant constructed to fulfill this contract) and three cents each for non-labor (primarily fuel) and labor costs. The former was indexed by the Industrial Component of the Wholesale Price Index and the latter by Alcoa's average hourly labor cost at the Warrick plant. The contract included a ceiling price of 65% of the price of a specified type of aluminum as reported in a trade journal; however, it did not specify a minimum price.

The demand charge was to be paid regardless of whether Essex took any aluminum. In effect, Essex "rented" a portion of Alcoa's Warrick plant at a fixed rate of \$7.09 million per year (\$4.09 million for the demand charge and \$3 million for the fixed charge) and paid a service fee of six cents per pound that was indexed.

Problems arose following the large increase in fuel prices in 1973. In the ensuing years the market price of aluminum and the cost of producing it in Warrick increased far more rapidly than did the contract price. By 1979, Essex received aluminum from Alcoa under the contract at 36 cents per pound and resold some of it in the open market at 73 cents. Non-labor production costs rose from 5.8 cents to 22.7 cents in 1973-78, while the wholesale price index less than doubled. Alcoa attempted to renegotiate the price as early as 1975. In 1978, the dispute went to trial.

The trial court ruled in Alcoa's favor. Indexing non-labor production costs to the Wholesale Price Index was deemed a "mutual mistake" because it tracked those costs so badly. The court also accepted Alcoa's alternative theories of impracticability and frustration. The court reformed the contract, since rescission would result in a windfall for Alcoa and deprive Essex of the benefits of its long-term supply contract. The court rewrote the price term of the contract to include a minimum price assuring Alcoa a one cent per pound "profit".

The disputed contract represented only a small part of the business of Alcoa and Essex. Alcoa's sales and total assets in 1979 were each

22. Actually, this price was to be adjusted to cover increased construction costs at the Warrick plant when new blocks of aluminum capacity were ordered. The price of the first block (50 million pounds) was 5.27 cents per pound and the price for the second block was 5.82 cents per pound. These prices would remain constant for the life of the contract.

almost \$5 billion.²³ By the time of trial, Essex had been acquired by United Technologies, another multi-billion dollar firm. Despite its losses on this contract, Alcoa's overall profits in 1979 were around \$500 million; its rate of return on equity in 1978 exceeded 14 percent for the first time in 22 years.²⁴ This is not, clearly, a case in which a bad contract jeopardized the survival of a firm, as in *Westinghouse*. Rather, it is more instructive to view this contract as a poor performer in the firm's much larger portfolio of contracts, a portfolio which was performing very well overall.

B. The \$75 Million Misunderstanding

The court placed considerable emphasis on the fact that projected losses from 1977 to 1987 were in the range of \$75 million. This is one of those funny numbers that means nothing, but could end up as a fundamental part of the *Alcoa* doctrine, were one to emerge. Alcoa was excused because they stood to lose \$75 million; we won't excuse *X* because it cannot prove that it will lose such a large amount. (As I will note below, the *Alcoa* judge distinguished another case on precisely this ground.) It is, therefore, useful to look at how the court determined the magnitude of the loss.

The "profits" are the revenue minus the actual production costs minus the demand charge (the 5 + cents per pound). The court assumed something (the decision does not make it quite clear what) about future costs and prices for the remaining life of the contract and then added them up. There are three obvious problems with this. First, the future profits are undiscounted. A dollar lost in 1984 is just as important as a dollar lost in 1979. Second, the estimates are based on guesses about the future course of prices; there is nothing wrong with guesses, but time has a way of transforming guesses into facts.²⁵ But these are quibbles. The most important point is that the estimate, even if done right, is irrelevant.

What does Alcoa lose if it must fulfill the contract? It loses the chance to sell the aluminum to someone else. That is the true measure of the loss, and in this case it is considerably greater than the figure cited by the judge. In the year the suit was brought the loss was over thirty cents per pound, over \$20 million. The original cost of construction of the plant is a red herring equivalent to "par value" for a stock, a vestige of the past with no economic content.

23. *The Fortune Directory*, FORTUNE, May 5, 1980, pp. 274, 276.

24. *Aluminum's Bosses Are Beaming*, FORBES, Nov. 27, 1978, at 40.

25. In fact, aluminum prices fell sharply in the early 1980's. That price decline undoubtedly facilitated settlement of the dispute.

The error is important. In an earlier case,²⁶ the court refused to allow Gulf Oil to escape its obligation to deliver jet fuel under a five-year contract despite the fact that the price index utilized had inadequately tracked the course of oil prices. The court held that the cost data presented were insufficient to ascertain how much it cost Gulf to produce a gallon of jet fuel, and, therefore, Gulf had failed to prove that it had suffered losses on the contract. The *Alcoa* judge applied the "negative accounting profit" test in distinguishing this decision from *Alcoa*.

When faced with a claim of changed circumstances, courts or arbitrators should not look to accounting cost data to determine the merits of the claim. The relevant question is whether the difference between the contract price and the aggrieved party's next best option is large enough to warrant relief. An accounting cost or profit standard is an invitation to produce a lot of information with a low expected value.

C. *Alcoa's Mistake*

In retrospect, of course, Alcoa made a big mistake. However, the mistake singled out by the court to justify reformation of the contract was not the most important one. The failure of the price index to accurately measure the change in fuel prices accounted for only about ten to twelve cents of the difference between the contract price and the market price for aluminum in 1979 (that difference being over 30 cents).²⁷ The main problem was that the contract did not track changing demand conditions and the demand for aluminum was soaring in the late 1970's.²⁸

Moreover, the contract was not designed to adjust to large changes in the overall price level. Sixty percent of the initial contract price (the demand charge plus the fixed "profit") was unadjusted for the life of the contract. A very simple example gives an indication of the type of problem this could cause. Suppose that the price level rises about 7% per year (doubling roughly every ten years); assume that the factors of production remain equally productive and that they continue to be used in the same proportions.²⁹ The indexed production costs would then rise from six cents per pound to 24 cents per pound in the twentieth year. However, the remaining costs are unindexed, so the final contract price

26. *Eastern Air Lines v. Gulf Oil Corp.*, 415 F. Supp. 429 (S.D. Fla. 1975).

27. Since some of the data were confidential, it is necessary to use rough approximations. For my purposes that causes no difficulties.

28. See *Aluminum Wastes No Time Raising Prices*, BUS. WK., Oct. 15, 1979, at 36; *Shortage In Aluminum*, BUS. WK., Sept. 25, 1978, at 115, 117-18; *Aluminum's Bosses Are Beaming*, FORBES, Nov. 27, 1978, at 40; *Aluminum Makers Exult*, TIME, April 3, 1978, at 55.

29. The assumption of unchanged productivity is a strong one since it implies that real wages cannot grow.

would rise only to $(24 + 9 =)$ 33 cents. To keep the real price of aluminum constant the contract price would have had to increase to 60 cents.

The relevant question is not whether Alcoa made what turned out to be a bad decision. They did. But was it a bad decision at the time they made it? The answer to that is less certain. When I began this project it seemed clear that Alcoa could have, and should have, done better. At a minimum, I thought, they should have indexed the remaining 60% of the costs. However, a more careful look leads me to believe that it is a much closer question.³⁰

This long-term contract is in many respects similar to a lease or sale of part of Alcoa's Warrick production capacity to Essex. A fixed rental for long-term leases is not uncommon. Moreover, if one firm sells a durable asset to another, it is the rule rather than the exception, that the price is not to be readjusted after the sale has taken place. It can be argued, then, by analogy, that this component of the long-term contract that looks so much like a lease should also be at a fixed price.

If the contract price of a long-lived asset were to be readjusted to better track the market price, the parties would expend less resources today in pursuit of special information. If this benefit were great, we would expect the parties to incorporate price adjustment arrangements in their sales and leases of assets. However, the benefits will often be very small. Information regarding the future price level, for example, is already incorporated in the term structure of interest rates. It is not necessarily *accurate* information, *ex post*; however, the key question is whether it is *improvable* information, *ex ante*. Incorporating a general price index, therefore, need not result in reduced information costs.

The lease/sale analogy, however, has difficulties. A pure lease or sale is similar to a contract for a standardized commodity because further coordination between the two parties is unnecessary; the only issue is whether price adjustment reduces the initial price search. However, the more the outcomes depend upon future coordination by the parties, the less likely they will use a fixed price contract.³¹ For example, shopping center leases in which the lessor engages in activities which generate business for the tenants will base at least part of the compensation on a percentage of the gross (which automatically provides for some

30. The question of whether Alcoa had made a mistake is unrelated to the court's finding of mutual mistake. I am only trying to determine whether the price adjustment mechanism in this contract was a reasonable one under the circumstances.

31. This discussion is highly speculative since I am only dimly aware of the adjustment mechanisms actually used in long-term leases. I should note that a common device is to use short-term agreements with fixed prices so that the price can be renegotiated on a regular basis. Such arrangements might also include an expectation, legal or otherwise, of renewal on reasonable terms.

price adjustment). If Alcoa were leasing the plant to Essex and allowing Essex to operate it, the fixed price arrangement would be routine. The fact that operation of the plant was in Alcoa's hands reduced the likelihood that a fixed price would be successful. The increased divergence between the contract price and Alcoa's best alternative would induce Alcoa to engage in strategic behavior, thereby reducing the value of the contract to both parties.

However, it is unlikely that indexing capital costs would result in a more accurate contract price. I would speculate that the pre-1973 experience would confirm that indexing this cost component to the general price level, construction costs, or any other conceivable cost-based measure would have resulted in a poorer fit between the market and contract price.³²

Instead of using a cost-based price adjustment, the parties could have attempted to track market conditions by, for example, indexing to a particular aluminum price.³³ Using output prices to index is not without problems. First, other goods with published prices that are sufficiently close to the output that we are attempting to index might not exist. Second, the observable external prices are typically list prices, not transaction prices. If these diverge, the index suffers. It is plausible that the two would diverge in a concentrated industry like aluminum since list prices typically change more slowly in such industries.³⁴ Further, if the contract price were linked to the list price of a type of Alcoa's aluminum, then Alcoa would have an incentive, however modest, to set the list price in excess of the transaction price.

Even if list prices were accurate measures of transaction prices, a more fundamental difficulty remains. The parties do not necessarily confront the same external price. That is, the relevant price to each

32. Note that this is a different argument than the one accepted by the court. It emphasized how closely the wholesale price index had tracked one component of costs in the pre-contract period. I am claiming that there did not exist an index that would have closely tracked another, and larger, component of costs.

33. Note that in the previous paragraph I treated the capital cost as a historical cost. Alternatively, we could adjust to reflect the value of the fixed plant as it changes during the life of the structure. Thus, the cost of using the plant to fill this contract must include the opportunity cost of using the plant for other purposes (namely supplying aluminum to someone else). If the capital had a wide variety of other uses (for example, retail space or small vans), such an adjustment might be sensible. If, however, the capital was highly idiosyncratic, as in this case, its value would closely track changing market conditions. If these could be indexed accurately it would almost surely be unproductive to index the market value of capital either instead of or in addition to the market price of the output.

34. For example, in 1979 *Business Week* reported list prices for ingot of 66 cents per pound while the spot price was 75 cents. This is a bit misleading, however, because of the existence of price controls at the time. *Aluminum Wastes No Time Raising Prices*, *Bus. Wk.*, Oct. 15, 1979, at 36.

party is its opportunity cost—the net price it could get from the next best trading partner. In a market for a standardized commodity, the list price and these two opportunity costs would be roughly the same. However, in a long-term contract in which the parties deliberately isolate themselves from the external market, these three prices are more likely to diverge. Generally, the more isolated the contracting parties are from market alternatives, the poorer the relationship between these three prices is likely to be. Thus, while the parties might desire to index their agreement to a published market price, the very nature of a long-term contract makes it likely that the index price would not perform its function adequately. It is, therefore, not at all obvious that indexing the contract to changes in the published price of a particular type of output would be in the interest of the two parties.

In the instant case, Alcoa's opportunity cost is the net price it could receive by using the Warrick capacity to produce ingot for export to other customers. Essex's opportunity cost is the price of delivered aluminum ingot. There is no *a priori* reason to believe that these will be close to each other. However, for an index to work it is not necessary that the prices be close, only that they move together over time. Whether these two opportunity costs (and the market price for aluminum ingot) move together over time is an empirical question which I intend to explore in a later paper.

Essex chose to incorporate the output price information in the form of a maximum price. Alcoa, however, was not willing to pay (by agreeing to a lower initial contract price) for a price minimum. The failure to do so might well have been a mistake *ex ante*, but it is at least plausible that a ceiling indexed to published prices would be more valuable to Essex than a similarly indexed floor would have been to Alcoa. Alcoa's superior knowledge of the aluminum industry might make Essex suspicious of the manner in which costs were indexed. A bias in favor of Alcoa, because of Alcoa's superior knowledge, would make a bound on the index relatively more valuable to Essex.

Conceivably, therefore, Alcoa's failure to index plant costs or include a minimum price was not an error *ex ante*. Looking at the new contract may provide some insight on this issue. We know that the parties rejected the judicially imposed minimum price based on *ex ante* accounting costs.³⁵ But we do not know whether that was a reason for rejection and we do not know what replaced it. I would speculate that the new contract includes a minimum and that the minimum depends upon output prices. If so, that would suggest that Alcoa had erred initially.

35. See *Frustrated Contracts: United States*, *supra* note 3.

IV. RESOLUTION OF PRICE ADJUSTMENT DISPUTES

Suppose that contracting parties assign the task of resolving price adjustment disputes to an outsider (a court or an arbitrator). The outsider can be asked to resolve two very different questions: (a) have conditions changed sufficiently to justify relief; and (b) what form should relief take—what will the new price (or price formula) be? Since the parties bear the costs of producing the evidence, they must reckon the expected costs of producing evidence on production costs, accounting profits, market prices, opportunity costs, and so forth, and weigh these against the expected benefits (in terms of reducing the costs arising from the divergence of contract price from market price). These evidentiary costs provide the backdrop for subsequent renegotiation. Thus, for example, if a standard required that one party spend a lot to produce evidence to forestall price revision, its opposite party could use those potential costs as a bargaining chip in renegotiation.

For determining whether relief is justified, accounting cost data of the sort relied upon by the Alcoa judge are largely beside the point. The relevant question is whether the difference between the contract price and the aggrieved party's next best option is large enough to warrant relief. The requisite price differential would vary across contracts. There is no "magic number": if price goes up by at least $X\%$ or losses total at least $\$Y$, adjust the price. A large divergence between the market and contract price for a standardized commodity, for example, would have little adverse effect on the expected value of a contract; it would, therefore, be unlikely that the parties would benefit from revision. Conversely, if a modest price divergence would generate considerable joint costs, revision could be effective. The problem is complicated by the fact that making relief easy to obtain generates additional joint costs as well. Rational parties might easily find that the potential benefits from price revision come at too high a cost.

This is especially true if there is no obvious standard for determining a new contract price. My initial presumption was that if a reasonable measure of the output price were available, the parties would want the arbitrator to use this to guide his decision. Further consideration has led me to conclude that this might not be very helpful. A simple example illustrates the problem. Suppose that when the contract was written Alcoa would have received 10 cents a pound for its aluminum on the open market, Essex would have paid 20 cents per pound, and the contract price was fifteen cents. When the case is litigated, Alcoa could sell at 50 cents and Essex buy at 70, and the contract price is 35 cents. What should the contract price be? Even if this information were costlessly produced and absolutely accurate, are the parties better off putting the decision in the hands of an arbitrator? What decision rule

would they want him to apply? When the opportunity costs of the buyer and seller diverge, it is not at all clear what should guide the arbitrator in setting a new price. Thus, the possible divergence not only impairs the value of a published price as an index, but makes it more difficult for the parties to rely upon outsiders (arbitrators and judges) to revise the price.

V. CONCLUDING REMARKS

The foregoing provides a framework for analyzing price adjustment in long-term contracts. The analysis downplays risk aversion and instead emphasizes controlling the joint costs arising from the divergence of contract price from the opportunity costs of the parties.

If a unique, easily observable market price existed, the adjustment problem would not be difficult. However, the conditions that make entering into a long-term contract desirable in the first instance make it unlikely that such prices exist. This is obviously true for such things as complex defense hardware and construction of state-of-the-art chemical plants. But it is even a problem in a relatively simple case like *Alcoa v. Essex* where the contract calls for a product (molten aluminum) that appears closely related to an easily observable market price. The problem is that by entering into the long-term contract at least one of the parties deliberately isolated itself from the external market. The relationship between the external price and the opportunity costs of the parties need not be very close.

This argument is, I confess, *ex post* rationalization. I had originally thought that it was definitely in Alcoa's interest to index the contract to a published aluminum ingot price or at least to include an indexed floor. It had not occurred to me that the opportunity cost and market prices should diverge and that this divergence would have an adverse effect on the value of an index based on output price. The empirical question, which I hope to shed some light upon in a subsequent paper, is the extent of the divergence.

I have deliberately avoided the questions of whether the court was right to revise this contract or, more generally, under what conditions (if any) courts should excuse or reform contracts because of one party's dissatisfaction with the price. I have done so for three reasons. First, any conclusion would be premature—there has been very little analysis of why and how business firms deal with price adjustment problems. Second, I believe that we will make more progress in understanding the economics of contracts if we do not insist upon drawing policy conclusions; in any event, the principle of division of labor suggests that I leave this task to the lawyers. Third, providing an indication of the rela-

tive importance of various factors is more important than putting forth a conclusion embodying an implicit weighting.

For example, in contracts for future delivery of commodities traded in thick markets, parties can rarely impose costs upon each other and the ex ante demand for price adjustment will be low. The parties probably would not choose to include price adjustment mechanisms in their contract; nor would they permit the disadvantaged party to call upon the courts for relief. The more isolated the exchange is from the market, the more likely it is that the parties would find price adjustment efficacious. However, the reasons that make adjustment desirable make it hard to achieve. The case for intervention, if the contract does not explicitly provide for it, is stronger when the costs of a price dispute are high and the costs of settlement would be reduced by giving the disadvantaged party the right to call upon the court to revise the contract, despite the contract's silence. It might well turn out that this is a null set. But even so, the intellectual apparatus will be applicable in cases in which the parties explicitly provide for price revision by outsiders.