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Predation Analysis and the FTC's Case against Intel

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Abstract

The Federal Trade Commission's pending antitrust case against Intel challenges a number of Intel's discounting and rebating practices. The Commission appears poised to apply a cost-price test to the challenged practices, but proposes to include "fixed sunk costs" in the appropriate measure of cost. This paper explains the importance of using cost-price screens to assess unilaterally imposed prices and analyzes the futility of including sunk costs in the relevant cost measure.

PREDATION ANALYSIS AND THE FTC'S CASE AGAINST INTEL

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In a previous paper, I argued that it was a mistake for the FTC to assert that its antitrust case against Intel did not need to comply with established antitrust rules.[1] In this paper, I analyze the major charge that the Commission levels against Intel—its use of various forms of various discount structures and loyalty rebates—from a conventional antitrust perspective.

From the face of the FTC's complaint, it is unlikely that the case will withstand scrutiny in the courts. While appearing to accept that, in at least some contexts, it may have to prove that Intel's loyalty rebates resulted in predatory pricing, Complaint Counsel argue that the measure of cost used in their predatory pricing analysis must include a share of Intel's fixed sunk costs on every CPU or GPU it sells. Such an effort to force a manufacturer to cover a share of sunk costs on every unit sold has been widely rejected by the courts, and for good reason. Consumers' interests would be seriously harmed by a rule requiring producers to price based on an arbitrary sunk costs allocation formula rather than upon the changing demands of the marketplace.

In the first section of this paper, I discuss the importance of using a cost-price test to decide the legality of all forms of unilateral discounting or rebating by dominant firms. Without such analysis, it is impossible to determine whether the supposedly thwarted competitors fell victim to the dominant firm's misconduct or to their own inefficiency.

In the second section, I show why courts have used an incremental or marginal cost test for predation claims rather than requiring the defendant to cover fixed

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* This paper was funded by the Intel Corporation. The views expressed herein are solely my own and not those of Intel Corporation or the University of Michigan.

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[1] *In re Intel Corp.*, Docket No. 9341 (FTC).

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costs, as the Complaint Counsel now suggest. One of the key intuitions behind this approach is that it would be suicidal for a firm to follow a self-imposed rule of recouping a pro rata share of sunk costs on every unit it sells. Sunk costs are often incurred in research and development or production functions that serve many different products or potential products at once, and allocating these costs among various product lines in a "pro rata" way is simply not something that businesses can or should do. Further, businesses make real-world pricing decisions based on their competitive position in the marketplace and the costs of producing further units, not based on their bygone costs.

I. WHY COURTS REQUIRE PRICE-COST ANALYSIS FOR LOYALTY DISCOUNTS AND REBATES

A. The Case Law

The core of the FTC's complaint is that Intel used a variety of discounting or rebating schemes—such as volume discounts, market share discounts, "extra money" inducements, and loyalty discounts—to foreclose competitors from competing. (Complaint ¶¶ 6, 7, 51) Although the Complaint presents these allegations in different forms and contexts, the common core is a claim that Intel lowered its prices so far and in such a manner that competitors could not match them.

Since price-cutting lies at the very heart of competition and almost always benefits consumers, the Supreme Court has prohibited predatory pricing claims from proceeding without a rigorous showing of anticompetitive exclusion. It has noted that prohibiting aggressive pricing could chill beneficial price competition and that "low prices benefit consumers regardless of how they are set, and as long as they are above

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predatory levels, they do not threaten competition."[2] The Supreme Court has repeatedly held that predatory pricing allegations require a showing that the defendant priced "below an appropriate measure of cost."[3] This latter criterion requires a comparison of the defendant's revenues and "appropriate" costs to determine whether the prices offered were below cost.

Over the last few decades, plaintiffs have shown remarkable creativity in trying to skirt the requirement of showing below-cost pricing (the "cost-revenue" test) by characterizing the allegedly anticompetitive conduct as something other than ordinary predatory pricing. They have argued, for example, that predatory pricing rules should not apply when the challenged discount spans multiple products or can only be obtained when the customer shows some form of "loyalty" to the defendant.

The courts have not been fooled. On every occasion when it has been presented with such an effort to skirt the cost-revenue test in a case challenging a unilaterally set price, the Supreme Court has demurred. The Court has explained on several occasions that it adheres to the cost-revenue test "regardless of the type of antitrust claim involved."[4] In other words, plaintiffs cannot skirt the cost-revenue test by adding bells and whistles to their antitrust claim, by claiming that the conduct at issue is not traditional predation, or by recharacterizing it as something other than a price discount. Thus, the Court has insisted on a showing of below-cost pricing for price

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[2] *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 222-23 (1993) (citation omitted).

[3] *Brooke Group*, 509 U.S. at 222-23; *Atlantic Richfield Co. v. USA Petroleum Co.*, 495 U.S. 328, 341 n.10 (1990); *Cargill, Inc. v. Monfort of Colorado, Inc.*, 479 U.S. 104, 117-118 (1986); *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 585 (1986).

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[4] *Brooke Group*, 509 U.S. at 223 (quoting *Atlantic Richfield*, 495 U.S. at 340).

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discrimination,[5] a competitor's resale price maintenance,[6] predatory overbidding,[7] and, most recently, price squeezing.[8] With a few controversial exceptions, the federal appellate courts have continued this consistent application of the cost-revenue rule, applying it to such pricing schemes as market share discounts,[9] loyalty rebates,[10] and bundled discounts.[11] Any challenge to a defendant's unilaterally set prices that does not show pricing below cost is bound for dismissal in the courts.

B. The Intuition

The price-revenue test is not a mere formality; it rests on a strong conviction about the rule of antitrust law in policing dominant firm behavior. Courts and antitrust authorities hold that, in order to be unlawfully exclusionary, a practice must be capable of excluding equally efficient rivals.[12] The courts have uniformly rejected the possibility that antitrust law should be "used [] to require businesses to price their products at unreasonably high prices (which penalize the consumer) so that less efficient

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[5] *Brooke Group*, 509 U.S. at 222-223.

[6] *Atlantic Richfield*, 495 U.S. at 341.

[7] *Weyerhaeuser Co. v. Ross-Simmons Hardware Lumber Co.*, 549 U.S. 312 (2007).

[8] *Pac. Bell Tel. Co. v. linkLine Communcs., Inc.*, 129 S. Ct. (2009).

[9] *Concord Boat Corp. v. Brunswick Corp.*, 207 F.3d 1039 (2000).

[10] *Virgin Atl. Airways Ltd. v. British Airways PLC*, 257 F.3d 256 (2d Cir. 2001).

[11] *Cascade Health Solutions v. PeaceHealth*, 515 F.3d 883 (9th Cir. 2008)

[12] *See, e.g.*, *Cascade Health Solutions*, 515 F.3d at 909; *Barry Wright Corp. v. ITT Grinnell Corp.*, 724 F.2d , 223 (1st Cir. 1983) (Breyer, J.); *MCI Communcs. Corp. v. AT&T*, 708 F.2d 1081, 1113 (7th Cir. 1983); III PHILIP AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 749b2 at 335-36 (Supp. 2006).

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competitors can stay in business."[13] Hence, in separating aggressive, but legitimate pricing strategies from exclusionary ones, courts typically ask whether the defendant's pricing strategy would force an equally efficient competitor to price below cost in order to compete. If the answer is no, then the pricing strategy can have no exclusionary effect.

Although the intuition behind this principle is straight-forward, its application in practice sometimes can be complicated. This is particularly true in the world of complex pricing strategies, involving multiple products or contingent contractual commitments. These complexities have provided fodder to plaintiffs' efforts to escape cost-revenue tests, as previously described. But complexities of application are a reason to contextualize and refine cost-revenue tests, not to jettison them altogether.[14] Once a court or antitrust enforcement agency succumbs to the temptation to abandon price-revenue comparisons because of the complexities of the defendant's pricing scheme, antitrust cases quickly lose both rigor and objectivity. Pricing schemes may be condemned because they resulted in harm to some individual competitor merely because the competitor was inefficient or unwilling to compete aggressively. The complexity of a pricing scheme is a reason to articulate the relevant cost-revenue test with precision, not to abandon it altogether.

Suppose, for example, that the defendant produces three products—widgets, gidgets, and fidgets. None of the defendant's competitors makes all three products. One makes widgets and gidgets and another makes fidgets. Now suppose that

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[13] *Hansen v. Shell Oil Co.*, 541 F.2d 1352, 1358-59 (9th Cir. 1976); *see also Arthur S. Langenderfer, Inc. v. S.E. Johnson Co.*, 729 F.2d 1050, 1058 (6th Cir. 1984) (same); *MCI*, 708 F.2d at 1125; *Buffalo Courier-Express, Inc. v. Buffalo Evening News, Inc.*, 601 F.2d 48, 58 (2d Cir. 1979).

[14] *See* Herbert Hovenkamp & Erik Hovenkamp, *Complex Bundled Discounts and Antitrust Policy*, 57 Buff. L. Rev. 1227 (2009).

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the defendant offers customers a 5% discount if they will purchase their requirements in all three categories from the defendant. Is such a discount structure exclusionary? The competitor that makes just widgets and gidgets may complain that it cannot match the discount since it is unable to make up the discounts that customers would forgo on fidgets, and the competitor that makes just fidgets would complain that it cannot match the discount on widgets and gidgets. One might believe that such a circumstance requires jettisoning the cost-revenue test, since the defendant and its competitors are differently situated with respect to their product portfolios and competitive discounting options. But it is impossible to know whether the bundled discount scheme excludes the two competitors unless it can be determined that meeting the defendant's bundled 5% offer would require the competitors to price below their cost.

The alternative to cost-revenue tests is to condemn discounting schemes whenever they harm competitors. But grounding an antitrust policy on the effects of a practice on competitors would create the very coddling of inefficient rivals that the courts have uniformly rejected. The mere fact that the defendant's discounting structure happened to coincide with the demise of one or more competitors tells us very little about whether the discounts were exclusionary, just as the mere fact that a marathoner wins a race tells us very little about whether he used steroids. The rivals could have failed because they had a lousy business, because they were not as efficient as the defendant, or because a meteor happened to fall on their factory. Given the fact presented above, the competitors could fully match the defendant's discounts simply by each dropping their prices by 5%, so the defendant's discount scheme could not have been exclusionary.

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Application of a cost-revenue test would show this; merely asking whether the conduct was abstractly "exclusionary" would not.

The *Intel* Complaint suggests that the Commission may try to prove its case using cost-revenue tests. It would be a significant mistake for the Commission to abandon cost-revenue tests for unilateral pricing schemes. Cost-revenue tests—properly adjusted to fit the circumstances of each case—are indispensable to rigorous and objective antitrust adjudication. The alternative is a world in which firms are condemned for lowering their prices to consumers simply because competitors cannot keep up. And that is a world that the courts have sensibly rejected.

II. WHY COURTS DISREGARD SUNK COSTS

The FTC's complaint charges Intel with pricing below cost in both the CPU and GPU markets (Cplt. ¶¶ 24, 52, 88). While there is nothing legally novel about a predatory pricing allegation, there is something both novel and disturbing about the Commission's assumption about the meaning of "cost." The Complaint makes clear that the Commission considers cost to include "average variable cost plus an appropriate level of contribution toward sunk costs." (Cplt. ¶ 53). Even more disturbingly, the Complaint seeks injunctive relief requiring Intel to price all of its microprocessors at a price that includes an allocation of "fixed sunk costs:" "Pricing will be presumed to be below cost even if it exceeds Intel's average variable cost but does not contribute to its fixed sunk costs in an appropriate multiple of that average variable cost." (Cplt., Notice of Contemplated Relief, ¶ 6). This effort to include sunk costs in the "appropriate measure of cost" required by the Supreme Court is novel, unlawful, and profoundly erroneous.

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A. Courts Hold that Costs for Purposes of Predatory Pricing Analysis Are those that Vary with Changes in the Level of Output

In the previous section, I noted that that the Supreme Court requires predatory pricing plaintiffs to show that the defendant's price fell below "an appropriate measure of cost."[15] The Court has not yet directly announced what the appropriate measure of cost is since that issue has not yet been presented to the Court. Still, this does not mean that plaintiffs, lower courts, or agencies are free to define the measure of cost as they see fit.

Before explaining this further, it is necessary to take a brief diversion into economic jargon about costs. Ask an accountant, an economist, a chief financial officer, a financial analyst, a consumer, a lawyer, or a politician how much something "costs" to produce, and you will get a wide variety of answers. Even among the economics profession, there has been a cottage industry of academic articles trying to explain the proper meaning of "cost" in a predatory pricing context. Fortunately, these complexities and controversies do not have to detain us as to *Intel*, because the Complaint makes clear that Complaint Counsel can only succeed in their predation claims by including in "cost" certain components—"fixed sunk costs"—that none of the relevant legal or economic tests include.

To simplify greatly, let us break down the world of costs into three buckets. The first category, sunk costs, consists of those that have already been expended by the time the firm is making pricing decisions and can never be "unspent." An example of this is research and development costs for a new generation of microprocessor. In order to create the first microprocessor off the assembly line, it is

[15] *Brooke Group*, 509 U.S. at 222-23.

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necessary to incur all of the R&D expenses for all of the microprocessors that will be created. Once the R&D dollars are spent, they can never be recovered (except, in a colloquial sense, by selling products that embody the new technologies). A rational product manager should not consider sunk costs in making future pricing decisions, any more than a rational driver should decide to feed his expiring parking meter based on how many quarters he previously fed the meter. Bygones are bygones.

The second cost bucket consists of recurring fixed costs. These are costs that are not sunk (because they must be periodically incurred) but also do not vary with how many microprocessors the firm produces. An example here might be the cost of repairing the factory, which does not (usually) depend on how many microprocessors are being produced but is necessary to producing any microprocessors at all. The company could shut down the factory altogether and hence avoid paying these costs.

The final bucket consists of incremental, variable, or marginal costs—costs that vary directly with the number of microprocessors created. Labor costs, raw materials costs, distribution costs, electricity usage in factories, and similar costs usually fall into this category.

Which of these costs counts as "appropriate" for predatory pricing cases? Although the Supreme Court did not directly decide the question in *Brooke Group*, a fair reading of the case is that only "incremental cost" should be included.[16] Indeed, most post-*Brooke Group* courts have held that *Brooke Group* rules out any effort to define cost

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[16] *Id.* at 223.

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in a way that does not approximate incremental cost.[17] This definition of cost likely excludes most recurring fixed costs and certainly excludes all sunk costs from predatory pricing cases.

To the extent that debates persist in the lower courts about the appropriate measure of cost, they generally center on the time horizon over which "incrementality" or "avoidability" should be measured. The most widely accepted test in the lower courts—the "average variable cost" test associated with a seminal article by Harvard law professors Phil Areeda and Donald Turner—focuses on costs that vary with short-run changes in output.[18] A competing test—the long-run incremental cost test—would capture a greater number of costs, including certain costs that appear fixed from the short-run perspective.[19] But the critical fact is that neither of these tests would capture costs that have already been sunk. As the U.S. Court of Appeals for the Seventh Circuit explained in a seminal decision generally considered to lie at the outer bounds of the allowable definition of cost: "The historical costs associated with the plant already in place are essentially irrelevant to the decision since those costs are 'sunk' and unavoidable and are unaffected by the new production decision."[20]

In light of the existing case law, the FTC's decision to make explicit its

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[17] *Cascade Health Solutions v. PeaceHealth*, 515 F.3d 883, 909 (9th Cir. 2008); *U.S. v. AMR Corp.*, 335 F.3d 1109, 1117 (10th Cir. 2003); *Stearns Airport Equip. Co. v. FMC Corp.*, 170 F.3d 518, 532 (5th Cir. 1999).

[18] Phillip Areeda & Donald F. Turner, *Predatory Pricing and Related Practices Under Section 2 of the Sherman Act*, 88 Harv. L. Rev. 697, 701 (1975).

[19] Even the Seventh Circuit, which in earlier cases followed the long run incremental cost test, has more recently suggested that average variable cost is the appropriate measure. *Schor v. Abbott Labs.*, 457 F.3d 608, 611 (7th Cir. 2006).

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[20] *MCI*, 708 F.2d at 1117.

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view that sunk costs should (and, presumably, must if Complaint Counsel are to prevail) count toward liability is extraordinary. The only way that the Commission could win such an argument is by persuading the reviewing courts to abandon Sherman Act principles and allow the Commission prophylactic space under Section 5 of the FTC Act. Under conventional antitrust principles, the effort (apparently necessary to the Commission's case) to include sunk costs in the appropriate measure of costs is doomed to failure.

B. Requiring Future Recoupment of Sunk Costs on Every Sale Would Further Compound the Error of Including Sunk Costs in the Liability Determination

As just discussed, it is reversible error for a court or antitrust agency to include sunk costs in the appropriate measure of cost for purposes of determining predatory pricing liability. But the Commission proposes to go far beyond determining that Intel violated the law by pricing below cost (including sunk cost) in the past. Complaint Counsel propose to enjoin Intel from selling any microprocessor at a price that does not include some undefined "contribution" toward sunk costs. As troubling as it is to include sunk costs in the relevant liability determination, it is significantly more troubling for an agency to mandate that the defendant include a sunk-cost component in every product it sells in the future. To my knowledge, an injunction requiring the defendant to include a sunk cost contribution in every future sale is unprecedented in the history of antitrust.

The *Intel* complaint's symmetry between theories of liability and contemplated relief seems to rest on an assumption that whatever conduct gives rise to liability can be enjoined in the future. But courts often refuse to constrain certain categories of future behavior prospectively even though they might punish past instances

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of the same conduct. Perhaps the most familiar example is First Amendment law, where courts refuse to issue prior restraints of defamatory speech, even though they may subsequently award damages for the same words.[21] Many policy concerns animate this distinction, including the possibility that an overly restrictive injunction may improperly restrain beneficial speech and that potential speech that looks menacing might, when spoken, turn out to be socially benign. Further, a finding that the defendant has already defamed the plaintiff does not justify prior restraints of future speech.[22] Speech simply is not susceptible to injunctive restraint.

Similar concerns apply to regulatory efforts to limit a firm's future pricing discretion. Just as free speech is the central nervous system of democracy, pricing is the "central nervous system of the economy."[23] Regulatory mandates that force a firm to raise its prices prospectively in order to accommodate competitors are serious threats to the competitive order. The suppression of free pricing—particularly by an industry leader like Intel—will curtail and distort the pricing movements that are vital to the dynamism of the microprocessor market. The sunk-cost recoupment mandate the Commission seeks to impose would straight-jacket Intel's future pricing discretion, lock-in prices over time, and lead to a general increase in prices industry-wide. There is no way to impose such a future mandate without impairing the interests of consumers and stymieing innovation.

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[21] *CBS, Inc. v. Davis*, 510 U.S. 1315, 1317-18 (1994).

[22] *Near v. Minnesota*, 283 U.S. 697, 713 (1931).

[23] *National Soc. of Prof. Engineers v. U.S.*, 435 U.S. 679, 692 (1978).

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C. Requiring Sunk Cost Recoupment on Every Sale Would Harm Consumers and Stymie Innovation

Suppose Intel is required to cover a pro rata share of sunk R&D costs on every sale of a CPU. There is no satisfactory way to construct a legal rule as to how R&D costs should be allocated. There are two basic problems: (1) how to attribute joint and common research and development costs to a particular product; and (2) how to allocate sunk costs to a particular unit sold given difficulties of prediction and changing market circumstances.

1. Problems of Allocating Joint and Common Costs

Many sunk research and development costs in the microprocessor industry—as in many other high-technology industries—are not directly attributable to any individual product line. The technologies created by these efforts are employed in a wide variety of products. Further, technologies may be deployed in different products at different times and for different lengths of time. Any legal or regulatory effort to dictate a means for the allocation and recoupment of these sunk costs will run into serious difficulty.[24]

Suppose, for example, that Intel spends $10 million to create a new technology that it subsequently embeds in a variety of different products, including server, workstation, desktop, and laptop microprocessors. How would the sunk cost recoupment mandate allocate such costs across the different products?

One could simply divvy up the entire $10 million over the expected number of sales of all products in which the technology was embedded and assign each product a flat pro rata share of the total cost. So if the expected sales of all products

[24] *See MCI Communcs. Corp. v. AT&T*, 708 F.2d 1081, 1116 (7th Cir. 1983).

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embodying the technology was 10 million, each sale would have to include $1 to contribute toward recouping the sunk investment. But that solution is obviously unsatisfactory. A technology may be much more valuable in one application than in another. Requiring all applications to absorb an equal share of a joint and common cost means that some applications will end up not using the technology at all, since it is not sufficiently valuable in that application to warrant the necessary increase in price. And that means that the price of all other applications using the technology must be increased even more, since they must help to defray a greater share of the joint and common costs. The upshot is that some applications will be arbitrarily restricted from employing beneficial technologies and other applications will employ the technologies but cost more than they need to.

Alternatively, one might insist that each product absorb a pro rata share of the $10 million pool, with relative revenue used as the pro ration mechanism. So, if a server CPU cost three times as much as a desktop CPU, the server would absorb three times as much of the sunk development costs as the desktop. That would not solve the previously identified problem, since total product cost is a very poor proxy for the intensity of the product's use of a technological subcomponent. Moreover, this approach would not solve a more fundamental problem with regulatory approaches to the allocation of joint and common costs—that efficient allocation of joint and common costs rests on the relative demand elasticities of the different products rather than on any preconceived notion about what percentage of joint and common costs each product should absorb.

Suppose that a firm incurs research and development costs for a

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technology that it embeds in two products. Product A is highly competitive with other products and Product B is quite differentiated from its closest substitutes. Since the firm faces relatively elastic demand for Product A and relatively inelastic demand for Product B, it will naturally allocate most of the joint and common costs to Product B. This not only maximizes the firm's profits, but also is good for consumers. If the firm was required by a legal mandate to allocate more R&D costs to Product A and fewer to Product B, it would sell fewer units of Product A but would not sell more units of Product B. Overall output would decrease.

This problem has long bedeviled rate regulators in public utility industries, and they have developed complex formulas for determining how to allocate joint and common costs across products in order to maximize efficiency. While such approaches may be viable in rate-regulated monopoly industries, they are useless as mechanisms for trying to stimulate competition. Paradoxically, any scheme that tried to match efficiency criteria by requiring an allocation of costs based on demand elasticity would allow the regulated firm to defray the smallest amount of sunk costs (or none at all) when it faced the most competition (and, hence, the greatest demand elasticity). This would defeat the entire purpose of Complaint Counsels' ostensible effort to require sunk cost recoupment, since it would allow the regulated firm to respond to competitive pressure by allocating its joint and common sunk costs only to non-competitive products.

To recap, any method of allocating joint and common costs based on arbitrary pro ration mechanisms results in some goods being shut out from using the technology and goods that do use the technology being overpriced. Conversely, any effort to allocate joint and common costs as rate regulators typically do would not

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respond to the problem Compliant Counsel believes needs to be addressed.

2. Problems of Prediction and Market Dynamics

How would the Commission decide on the amount of sunk costs to require Intel to include in every sale? To put it formally, sunk costs are "recouped" through product sales when enough sales occur that the increment of revenue over marginal costs and recurrent fixed costs equals sunk costs on a time-value-adjusted basis. In order to make this equation work prospectively and therefore allocate the "proper" amount of sunk costs to each sale, one has to know how many products will be sold. As they say in France, "bonne chance."

Sales are a constantly moving target. So perhaps the sunk recoupment mandate would require Intel to readjust its price as its sales volume changed in the marketplace. For example, suppose that the sunk costs at the end of the development period were $100 and some Commission-appointed monitor expected Intel to sell 100 units. In order to recover the sunk investment, Intel would need to price each unit at the marginal and recurrent fixed production costs plus $1. But now suppose that six months into the CPU's expected lifecycle a competitor brought an attractive new product to market. Say that Intel had already recouped $20 of its investment on 20 units sold, but now expected to sell only 60 more units over the CPU's lifecycle (instead of the balance of 80 units originally expected) because of the changed competitive dynamics. Under a sunk costs recoupment mandate, Intel would have to increase its per unit price by 33 cents, which would theoretically allow it to recoup the needed $80 on the remaining 60 units sold.

But increasing price in response to enhanced competition is the exactly

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wrong response from a business perspective. Business should cut price, not raise it, as their market share declines due to enhanced competition. Indeed, by increasing price Intel would actually sell fewer units than 60 since customers would be willing to purchase fewer units at the higher prices. Hence, Intel would have to increase price even more than 33 cents to recoup the $80. But this would simply make Intel a dog chasing its tail—forever compelled to raise its price in the face of falling sales in a futile effort to recover sunk costs. Such a mandate will quickly drive a firm to the place it can no longer make any sales at all, with the comical endgame being a moment when the firm grimly offers its last customer a price that includes the entire remaining sunk development cost. "Mrs. Jones, we appreciate that you've always been a great customer and we'd love to sell you another laptop, but the price has to be $500 million".

In order to avoid the absurdity of a sunk cost recoupment mandate that varies with market share changes over time, the Commission might instead lock in the per-unit recoupment rate based on a single-time expectation about future sales volume. So, for example, the Commission (or its delegate) might determine at the end of a $100 development period that the expected sales of the new CPU amount to 100 and hence that Intel must include a $1 sunk costs development fee on all units sold. Now suppose that Intel sells more CPUs than it had expected (perhaps because the market expands or its competitors' products are a flop) and ends up covering all its sunk costs before the termination of the CPU's lifecycle. It would be unable to lower its price to consumers on the additional sales because of the mandate to continue arbitrarily including sunk costs in its CPU prices. In that event, the recoupment mandate would act as an arbitrary pricing floor to keep prices high. Consumers would suffer artificially high prices.

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One could revise the rule to say that Intel would be permitted to disregard sunk costs once it covered them on a particular generation of CPUs. Thus, for example, once Intel recovered its $100, it could start pricing at marginal cost. But such an approach continues to suffer from the insoluble problem with any legal mandate to recover sunk costs: No reasonable company approaches the recoupment of its sunk costs by setting an inflexible minimum price that it insist upon until sunk costs are recovered. If the company's managers miscalculate consumer sentiment or other market forces and set the initial price too high, they may never recover sunk costs.

To take a recent example, during the fourth quarter of 2008—in the heat of the financial crisis—microprocessor sales and average selling prices declined precipitously. Any company that was straight jacketed in an inflexible sunk-cost recoupment mandate that prevented them from adjusting their prices would face a terrible disadvantage in the market. Flexible price adaptation in response to changing market circumstances is key to business success.

A sunk cost recoupment mandate would be particularly pernicious in a highly innovative industry like the microprocessor market. Innovation is a high-risk, high-reward enterprise. How would one set the sunk cost recoupment mandate for a product like Apple's new iPad which could turn out to be a huge success or a huge failure? It is impossible to set any recoupment mandate without estimating total eventual sales. But total eventual sales estimates for novel innovations are necessarily guesswork. As of the writing of this paper, projections for iPad sales for the year 2010 alone—much less for the entire life of the iPad—vary widely. In order to set a sunk cost recoupment mandate for the iPad, the relevant regulator would have to make a total sales assumption

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that, with the later benefit of hindsight, would likely look either substantially too high or substantially too low.

One implication of this last observation is that a sunk cost recoupment mandate would dull incentives to innovate. Innovation creates uncertainty as to market acceptance and uncertainty as to market acceptance increases the arbitrariness of the per-unit sunk cost mandate. Firms subject to a sunk cost recoupment mandate are therefore less likely to innovate and more likely to fall back on established products. The upshot of such an approach would be that Intel would likely pursue a more conservative technological development strategy. Like a rate-regulated public utility distributing a commodity, it would have diminished incentives to make risky investments in innovation. The sunk cost recoupment mandate could have seriously deleterious effects on the pace of innovation in the entire microprocessor industry.

CONCLUSION

The Commission's inclusion of sunk costs in the appropriate measure of costs is contrary to law. The contemplated scheme of reverse rate-regulate—a requirement to *raise* prices to consumers—is contrary to common sense. It is time for the Commission to take a step back and consider the damage to the microprocessor industry, consumers, and ultimately to the Commission itself of pursuing such a path.

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