

CASE 13

Intel and Blocking Practices (2010)

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INTRODUCTION

In the 1990s and 2000s, the Intel Corp. was the largest semiconductor chip-maker in the world. It produced chips, boards, and other semiconductor components—the building blocks that are integral to the computers, servers, and other modern computing and communication products.

In 2009 and 2010, the Federal Trade Commission (FTC) and the European Commission (EC) brought and resolved antitrust claims against Intel.¹ These had been preceded by a private case that was filed by Intel's rival, AMD, that was settled in 2009 and followed by a case brought by the New York Attorney General (NYAG) that was subsequently settled. The cases alleged that Intel had abused market power and illegally maintained monopoly status—specifically, that Intel had used its market power in the market for a specific line (“x86”) of microprocessors to engage in a set of practices that had the effect of blocking rivals (in particular, AMD) from engaging in entry and effective competition in that and related markets (for instance, for graphical processing units that were supplied by potential rivals such as Nvidia).² Often these practices involved contractual and informal arrangements with original equipment manufacturers (OEMs), such as

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¹ The FTC case was distinct from an earlier case that was brought against Intel over technology licensing issues (Shapiro 2004).

² In addition to AMD the case had an impact on Via (a European microprocessor manufacturer) and also did recount issues that were associated with Transmeta (an American microprocessor manufacturer). However, it was competition with AMD in particular that was the focus of both the EU and FTC.

Dell and Hewlett-Packard (HP), which used Intel processors in their own computing products.³

The Intel case is of interest due to the diverse range of practices that were employed by Intel and that were covered under various settlements, judgments, and remedies in jurisdictions in Europe and the United States. Those practices included the use of conditional rebates (sometimes referred to as “contracts that reference competitors” (Scott Morton 2012), naked or exclusionary restrictions (Baker 2012), and choices regarding the interoperability and compatibility of components. Collectively, these will be described in this chapter as *blocking practices*. The case against Intel is best understood as various legal and regulatory authorities’ considering together the set of blocking practices that Intel engaged in rather than focusing on Intel’s behavior practice by practice.

This chapter will first argue that the set of practices that are employed by Intel can be considered within a broad economic framework as it relates to “blocking practices” that, when employed, make it more difficult for a rival or rivals to compete effectively. Some of these practices will then be described in relation to the Intel case and to the findings, in particular, by the FTC and the EC. Finally, the chapter will describe how various authorities sought to curb the set of blocking practices through both penalties (in the case of the EC) and behavioral restrictions (most extensively employed by the FTC).

THE BROAD ECONOMIC FRAMEWORK

As noted above, the activities of Intel constituted a set of practices that spanned a wide literature on anticompetitive practices in economics. For that reason, it is useful to consider a framework that identifies their common attributes, effect, and purpose. This will provide a means of analyzing whether the prohibition of the practice by a firm would lead to an increase in competition.^{4,5}

To consider a unified approach to Intel’s action, a *blocking practice* is defined as an action that is taken by the firm that has the intention of blocking

³ The OEMs were not always willing participants in the investigations that occurred. This partly reflects their ongoing relationship with Intel and also the fact that the larger OEMs benefited in the short-term from the arrangements with Intel. Moreover, in the case of Dell, the nature of those arrangements and how they were accounted for had other legal consequences (e.g., 2010 litigation brought by the Securities and Exchange Commission).

⁴ This approach can be contrasted with an analysis as to whether the coordinated prohibition of the practice by all firms would improve competition. That may well be the case, but the mode of analysis here will be firm-by-firm rather than industry-wide.

⁵ While the application of this framework can be construed as being implicit in the analysis, in particular, by the European Commission, to this author’s knowledge it has not been employed with the terminology that is used here.

the ability of a rival to compete.⁶ An example of such a practice is an exclusive arrangement with one or more buyers in a market. If such an arrangement is in place, the firm's rivals cannot make offers to buyers on an equivalent basis to those made by the firm itself and have a reasonable prospect of having those offers accepted. For example, if the firm and its rivals sold equivalent products and buyers chose their suppliers on the basis of the lowest price, the existence of an exclusive arrangement would mean that rivals could not supply the buyer even if their prices were below that of the firm.

A key distinction of whether a practice is designed to block a rival from being able to compete versus whether a practice is designed simply to compete with a rival is whether the rival itself is able to engage in the same practice profitably. Consider the example of deep discounting; that is, setting prices temporarily well below expected and sustainable market equilibrium prices. One rationale as to why a firm might engage in deep discounting would be to secure buyers in the hope that a rival will exit the market. In this case, the practice (deep discounting) leads to a substantial change in competition. However, our assessment of this practice changes if, should the firm under consideration refrain from deep discounting, its rival starts or continues to engage in deep discounting, say due to economies of scale in the market over the entire range of conceivable demand or strong network effects. In this case, whether the firm engages in deep discounting or not, the future state of competition is the same: The market is monopolized or dominated by a single firm.

Thus, the analysis of whether a practice is a blocking one or not requires a "with and without" comparison. Comparing the factual (with the firm engaging in the practice) to the counter-factual (where it refrains), we ask "Is the practice likely to lead to a reduction in competition relative to the counter-factual?" If, in addition to affirmative answers to this question, it is also established that the firm has an incentive to engage in the practice (e.g., because any short-run profit sacrifice is likely to be outweighed by the additional profits that the firm receives from a reduction in competition), then it is likely that prohibiting the firm from engaging in the practice will improve competition in the market.

To put this in more concrete terms, suppose that there exists a practice, x , that, if undertaken, may cause a firm a "cost" or "profit sacrifice" of $C(x)$. That is, if the firm's profits each period would otherwise be π , if it undertook the activity it would earn $\pi - C(x)$. Suppose also that x gives rise to a probability $P(x)$ that a rival will *disengage in an activity* that negatively affected the firm's profits but boosted consumer welfare; say, when the rival disengaged, it would boost the firm's profit by m . A key feature is that $P(x)$ is the probability of a rival's disengaging in an activity (conditional on x) and not simply the probability that the firm can boost its profits by m .

⁶ The notion of a blocking practice is similar to the concept of "raising rival's costs" (Salop and Scheffman 1983). The difference is that it approaches issues more broadly than does the notion of rivals' having higher costs and other ways in which rivals might be blocked from competing.

Suppose that $P(x)$ is increasing in x . In this case, prohibiting the practice would enhance competition if $P(x)m > C(x)$.

An important piece of evidence as to whether a practice is blocking or not is whether $C(x) > 0$; that is, the practice involves some (even small) cost for the firm in terms of profits that are forgone should it not engage in the practice. If there is such a cost, we can infer that the practice had a purpose of causing a rival to disengage in a competitive activity rather than being profitable regardless of the actions of a competitor. For example, the firm might engage in research and development (R&D) to develop a superior product. That might cause a rival to disengage in similar R&D efforts. But if it was the case that the firm would find it profitable to engage in the R&D regardless (because the boost to profits—regardless of what a rival was doing—would outweigh the costs), then $C(x) = 0$, and the substantive purpose of the practice could not be said to be to block the rival's competitive activity. To take another example: exclusive arrangements. If such an arrangement requires the firm to give discounts to buyers in return for exclusivity, that discount indicates that the firm is paying for the consequent reduction in the ability of rivals to compete in the market. Instead, if such an arrangement involved buyers who themselves paid a premium for exclusivity in order, for example, to ensure the firm's dedication to the buyer, it would not be considered a blocking practice.

Economic theory will often be informative about the relationship between m and $C(x)$ in various situations and perhaps about the magnitudes of these variables. For example, $C(x)$ might represent the discount paid (as a lump sum) to a buyer for an exclusive contract. This contract would directly prevent rivals from competing for the buyer, and so $P(x) = 1$. However, this is not sufficient to classify the contract as anticompetitive. First, the buyer may recognize its own future harm from any lack of competition among suppliers. If m represented a future price premium from a monopoly position, the buyer would not accept $C(x) < m$ for that contract. However, with $C(x) > m$, it is not worthwhile for the firm to engage in the practice.

Second, it may be that m represents more than a premium that is paid by the buyer that is considering signing the exclusive arrangement (e.g., because locking in one buyer is enough to cause the rival to exit the industry). In this case, it may be that $C(x) < m$ is acceptable to the buyer. However, if the firm did not offer an exclusive contract, a rival might choose to do so, especially if the rival could earn a similar or higher increment to profit than m . In this case, if the firm were prohibited from engaging in the practice, in the counter-factual, competition in the market would still be reduced. Thus, we could not simply conclude that the firm's practice leads to a reduction in competition.⁷

⁷This highlights the need for a careful consideration of what drives the costs of the practice (and how these might relate to the firm's returns) as well as whether there are reasons to believe that there might be asymmetries between the firms as to the competitive consequences of engaging in the practice. This might be because only one firm has an incentive to engage in the practice or that the impact of the practice materially differs among the firms.

If a firm is found to have engaged in a blocking practice, that practice will likely affect competition negatively in several ways: First, if the practice causes a rival to exit or reduces the incentives of rivals to enter a market, the practice could be said to raise barriers to entry. Similarly, if the practice reduces rival incentives to expand production or introduce new product lines, the blocking practice would present a barrier to expansion in a market. Finally, if the practice reduced rival returns to innovation, the practice is likely to cause reduced levels of innovation in the market.⁸ All of these paths generate immediate and ongoing impacts on consumers who face higher prices and lower product quality relative to a situation where the firm did not engage in the blocking practice.

Using this framework, we can now analyze specific practices, including exclusionary arrangements and other activities that restrict rival demand or productivity. These practices were a key part of the EC and, in particular, the FTC case against Intel.

Analyzing Exclusionary Arrangements

An exclusionary arrangement is an agreement that is made up of the following characteristics:

- A buyer agrees not to purchase from a rival of the selling firm in a specific market or to restrict rival sales in a specific market;
- The selling firm pays the buyer a lump sum, which is unrelated to units purchased, in return for that agreement;
- Should the buyer violate the arrangement or refuse to continue the arrangement, it is understood that either (a) the lump sum is reduced or eliminated and/or unit purchase prices rise or (b) the selling firm may offer the arrangement to one of the buyer's rivals.

The exclusionary arrangement here involves the selling firm's paying a buyer for restrictions on rival sales with an additional threat should the arrangement not be undertaken. That threat could involve strong price competition in the market (*contingent agreements*); or, alternatively, it could involve switching the arrangement to a rival (*divide and conquer*). There are some differences between the two mechanisms; but, in each case, the outcome is the same: the reduction of the ability of the rival supplier to compete in the market, resulting in higher downstream prices and/or reduced product options that are available to consumers downstream. In each case, the exclusionary arrangement can lead to high prices in the market.

When buyers sign a contingent agreement, they accept a lump-sum payment as compensation for bearing a higher wholesale price for

⁸This is at the core of the analysis by Segal and Whinston (2007).

components.⁹ Large discounts that are rebated by a monopolist only if the customer agrees to an exclusive or nearly exclusive contract (in contrast with an incremental discount) can have a significant exclusionary effect. These payments arose in the Intel matter with some OEMs' being paid large rebates in return for exclusivity. A smaller rival upstream firm, such as AMD, could not easily attract buyers away in the face of those restrictions. For example, if demand for a product is 100 units and the monopolist's discount is 10 percent on all units, but nothing if the buyer purchases even one unit from a competitor, a competing entrant or seller that attempts to sell 10 percent of the customer's needs would have to give the product away for free to make the customer whole—and would have to pay the customer to take less than 10 units. This would block competition.

On the other hand, if the monopolist's discount is incremental, by definition there is no penalty for a buyer's purchasing some product from a rival. In that case, the buyer will lose an incremental discount on only the products that it fails to purchase from the monopolist, and a new competitor can price below a monopolist's price and succeed in making a sale. The monopolist would then be incentivized to lower its prices further as well to match the competitor's price, which could easily have a discount that is far below the all-or-nothing discount by a monopolist. This additional incentive to lower price would be more likely in a product market with a high marginal profit, such as computer chips. Thus, with all-or-nothing discounts by a monopolist in a high-margin product market in which the customer must continue to buy a large percentage of its goods from the monopolist, average prices will likely be higher, and the barrier to entry will be higher as well.

By contrast, the *divide and conquer strategy* involves a dominant upstream firm offering a subset of buyers an exclusionary arrangement whereby it is understood that, should they refuse the arrangement, it would be offered to another buyer.¹⁰ In calculating whether to accept the exclusionary arrangement, a buyer will look to the conditions of that arrangement relative to the conditions where one of its rivals inherited that arrangement. In an imperfectly competitive downstream market, that difference in profits drives buyers to accept restrictions on rival sales even if they understand that this might limit future upstream competition.

Note that the threats that support the ability of a supplier to convince buyers to enter into exclusionary arrangements are made credible if the supplier has market power—specifically, if the supplier has an asymmetric ability to limit a rival's market sales. This may arise if, for example, final consumers had a preference to purchase Intel-based computers over others. To see this, suppose that the firm's success, should buyers agree to

⁹ DeGraba (2009); Abito and Wright (2008).

¹⁰ Rasmusen, Ramseyer, and Wiley (1991); Segal and Whinston (2000); Gans and King (2002); Wright (2008).

exclusivity by it, would lead to the rival's either exiting the market or gaining a very restricted market share; whereas the rival, should it bid successfully for some exclusive arrangement, would not have a similar detrimental effect on the initial firm. In this case, the firm would be willing to pay the difference between its monopolistic profits (should an exclusivity arrangement be reached) and competitive profits (in its absence) for exclusivity. In contrast, its rival would only be willing to pay the difference between its competitive profits and marginalized profits for the same exclusive arrangement. As the sum of monopolistic and marginalized profits outweigh the sum of profits under competition, it is easy to see that the firm will always have a greater ability to bid for exclusivity. Put simply, the original firm is the only one that can pay for a monopolistic position, and that is more valuable than a competitive one.

Consequently, evidence that the firm that is engaging in exclusionary arrangements also possesses significant market power relative to its rivals would support the notion that it had an asymmetric ability to undertake the practice and, hence, that it is likely to be blocking.

In summary, exclusionary arrangements can constitute a blocking practice as: (a) they induce buyers to restrict sales to a rival firm; and (b) they are enforced by a combination of rewards and punishments to buyers. The potential benefits of exclusionary arrangements to the seller are that they can reduce future competition between itself and a rival (for example, by reducing the incentives of rivals to develop and introduce superior substitute products) and/or they directly allow higher downstream and wholesale prices to be sustained in the market. There may also be, in some situations, efficiency benefits from those arrangements. As will be discussed below, the EC applied this approach to find that Intel had engaged in anti-competitive exclusionary conduct through its dealings with OEMs.

Analyzing Activities That Restrict Rival Demand or Productivity

Exclusionary arrangements are a direct means by which a firm can restrict the demand of rivals. There are others, including obfuscation, hindering interoperability, and the restrictive control of proprietary standards. These actions were part of the allegations against Intel. They have a similar pricing impact and reduction in consumer choice as do exclusionary arrangements. Here I consider the other competitive impacts that may arise when blocking practices are employed by a firm with market power.

Interoperability and standards are important in the Intel matter as microprocessors are a component in the manufacturer and operation of microcomputers. Consequently, the value generated for consumers of microcomputers depends critically on how efficiently the components within the computer work with one another. The evaluation of this efficiency

is an engineering matter. However, if one firm adopts a standard or design that makes it difficult for components that rivals provide to work efficiently, this can have a detrimental impact. Specifically, it can change the nature of platform competition.

To consider this, suppose that a computer requires two components: A and B. Both A and B can be provided by two firms (1 and 2). Thus, there are four providers in total: A1, A2, B1, and B2. Further, suppose that A1 has a dominant position in the provision of A. Finally, start from a position that involves A1 and B1 working relatively efficiently together and B2 working relatively efficiently together with both A1 and A2. In this situation, absent other arrangements, we would expect to see B2 have advantages over B1 in being adopted widely (that is, it would have higher demand), and so most computers would employ B2 while leaving some choice between A1 and A2.

Now suppose that A1 redesigns its component so that it no longer works efficiently with B2. In this situation, the market will segment into two "platforms" with {A1, B1} competing with {A2, B2}. The problem is that this change in status and market position for B2 will reduce the incentives of its provider to improve that product. This will have a flow-on impact on A2, which will lose further competitive ground in competition with A1. The end result is that while, prior to the redesign's being employed by A1, consumers had a choice between three configurations of computers, the redesign changes that to just two and does so in a way that reduces the strength of competition between A1 and A2.

Impact on innovation

Blocking practices, in general, can have the effect of reducing the rate of innovation in an industry, especially with regard to new product upgrades and introductions. To see this, it is useful to consider what drives the overall rate of innovation in an industry: On the one hand, there are "supply-side" factors; specifically, for a given reward to innovating, how much R&D resources will be deployed towards generating innovation? This will be driven by the availability of scientists and engineers as well as by the broader availability of capital to those firms that have innovative capabilities in an industry.

On the other hand, there are "demand-side" factors that determine how the reward to innovation is influenced by various practices that are prevalent in the industry as well as by the overall rate of innovation itself.¹¹ First, upon innovating, a new innovation (if it is introduced by a firm that is not

¹¹ The latter part is significant because one of the components of the reward to innovation is the length of time, say, that a new product will be the leading technology before it is displaced. The more intensive is the rate of innovation that is expected, the shorter is the period of time that a new innovation will lead the industry. Consequently, the reward to innovation is decreasing in the expected innovation rate towards the next generation of technology.

the current market leader) will compete for a period of time with the previous generation of technology. The higher the profits that an innovator earns in that competitive period, the higher the reward for innovating. Note that if the innovator is the current market leader, this reward is affected by the implicit competition between its new and old products. The potential for an incumbent leader to be concerned about the lost profits that arise when its old products are cannibalized is one of the reasons why initial rewards can be lower for an incumbent than for an entrant. Consequently, it is the reason why practices that favor entrant innovation can generate higher rates of innovation in a market.

Second, there is a long-term return from the innovation. Following a period of competition, the new product may become established, and the firm that produces it will hold a market leadership position. The firm's return during that period will be driven by the practices that it can deploy to reduce the rate of innovation by rivals but also, indirectly, by reducing the return that those rivals might receive immediately upon innovating.

When blocking practices are deployed, they have two impacts on the reward to innovation: They tend to reduce the profits that an entrant receives upon innovating; and, for an incumbent that can employ such practices, these tend to increase the profits that an incumbent will receive should a competing innovation be generated. That longer-term benefit is a component of the reward from innovating, and so such practices will increase that reward. From a policy perspective, we need to understand whether the impact of a given practice will on balance increase or decrease the reward from innovation.

There is a strong reason to expect that blocking practices that involve a shift in profits from an entrant to an incumbent when they are in competition will reduce the innovative reward. The reason is that the innovative reward is a sum of the competitive profits in immediate competition and the discounted profits for an incumbent in future competition. The discount factor on those future profits is determined by the prevailing interest rate used and is also affected by the expected period during which individual products hold a market leadership position. Both of these mean that less weight is placed by would-be innovators on future profits than on immediate profits. Consequently, a blocking practice that enhances future profits proportionately to a reduction in immediate profits will reduce the overall rate of innovation in the industry.^{12,13}

¹² This proposition is formally proved by Segal and Whinston (2007); see Gans (2010). This analysis tells us that we should examine the impact of blocking practices on the balance of firm profits in the industry with weight placed on the immediate profits that are earned by a firm generating a new innovation in competition with firms that control the previous generation of products.

¹³ It should be noted that, in the Intel matter, Intel pointed out that both Intel and AMD had engaged in a high rate of product introduction over the period in question. However, it should be noted that the theory pertains to the effect of practices on the rate of innovation and does not predict a lack of innovation should blocking practices be employed.

LEGAL BACKGROUND

There were four main cases that investigated Intel in the years leading up to 2010: (1) an official investigation by the European Commission;¹⁴ (2) a private but settled action that was brought by Intel's semiconductor competitor, AMD;¹⁵ (3) an investigation by the State of New York;¹⁶ and, finally, (4) an investigation that was brought by the Federal Trade Commission.¹⁷

The two U.S. cases that were brought by AMD and New York Attorney General each alleged illegally maintained monopoly power, in violation of section 2 of the Sherman Act, which prohibits "monopolization, attempted monopolization, or conspiracy or combination to monopolize." While this is a prohibition of an anticompetitive outcome, which is conditioned on a finding of monopoly power first, an allegation of illegal maintenance of monopoly power would require proof of existing monopoly power. Both of these cases were settled and, for this reason, will only be sparingly referred to here.

The EC case was a proceeding under Article 82 of the EC Treaty, which prohibits abuse of a dominant position in the market by an undertaking in so far as it may affect trade between Member States. By contrast, the FTC case was a proceeding pursuant to Section 5 of the Federal Trade Commission Act (FTC Act), which prohibits "unfair methods of competition" and "unfair or deceptive acts or practices." The U.S. Supreme Court has previously found that all violations of the Sherman Act are automatically violations of the FTC Act.¹⁸ Therefore, while the FTC does not administer the Sherman Act, the FTC often bases its enforcement actions on previous court findings of Sherman Act violations. In the Intel case, the FTC first filed its complaint

The relationship between market power and the rate of innovation is complex: For instance, as Joseph Schumpeter famously conjectured, a monopolist may have greater incentives to innovate than does a firm under competition. Different theoretical models can generate different results. Goettler and Gordon (2011) investigated this issue for the period 1993 to 2005 in the microprocessor industry. They found that Intel would have innovated at a faster rate had AMD not been present in the market but that, despite this, overall consumer surplus would have been lower. They also found that the result would be different if there were more new users (as opposed to upgraders) in the market (which is relevant for the world-wide microprocessor market) and also that the rate of innovation peaked when AMD was foreclosed from around half of the market; the allegations against Intel in some cases alleged a greater degree of foreclosure.

¹⁴ European Commission, Commission Decision of relating to a proceeding under Article 82 of the EC Treaty and Article 54 of the EEA Agreement, (COMP/C-3/37.990—Intel), 13 May 2009; hereinafter EC Decision.

¹⁵ *AMD v. Intel*, in the U.S. District Court, Delaware, AMD Complaint, 27 June 2005.

¹⁶ *State of New York v. Intel*, in the U.S. District Court, Delaware, State of New York Complaint, 3 November 2009.

¹⁷ FTC, *In the Matter of Intel Corporation*, Decision and Order, Docket No.9341, 29 October 2010.

¹⁸ FTC web site http://www.ftc.gov/bc/antitrust/antitrust_laws.shtm.

against Intel in December 2009, a month after AMD withdrew its allegation of a Sherman Act violation as a part of its settlement agreement with Intel.

All of these cases had much in common: Fundamentally, each alleged that Intel had taken certain actions that were deliberately designed to handicap or block rival chip manufacturers from competing fairly against it—to the detriment of OEMs and the ultimate consumers of computer hardware. Of these cases, only the EC matter went to a full adjudication. As a result, the EC case produced a much more voluminous record of evidence and argument about the issues, and it will be relied upon extensively here to describe the issues that were common to all of the cases.

Market Definition

Microprocessors, which are also known as central processing units (CPUs), are one of Intel's most important products. The CPU is a computer's core, and is often described as the "brain" of a computer; it is the device that interprets and executes instructions. CPU performance is a key factor in the overall performance of a computer. Accordingly, the CPU also represents the most significant proportion of a computer's cost. This cost is built into the price of computers that are assembled by OEMs.

The CPU market can be divided into segments in a number of different ways, primarily reflected through the ways that the computer market is segmented. The computer market is often divided into three segments: desktop computers, laptop or notebook computers, and server computers; similarly, the CPU market can be divided into three segments that correspond to these three computer market segments. The computer market is also divided into a business/commercial segment and a private/consumer segment; the CPU market can be similarly divided. There is also an important technical distinction between CPUs of the x86 architecture and non-x86 architecture. While CPUs are used in computers, they are also an important component in a variety of non-computer devices, such as video game systems, cash registers, and automatic teller machines (ATMs). They are usually called embedded CPUs. Therefore, there must be an appropriate definition of the CPU market before any antitrust analysis can go further.

The EC decision conducted a careful analysis of demand and supply side substitution in the CPU market. On the substitution between CPUs for desktop, laptop/notebook, and server computers, questionnaire responses from OEMs showed that different CPUs are used for the three different computer segments. The end use of a computer determines the type of CPU that is used in that computer, since the three computer segments have different technical performance requirements. The prices of the CPUs that are used in each of the three computer segments were also substantially different. There was only a limited degree of overlap between CPUs for desktop and laptop/notebook computers and between CPUs for certain desktops

and low-end servers. Therefore, demand-side substitution between the three segments was very limited and only existed at the margin of the three segments. Questionnaire responses from Intel and AMD showed that there was a great deal of supply side substitutability among the three segments, as they indicated that there are no production lines that were specifically dedicated to production of each of the CPU segments and production can be quickly and easily switched from one segment to another.

On the substitution between CPUs for business/commercial computers and private/consumer computers, OEMs were generally in agreement that the distinction between the two segments was made from a marketing perspective, since consumers tend to have greater requirements in terms of entertainment and audiovisual needs, while business users are more focused on data-processing performance. However, there is generally no difference between the CPUs that are used in these two segments, so they were considered as substitutes from both the demand and supply sides.

The EC concluded that there was no substitution between CPUs of x86 and non-x86 architecture. On the demand side, the responses from OEMs were unanimous that they would not consider switching x86 CPUs to non-x86 CPUs for desktop and laptop/notebook computers. This is because products and applications that are designed for the x86 architecture are generally incompatible with non-x86 architectures. Most notably, the Windows operating system, which runs on the majority of desktop and laptop/notebook computers, is not compatible with non-x86 CPUs. For servers, there is also no indication that OEMs would consider switching x86 CPUs for non-x86 CPUs or vice versa. This, however, is not to say that servers of x86 and non-x86 architectures are not substitutes. On the supply side, Intel and AMD's responses disagree on how difficult it is to switch from production of x86 CPUs to production of non-x86 CPUs. The EC found that the production of both x86 and non-x86 CPUs involves significant sunk costs, and the cost of switching between their production is minimal only if the manufacturer is already producing CPUs of both architectures, and has thus already incurred the sunk cost of both types of CPUs.

The EC also found that there was no substitution between CPUs for computers and embedded CPUs for noncomputer devices. On the demand side, CPUs that are embedded in noncomputer devices were not substitutes for CPUs that are used in computers because they are insufficient in performance levels and incompatible with operating systems that are run on computers. On the supply side, the EC noted the significant difficulty in switching from production of embedded CPUs to computer CPUs due to the large costs of designing new CPUs and investing in production equipment.

On the basis of this analysis of demand and supply side substitution, the EC defined the relevant market to be x86 CPUs for computers, while leaving open the question whether the definition should be divided into the desktop, laptop/notebook, and server segments. Non-x86 CPUs and

embedded CPUs for noncomputer devices are excluded. The FTC provided a similar market definition without elaborating on the reasoning behind the definition. The geographical market was defined as worldwide in both the EC and FTC cases.

Intel's Dominant or Monopoly Position

As discussed earlier, a finding of a dominant position or monopoly power is necessary to distinguish a blocking practice from other practices. This is because a blocking practice will only be effective if a firm can affect and benefit from the reduced competition. Intel is in a very dominant position in the relevant CPU market, enjoying significant market power. In each case, it was recognized that Intel's dominant position and monopoly power is reflected in two ways: Intel's extremely high share in the relevant CPU market, and the presence of significant barriers to expansion and entry.

Intel's share in the x86 CPU market has been consistently very high. Although somewhat different figures for Intel's market share have been alleged in the four cases, they all point to an extremely high share: around 80 percent in both unit and revenue shares. Intel itself has admitted that it had 70 to 85 percent in units and 80 percent in revenue since 1999. The EC decision also examined Intel's market share in desktop, laptop/notebook, and server segments of the market and found that Intel enjoyed a share of at least 70 percent in each of them.

Two broad barriers to expansion and entry were identified: The first relates to the substantial sunk cost of investment in order to enter the market. In order to produce x86 CPUs, the manufacturer must first develop the basic x86 CPU designs, which requires very significant expenditure in R&D. The technological knowledge base is very costly for a potential entrant to replicate. There are then additional sunk costs of building the necessary manufacturing facilities, which are known as fabs. A state of the art fab takes years to build and costs as much as \$3 billion.

The second barrier to entry for a potential entrant was brand recognition and reputation of reliability, which can take years and significant marketing expenditures to develop. Intel, as one of the oldest CPU producers in the world and with its extensive advertising campaigns, has achieved the particularly advantageous status as a must-stock product. This is to say that Intel has such brand recognition and reliable reputation that OEMs must have computers with Intel CPUs in stock. Intel is an unavoidable trading partner for OEMs.

While admitting to the extremely large market share and the must-stock status, Intel denied having a dominant position or monopoly power in the x86 CPU market. Intel argued that the OEMs exerted significant buyer power and the substantial negotiating leverage that they wield prevents Intel from having significant market power. The EC dismissed this argument on

the basis that it ignored the fundamental nature of Intel's relationship with OEMs: that it is an unavoidable trading partner. OEMs could not credibly threaten to switch a substantial proportion of its x86 CPU supply from Intel to a competitor, such as AMD. This significantly diminished the OEMs' negotiating leverage. Furthermore, OEMs had small shares in the computer market relative to Intel's share in the x86 CPU market, and they negotiated with Intel individually. Therefore, the OEMs did not have sufficient buyer power to countervail Intel's market power as a supplier. Intel further argued that the consistently declining x86 CPU prices were evidence of intense competition in the market. The EC also dismissed this argument. The EC noted that the rapid technological progress in the x86 CPU industry made falling prices a natural feature of this industry, irrespective of the state of competition in the market.

INTEL'S BLOCKING PRACTICES

Intel was accused of three broad types of anticompetitive conduct that formed the basis the allegations: conditional rebates and payments, naked restrictions, and alterations to complementary products.¹⁹

Conditional Rebates

Intel was accused of awarding rebates and various other payments to major OEMs, conditioned on these OEMs' purchasing all or almost all of their x86 CPU supply needs from Intel. Intel's conditional rebate arrangements differed amongst OEMs. Some OEMs are clearly strategically more important than others in their ability to provide x86 CPU manufacturer access to the market. Dell and HP were considered to be more important, since they were the world's largest important computer and server vendors by market share. Dell and HP were better able to sell more expensive x86 CPUs through their computer systems, thus giving CPU manufacturers greater presence in the more profitable end of the market. Large OEMs also have the abilities to influence market trends and create consumer trust in new products. Dell and HP enjoyed such strategically important positions in the computer market, which smaller OEMs do not. Thus, the following discussion will focus primarily on Intel's rebate arrangements with them. Both Dell and HP had been considering introducing and expanding their computer products with non-Intel x86 CPUs.

The EC's primary objection to Intel's practice was that the rebates and payments that Intel offered to the OEMs were *de facto* conditional on those companies' purchasing all or nearly all of their supply for x86 CPUs from

¹⁹ In the analysis below, all references to CPUs should be understood to mean CPUs of the x86 architecture, unless explicitly indicated otherwise.

Intel. Such conditions restricted those companies' freedom to choose. As a matter of evidence, the EC reached its conclusion on the conditional nature of the rebates and payments primarily by relying on the OEMs' submissions to the EC and the OEMs' internal documents and emails. Where available, the EC also relied on Intel's internal documents and oral testimony of executives at the OEMs and Intel.

With respect to Intel's dealings with Dell: While recognizing the absence of explicit conditions of exclusivity or minimum volume commitments in its rebate arrangement with Intel, Dell's submissions to the EC indicated an understanding of a condition of exclusivity. There was a general consensus within Dell that moving away from its exclusive relationship with Intel would result in a substantial reduction in the rebates that it would receive from Intel, which could potentially be disproportionate to the reduction in purchase volume from Intel. The rebates involved were sizeable. For example, in a single quarter in 2007, the payments of \$720 million amounted to 76 percent of Dell's operating profit.²⁰

In its assessment of the possibility of introducing AMD-based computers, Dell concluded that any advantage in partially moving to AMD would be more than offset by the negative impact from the loss of Intel rebates. Dell also feared that Intel would move the rebate advantage to one of Dell's competitors. This played an important part in Dell's final decision to stay exclusive with Intel.

Internal documents from Intel showed that Dell's understanding of the exclusivity condition and its fear of a substantial reduction in rebates were justified. Internal presentations and emails among Intel executives showed that there was a direct link between Intel's rebates and Dell's exclusive relationship with Intel. In fact, Intel made clear to Dell, including at the highest executive levels, that Dell would lose a significant portion of the rebates if Dell began sourcing non-Intel CPUs. The EC concluded, based on this documentary evidence, that Intel rebates to Dell during the period of December 2002 to December 2005 were conditioned on Dell's purchasing exclusively Intel CPUs.

Intel argued that its rebates to Dell contained no exclusivity conditions and characterized Dell's submission as merely the opinion of a Dell executive who was uninformed about the nature of the agreements. The EC dismissed these arguments by pointing out that Dell's submission represented the views of Dell as a whole and that it was corroborated by the testimony of Dell executives who were involved in the negotiations with Intel at the highest level.

Intel also argued that when Dell began sourcing from AMD in 2006, they reached a new rebate arrangement that was designed to produce comparable levels of discounts and that Intel did not penalize Dell for partially

²⁰ Justin Scheck and Kara Scannell, "SEC: Intel Case Inflated Dell," *Wall Street Journal*, 23 July 2010. <http://online.wsj.com/article/SB10001424052748703467304575383470750065524.html>.

switching its supply source to AMD. Intel presented this as evidence for its assertion that there were no exclusivity conditions in its rebate arrangements with Dell.

The EC first noted that its decision focused only on Intel's conduct from 2003 to 2005; thus what took place in 2006 was irrelevant. Also the EC pointed out that with respect to Intel's argument that the new arrangement produced "comparable" levels of discount, only a part of the old rebates were included in the comparison. When all of relevant rebates were included and compared "like to like," rebates under the new arrangement were lower than under the old arrangement.

To counter the EC's dismissal of this argument, Intel further argued three points: (1) that the decline in the rebates that Dell received under the new arrangement was due to the decline in the total purchase volume from Dell; (2) that the reduction in the listed prices of the many Intel CPUs in 2006 made much of the Dell rebates redundant; and (3) that the mix of CPUs that Dell purchased included fewer heavily discounted CPUs than before.

All three points were dismissed by the EC as unconvincing: The EC pointed out that the decline in rebates was disproportionate to the decline in Dell's purchase volume, which suggested that the decline in rebates had a punitive component. With regard to the reduction in listed price, the EC noted that this reduced listed price was not equivalent to rebates, since rebates were awarded to Dell only and the reduction in listed price applied to every OEM. On the issue of the mix of CPUs that Dell purchased, the EC noted that the old rebates arrangement did not depend on the mix of CPUs that Dell purchased; thus, the decline in rebates due to a change in the purchase mix would not have happened under the old arrangement.

The EC also found that conditionality attached to Intel's rebate arrangement with HP. HP's submission to the EC indicated that HP's rebate agreements with Intel from late November 2002 to December 2005 were subject to the unwritten condition that HP purchase at least 95 percent of its CPU needs for its business desktop system from Intel. Various internal emails between HP executives corroborated this submission and demonstrated that HP was convinced that the Intel rebates would be significantly diminished if HP broke the condition.

Intel argued that its rebate agreements contained no market share conditions but did not provide any specific comments on HP's submission about the conditions that were attached to the rebates. When questioned on this issue at an oral hearing, Intel attributed the discrepancy between its views and HP's submission to a lack of common understanding of the actual conditions of the agreements. Intel asserted that the 95 percent business segment market share condition was first offered by HP in early negotiations in the period July to August 2002 and that Intel rejected that offer out of "antitrust concerns." The EC noted that the case file did not provide

definitive evidence as to whether HP or Intel first proposed the condition. Even if HP indeed first proposed the condition, Intel still needed to show that it genuinely rejected the condition and that the condition was not implemented in any form. The EC found no evidence to support Intel's assertion that it had rejected the 95 percent condition.²¹

In supporting its legal case, the EC also utilized an "as efficient competitor analysis" to show that Intel's exclusivity rebates were capable of causing anticompetitive foreclosure. This hypothetical analysis examines the price at which a competitor as efficient as Intel could enter the CPU market at a more limited scale without incurring losses. It is therefore akin to establishing whether conditional rebates are a blocking practice. Given that an OEM would lose a substantial proportion of rebates from Intel if the OEM sourced from the entrant, the rival could enter the market only if it could offer sufficiently low prices to compensate the OEM for the lost Intel rebate. Therefore, if the after-rebate effective price that Intel offered was lower than the price that the rival could offer, the rebate scheme could be considered to be capable of foreclosing the rival. This analysis was independent of whether AMD was actually able to compete or not. The EC found that an efficient competitor would not have been able to compete effectively for Dell and HP's business under the conditional rebates that were imposed on them by Intel.

In response to this, Intel did offer some defense, although the EC was, in the end, unconvinced:

In order to objectively justify its conditional rebates, Intel would have to show that there is an efficiency (or another legitimate objective other than exclusion of competitors), that the conduct is capable of achieving the legitimate goal, that it had no equally effective alternative in achieving the legitimate goal with a less restrictive or less exclusionary effect and finally that the conduct is "proportionate," in the sense that the legitimate objective pursued by Intel should not be outweighed by the exclusionary effect.²²

For instance, Intel argued that the conditional rebates were a quantity discount that rewarded OEMs for achieving greater scale. In response, the EC noted that, in the case of HP, the agreement did not reference units but

²¹ Furthermore, the EC noted that the "antitrust concerns" that Intel cited related to Intel's alleged concern that the rebates might be construed as below-cost pricing. Such concerns relate to the rebates and discounts themselves, which was not the subject of the EC's decision, and had nothing to do with the EC's true concern: the conditionality that was attached to the rebates. The EC cited an internal email between Intel executives, which showed that Intel was satisfied with the 95 percent condition and was even prepared to pursue a 100 percent condition in exchange for granting HP more rebates. In sum, the EC found Intel's arguments unconvincing to rebut the existence of the 95 percent market share condition.

²² EC Decision, ¶ 1624.

instead HP's share of purchases made from Intel. With respect to Dell, the conditional rebate did not involve a clear schedule of prices with respect to volumes that might characterize an incentive contract that was designed to motivate Dell to sell greater quantities of computers with Intel CPUs. Instead, the rebates were subjective and were paid upfront and in a lump-sum manner without clear reference to the quantity of purchases that were achieved *ex post*.

Intel argued that the exclusivity requirements of its rebates attained efficiencies in the form of lower prices, economies of scale, other savings and production efficiencies, and risk reduction and marketing efficiencies. The EC was not satisfied with these arguments. It is unclear how the exclusivity condition produced "lower price" benefits that were additional to rebates without such conditions. Intel did not state the precise nature of the efficiencies from the economies of scale that were produced by the exclusivity condition, nor did it demonstrate that such efficiencies could not be generated in a rebate scheme without exclusivity conditions. On production efficiencies, Intel could not show how the part of the OEMs' demand that was secured through the exclusivity conditions created cost savings. Intel argued that the exclusivity requirement allowed OEMs to shift the risk of uncertain business conditions to Intel, their supplier, but did not demonstrate how this constituted an efficiency.

Naked Restrictions

Both the AMD civil case in Delaware and the EC case dealt with a category of Intel's conduct that can be called "naked restriction." They are payments by Intel in order for OEMs to delay, cancel, or in other ways restrict the commercialization of AMD-based products. Similar to conditional rebates, the EC concluded that these naked restrictions were present, primarily on the basis of the OEMs' submissions.

HP's rebate agreement with Intel, besides the condition of sourcing at least 95 percent of business desktop CPUs from Intel, also had further conditions that HP could only sell AMD-based business desktops to small and medium enterprises, and only via direct distribution channels as opposed to through distributors and retailers. HP was also required to postpone the launch of its AMD-based business desktop in Europe, Middle East, and Asia by six months. Intel argued that these restrictions were self-imposed by HP and not required under the rebate agreement. The EC pointed to a number of HP's internal emails that contradicted Intel's claim. Although HP was allowed to sell AMD-based computers at no more than five percent of its total volume, these naked restrictions on commercialization further limited AMD's ability to gain market access and acceptance.

Other examples of naked restrictions arose with Acer in 2003 and Lenovo in 2006, both of which abandoned plans to launch AMD-based

computers because of potential harms that would arise from actions by Intel specifically in the form of final support.

Alterations to Complementary Products

A final type of anticompetitive conduct was alleged in both the AMD civil case and the FTC case. It relates to Intel's making alterations to its products in order to degrade the performance of or even to prevent the use of complementary products that were produced by its competitors. I will focus on the allegation in the FTC complaint: Intel's conduct of this type involved changes that it made to compilers and graphic processing unit (GPU) connections.

A compiler is software that translates the source codes (which are programs that are written by programmers and software developers in a particular programming language) into the object codes that CPUs read and execute. Intel produces its own compilers. The FTC alleges that in 2003 Intel redesigned its compiler to generate software that run slower on non-Intel x86 CPUs, such as AMD's new Opteron CPUs. Intel-compiled software applications²³ would run slower on non-Intel CPUs than on Intel CPUs. It was alleged that Intel then falsely and misleadingly represented to the public, OEMs, independent software vendors (ISVs), and benchmarking organizations that the software application inherently performed better on Intel CPUs than on non-Intel CPUs and failed to disclose the effects of its compiler software redesign on non-Intel CPUs. It was further alleged that Intel paid OEMs and ISVs to change their software designs, including switching to use Intel compilers, to favor Intel CPUs.

The FTC alleged that Intel engaged in similar conduct in the GPU market as well. GPUs originated as specialized circuits for processing computer graphics. As GPUs evolve to take on greater functionalities, computers can achieve better performance by offloading computationally intensive tasks from the CPU to the GPU. This allows low-end CPUs to achieve better performance by pairing with GPUs. GPUs could thus facilitate new entry or expansion in the CPU market and thus were a threat to Intel's near monopoly in the CPU market.

In the past, Intel had encouraged GPU manufacturers like Nvidia to develop GPU products that interoperated with Intel CPUs. Interoperability is dependent on open interfaces that connect CPUs, chipsets, and GPUs. After seeing the competitive threat of GPUs, Intel reversed its previous policy of allowing Nvidia's integrated GPUs to interoperate with Intel CPUs. In the computer industry, a company produces documents known as roadmaps that outline its plans for the next stage product developments.

²³ Some of these commercial applications allegedly affected common benchmarking results of Intel versus AMD processors as well. FTC Analysis of Proposed Consent Order to Aid Public Comment, available at <http://www.ftc.gov/os/adjpro/d9341/100804intelanal.pdf>.

Such documents are often shared with partner companies to coordinate technology development. This is often crucial for developing compatibility and interoperability. Intel first attempted to deceive Nvidia by providing it with misleading CPU roadmaps. This greatly increased Nvidia's costs and delayed further development of other products.

Finally, Intel refused to deal with Nvidia at all by denying Nvidia the license to use the connecting interface. Intel further introduced barriers to connectivity, such as reductions in speed and encryption. Intel sought to ensure that its own x86-based GPU computing tools and interfaces become the industry standard. It began to bundle its CPUs with its own GPU chipsets and priced the bundle to deter OEMs from pairing Intel CPUs with non-Intel GPUs.

Complementary products, like compilers and GPUs, increase the performance and value of CPUs. However, Intel was alleged by the FTC to have altered its products to degrade the performance or to prevent interoperability of these complementary products that were produced by its competitors—all to protect its monopoly position in the CPU market.

REMEDIES

The conclusion of the cases against Intel have involved fines and payments (in the AMD and EC cases amounting to over \$2 billion) as well as various behavioral remedies. The EC's decision required Intel to stop its infringing activities. However, the AMD and FTC settlements imposed more detailed remedies. The focus here will be on the FTC's settlement, as AMD's was similar (although focused on AMD).²⁴

With respect to conditional rebates and naked restrictions, the FTC order prohibited Intel from conditioning rebates, discounts, and other benefits on the customer or end user's exclusive use or purchase of Intel products; on an agreement to limit, delay or refuse to purchase an Intel competitor's products or computers that contain Intel competitors' products; or on an abstention from selling or launching computers that contain Intel competitors' products. Conditions also cannot be in the form of minimum market segment shares, as was the case for HP. Intel cannot deny a benefit to its customers or end users because they design, manufacture, distribute or promote computers that contain Intel competitors' products or retaliate against a customer that accounted for two percent or more of sales of Intel products in the preceding year, in making product allocation decisions during times of supply constraint.

²⁴ The NYAG case was settled. Intel agreed to pay \$6.5 million to the New York Attorney General, who in exchange withdrew New York's case and ceased all investigations against Intel and irrevocably released Intel from all claims that were related to allegations that were contained in the case. There were no additional restrictions on Intel's business activities.

The order further prohibited benefits for customers that are conditioned on the customer's purchasing various Intel products in fixed proportions so that the bundle is effectively priced below cost. The order explicitly differentiated between two discount structures: a discount of X percent on all sales in excess of Y units, and a discount of X percent on all units if sales exceed Y units. Under the settlement order, Intel is allowed to provide the former (i.e., an incremental discount); the latter is allowed only if the quantity involved with that particular customer is less than eleven units of a relevant product. Intel is allowed, however, to offer discounts that it reasonably believes is offered by a competitor and can offer an exclusive contract under certain very restrictive conditions.

With respect to Intel's business practices in the complementary market, the FTC order required that Intel cannot make any design changes to its CPUs and GPUs if that change degrades the performance of similar products of Intel competitors and does not provide any benefit to Intel's CPUs and GPUs. Degradations that arise out of a bug or other inadvertent defects are not violations of the order. There were also remedies that were specific to GPUs and compiler software that required Intel to conform to some industry standards and also to license intellectual property to allow GPU functioning to AMD, Via, and Nvidia. Intel also was required to provide detailed product roadmaps to complementary product suppliers and other disclosures to ensure that consumers understand the impact of compiler software.

SUMMARY

The Intel case is of interest because it demonstrates what happens when a monopolist engages in a range of practices—each tailored toward specific situations—with a common goal of blocking the ability of rivals to compete. The rebates and actions that were taken by Intel were costly; and, indeed, while they were found to have violated antitrust rules in multiple jurisdictions, it was an open matter as to whether the monopoly benefits that Intel received exceeded those costs. Nonetheless, in the EU and for the FTC, it was the pattern of behavior across many OEMs that jointly determined Intel's liability.

While the EU and AMD settlements imposed a large financial penalty, in many respects it is the remedies that were imposed by the FTC that will be the standing characteristic of the Intel case for antitrust going forward. As was the case with the AMD litigation, the FTC's restrictions arose out of settlement negotiations with Intel. While these may be seen as restrictive, they are only restrictive to the extent that it was Intel's intention to engage in conduct that is now prohibited. The extent of the fines as well as the potential for ongoing litigation suggests that this was not Intel's intention. Consequently, the imposition of the restrictions allows Intel to provide a

clear commitment to the market of that intention. How this affects the evolution of the market will be of considerable interest going forward.

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