Quality-Improving Portfolio Effects in European Union Competition Policy

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1. Introduction

The European Union Competition Commission (Commission) has applied the concept of *portfolio effects* in recent merger cases. There is some disagreement over the precise meaning of the term portfolio effects, but in general it means that a firm has a portfolio of products that rivals have difficulty matching and the portfolio is a source of competitive advantage. The Commission applied this concept in denying the proposed *GE/Honeywell* merger,[1] a merger that the U.S. and Canada had already approved. The Commission's decision stimulated considerable debate about the Commission's reasons for denying the merger and renewed debate about why competition authorities from different countries might disagree on mergers. (See, for example, Patterson and Shapiro, 2001; Schmitz, 2002; Monti, 2001; and James, 2001.)

One of the Commission's concerns in the *GE/Honeywell* case was that the combination of *GE Capital* with certain other products would allow the merged company to develop product innovations that rivals could not match. For example, the Commission concluded that the combination of *GE Capital* and the merged company's aircraft engine business would allow the merged company "to take more risk in product development programmes than any of its competitors." (¶ 108) The Commission believed that this would harm competition. Patterson and Shapiro (2001) take exception to the Commission's view, believing that improvements in a firm's ability to innovate benefit customers.

In this paper, we analyze how competition authorities in different countries may disagree on mergers that would improve a firm's product quality. Others have examined conflicts in international antitrust in other contexts, such as the *Boeing/McDonnell-Douglas* merger. (See, for example, Neven and R`ller, 2000, and Head and Ries, 1997) We find that in certain situations an improvement in one firm's product quality may reduce competition, which we define as causing a rival to exit the market, but that there are many situations where this does not occur. We develop conditions under which the Commission's view would be correct and conditions under which Patterson and Shapiro (2001) would be correct. To simplify our analysis, we assume that the quality improvement results directly from a merger, which we call a quality-improving merger. To isolate the quality effect, we assume that the merger is not a merger between rivals nor between suppliers and buyers for the markets we examine. The Commission considered horizontal and vertical integration to be distinct from the product improvement issue.

We develop conditions under which a quality-improving merger that needs approval from more than one country's competition authority may be approved by one country and denied by another. We consider a situation where the merging firm, which we call *a*, is "from" country *A* and its rival, which we call *b*, is "from" country *B*. In saying that *a* (alternatively, *b*) is "from" *A* (alternatively, *B*), we mean that *a*'s (alternatively, *b*'s) profits go to shareholders in *A* (alternatively, *B*) and that customers in *A* (alternatively, *B*) prefer the output of *a* (alternatively, *b*) to that of *b* (alternatively, *a*). If a firm chooses to produce, it sells its products in both

[1] *General Electric/Honeywell*, Commission Decision, Case COMP/M. 2230, July 3, 2001.

countries.[2] To simplify discussion, we write as if *A* or *B* approve or deny the merger rather than the competition authority in *A* or *B*. If both countries seek to improve welfare in which net consumer surplus and profit are given equal weight, country *A* approves the merger in many instances in which *B* denies the merger. *B* approves the merger only if the improvement in quality is "small" or if *a* and *b* have nearly identical product quality. If the countries seek to maximize net consumer surplus, both countries approve the merger if 1) *b* does not exit the market, or 2) the quality improvement is sufficiently large to compensate consumers for the loss of competition if *b* does exit. However, there remain many situations where the countries would disagree, i.e., there are quality improvements that benefit the customers in *A*, but not the customers in *B*, if firm *b* exits. If the countries seek to protect competition, they always agree on whether to approve or deny the merger.

We develop these results by considering a model in which a country can approve or deny a proposed merger that would increase the quality of *a*'s product relative to *b*'s product. By an improvement in quality, we mean that there is some change in *a*'s product such that the demand for *a*'s product increases relative to the demand for *b*'s product. Customers are uniformly distributed along a line segment and a customer's location on the line segment represents her product preferences. *a* and *b* are also located on this line, but not in the same location. All other things being equal, a customer located closer to *a* than to *b* prefers *a*'s product to *b*'s product. We assume conditions that ensure that there is unmet demand in equilibrium, i.e., there are customers near each end of the line segment who rationally choose to not purchase from either firm. We also assume conditions that ensure that the firms compete for customers located between the two firms in equilibrium if both firms produce, i.e., there is a marginal customer who purchases the product, but who is indifferent between purchasing from *a* or *b*. After the country has made its decision on whether to approve or deny the proposed merger, firms decide whether to stay in the market or exit. Each firm that stays in the market chooses a single uniform price to maximize its own profit. After firms choose prices, customers perfectly observe the prices and product quality. Each customer who chooses to purchase buys from the firm that offers her the greatest net consumer surplus.

We first examine a single-country situation in which both firms are from the same country and all customers are in this country. We develop conditions under which an improvement in *a*'s product quality would cause *b* to exit the market because producing would result in negative profits for *b*. We illustrate these conditions with a simulation and show the ranges of product quality (i.e., the quality of *a*'s output relative to *b*'s output) under which the country would always approve the merger and under which the approval would depend on the magnitude of *a*'s quality improvement.

We then examine the two-country situation described above. Firms do not discriminate between countries, i.e., each firm charges a single uniform price for both countries. This might be true if, for example, a European aircraft engine customer could purchase an engine in the U.S. and use it for air service in Europe. We develop conditions under which the two countries agree on whether to approve or deny the merger and conditions under which the countries disagree. There are conditions under which *A* will approve the merger and *B* will not, but there are no conditions under which the reverse is true if both countries apply the same criteria. Both

[2] In our model there is no benefit to exiting one country and not the other.

countries approve the merger if *b* does not exit. Both countries deny the merger if 1) the countries seek to maximize net consumer surplus or welfare, 2) *b* exits, and 3) the improvement in *a*'s quality is "small." However, the countries differ on what they consider to be a small improvement in quality. We illustrate our findings with simulations.

The paper proceeds as follows. Section 2 provides background on competition policy in the European Union (EU). Section 3 describes our model. Section 4 presents the single-country situation and Section 5 presents the two-country situation. Section 6 is the conclusion. All proofs are in the Appendix.

2. Background

2.1. Summary of EU competition and merger policies

Competition (antitrust) policy is one of the most fundamental policies underlying the European Community (EC) because of its relationship to the original overarching goals of the Community to create a European common market in which distinct national markets give way to the "Single Market." While this may come as a surprise to those familiar with the large role played by cartels in the industrialization of Europe, (Trebilcock, 1981) the emphasis on competition rules followed from the decartelization of Germany during the Allied occupation following the Second World War. The now-expired European Coal and Steel Community Treaty (1952-2002) was of limited scope but nonetheless laid the single market groundwork for the more expansive European Community Treaty. Competition policy was seen by the High Authority (now the Commission of the EC) as integral to this objective, as was noted in an early policy memorandum:

> A genuine single market cannot be brought about except through free competition. If the market were to remain subject to the arbitrary decisions of the cartels, or to the restrictive practices of monopolies, then the benefits of the single market would soon be offset by the effects of price-fixing and production quotas. This of course was understood by the framers of the [ECSC] Treaty, who provided in Articles 65 and 66 a set of standards and guiding procedural principles which together constitute the first effective anti-trust law in Europe. (There is a resemblance to American models here. Article 65, which relates to combinations in restraint of trade, and Article 66, which relates to illegal concentrations of economic power, respectively correspond somewhat to Articles 1 and 2 of the Sherman Anti-Trust Act.)[3]

[3] High Authority, European Coal and Steel Community, *Memorandum On The Anti-Trust Policy of The High Authority* 1 (1954). (Translation by the High Authority) The original antitrust rules of Articles 65 and 66 of the ECSC Treaty migrated into what are now Articles 81 and 82 of the EC Treaty.

In the EC, the "first principle" of competition law is single market integration and the elimination of private practices which interfere with integration. (Hawk, 1990) As Deringer (1980) has commented, "the basic sin in Europe is not so much restricting competition but creating an obstacle to integration." Competition law serves the purpose of integration by preventing private concerns from erecting or maintaining private barriers to free trade after or as governmental barriers are dismantled under the Treaty of Rome. (Green et. al, 1991; Korah, 1994) As Faull (1992) has put it, "the EC's overriding objective of prising open national markets … is not the invisible hand; it is competition policy as can opener."

The principle competition rules in the EC[4] are found in the EC Treaty, particularly Articles 81 and 82.[5] These provisions were essentially modeled after Sections 1 and 2 of the U.S. Sherman Act of 1890 and drafted by a U.S. professor of antitrust. (Jones, 1999) Article 81, like Sherman Act Section 1, addresses joint conduct ("agreements" or "concerted practices") of "undertakings" (firms) and prohibits those which have as their "object or effect the prevention, restriction, or distortion of competition within the common market…"[6] Article 82 is the analog of Sherman Act Section 2 (prohibiting monopolization or attempts) in that it primarily addresses single firm conduct, and it prohibits "abuse by one or more undertakings of a dominant position within the common market or any substantial part of it."

A dominant position within the meaning of Article 82 is "a position of economic strength employed by an undertaking which enables it to hinder the maintenance of effective competition on the relevant market by allowing it to behave to an appreciable extent independently of competitors and ultimately of consumers."[7] However, a "dominant position" does not require the same level of market power as does a "monopoly" under the Sherman Act.[8] "Abuse" includes a variety of conduct, expressly including imposition of unfair pricing or trading conditions, tying, exclusive supply agreements, or discrimination in prices or other trading conditions.[9]

Merger rules are not addressed explicitly in Article 81 or 82 of the EC Treaty. While Article 82 prohibits the abuse of a dominant position, it does not prohibit the creation or acquisition as such of a dominant position by merger. This limits the scope of its application for

[4] Technically, competition law and merger regulation is the province of the EC, not the EU. These are separate but overlapping entities. (Weatherill, 2000) However, for our purposes the terms may be used interchangeably.

[5] Formerly Articles 85 and 86, respectively. In 1999, the Treaty of Amsterdam entered into force and introduced a new numbering scheme. However, pre-1999 decisions of the European Commission and judgments of the European Court of Justice, the Court of First Instance, and many publications of course refer to the old numbering system, so it is necessary to keep old and new numbers in mind.

[6] "Treaty Establishing the European Economic Community," 25 March 1957, 298 UNTS 3, Art. 81. (As amended). (Hereafter referred to as the Treaty of Rome, or the EC Treaty).

[7] Case 322/81, *Michelin v. Commission*, [1983] ECR 3461.

[8] Market shares above 40 to 50 percent raise a rebuttable presumption of a dominant position. Case 27/76, *United Brands v. Commission*, [1978] ECR 207. Monopoly power under the Sherman Act normally requires market shares in excess of 60 or 70 percent.

[9] Art. 82 EC, (a) through (d).

controlling mergers *ex ante*. The principal legal basis for merger control is the Merger Regulation,[10] initially effective in 1990, reviewed and amended in 1997, and under further review in 2002-2003 with additional substantial amendment likely to come. U.S. firms such as Boeing, McDonnell-Douglas, General Electric, and Honeywell are subject to the EC's Merger Regulation because they have sufficient turnover (gross sales less rebates and VAT) in the Community and worldwide to meet the monetary thresholds specified in the Regulation and thus have a "Community dimension."

Since the Merger Regulation came into force in 1990, the EC has considered over 1,000 merger notifications and has blocked less than 20. Although the *Boeing/McDonnell-Douglas* merger was nearly blocked in 1997, late-hour concessions by the firms avoided this result. The *GE/Honeywell* transaction, cleared in the U.S., is so far the sole example of a merger of U.S. firms which the EC has prohibited.

The substantive merger control rules differ somewhat from those applied in the U.S. The Merger Regulation, Art. 2(3) prohibits as incompatible with the common market any merger which "creates or strengthens a dominant position as a result of which effective competition would be significantly impeded in the common market or in a substantial part of it." Therefore, if a proposed merger either creates a dominant position which did not previously exist, or strengthens one which already exists, and there is likely to be a significant impeding of competition, the Commission is obligated to block the merger.

2.2. EC Policies on Portfolio Effects

The concept of portfolio effects is not well defined in the case-law of the EC, but it relates to the situation in which a merger has the possibility of significantly impeding competition due to acquisitions of complementary products which enable it to become a "full line" seller with whom firms may prefer to deal. The general concept is that a firm with market power which acquires a fuller line may obtain "portfolio power" which forecloses access to the market to single line firms and extends power from one market to another—a form of leveraging. (Bermann et al., 2002) The terms "portfolio power" and "portfolio effects" were first applied in the *Guinness/Grand Metropolitan*[11] decision, in which the Commission listed the enhanced market power effects and marketing advantages which the merger of spirits subsidiaries would confer on the merged company (GGM), especially in the Greek market. The Commission concluded that the merger would create a dominant position in some markets, strengthen it in others, and the uniquely wide portfolio of spirits brands would allow GGM to have price flexibility, bundling of products, and promotions with exclusionary effects which could not be matched by other competitors who could not assemble a similar portfolio of brands. The merger

[10] Council Regulation (EEC) 4064/89 on the control of concentrations between undertakings. OJ 1989 L395/1, corrected version published OJ 1990 L 257/14. Reg. 4064/89 has now been amended by Reg. 1310/97 [1997] OJ L 180/1.

[11] Commission Decision, Case IV/M.938, O.J. L 288/24 (October 27, 1998). The concept was mentioned in earlier Commission decisions, e.g., Case No. M.794 *Coca-Cola Enterprises/Amalgamated Beverages GB*, OJ [1997] L 218/15 ; Case No. IV/M.833 *Coca-Cola/Carlsberg* OJ [1998] L 145/41, but no final conclusion was reached.

was ultimately cleared, but the Commission required conditions to do so, including divestiture of brands (e.g., Bacardi rum in Greece).

The *GE/Honeywell* decision addressed leveraging and bundling concerns, although it has been debated whether this is a genuine application of the portfolio effects doctrine.[12] If portfolio effects are seen as limited to the sort of product line found in the drinks cases (*GGM*, *Coca-Cola*), then arguably *GE/Honeywell's* focus on vertical integration, financing services, and component parts of large complex aircraft could be considered qualitatively different. Nonetheless, there is an underlying similar theme in the Commission's view that none of a merged *GE/Honeywell*'s competitors would be able to match the combination of vertical integration, products and services offered by the merged firm.

2.3. Policies on Product Improvements

Neither the EC Treaty nor the Merger Regulation explicitly addresses impact on product or service quality per se as a factor to be considered in assessing the legality of a merger. Companies seeking merger approval in the U.S. frequently assert that their merger will be efficient and lead to cost reductions or other efficiencies, and suggest that such efficiencies outweigh any minor negative impact on competition which might be present. In the EU, the analysis is somewhat different.

Article 2(1) of the Merger Regulation provides assessment criteria which include "the development of technical and economic progress provided that it is to consumers' advantage and does not form an obstacle to competition." Arguably, this concept could embrace efficiencies. However, the EU has not adopted the "efficiency defense" (Bermann, 2002) allowed in U.S. law. In particular, the EU does not allow an efficiency defense to be weighed against the negative aspects of a merger—efficiency considerations are only allowable if the merger is to consumers' advantage and does not form an obstacle to competition.[13] (Faull and Nikpay, 1999) Article 2(1) suggests that if competition is negatively affected at all, efficiencies are not available as a "trump card." (Whish, 2001) The Commission has never said that despite a merger's creation or strengthening of a dominant position it would clear a merger which offered efficiencies. Indeed, the Commission said in *Danish Crown/Vestjyske Slagterier*[14] that because the proposed concentration would create a dominant position, "the efficiency arguments of the parties cannot be taken into account."

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[12] Most independent observers seem to think it is (e.g., Whish, 2001), but the Director of the Commission's Merger Task Force has taken the contrary position. Drauz (2002) considers that the decision was not a "true portfolio effects" case, but one based on the conclusion that GE's financial strength and vertical integration into aircraft purchasing, financing, and leasing combined with Honeywell's strength in various product markets such as corporate jet engines, avionics and non-avionics products would quickly result in creation of true dominant positions in Honeywell's products. Our model addresses the product improvement issues regardless of whether this is a true portfolio effect.

[13] However, Drauz (2002), head of the Merger Task Force maintains that the Commission does accept an efficiency defense, but does not accept short-term cost savings which are not likely to persist or be passed on to consumers as true efficiencies.

[14] Case IV/M. 1313 OJ [2000] L 20/1, [2000] 5 CMLR 296.

Whish (2001) suggests that the presence of efficiencies may informally influence the Commission's assessment of creation or strengthening of a dominant position, but that Art. 2(1) may mean that there is no efficiency defense in the EU as a matter of law. (Whish, 2001) The European Court of Justice has not addressed this issue, but it may have the opportunity to do because the *GE/Honeywell* decision of the Commission blocking the merger currently is on appeal.

3. The Model

In this section we describe the model as it applies in the single-country situation. Section 5 describes the adjustments we make to the model to consider the two-country situation.

There are up to two producers, *a* and *b*, each producing a single differentiated product, who seek to maximize individual profits by simultaneously choosing uniform prices. Each customer perfectly observes product characteristics and prices and makes her purchasing decision to maximize net consumer surplus. A customer who chooses to purchase buys a single unit of output from the producer that offers her the greatest net consumer surplus.

Customers are uniformly distributed on a line segment with endpoints zero and one. *a* and *b* are also located on the line segment such that *a* is closer to zero than is *b*, but neither firm is located at an endpoint. For convenience we use the firms' names to represent their locations on the line segment, i.e., *a* is located at point *a* and *b* is located at point *b*. A customer located at x_i on the line segment and purchasing from *a* receives utility $u^a \equiv \alpha - t|x_i - a|$, where *t* is the "cost" of distance between *a* and the customer and α represents the quality of *a*'s product. Likewise, a customer at x_i and purchasing from *b* receives utility $u^b \equiv \beta - t|x_i - b|$, where β is the quality of *b*'s product.

A customer chooses to purchase if doing so results in her receiving non-negative net consumer surplus. Assuming $7t(4a+b) - 90(\alpha - c^a) - 15(\beta - c^b) > 0$, there exists a customer at x_ℓ located between 0 and *a*, who is indifferent between purchasing and not purchasing the product. c^j is firm *j*'s constant marginal cost of output.[15] Assuming for convenience that this customer purchases from *a* if the customer chooses to consume, this customer's net consumer surplus is $s_\ell \equiv \alpha - t(a - x_\ell) - p^a = 0$, where p^a is *a*'s uniform price. Solving for x_ℓ, we express this customer's location on the line segment as

$$x_\ell = \frac{ta - \alpha + p^a}{t}. \qquad (1)$$

[15] If only *a* produces, then the necessary assumption is $a - \frac{\alpha - c^a}{2t} > 0$.

Likewise, assuming $1 > \frac{15(\alpha - c^a) + 90(\beta - c^b) + 7t(a+4b)}{35t}$, there exists a customer at x_h located between *b* and 1, who is indifferent between purchasing and not purchasing the product.[16] Assuming for convenience that this customer purchases from *b*, this customer's net consumer surplus is $s_h \equiv \beta - t(x_h - b) - p^b = 0$ and her location is

$$x_h = \frac{-tb + \beta - p^b}{t}. \tag{2}$$

Finally, assuming $3(\alpha - c^a + \beta - c^b) - 7t(b-a) \geq 0$, there exists a customer at x_m located between *a* and *b* who purchases, but who is indifferent between the two firms. This customer's net consumer surplus is $s_m \equiv \alpha - t(x_m - a) - p^a = \beta - t(b - x_m) - p^b$ and her location is

$$x_m = \frac{\alpha - \beta + t(a+b) + p^b - p^a}{2t}. \tag{3}$$

Assuming that there are *n* customers at each location on the line segment, we can subtract (1) from (3) to express the demand for *a*'s product as

$$D_a(p^a, p^b) \equiv n\frac{3(\alpha - p^a) - \beta + p^b + t(b-a)}{2t}.$$

We can similarly subtract (3) from (2) and express the demand for *b*'s product as

$$D_b(p^a, p^b) \equiv n\frac{3(\beta - p^b) - \alpha + p^a - t(b-a)}{2t}.$$

Assuming that each firm *j* incurs a fixed cost f^j, we can now express the profit functions of *a* and *b* respectively as

$$\pi^a \equiv (p^a - c^a)D_a - f^a$$

and

$$\pi^b \equiv (p^b - c^b)D_b - f^b.$$

As a useful benchmark, we assume that a benevolent social planner would seek to maximize weighted social welfare

$$W \equiv w(s^a + s^b) + (1-w)(\pi^a + \pi^b),$$

[16] If only *a* produces, then the necessary assumption is $1 > a + \frac{\alpha - c^a}{2t}$.

where w is a weight from zero to one that the social planner places on net consumer surplus, $s^a \equiv \int_{x_\ell}^{a} n\left(\alpha - t(a-\hat{x}) - p^a\right)d\hat{x} + \int_{a}^{x_m} n\left(\alpha - t(\hat{x}-a) - p^a\right)d\hat{x}$ is the net consumer surplus received by customers purchasing from a, and $s^b \equiv \int_{x_m}^{b} n\left(\beta - t(b-\hat{x}) - p^b\right)d\hat{x} + \int_{b}^{x_h} n\left(\beta - t(\hat{x}-b) - p^b\right)d\hat{x}$ is the net consumer surplus received by customers purchasing from b. To maximize weighted social welfare, the social planner would choose $p^a = \frac{2c^a(w-1)+(2w-1)(t(b-a)+2\alpha)}{2(3w-2)}$ and $p^b = \frac{2c^b(w-1)+(2w-1)(t(b-a)+2\beta)}{2(3w-2)}$, which, if the social planner places equal weight on net consumer surplus and profits, simplify to $p^a = c^a$ and $p^b = c^b$.

4. Single-Country Situation

We now consider a single-country situation in which a proposed merger would increase the quality of a's product by $\Delta\alpha$. The country may use one of three criteria for deciding whether to approve the merger.

Welfare Criteria. The country denies the merger if welfare in the country is lower with the merger than without it.

Consumer Surplus Criteria. The country denies the merger if net consumer surplus for the country's customers is lower with the merger than without it.

Competition Criteria. The country denies the merger if b would exit if the merger occurred.

We assume that if the country uses the welfare criteria it gives producer profit and net consumer surplus equal weights. We also adopt the following to conserve notation $N^b = -3(\alpha - c^a) + 17(\beta - c^b) + 7t(b-a)$, $N^a = 17(\alpha - c^a) - 3(\beta - c^b) + 7t(b-a)$, $\ell = \frac{-18(\alpha - c^a) - 3(\beta - c^b) + 7t(b+4a)}{35t}$, $\mu = \frac{3(\alpha - c^a - \beta + c^b) + 7t(b+a)}{14t}$, $\eta = \frac{3(\alpha - c^a) + 18(\beta - c^b) + 7t(4b+a)}{35t}$, $\omega^a = \frac{3\alpha^2 N^a}{7t} - t\left(a(a-\ell-\mu) - \frac{\mu^2+\ell^2}{2}\right)$, and $\omega^b = \frac{3\beta^2 N^b}{7t} - t\left(\beta(\beta-\eta-\mu) - \frac{\eta^2+\mu^2}{2}\right)$.

Proposition 1 provides this section's primary result. Conditions 1 and 2 and Lemma 1 are useful for Proposition 1.

Condition 1. A quality-improving merger decreases b's profit by less than $9n\frac{N^b}{1225t}\Delta\alpha$.

Lemma 1. When Condition 1 holds, b remains in the market if the merger occurs. b exits if Condition 1 does not hold.

An increase in *a*'s quality has two effects on *b*'s output. One effect is the decrease in *b*'s market share that results from the greater value that customers place on *a*'s product. The customers who would be indifferent between purchasing from *a* or *b* if there were no merger strictly prefer to purchase from *a* if the merger occurs, all other things being equal. In other words, higher quality for *a* shifts x_m to the right, which implies a smaller market share for *b*. Furthermore, the increase in *a*'s quality decreases customers' willingness to pay for *b*'s output. This lowers *b*'s profit-maximizing price. If these two effects are sufficiently large, *b* cannot cover its fixed costs and so chooses to not produce.

Condition 2. The difference between the net consumer surplus if both *a* and *b* produce and the net consumer surplus if only *a* produces is less than $n\frac{\alpha - c^a}{2t}\Delta\alpha$.

Condition 3. The effect on welfare of a quality-improving merger is greater than zero, i.e.,

$$n\left(3\frac{\left(-\alpha + c^a\right)^2 + 2\left(\alpha - c^a\right)\Delta\alpha}{4t} - \omega^a - \omega^b + \frac{3}{7t}\left(N^a c^a + N^b c^b\right)\right) + f^b > 0.$$

Proposition 1. The country approves the proposed merger when (1) the country applies the welfare criteria and Condition 3 holds, (2) the country applies the consumer surplus criteria and Condition 2 holds, or (3) the country applies the competition criteria and Condition 1 holds. The country denies the proposed merger otherwise.

We illustrate Proposition 1 with a simulation in which we assume that the quality of *a*'s output ranges from 3 to 4.57 without the proposed merger and from 3 to 6 with the proposed merger, the quality of *b*'s output is 3, *a*'s location is 0.4 and *b*'s location is 0.6, both firms' constant marginal cost of production is 1 and fixed cost is 2, customer density is 10, the cost of distance is 6, and when the country applies the welfare criteria it weights profit and net consumer surplus equally, i.e., α = [3, 4.57] without the merger and α = [3, 6] with the merger, β = 3, a = 0.4, b = 0.6, $c^a = c^b = 1$, $f^a = f^b = 2$, n = 10, t = 6, and w = 0.5. It is trivial to show that these parameter values satisfy the assumptions in Section 3.

Figure 1 shows the results of this simulation. The horizontal axis represents values for α, expressed as a function of β. The vertical axis represents dollar values for welfare and net consumer surplus. Welfare is represented by a solid line and net consumer surplus is represented by a dashed line. Net consumer surplus is higher for higher values of α, except when *b* exits the market, which happens at $a = 1.57\beta$. Net consumer surplus decreases at that point because of the loss of competition, but continues to rise as α increases beyond 1.57β. When α is greater than 1.64β, net consumer surplus exceeds the maximum level that it reached before *b* exited the market. Welfare is always increasing in *a*'s quality even when *b* exits the market because the increase in *a*'s profit that results from *b*'s exit more than compensates for the corresponding loss in net consumer surplus.

[INSERT FIGURE 1 ABOUT HERE]

If the country applies the welfare criteria it always approves the merger because the merger always improves welfare. If the country applies the competition criteria, it approves the merger as long as *a*'s quality does not exceed 1.57β after the merger because *b* exits the market at that point. If the country applies the net consumer surplus criteria, it approves the merger if *a*'s quality is:

(a) Less than 1.47β without the merger,
(b) Less than 1.57β with the merger, or
(c) Greater than 1.64β with the merger.

In (a) net consumer surplus without the merger is lower than s_1, the lowest net consumer surplus with *a* as a monopoly. Because the only adverse effect of the merger on net consumer surplus quality is *b* exiting the market, customers are always made better off by the merger. In (b) *b* remains the in the market, so the merger increases net consumer surplus. In (c) net consumer surplus with the merger is greater s_2, which is the greatest net consumer surplus that customers receive with *b* in the market.

If *a*'s quality is greater than 1.47β without the merger and between 1.57β and 1.64β with the merger, and if the country applies the consumer surplus criteria, the country approves the merger if Condition 2 applies, i.e., if $\Delta\alpha > \frac{0.326-\alpha(0.807-0.386\alpha)}{0.833(\alpha-1)}$.

5. Two-country Situation

We now consider the situation in which there are two countries, *A* and *B*. *a* is "from" *A*, which means *a*'s profit goes to shareholders in *A*, and *b* is from *B*. Customers of every type are in both countries, but *A* has more customers closer to zero than does *B* and *B* has more customers located closer to 1 than does *A*. To represent this, we assume that *A* has $n(1-x_i)$ customers located at x_i and *B* has nx_i customers located at x_i. This might be the case if, for example, a company initially sold only in its own country and as a result had products that more closely matched its home country's customers than other countries' customers. We adopt the following to conserve notation

$$T^A = t\left(a^2+b^2\right) - \ell\left(\frac{2-\ell}{2}(\alpha-ta) - t\ell\frac{3-2\ell}{6}\right) + \eta\left(\frac{2-\eta}{2}(\beta+tb) - t\eta\frac{3-2\eta}{6}\right) + \mu\frac{2-\mu}{2}(\alpha-\beta+t(b+a)) \text{ and}$$

$$T^B = -\frac{t\left(a^3+b^3\right)}{3} - \frac{\ell^2}{2}\left(\alpha - t\left(a-\frac{\ell}{3}\right)\right) + \frac{\eta^2}{2}\left(\beta+t\left(b-\frac{\eta}{3}\right)\right) + \frac{\mu^2}{2}(\alpha-\beta+t(a+b)).$$

It is trivial to show that if both countries apply the competition criteria, then both countries approve the merger when Condition 1 applies and deny the merger when Condition 1 does not apply. Propositions 2 and 3 describe when the countries approve or deny the merger if they apply the consumer surplus or welfare criteria.

Condition 4A. The effect on net consumer surplus for customers in *A* if *a*'s quality improves by $\Delta\alpha$ and *b* exits the market is greater than zero, i.e.,

$$\frac{(1-a)(\alpha-c^a)}{2t}\left(\frac{(\alpha-c^a)}{2}+\Delta\alpha\right)-T^a+(\mu-\ell)\frac{N^a+c^a}{35}+(\eta-\mu)\frac{N^b+c^b}{35}>0.$$

Condition 4B. The effect on net consumer surplus for customers in *B* if *a*'s quality improves by $\Delta\alpha$ and *b* exits the market is greater than zero, i.e.,

$$\frac{a(\alpha-c^a)}{2t}\left(\frac{\alpha-c^a}{2}+\Delta\alpha\right)-T^b+\frac{(\eta^2-\mu^2)(N^b+c^b)}{70}+\frac{(\mu^2-\ell^2)(N^a+c^a)}{70}>0.$$

Proposition 2. If both countries apply the net consumer surplus criteria, *A* approves the merger when Condition 4A applies and *B* approves the merger when Condition 4B applies.

We illustrate Proposition 2 with a simulation using the same parameter values as in Section 4. Figure 2 shows the results of this simulation. The horizontal axis represents values for α. The vertical axis represents dollar values for net consumer surplus. Applying the consumer surplus criteria, *A* always approves the merger when α is:

(d) Less than 1.52β without the merger,
(e) Less than 1.57β with the merger, or
(f) Greater than 1.6β with the merger.

In (d) net consumer surplus without the merger is lower than s_5, the lowest net consumer surplus that customers in *A* receive with *a* as a monopoly. In (e) *b* remains the in the market, so the merger increases net consumer surplus. In (f) net consumer surplus with the merger is greater than s_6, which is the greatest net consumer surplus that customers in *A* receive with *b* in the market. If *a*'s quality is greater than 1.52β without the merger and between 1.57β and 1.6β with the merger, *A* approves the merger if Condition 4A applies.

[INSERT FIGURE 2 ABOUT HERE]

Applying the consumer surplus criteria, *B* always approves the merger when α is:

(g) Less than 1.38β without the merger,
(h) Less than 1.57β with the merger, or
(i) Greater than 1.68β with the merger,

for reasons analogous to those for *A*. If *a*'s quality is greater than 1.38β without the merger and between 1.57β and 1.68β with the merger, *B* approves the merger if Condition 4B applies.

Customers in *A* benefit more from an increase in α than do customers in *B* because customers of *a* benefit more from an increase in quality than do customers of *b* and *a* serves more customers in *A* than it does in *B*. *a* serves more customers in *A* than it does in *B* because *a* is closer in location to the customers in *A* than it is to the customers in *B*. The effect of this closer proximity to more customers in *A* than in *B* means that more customers in *A* (than in *B*) prefer *a*'s output to *b*'s output, all other things being equal.

Condition 5A. The effect on welfare in *A* if *a*'s quality improves by $\Delta\alpha$ and *b* exits the market is greater than zero, i.e.,

$$\frac{(3-a)(\alpha-c^a)}{2t}\left(\frac{(\alpha-c^a)}{2}+\Delta\alpha\right)-T^a+(\mu-\ell)c^a+(\eta-\mu)\frac{N^b+c^b}{35}-\frac{\mu^2-\ell^2}{70}\left(N^a-34c^a\right)>0\,.$$

Condition 5B. The effect on welfare in *B* if *a*'s quality improves by $\Delta\alpha$ and *b* exits the market is greater than zero, i.e.,

$$n\left(\frac{a(\alpha-c^a)}{2t}\left(\frac{(\alpha-c^a)}{2}+\Delta\alpha\right)-T^b+\frac{(\eta^2-\mu^2)}{70}c^b+\frac{(\mu^2-\ell^2)(N^a+c^a)}{70}-\frac{(\eta-\mu)(2-\eta-\mu)}{70}\left(N^b-34c^b\right)\right)+f^b>0\,.$$

Proposition 3. If both countries apply the welfare criteria, *A* approves the merger if Condition 5A applies and *B* approves the merger if Condition 5B applies. The countries deny the merger otherwise.

We illustrate Proposition 3 with a simulation using the same parameter values that we used for Proposition 2. Figure 3 shows the results. The horizontal axis represents values for α. The vertical axis represents dollar values for welfare. *A* is represented by a solid line and *B* is represented by a dashed line. *A* always approves the merger when it applies the welfare criteria because a higher α always results in higher welfare for *A*. This holds because *A* includes *a*'s profit in welfare and the increase in *a*'s profit if *b* exits is greater than the loss of welfare for customers in *A*. *B* always approves the merger when α is:

(j) Less than 1.2β without the merger,
(k) Less than 1.57β with the merger, or
(l) Greater than 1.69β with the merger,

for reasons analogous to those given in the discussion of Figure 2. If *a*'s quality is greater than 1.2β without the merger and between 1.57β and 1.69β with the merger, *B* approves the merger if Condition 5B applies.

[INSERT FIGURE 3 ABOUT HERE]

We now examine situations in which *A* and *B* agree and in which they disagree on whether the merger should be approved. We also compare their decisions to those of a social planner who 1) considers the effects of the merger on both counties, 2) applies equal weights to both countries' net consumer surplus and welfare measures, and 3) if she applies the welfare criteria, applies equal weights to net consumer surplus and profit. *A* approves the merger if it applies:

i) The competition criteria when Condition 1 applies,
ii) The consumer surplus criteria and $\alpha < 1.52\beta$ without the merger,
iii) The consumer surplus criteria and $\alpha > 1.52\beta$ without the merger and Condition 4A applies, or
iv) The welfare criteria.

B approves the merger if:

i) The competition criteria when Condition 1 applies,
ii) The consumer surplus criteria and $\alpha < 1.38\beta$ without the merger,
iii) The consumer surplus criteria and $\alpha > 1.38\beta$ without the merger and Condition 4B applies,
iv) The welfare criteria and $\alpha < 1.2\beta$ without the merger, or
v) The welfare criteria and $\alpha > 1.2\beta$ without the merger and Condition 5B applies.

The social planner would approve the merger if:

i) The competition criteria when Condition 1 applies,
ii) The consumer surplus criteria and $\alpha < 1.47\beta$ without the merger,
iii) The consumer surplus criteria and $\alpha > 1.47\beta$ without the merger and Condition 2 applies, or
iv) The welfare criteria.

Table 1 summarizes this comparison. The column on the left expresses *a*'s quality without a merger as a function of *b*'s quality. The remaining columns indicate the conditions under which a country or the social planner would approve the merger.

[INSERT TABLE 1 ABOUT HERE]

There are many combinations of decision criteria and product quality that could result in disagreements. In general, *A* approves more mergers than *B* because customers in *A* benefit more from *a*'s quality improvements than do customers in *B*, and because *a* always benefits from the merger and *b* never benefits. This difference between *A* and *B* is more pronounced if *B* applies the welfare criteria. *A* is willing to approve mergers that the social planner would not approve, and *B* would deny mergers that the social planner would approve, because neither country internalizes the effects the merger has in the other country.

This analysis could contribute to understanding some of the disagreements between US and EU competition authorities on mergers. The proposed mergers that have resulted in disagreements have been mergers of US firms. This makes the US more comparable to country *A* and the EU more comparable to country *B*. Based on this, we would expect the US to approve mergers that the EU would not approve, even if the countries agreed upon the criteria to apply and the facts of the merger. Furthermore, the EU criteria for approving mergers include concerns for weakening competitors to the merging companies, which would appear to resemble the welfare criteria. The EU would approve fewer mergers applying the welfare criteria than any other of our three criteria.

6. Conclusion

We have shown conditions under which countries would disagree on whether to approve or deny quality-improving mergers. In general under our model, the countries should agree to approve the merger as long as it does not cause a rival to exit. Also, we find that a country is more likely to approve quality-improving mergers between domestic firms than between foreign firms operating in its country. Both net consumer surplus and welfare are higher for mergers

between domestic firms than between foreign firms because the country's customers prefer the domestic firms' output and the country internalizes the effects of the merger on the domestic firms' profits, but does not internalize the effects on the foreign firms' profits.

Appendix

Proof of Lemma 1. If *b* produces it receives profits

$$\pi^{b^*} = \frac{3n\left(-3\left(\alpha - c^a\right)+17\left(\beta - c^b\right)+7(b-a)\right)^2}{2450t} - f^b. \tag{1A}$$

Differentiating 1A with respect to α gives

$$\frac{\partial \pi^{b^*}}{\partial \alpha} = \frac{9n\left(3\left(\alpha - c^a\right)-17\left(\beta - c^b\right)-7(b-a)\right)}{1225t}. \tag{2A}$$

Multiplying 2A by $\Delta\alpha$ and subtracting from 1A gives

$$\pi^{b^*} - \frac{\partial \pi^{b^*}}{\partial \alpha}\Delta\alpha = 3n\left(3\left(\alpha - c^a\right)-17\left(\beta - c^b\right)-7(b-a)\right)\left(\frac{3\left(\alpha - c^a\right)-17\left(\beta - c^b\right)-7(b-a)+6n\Delta\alpha}{2450t}\right) - f^b,$$

which must be positive for *b* to remain in the market.

Proof of Proposition 1. Total welfare for *a* and its customers is

$$n\left(\omega^a - \frac{3\alpha N^a}{7t}c^a\right) - f^a \tag{3A}$$

and the total welfare for *b* and its customers is

$$n\left(\omega^b - \frac{3\beta N^b}{7t}c^b\right) - f^b. \tag{4A}$$

Combining (3A) and (4A) gives total welfare in the single country case when both *a* and *b* produce

$$n\left(\omega^a + \omega^b - \frac{3}{7t}\left(N^a c^a + N^b c^b\right)\right) - f^a - f^b. \tag{5A}$$

Total welfare in the single country case when only *a* produces is

$$\frac{3n\left(-\alpha + c^a\right)^2}{4t} - f^a. \tag{6A}$$

Combining (5A) and (6A) shows how *b*'s exit changes total welfare

$$n\left(\frac{3\left(-\alpha+c^{a}\right)^{2}}{4t}-\omega^{a}-\omega^{b}+\frac{3}{7t}\left(N^{a}c^{a}+N^{b}c^{b}\right)\right)+f^{b}. \tag{7A}$$

The effect of a change in quality on welfare in the single country case when only *a* produces is

$$\frac{3n\left(\alpha-c^{a}\right)}{2t}. \tag{8A}$$

Combining (7A) and (8A), if *b*'s exit is prompted by an increase in *a*'s quality, then the effect of the increase in quality on welfare is

$$n\left(3\frac{\left(-\alpha+c^{a}\right)^{2}+2\left(\alpha-c^{a}\right)\Delta\alpha}{4t}-\omega^{a}-\omega^{b}+\frac{3}{7t}\left(N^{a}c^{a}+N^{b}c^{b}\right)\right)+f^{b}. \tag{9A}$$

This confirms part 1 of Proposition 1.

Net consumer surplus for customers of *a* and *b* when both produce is

$$n\left(\omega^{a}+\omega^{b}-\frac{3}{235t}\left(\alpha N^{a}\left(N^{a}+c^{a}\right)+\beta N^{b}\left(N^{b}+c^{b}\right)\right)\right). \tag{10A}$$

Net consumer surplus if on *a* produces is

$$n\frac{\left(c^{a}-\alpha\right)^{2}}{4t} \tag{11A}$$

and the effect of $\Delta\alpha$ on (11A) is

$$n\frac{\alpha-c^{a}}{2t}\Delta\alpha. \tag{12A}$$

Combining (10A), (11A), and (12A), if *b* exits because of an increase in *a*'s quality, then the effect of the increase in quality on net consumer surplus is

$$n\left(\frac{\left(c^{a}-\alpha\right)^{2}}{4t}+\frac{\alpha-c^{a}}{2t}\Delta\alpha-\omega^{a}-\omega^{b}+\frac{3}{235t}\left(\alpha N^{a}\left(N^{a}+c^{a}\right)+\beta N^{b}\left(N^{b}+c^{b}\right)\right)\right). \tag{13A}$$

This confirms part 2 of Proposition 1. Lemma 1 is sufficient to prove part 3.

Proof of Proposition 2. Net consumer surplus for customers in *A* if both *a* and *b* produce is

$$n\left(T^a-(\mu-\ell)\frac{N^a+c^a}{35}-(\eta-\mu)\frac{N^b+c^b}{35}\right). \tag{14A}$$

If only *a* produces, net consumer surplus for customers in *A* is

$$n(1-a)\frac{\left(\alpha-c^a\right)^2}{4t}. \tag{15A}$$

As α changes, the change in (15A) is

$$n(1-a)\frac{\alpha-c^a}{2t}\Delta\alpha. \tag{16A}$$

Combining (14A), (15A), and (16A), if *b* exits because of a change in α, the effect on net consumer surplus for customers in *A* is

$$n\left(\frac{(1-a)(\alpha-c^a)}{2t}\left(\frac{(\alpha-c^a)}{2}+\Delta\alpha\right)-T^a+(\mu-\ell)\frac{N^a+c^a}{35}+(\eta-\mu)\frac{N^b+c^b}{35}\right). \tag{17A}$$

Net consumer surplus for customers in *B* if both *a* and *b* produce is

$$n\left(T^b-\frac{\left(\eta^2-\mu^2\right)\left(N^b+c^b\right)}{70}-\frac{\left(\mu^2-\ell^2\right)\left(N^a+c^a\right)}{70}\right) \tag{18A}$$

and if only *a* produces is

$$na\frac{\left(\alpha-c^a\right)^2}{4t}. \tag{19A}$$

The effect of a change in α on (19A) is

$$na\frac{\alpha-c^a}{2t}\Delta\alpha. \tag{20A}$$

Combining (18A), (19A), and (20A), if *b* exits because of a change in α, the effect on net consumer surplus for customers in *B* is

$$n\left(\frac{a(\alpha-c^a)}{2t}\left(\frac{\alpha-c^a}{2}+\Delta\alpha\right)-T^b+\frac{\left(\eta^2-\mu^2\right)\left(N^b+c^b\right)}{70}+\frac{\left(\mu^2-\ell^2\right)\left(N^a+c^a\right)}{70}\right). \tag{21A}$$

Proof of Proposition 3. Welfare for customers in *A* and firm *a* if both *a* and *b* produce is

$$n\left(T^a-(\mu-\ell)c^a-(\eta-\mu)\frac{N^b+c^b}{35}+\frac{\mu^2-\ell^2}{70}\left(N^a-34c^a\right)\right)-f^a. \tag{22A}$$

If only *a* produces, welfare for *a* and customers in *A* is

$$n(3-a)\frac{\left(\alpha-c^a\right)^2}{4t}-f^a. \tag{23A}$$

The effect of a change in α on (23A) is

$$n(3-a)\frac{\alpha-c^a}{2t}\Delta\alpha. \tag{24A}$$

Combining (22A), (23A), and (24A), the effect on welfare in *A* of *b* exiting as a result of a quality-increasing merger is

$$n\left(\frac{(3-a)\left(\alpha-c^a\right)}{2t}\left(\frac{\left(\alpha-c^a\right)}{2}+\Delta\alpha\right)-T^a+(\mu-\ell)c^a+(\eta-\mu)\frac{N^b+c^b}{35}-\frac{\mu^2-\ell^2}{70}\left(N^a-34c^a\right)\right). \tag{22A}$$

Welfare for *b* and customers in *B* if both *a* and *b* produce is

$$n\left(T^b-\frac{\left(\eta^2-\mu^2\right)}{70}c^b-\frac{\left(\mu^2-\ell^2\right)\left(N^a+c^a\right)}{70}+\frac{(\eta-\mu)(2-\eta-\mu)}{70}\left(N^b-34c^b\right)\right)-f^b \tag{23A}$$

and if only *a* produces is simply net consumer surplus, which is (19A). The effect of a change in α on (19A) is (20A). Combining (19A), (20A), and (23A), the effect on welfare in *B* if *b* exits as a result of a change in α is

$$n\left(\frac{a\left(\alpha-c^a\right)}{2t}\left(\frac{\left(\alpha-c^a\right)}{2}+\Delta\alpha\right)-T^b+\frac{\left(\eta^2-\mu^2\right)}{70}c^b+\frac{\left(\mu^2-\ell^2\right)\left(N^a+c^a\right)}{70}-\frac{(\eta-\mu)(2-\eta-\mu)}{70}\left(N^b-34c^b\right)\right)+f^b.$$

This confirms Proposition 3.

References

Bermann, G., R. Goebel, W. Davey, and E. Fox, *Cases and Materials on European Union Law* (Minneapolis: West Publishing, 2nd Ed. 2002), pp. 973-4.

Deringer, A., in conference discussions, *Enterprise law of the 80's: European and American perspectives on competition and industrial organization* [F. Rowe, F. Jacobs & M. Joelson, Eds.] (Chicago, 1980), 65.

Drauz, G., "Unbundling GE/Honeywell: The Assessment of Conglomerate Mergers Under EC Competition Law," 2001 *Fordham Corp. L. Institute* 183, 192 (2002).

Faull, J., 'The enforcement of competition policy in the European Community: a mature system', 18 (1992) *Fordham Corp. Law Inst.* 139, 141 (B. Hawk, ed.).

Faull, J., and A. Nikpay, eds., *The EC Law of Competition* (Oxford: Oxford Press 1999), p. 250.

Green, N., T. Hartley, & J. Usher, *The legal foundations of the Single European Market* [T. Hartley, Ed.] (Oxford, 1991), 201; V. Korah, *EC competition law and practice*, 5th edn. (London, 1994), 1.

Hawk, B., *United States, Common Market and international antitrust*, II, 6, (2d edn.), (Englewood Cliffs, N.J. Supp. 1990).

Head, K., and J. Ries, "International Mergers and Welfare under Decentralized Competition Policy," *The Canadian Journal of Economics*, 30(4b): November 1997, pp. 1104-1123.

High Authority, European Coal and Steel Community, *Memorandum On The Anti-Trust Policy of The High Authority* 1 (1954). (Translation by the High Authority)

James, C. A., "International Antitrust in the 21st Century: Cooperation and Convergence," *Presentation to the OECD Global Forum on Competition*, Paris, France, October 17, 2001.

Jones, C.A., *Private Enforcement of Antitrust Law in the EU, UK, and USA* (Oxford: Oxford Press 1999), p. 25.

Monti, M., "Antitrust in the US and Europe: A History of Convergence," *Presentation to the American Bar Association*, Washington, D.C., November 14, 2001.

Neven, D. J., and L. R`ller, "The Allocation of Jurisdiction in International Antitrust," *European Economic Review*, 44: 2000, pp. 845-855.

Patterson, D. E., and C. Shapiro, "Trans-Atlantic Divergence in *GE/Honeywell:* Causes and Lessons," *Antitrust Magazine*, 16(1): Fall 2001.

Schmitz, S., "Can We Regulate Competition Internationally? A Case Study of the Attempted GE/Honeywell Merger," *University of Pennsylvania Journal of International Economic Law*, 23: Fall 2002.

Trebilcock, C., *The Industrialization of the continental powers 1780-1914* (Oxford, 1981).

Weatherill, S., *Cases & Materials on EC Law*, (London: Blackstone Press, 5th edn. 2000), p. 28.

Whish, R., *Competition Law* (London: Butterworths, 5th Ed. 2001), p. 777.

Figure 1. Effects of Change in Innate Quality of Firm a's Output on Profits and Net Consumer Surplus, Single Country

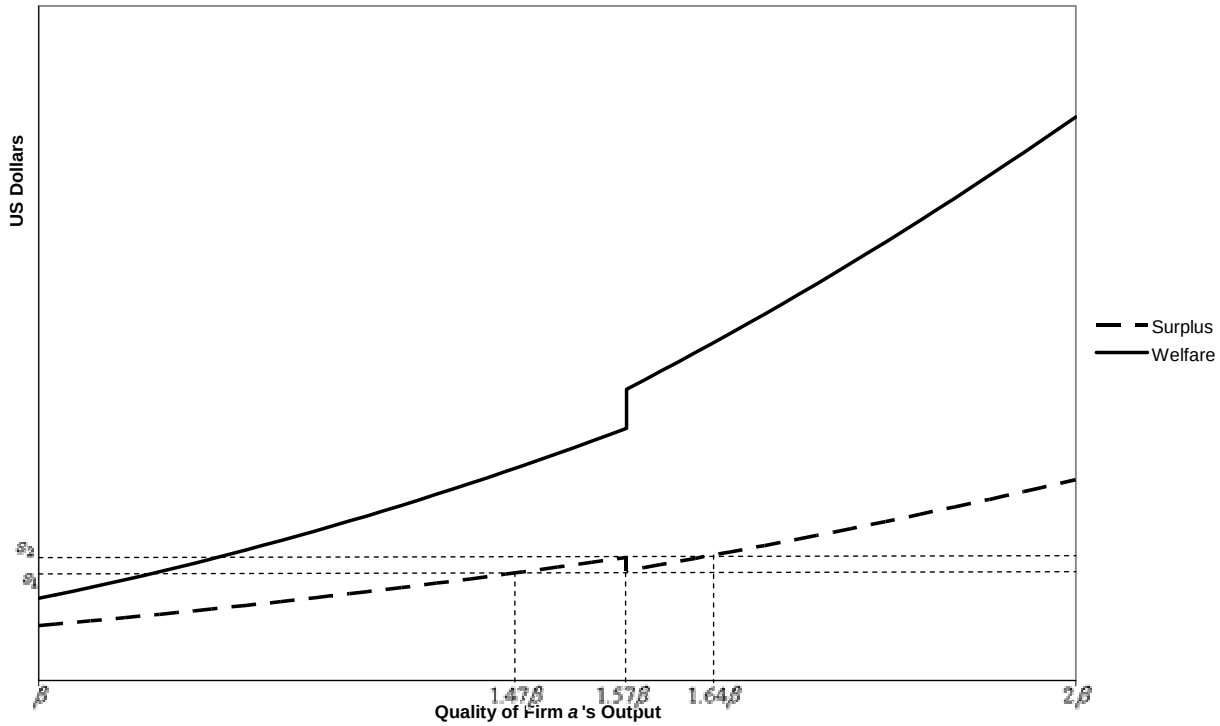

Figure 2. Effects on Net Consumer Suplus of Change in Innate Quality of Firm a's Output by Country

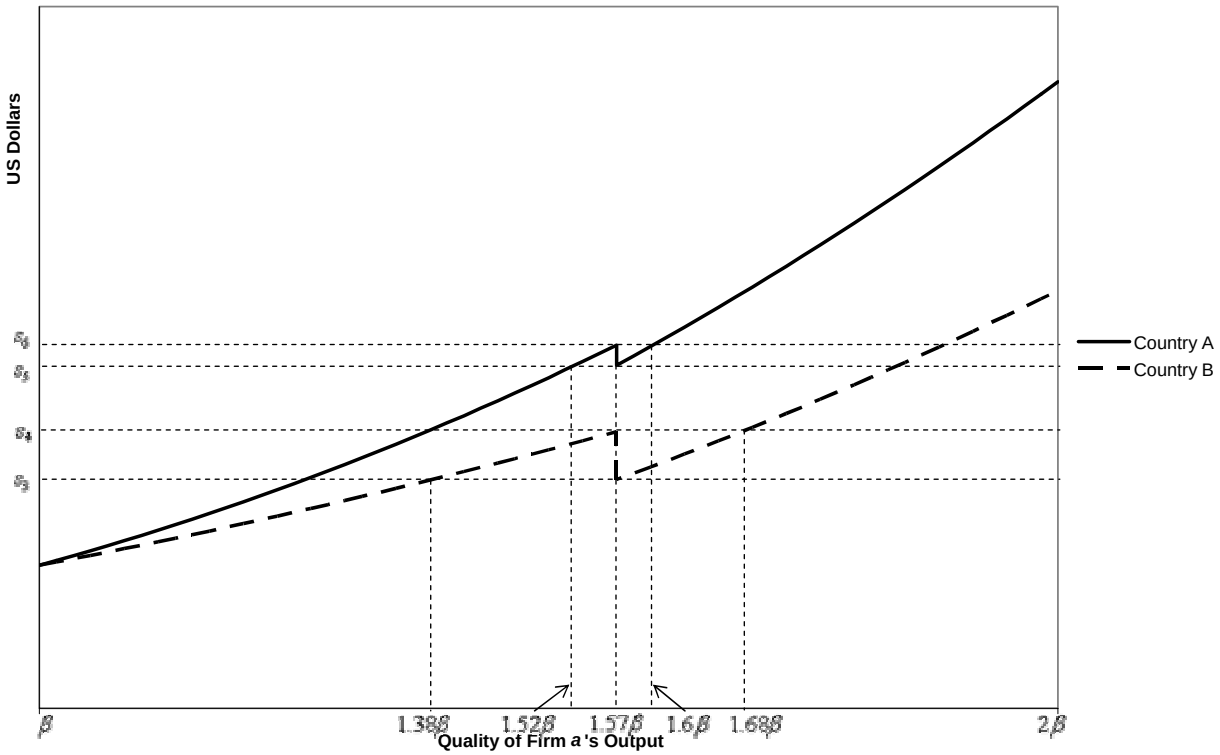

Figure 3. Welfare Effects of Increase in Innate Quality of Firm a's Output by Country

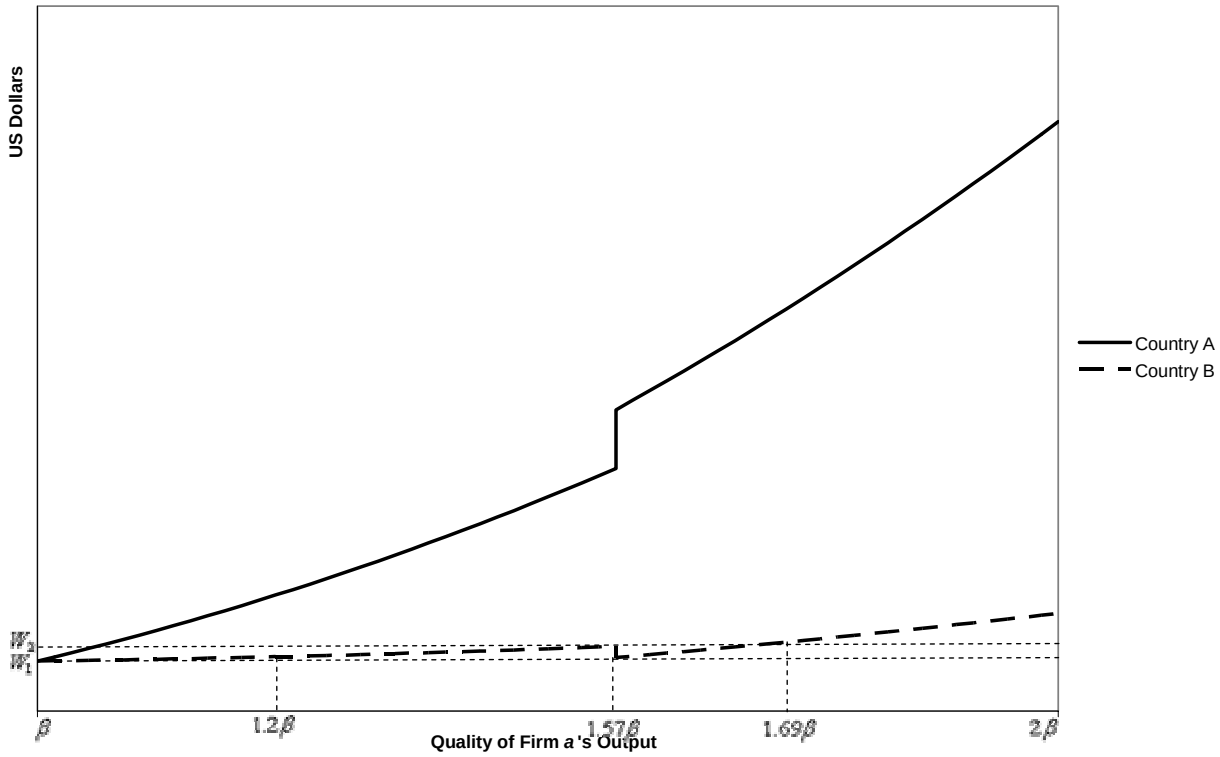

Table 1. Areas of Agreement and Disagreement for Countries *A* and *B*

a's quality w/o merger	Criteria Applied							
	Competition		Consumer Surplus			Welfare		
	A's Decision	*B*'s Decision	*A*'s Decision	*B*'s Decision	Social Planner	*A*'s Decision	*B*'s Decision	Social Planner
β				Approve			Approve	
1.2β	Approve if Condition 1 Applies	Approve if Condition 1 Applies	Approve		Approve	Approve		Approve
1.38β				Approve if Condition 4B Applies			Approve if Condition 5B Applies	
1.47β					Approve if Condition 2 Applies			
1.52β			Approve if Condition 4A Applies					
1.57β								