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**ON THE ECONOMICS OF THE
“MEETING COMPETITION
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ROBINSON-PATMAN ACT**

by

Iñaki Aguirre

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University of the Basque Country

On the Economics of the “Meeting Competition Defense” Under the Robinson-Patman Act¹

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Iñaki Aguirre²

University of the Basque Country UPV/EHU

Abstract

In this paper we analyze the welfare effects of third-degree price discrimination when competitive pressure varies across markets. In particular, we study the economic aspects of the Robinson-Patman Act associated with the “meeting competition defense.” Using equilibrium models, the main result we find is that this defense might be used successfully in cases of primary line injury precisely when it should not be used, namely when price discrimination reduces social welfare. This result obtains both when discrimination appears in the final good market and when it is used in the intermediate goods market. We also find that these results may also remain under secondary line injury. (JEL D42, L12, L13)

1. Introduction

In this paper we analyze the welfare effects of third-degree price discrimination when competitive pressure varies across markets, an important issue that is present in many

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² Departamento de Fundamentos del Análisis Económico I and *BRiDGE* Group, University of the Basque Country UPV/EHU, Avda. Lehendakari Aguirre 83, 48015-Bilbao, Spain, e-mail: inaki.aguirre@ehu.es.

cases of antidiscrimination litigation. Consider a multimarket seller engaging in price discrimination and assume that the Federal Trade Commission (FTC) initiates a case against this firm under Section 2 of the Robinson-Patman (R-P) Act which says that it is unlawful “to discriminate in price between different purchases of commodities of like grade and quality.” Injury to competition under section 2(a) can be shown at any one of three levels (see, for instance, Dam, 1963, or Schwartz, 1986): (1) primary line, entailing injury to direct rivals of the discriminating firm; secondary line, involving harm to buyers competing with favored buyers; and tertiary line, implying damage to competitors of customers of favored buyers. We focus on settings where primary line or secondary line injuries are involved, as these include the vast majority of antitrust cases. Section 2(b) of the R-P Act permits a seller to rebut the prima facie presumption of illegality by showing that its discriminatory price was quoted “in Good Faith to meet (not beat) an equally low price of a competitor” (see, for example, Scherer and Ross, 1990, p. 514). This defense is absolute and will bar a claim under the R-P Act regardless of injury to competitors or competition” (<http://legal-dictionary.thefreedictionary.com/Robinson-Patman+Act>). In this paper we find that, actually, this defense does not make economic sense, particularly in cases of primary line injury. The reason is that it would be applicable only when the discriminating firm was to set a lower price in the market with higher competitive pressure. But, as we will show, this kind of price discrimination will be generally welfare *reducing* in these cases and, therefore, the meeting competition defense (MCD) would lead to results that are contrary to those desired.

We analyze the effects of the MCD both when there is price discrimination in the final good market and when discrimination is used in the intermediate good market. Given that this defense is based on the existence of different competitive pressure across markets we shall consider a multimarket firm that sells a (final or intermediate) product in two markets: one market is captive and in the other market the multimarket firm faces the competition of another firm. When discrimination appears in the final good market we consider both price competition and quantity competition. This setting allows us to illustrate cases where under the R-P Act it might be considered that there exists primary line injury. “Primary line injury occurs when one manufacturer reduces its prices in a specific geographic market and causes injury to its competitors in the same market” (see Federal Trade Commission, <http://www.ftc.gov/tips-advice/competition-guidance/guide->

antitrust-laws/price-discrimination-robinson-patman). We then generalize the model to allow the competitive pressure to vary across markets and show that, under Cournot competition with homogenous product, if the low price market is the more competitive market (that is, the one with more competitors) then price discrimination reduces welfare. When discrimination affects an intermediate good we consider two cases: first, price discrimination might induce a primary line injury and, second, price discrimination might generate a secondary line injury which occurs when the favored customers of a supplier are given a price advantage over competing customers. Here, the injury is at the buyer's level.

We consider settings where the MCD could be used successfully (in an economic sense) given that the discriminating firm states a lower price in the more competitive market.³ We obtain the general result that price discrimination reduces social welfare in contexts of primary line injury. Our results are robust to the kind of competition (price or quantity competition) and the type of market (final product or intermediate good). We also show that results also maintain when we consider secondary line injury under price discrimination in the intermediate good market.

The paper is organized as follows. In Section 2 we connect our research to the relevant literature. In Section 3, we consider the effects of price discrimination in the final good market and then, in Section 4, we analyze the effects of price discrimination in the intermediate good market. Section 5 presents some concluding remarks.

³ Other possible defense is the cost justification defense which states that a seller who offered a discriminatory price may defeat a R-P Act claim by establishing that the price difference was justified by “differences in the cost of manufacture, sale, or delivery resulting from the differing methods or quantities” in which the goods are sold. Proving cost justification is difficult because of the complicated accounting analysis required to establish the defense and, therefore, it is rarely used. Chen and Schwartz (2015) show that cost-based differential pricing can increase social welfare and consumer surplus relative to uniform pricing for broad classes of demand functions, even when total output falls or the output allocation between consumers worsens.

2. Related Literature

The economic problems studied in this paper are closely connected to the literature on monopolistic and oligopolistic third-degree price discrimination both in final good markets and intermediate goods markets, and to the Competition (or Antitrust) Policy literature on price discrimination. In this section, we briefly discuss these connections.

A well-known result in the economics of monopolistic third-degree price discrimination in final good markets is that a move from uniform pricing to third-degree price discrimination reduces welfare if total output does not increase. Pigou (1920) and Robinson (1933) show that if a monopolist faces two independent linear demand curves, the use of price discrimination will not affect output but will reduce welfare. Schmalensee (1981) proves this conjecture assuming nonlinear demand curves, perfectly separated markets and constant marginal cost.⁴ Varian (1985) extends the result by allowing marginal cost to be constant or increasing (Schwartz, 1990, generalizes it to the case in which marginal cost is decreasing).⁵ We follow Varian's (1985) strategy of bounding welfare to assess the social desirability of price discrimination in contexts covered by the R-P Act.

Some works have analyzed third-degree price discrimination in oligopolistic settings. Neven and Philips (1985) show that whenever the price elasticity varies across markets, oligopolists tend to price discriminate exactly in the same way as the discriminating monopolist would. They consider a multimarket Cournot duopoly, with homogenous product, and conclude that allowing duopolists to discriminate between markets leads to a welfare loss (they consider linear demands and the total output is unchanged by price

⁴ Some authors have shown that when there are two potential markets price discrimination may lead, by opening markets, to a Pareto welfare improvement. Hausman and MacKie-Mason (1988) show that if the marginal cost is constant or falling, then price discrimination results in a Pareto improvement if it serves to open new markets. In this paper, in order to focus on the MCD we assume that all markets are served under both price regimes, uniform pricing and price discrimination.

⁵ More recently, Cowan (2007) and Aguirre, Cowan and Vickers (2010) find sufficient conditions for third-degree price discrimination to increase welfare that are related to the shape of inverse and direct demand functions.

discrimination).⁶ Holmes (1989) also studies a discriminating duopoly, but firms produce differentiated products and compete in prices. What determines which regime has a larger output is the sum of an adjusted-concavity condition and an elasticity-ratio condition (see Dastidar, 2006, for a related extension). Corts (1998) shows that price discrimination may intensify competition. Allowing firms to set market-specific prices through discrimination breaks the cross-market profit implications of aggressive price moves that may restrain price competition when firms are limited to uniform pricing. Thus, firms may price more aggressively in some markets when allowed to discriminate; if firms differ in which markets they target for this aggressive pricing and competitive reactions are strong, prices in all markets may fall. Adachi and Matsushima (2014) show that price discrimination can improve social welfare especially if firms' brands are substitutes in the market where the discriminatory price is higher and complements in the market where it is lower; however, it never improves in the reverse case.⁷ We also explore the effects of price discrimination both under strategic substitutes (Cournot competition with perfect and imperfect substitutes) and strategic complements (Bertrand competition with product differentiation). We show that our results are robust to the type of competition.

Our work is closely related to the literature on oligopoly price discrimination but with competitive pressure varying across markets. We consider the specific context of a discriminating multimarket seller facing potential competition only in one of its two markets (or different competitive pressure across markets). Armstrong and Vickers (1993) also consider a dominant incumbent firm that faces a threat of entry of a price-taking entrant in one of its two markets under the assumption of identical demand across markets. They find that banning price discrimination tends to encourage more entry since makes the incumbent less aggressive by increasing prices in the threatened market.⁸ Allowing different demands across markets, Cheung and Wang (1999) show that price discrimination may encourage or discourage entry depending on the elasticity difference between markets.

⁶ Cheung and Wang (1997) analyze the effect of price discrimination on total output considering a multimarket Cournot oligopoly. They relate the output effect to the shape of inverse demands in weak markets (low price markets) and strong markets (high price markets).

⁷ See Armstrong (2007) and Stole (2007) for comprehensive surveys of price discrimination under imperfect competition. See also Liu and Serfes (2010).

⁸ Other related papers that consider the effects of price discrimination when competition varies across markets are Aguirre (2000), Dobson and Waterson (2005), Aguirre (2011) and Jorge and Pires (2013).

Instead of considering a price-taking entrant, this paper considers, in section 3, a multimarket seller facing competition in one of its two markets, and show that the pricing policy (price discrimination or uniform pricing) of the multimarket established firm meaningfully affects competition in the duopolistic market, both under strategic substitutes and strategic complements. Under price competition, when the duopolistic market is *weak* (that is, the low price market, using Robinson's 1933 terminology), price discrimination makes the multimarket firm more aggressive (by reducing prices) and the rival also reacts more aggressively. As a consequence, there is a fall in the profit of the rival in the duopolistic market and the effect on the total profit of the multimarket seller is ambiguous (given that its profits in the monopolistic market increase).⁹ Under quantity competition, when the duopolistic market is weak, price discrimination makes the multimarket firm more aggressive (by increasing its output) and the rival reacts being less aggressive. As a consequence, there is a fall in the profit of the rival in the duopolistic market and the total profit of the multimarket seller increase.¹⁰

Following Varian (1985) we obtain upper and lower bounds on welfare change when a move is made by the multimarket firm from uniform pricing to price discrimination. These bounds on welfare change provide necessary and sufficient conditions for price discrimination to increase social welfare. In order to study the effects of the meeting competition defense, we focus on cases where the multimarket seller states a lower price in the more competitive market and show that under linear demand price discrimination reduces welfare if the duopolistic market is weak both under price competition and under quantity competition.

Over the last forty years many papers have analyzed price discrimination in input markets. Katz (1987) studies the welfare effects of price discrimination by an input monopolist that sells many local firms and a chain store. In his model, the downstream firms differ in their capability for backward integration. He finds conditions for price

⁹ If the duopolistic market were *strong* (that is, the high price market), price discrimination would lead to a moderation of price competition and, therefore, higher firms' profits than those under uniform pricing.

¹⁰ Price discrimination would make the multimarket firm less aggressive if the duopolistic market were strong, (by decreasing its output) making the rival more aggressive. As a consequence the profit of the rival increases and the effect on the total profit of the multimarket seller is ambiguous.

discrimination to reduce total output and welfare.¹¹ Moreover, he shows that price discrimination is welfare-improving only if inefficient backward integration is prohibited.¹² DeGraba (1990) focuses on how price discrimination by upstream firms affects downstream producers' long-run choice of a production technology. He shows that price discrimination discourages downstream firms' efforts in R&D activities resulting in a welfare reducing. Yoshida (2000) shows that an increase in the total output of the final good is a sufficient condition for deterioration in welfare as price discrimination reinforces the inefficiency of the downstream production. Inderst and Valletti (2009) consider an input monopolist facing a threat of demand-side substitution. They obtain the result opposite to that of Katz (1987) that the more efficient downstream firm always receives a price discount from the upstream monopolist. They show that with linear demand, a ban on price discrimination benefits consumers in the short run but reduces consumer surplus in the long run, which is once again the opposite of what is found without the threat of demand-side substitution. Although all of these papers on input price discrimination might involve primary line injury, they do not fit well the context of this paper because in order to value the role of the MCD we need at least another competing firm in the input market.¹³

Finally, there is a vast antitrust literature analyzing the effects of the anti-discriminating R-P Act.¹⁴ During its almost eighty-year history the Robinson-Patman Act has been severely criticized in terms not comparable to any other antitrust statute. See, for example, the criticism of Bork's (1978) famous *The Antitrust Paradox* and the perverse effects found by Schwartz (1986) on the occasion of the fiftieth anniversary of the law. Blair and DePasquale (2014) explore Bork's criticism of the R-P Act along with those of other legal scholar and economists. They analyze the central prohibitions of the Act and explore their competitive implications. They conclude by indicating their agreement with

¹¹ O'Brien (2014) extends Katz's take-it or leave-it model to a bargaining framework.

¹² Recently, Chen, Hwang and Peng (2011) extend Katz's (1987) model to show that input price discrimination may improve output allocation efficiency in the final good market and increase social welfare. See McAfee and Schwartz (1994) and O'Brien and Shaffer (1994) for the case of nonlinear pricing in intermediate good markets.

¹³ O'Brien and Shaffer (1994) consider a context of secondary line injury, but, however, their discriminatory firm is also a monopolist in the intermediate goods markets.

¹⁴ See Geradin and Petit (2006) for an extensive legal and economic analysis of price discrimination under EC Competition Law. See also Gifford and Kudrle (2010) for an excellent review of the main economic concerns that price discrimination raises and a detailed exploration of its legal treatment both in the United States and the European Union.

the recommendation of the Antitrust Modernization Commission in its 2007 report: "Congress should repeal the R-P Act in its entirety." It therefore seems that the "Antitrust's Least Glorious Hour" (Bork, 1978) is running out. In fact, the number of cases under the R-P Act has sharply fallen down in the last years. Luchs et al. (2010) show that the Brooke Group case for price discrimination involving primary line injury and the Volvo case for discrimination entailing secondary line harm raised the competitive harm standard making it substantially harder to win such cases. The economic implications of the MCD have been deeply studied in the legal literature but, to the best of our knowledge, it remains unexplored in the economics literature. We mainly analyze the effects of the MCD in contexts, both for final good market and for intermediate goods markets, where primary line injury has been presumably caused. We show that price discrimination that implies lower prices in the market with higher competitive pressure are, generally, welfare-reducing practices. But, it is precisely in these settings that a successful application of the MCD would lead to a decrease in social welfare. We also include an example involving secondary line injury induced by input price discrimination that also reduces social welfare, leaving the use of the MCD unsubstantiated.

3. MCD and discrimination in the final good market

The fact that competitive pressure varies across markets is a common feature in most cases of antidiscrimination litigation. One of the most famous primary line cases is *Utah Pie Co. v. Continental Baking Co.* Prior to Utah Pie entry into the frozen dessert pie market in Salt Lake City, three multimarket firms, Carnation, Continental Baking and Pet Milk, supplied the market.¹⁵ In 1957, Utah Pie enters the frozen pie market and its strategy of undercutting the rivals' prices proves successful, obtaining a share of 67% in its second year. In 1959 the multimarket sellers respond to Utah Pie by lowering prices; as a consequence Utah Pies share of the market falls down to 34%. Given that Carnation, Continental Baking and Pet Milk charge prices in Salt Lake City below those they charged in other geographic markets, under the R-P Act, "selling frozen dessert pies in Salt Lake City at prices below those charged in other markets constitutes primary-line price discrimination" (see Blair and DePasquale, 2014). In order to analyze the economic

¹⁵ We follow Blair and DePasquale (2014) in the description of Utah Pie case.

effects of price discrimination when competition varies across markets we consider a stylized model: a multimarket firm selling in two markets, being a monopolist in one market and facing a competitor in the other market.

Our analysis is based on the general test for welfare improvement proposed by Varian (1985, 1989). Consider an aggregate utility function of the form $U(q_1, q_A, q_B) + y$ where q_1 is the consumption in market 1 (served by a multimarket firm, firm A), $q_i, i = A, B$, are the product varieties consumed in market 2 (offered by firm A and firm B, respectively) and y is the money to be spent on other goods. We assume that U is concave and differentiable. The inverse demand functions are given by $P_j(q_1, q_A, q_B) = \frac{\partial U(q_1, q_A, q_B)}{\partial q_j}, j = 1, A, B$. Consider two configurations of output, (q_1^0, q_A^0, q_B^0) and (q_1^1, q_A^1, q_B^1) , corresponding to uniform pricing and price discrimination, respectively, with associated prices (p_1^0, p_A^0, p_B^0) and (p_1^1, p_A^1, p_B^1) . By using the concavity of the aggregate utility function we obtain upper and lower bounds on the change in social welfare due to a move from uniform pricing to price discrimination:

$$\sum_{j=1,A,B} (p_j^0 - c) \Delta q_j \geq \Delta W \geq \sum_{j=1,A,B} (p_j^1 - c) \Delta q_j, \quad (1)$$

where $\Delta W = \Delta U - \Delta C$ and $\Delta q_j = q_j^1 - q_j^0, j = 1, A, B$. Note that if the multimarket firm had to state the same price in both markets, then $p_1^0 = p_A^0 = p_B^0$ and the bounds on welfare change would become:

$$(p^0 - c) \sum_{j=1,A} \Delta q_j + (p_B^0 - c) \Delta q_B \geq \Delta W \geq \sum_{j=1,A,B} (p_j^1 - c) \Delta q_j. \quad (2)$$

Assume that firm A, monopolist in market 1, faces in that market the linear demand and inverse demand given by $D_1(p_1) = a_1 - b_1 p_1$ and $p_1(q_1) = \alpha_1 - \beta_1 q_1$, respectively, with $a_1 = \alpha_1 / \beta_1$ and $b_1 = 1 / \beta_1$. In market 2, firm A faces the competition from firm B, and we assume that the firm sells imperfect substitutes. Demands are $D_A(p_A, p_B) = a - b p_A + d p_B$ and $D_B(p_A, p_B) = a - b p_B + d p_A$, and inverse demands are $p_A(q_A, q_B) = \alpha - \beta q_A - \gamma q_B$ and $p_B(q_A, q_B) = \alpha - \beta q_B - \gamma q_A$, with $a = \alpha / (\beta + \gamma)$, $b = \beta / (\beta^2 - \gamma^2)$, $d = \gamma / (\beta^2 - \gamma^2)$ and $\beta > \gamma$. We assume constant unit costs that are identical for both firms $c_A = c_B = c > 0$.

In order to study the potential effects of the Robinson-Patman Act we focus our analysis on contexts where $p_1^1 > p^0 > p_A^1$ and $p_B^0 > p_B^1$ (with $p_A^1 = p_B^1$). Figure 1 represents a typical primary-line case in the final good market. So we consider settings where the duopolistic market is *weak* and, therefore, that it is satisfied that:

- 1) Price discrimination by the multimarket firm harms the competitor in market 2, firm B. Therefore, firm B (or the FTC) might initiate a case against firm A alleging a violation of the R-P Act, in particular invoking a primary line injury.
- 2) Given that $p^0 > p_A^1$ and $p_B^0 > p_B^1$, the multimarket seller, firm A, might use the MCD arguing that it was acting in Good Faith to meet an equally low price of a competitor.

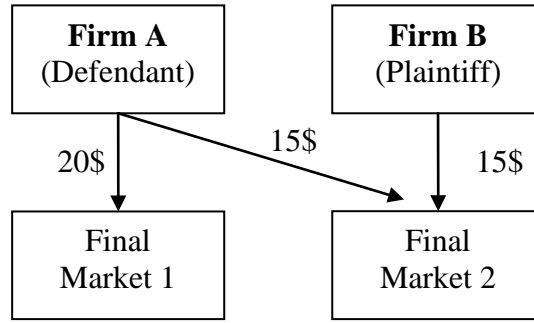


Figure 1. Primary-line case in the final market.

First, we consider Bertrand competition in the duopolistic market and, second, we assume Cournot competition. We shall see that results are robust to both types of competition.

3.1. Price Competition

The aggregate profit function of the multimarket firm is $\pi_1(p_1) + \pi_A(p_A, p_B) = (a_1 - b_1 p_1)(p_1 - c) + (a - b p_A + d p_B)(p_A - c)$ and the profit function of firm B is $\pi_B(p_A, p_B) = (a - b p_B + d p_A)(p_B - c)$. The equilibrium prices under third-degree price discrimination are given by:

$$p_1^1 = \frac{a_1 + b_1 c}{2b_1}; \quad p_A^1 = p_B^1 = \frac{a + bc}{2b - d} \quad (3)$$

Under uniform pricing the multimarket firm aggregate profit is $\pi_1(p) + \pi_A(p, p_B) = (a_1 - b_1p)(p_1 - c) + (a - bp + dp_B)(p - c)$. The equilibrium prices under uniform pricing are given by:

$$p^0 = \frac{2(a_1 + a)b + ad + 2b(b + b_1)c + bdc}{\Gamma};$$

$$p_B^0 = \frac{2a(b + b_1) + (a_1 + a)d + (2b + d)(b + b_1)c}{2b - d}, \quad (4)$$

where $\Gamma = [4b(b + b_1) - d^2]$. The changes of the output in market 1 and in market 2 due to a move from uniform pricing to price discrimination are given by:

$$\Delta q_1 = -\frac{b_1(4b^2 - d^2)(p_1^1 - p_A^1)}{2\Gamma};$$

$$\Delta q_A = \frac{b_1(4b^2 - 2d^2)(p_1^1 - p_A^1)}{2\Gamma}; \quad \Delta q_B = -\frac{2b_1bd(p_1^1 - p_A^1)}{2\Gamma}, \quad (5)$$

The change of the multimarket seller's total output is:

$$\Delta q_1 + \Delta q_A = -\frac{b_1d^2(p_1^1 - p_A^1)}{2\Gamma} \quad (6)$$

It is easy to check that the upper bound (*UB*) on the welfare change is given by:

$$UB = -\frac{b_1d(p_1^1 - p_A^1)}{2\Gamma^2} \{[4b(b + b_1) + (4b + d)d] + 4bd(a_1 - b_1c)\}. \quad (7)$$

We obtain the following result:

Proposition 1. Under price competition:

- (i) If the duopolistic market is *weak*, $p_1^1 > p^0 > p_A^1$, then third-degree price discrimination reduces social welfare.
- (ii) The MCD might be successfully used precisely when price discrimination reduces social welfare.

Proof. If market 2 is weak then $p_1^1 > p_A^1$ and the upper bound of welfare change is, therefore, negative (see condition (7) above), and, consequently, price discrimination reduces welfare. Note that, from (5) and (6), $\Delta q_1 + \Delta q_A < 0$ and $\Delta q_B < 0$ and the two terms of the upper bound (see condition (2)) are therefore negative. ■

With respect to uniform pricing, price discrimination makes the multimarket seller more aggressive in price competition and the rival reacts by also being more aggressive. As a consequence, the rival's profits are reduced and the effect on the multimarket seller's profit is ambiguous since its profit increases in the captive market.

The welfare cost from price discrimination comes because it enables the multimarket seller to exploit its monopoly power in the captive market. The welfare gain comes from the lower equilibrium price in the duopoly market under price discrimination. With linear demand the first effect dominates the second and, as the next subsection shows, this result also maintains with quantity competition.¹⁶

3.2. Quantity competition

The aggregate profit function of the multimarket firm is $\pi_1(q_1) + \pi_A(q_A, q_B) = (\alpha_1 - \beta_1 q_1 - c)q_1 + (\alpha - \beta q_A - \gamma q_B - c)q_A$ and the profit function of firm B is $\pi_B(q_A, q_B) = (\alpha - \beta q_B - \gamma q_A - c)q_B$. The equilibrium outputs and prices under price discrimination are given by:

$$q_1^1 = \frac{\alpha_1 - c}{2\beta_1}; \quad q_A^1 = q_B^1 = \frac{\alpha - c}{2\beta + \gamma} \quad (7)$$

$$p_1^1 = \frac{\alpha_1 + c}{2}; \quad p_A^1 = p_B^1 = \frac{\alpha\beta + (\beta + \gamma)c}{2\beta + \gamma} \quad (8)$$

The changes of the output in market 1 and for firm A and firm B in market 2 due to a movement from uniform pricing to price discrimination are given by:

¹⁶ If the duopolistic market were strong, then the upper bound on the welfare change would be positive and it would therefore satisfy the necessary condition for price discrimination to increase welfare. However, this possibility is beyond the scope of the R-P Act and, even though price discrimination might increase social welfare, the MCD could not be invoked.

$$\Delta q_1 = -\frac{(4\beta^2 - \gamma^2)(p_1^1 - p_A^1)}{\Phi};$$

$$\Delta q_A = \frac{4\beta^2(p_1^1 - p_A^1)}{\Phi}; \quad \Delta q_B = -\frac{2\beta\gamma(p_1^1 - p_A^1)}{\Phi}, \quad (9)$$

where $\Phi = [4\beta^2(\beta + \beta_1) - \gamma^2(2\beta + \beta_1)]$. The change in the multimarket seller's total output is:

$$\Delta q_1 + \Delta q_A = \frac{\gamma^2(p_1^1 - p_A^1)}{\Phi}. \quad (10)$$

It is easy to check that the upper bound on the welfare change is given by:

$$UB = -\frac{\beta\gamma(p_1^1 - p_A^1)}{\Phi^2} \{4\beta^2(\beta + \beta_1)(\beta - \gamma)(\alpha - c) + \gamma^2[(\alpha - c)\beta_1 + (\alpha_1 - c)\gamma]\}. \quad (11)$$

We obtain the following result.

Proposition 2. Under quantity competition:

- (i) If the duopolistic market is *weak*, $p_1^1 > p^0 > p_A^1$, then third-degree price discrimination reduces social welfare.
- (ii) The MCD might be successfully used precisely when price discrimination reduces social welfare.

Proof. If market 2 is weak then $p_1^1 > p_A^1$ and the upper bound of welfare change is, therefore, negative (see condition (11)), and, consequently, price discrimination reduces welfare. ■

Note that under quantity competition price discrimination also makes the multimarket seller more aggressive and the rival reacts being less aggressive (as it occurs under strategic substitutes). There is a tendency for price discrimination to increase the multimarket seller's profit (since price discrimination increases its profits in the captive market and increases its output in the duopolistic market) while the rival's profits are reduced. As it also occurs under price competition, price discrimination reduces social

welfare and the profit of the local producer.¹⁷ So our analysis supports the idea behind the R-P Act of protecting “mom and pop stores”. However, the MCD would precisely go in the opposite direction.

From Proposition 1 and Proposition 2 we identify an additional perverse effect of the R-P Act under primary line injury. That is, when the market with more competitive pressure is the weak market (the market with the lower price) price discrimination reduces social welfare, but the MCD, if successfully used, would allow price discrimination. However, if the market with more competitive pressure was the strong market (the market with the higher price), the MCD might not be invoked even though price discrimination might be able to increase welfare.

3.3. Cournot competition and the number of firms

We now generalize the model to allow the competitive pressure to vary across markets and show that, under Cournot competition with homogenous product, if the low price market is the more competitive market (that is, the one with more competitors) then price discrimination reduces welfare. Assume now that the multimarket seller faces the competition of $n_1 - 1$ firms in market 1 and $n_2 - 1$ firms in market 2. For simplicity we now consider that firms sell a homogeneous product, Cournot competition and constant marginal cost. The inverse demand in market i is $p_i(q_i) = \alpha_i - \beta_i q_i$, $i = 1, 2$. Under price discrimination, the equilibrium price in market i is $p_i^1 = \frac{\alpha_i + cn_i}{1 + n_i}$, $i = 1, 2$. The change in total output due to a move from uniform pricing to price discrimination by the multimarket seller is:

$$\Delta Q = \frac{(n_1 - n_2)[\alpha_1 + (\alpha_1 - c)n_2 - \alpha_2 + (\alpha_2 - c)n_1]}{(n_1 + 1)(n_2 + 1)[\beta_1(n_2 + 1) + \beta_2(n_1 + 1)]}, \quad (12)$$

which can be written as:

¹⁷ If the duopolistic market were strong, then the upper bound on the welfare change would be again positive and it would therefore satisfy the necessary condition for price discrimination to increase welfare. However, once again this possibility is beyond the scope of the R-P Act and the MCD could not be invoked.

$$\Delta Q = \frac{(n_1 - n_2)}{[\beta_1(n_2 + 1) + \beta_2(n_1 + 1)]} (p_1^1 - p_2^1). \quad (13)$$

Note that, since the product is homogeneous the upper bound on the change in welfare is $(p^0 - c) \sum \Delta Q_i = (p^0 - c) \Delta Q$ and an increase in total output would therefore be a necessary condition for a welfare improvement. We obtain the following result:

Proposition 3. If the market with more competitive pressure is the weak market then price discrimination reduces social welfare.

Proof. Assume that market 2 is the weak market, so $p_1^1 > p_2^1$, and that the number of firms is greater in market 2, $n_1 < n_2$. Then, from condition (13), we obtain that $\Delta Q < 0$ and price discrimination reduces social welfare. ■

Note that if we allow the multimarket seller to state a lower price in the more competitive market then this type of price discrimination reduces social welfare. Again the MCD (justifying a lower price in a more competitive market) goes against increasing social welfare. Note that when $n_1 = 1$ and $n_2 = 2$, the model would be like that in Subsection 3.2 but with a homogeneous product.

4. MCD and price discrimination in the intermediate goods market

We consider two contexts to analyze the effects of price discrimination over the intermediate goods market. First, a context where a firm causes harm to a competitor by using price discrimination, that is a primary line injury. Second, we consider a secondary line injury when favored customers of a supplier are given a price advantage over competing customers.

4.1. Primary line injury in the input market

We consider a Cournot industry with an upstream and a downstream sector.¹⁸ A multimarket upstream firm, firm U1, that produces a homogeneous intermediate good at a constant marginal cost $c > 0$, sells it in two monopolized downstream markets: market 1 and market 2. There exists another firm, firm U2, which serves the intermediate good in market 2. In the downstream sector, the intermediate good is an input and firms transform one unit of input into one unit of a final good at constant marginal cost. If the downstream firms were retailers the one-to-one conversion would naturally hold. Marginal costs in the downstream sector are normalized to zero. Inverse demand for the final good in market i is $p_i(q_i) = \alpha_i - \beta_i q_i$, $i = 1, 2$, and we assume that each market is monopolized by firm i , $i = 1, 2$. Figure 2 represents a typical primary-line case in the input market.

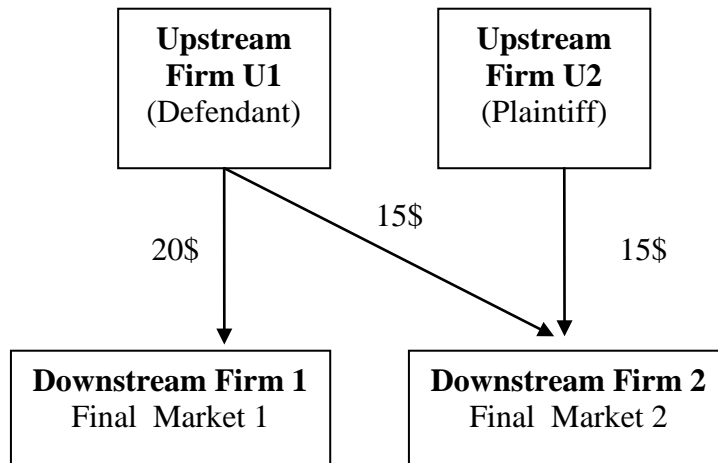


Figure 2. Primary-line case in the intermediate good market.

We model the problem as a two-stage game and then solve it by backward induction (so the equilibrium concept is subgame perfect equilibrium). At the first stage, upstream firms set upstream quantities simultaneously (firm U1 decides how much input to sell in market 1 and 2, and firm U2 the input to sell in market 2). The market clearing input prices (from the point of view of downstream firms) denoted by $w_i, i = 1, 2$, are

¹⁸ In order to maintain the analysis as simple as possible we follow the treatment of vertical relationships of Belleflamme and Peitz (2010).

determined by equalizing the total amount of input supplied by the upstream firms in each market with the demand of the downstream firms.

At the second stage, the monopolistic firm in each final good market chooses its output. Downstream firms are assumed not to have market power in the upstream sector, so take w_i as given.¹⁹ So the profit function of the monopolistic firm in market i , $i = 1, 2$, is $\pi_i(q_i) = [p_i(q_i) - w_i]q_i = (\alpha_i - \beta_i q_i - w_i)q_i$. The monopolistic output and the retail price are, respectively:

$$q_i(w_i) = \frac{\alpha_i - w_i}{2\beta_i}; \quad i = 1, 2, \quad (14)$$

$$p_i(w_i) = \frac{\alpha_i + w_i}{2}; \quad i = 1, 2. \quad (15)$$

Condition (14) defines the inverse demand for the intermediate good in market i , $w_i(x_i) = \alpha_i - 2\beta_i x_i$, given that in equilibrium $x_i = q_i$. The profit function of the multimarket upstream firm in market 1 and market 2 are $\pi_1^{U1}(x_1) = (\alpha_1 - 2\beta_1 x_1 - c)x_1$ and $\pi_2^{U1}(x_2^{U1}, x_2^{U2}) = [\alpha_2 - 2\beta_2(x_2^{U1} + x_2^{U2}) - c]x_2^{U1}$, under price discrimination in the intermediate good market. The optimal output, the wholesale price and the price for the final good in market 1 are, respectively, given by:

$$x_1^1 = q_1^1 = \frac{\alpha_1 - c}{4\beta_1}; \quad w_1^1 = \frac{\alpha_1 + c}{2}; \quad p_1^1 = \frac{3\alpha_1 + c}{4}. \quad (16)$$

The profit function of the upstream firm U2 in the input market 2 is $\pi_2^{U2}(x_2^{U1}, x_2^{U2}) = [\alpha_2 - 2\beta_2(x_2^{U1} + x_2^{U2}) - c]x_2^{U2}$. The Cournot equilibrium outputs, the whole price and the price for the final good are given by:

$$x_2^1 = q_2^1 = \frac{\alpha_2 - c}{3\beta_2}; \quad w_2^1 = \frac{\alpha_1 + 2c}{3}; \quad p_2^1 = \frac{2\alpha_2 + c}{3}. \quad (17)$$

Under price discrimination by the multimarket upstream firm total output is given by:

$$x^1 = x_1^1 + x_2^1 = q^1 = \frac{3(\alpha_1 - c)\beta_2 + 4(\alpha_2 - c)\beta_1}{12\beta_1\beta_2}. \quad (18)$$

¹⁹ See, for instance, in Belleflamme and Peitz (2010) a nice justification of this assumption.

We now assume that the multimarket upstream firm has to charge a uniform price. Therefore, it must be satisfied that $w_1(x_1) = \alpha_1 - 2\beta_1 x_1 = \alpha_2 - 2\beta_2(x_2^{U1} + x_2^{U2}) = w_2(x_2^{U1} + x_2^{U2}) = w_2(x_2)$. So the multimarket upstream firm must adjust its sales in market 1 to satisfy the following constraint:

$$x_1 = \frac{\alpha_1 - \alpha_2 + 2\beta_2(x_2^{U1} + x_2^{U2})}{2\beta_1}.$$

So we may write total profit of firm U1 as:

$$\pi^{U1}(x_2^{U1}, x_2^{U2}) = [\alpha_2 - 2\beta_2(x_2^{U1} + x_2^{U2}) - c][x_2^{U1} + \frac{\alpha_1 - \alpha_2 + 2\beta_2(x_2^{U1} + x_2^{U2})}{2\beta_1}].$$

The equilibrium outputs in market 1 and market 2 are given by:

$$x_1^0 = q_1^0 = \frac{\alpha_1\beta_2 + 3\alpha_1\beta_1 - \alpha_2\beta_1 - 2\beta_1c - \beta_2c}{2\beta_1(3\beta_1 + 2\beta_2)}, \quad (19)$$

$$x_2^0 = q_2^0 = \frac{2\alpha_2\beta_1 + 2\alpha_2\beta_2 - \alpha_1\beta_2 - 2\beta_1c - \beta_2c}{2\beta_2(3\beta_1 + 2\beta_2)}, \quad (20)$$

and the uniform wholesale price is:

$$w^0 = \frac{\alpha_1\beta_2 + \alpha_2\beta_1 + 2\beta_1c + \beta_2c}{3\beta_1 + 2\beta_2}. \quad (21)$$

Total output is:

$$x^0 = q^0 = \frac{\alpha_1\beta_2^2 + 2\alpha_1\beta_1\beta_2 + \alpha_2\beta_1\beta_2 + 2\alpha_2\beta_1^2 - 3\beta_1\beta_2c - \beta_2^2c - 2\beta_1^2c}{2\beta_1\beta_2(3\beta_1 + 2\beta_2)}. \quad (22)$$

From conditions (18) and (22) we obtain that the change in total output due to a move from uniform pricing to third-degree price discrimination by the multimarket upstream firm is:

$$\Delta Q = \Delta x = x^1 - x^0 = \frac{-3\alpha_1 + 2\alpha_2 + c}{12(3\beta_1 + 2\beta_2)} = -\frac{1}{2(3\beta_1 + 2\beta_2)}(w_1^1 - w_2^1). \quad (23)$$

Again, in order to study the potential effects of the R-P Act in the intermediate goods market we focus our analysis on the contexts where $w_1^1 > w_2^1$, as it occurs in the situation represented in Figure 2. This setting satisfies:

(1) Price discrimination by the multimarket upstream firm harms the competitor in market 2, firm U2. So firm U2 (or the FTC) might initiate a case against firm U1 alleging a violation of the R-P Act, in particular invoking a primary line injury.

2) Given that $w_1^1 > w_2^1$, the multimarket upstream firm might use the MCD arguing that it was acting in Good Faith to meet (nor to beat) an equally low price of a competitor.

The following proposition states the effect on social welfare.

Proposition 4. Under quantity competition in the duopolistic input market:

(i) If the duopolistic input market is weak, then third-degree price discrimination reduces social welfare.

(ii) The MCD might be successfully used precisely when price discrimination reduces social welfare.

Proof. If the duopolistic input market 2 is weak then $w_1^1 > w_2^1$. Thus, from condition (23) $\Delta Q = \Delta x < 0$ and, consequently, price discrimination reduces social welfare. ■

As it happens with the final good market, (wholesale) price discrimination in favor of the more competitive input market goes against social welfare. Again the welfare cost from price discrimination appears because it enables the multimarket input seller to exploit its monopoly power in the captive input market. The welfare gain comes from the lower equilibrium wholesale price in the duopoly input market under price discrimination. With

linear demand the first effect dominates the second and as the next subsection shows that phenomenon does also maintain in settings of secondary line injury.

4.2. Secondary line injury

Assume again a Cournot industry with an upstream and a downstream sector. Consider a multimarket upstream firm, firm U1, producing a homogeneous intermediate good at constant marginal cost $c > 0$ and selling it in two upstream markets: market 1 and market 2. There exists another firm, firm U2, serving the intermediate good market 2. In the input market 2, firm U1 and firm U2 practice Cournot competition. In the downstream market, two firms, firm A and firm B, produce a homogeneous product and compete under Cournot rules. In this final good market, the intermediate good is an input and firms transform one unit of input into one unit of a final good at constant marginal cost (a natural way of modeling when downstream firm are retailers). Firm A buys the input in market 1 whereas firm B purchases it in market 2. Figure 3 represents this situation in which one competitor in the final good market has access to a more competitive input market than the other competitor. Marginal costs in the downstream sector are normalized to zero. Inverse demand for the final good market is $p(q) = \alpha - \beta q$.

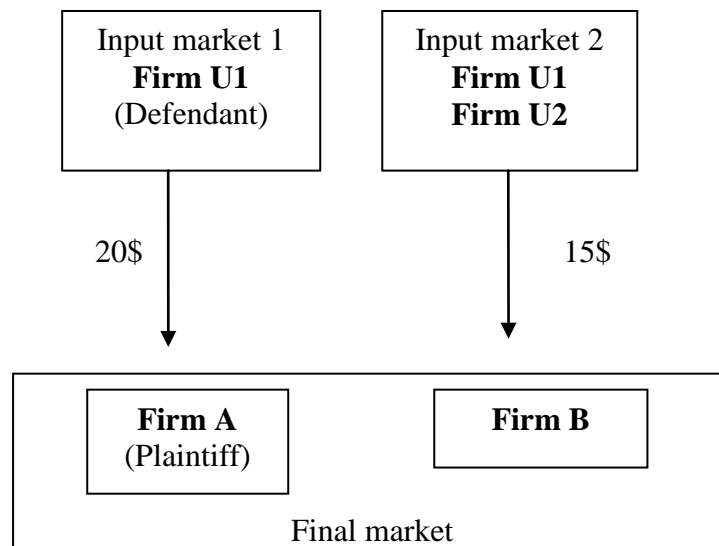


Figure 3. Secondary-line case in the intermediate good market.

We model the problem as a two-stage game and solve it by backward induction (being subgame perfect equilibrium the equilibrium concept). At the first stage, upstream firms set upstream quantities simultaneously (firm U1 decides how much input to sell in 1 and 2 and firm U2 the input to sell in market 2). The market clearing input prices (from the point of view of downstream firms) denoted by $w_i, i = 1,2$, are determined by equalizing the total amount of input supplied by the upstream firms in each market with the demand of the downstream firms.

At the second stage, firm A and B choose their output simultaneously in the final good market. Downstream firms are assumed not to have market power in the upstream sector and take w_i as given. So the profit function of the duopolistic firm $j, j = A, B$, is $\pi_j(q_j, q_k) = [p(q_j + q_k) - w_j]q_j = (\alpha_j - \beta_j(q_j + q_k) - w_j)q_j, j, k = A, B, j \neq k$. The equilibrium outputs are given by:

$$q_j^1(w_j, w_k) = \frac{\alpha - 2w_j + w_k}{3\beta}, j, k = A, B, j \neq k. \quad (24)$$

The equilibrium total output and the equilibrium price are, respectively:

$$q^1(w_A, w_B) = \frac{2\alpha - w_A - w_B}{3\beta}, \quad (25)$$

$$p^1(w_A, w_B) = \frac{\alpha + w_A + w_B}{3}. \quad (26)$$

Firm A buys the intermediate product in the intermediate market 1 from firm U1. Condition (24) defines the inverse demand for the intermediate good in market 1, $w_1(x_1^{U1}) = \alpha - 2\beta x_1^{U1} - \beta(x_2^{U1} + x_2^{U2})$ given that in equilibrium $x_1^{U1} = q_A^1$ and $x_2^{U1} + x_2^{U2} = q_B^1$. From condition (23) we also obtain the inverse demand for the intermediate good in market 2, $w_2(x_2^{U1}, x_2^{U2}) = \alpha - 2\beta(x_2^{U1} + x_2^{U2}) - \beta x_1^{U1}$ given that in equilibrium $x_1^{U1} = q_A^1$ and $x_2^{U1} + x_2^{U2} = q_B^1$. The profit function of the multimarket upstream firm under price discrimination in the intermediate good market is $\pi^{U1}(x_1^{U1}, x_2^{U1}, x_2^{U2}) = [\alpha - 2\beta x_1^{U1} - \beta(x_2^{U1} + x_2^{U2}) - c]x_1^{U1} + [\alpha - 2\beta(x_2^{U1} + x_2^{U2}) - \beta x_1^{U1} - c]x_2^{U1}$.

The profit function of firm U2 is $\pi_2^{U2}(x_2^{U1}, x_2^{U2}) = [\alpha - 2\beta(x_2^{U1} + x_2^{U2}) - \beta x_1^{U1} - c] x_2^{U2}$. The equilibrium outputs and total output are, respectively:

$$x_1^{U1} = q_A^1 = \frac{(\alpha - c)}{6\beta}, \quad (27)$$

$$x_2^{U1} = \frac{(\alpha - c)}{12\beta}; x_2^{U2} = \frac{(\alpha - c)}{6\beta}; x_2^{U1} + x_2^{U2} = q_B^1 = \frac{(\alpha - c)}{4\beta}, \quad (28)$$

$$q^1 = \frac{5(\alpha - c)}{12\beta}. \quad (29)$$

The equilibrium wholesale prices are:

$$w_1^1 = \frac{5\alpha + 7c}{12}; \quad w_2^1 = \frac{4\alpha + 8c}{12}, \quad (30)$$

and the final good equilibrium price is:

$$p^1(w_1^1, w_2^1) = \frac{\alpha + w_1^1 + w_2^1}{3} = \frac{7\alpha + 5c}{12}. \quad (31)$$

We now assume that the multimarket upstream firm has to charge a uniform price across the input markets. Therefore, it must be satisfied that $w_1 = \alpha - 2\beta x_1^{U1} - \beta(x_2^{U1} + x_2^{U2}) = \alpha - 2\beta(x_2^{U1} + x_2^{U2}) - \beta x_1^{U1} = w_2$. So the multimarket upstream firm must adjust its sales of input in market 1 and 2 to satisfy $x_1^{U1} = x_2^{U1} + x_2^{U2}$. So we may write total profit of firm U1 as:

$$\pi^{U1}(x_2^{U1}, x_2^{U2}) = [\alpha - 3\beta(x_2^{U1} + x_2^{U2}) - c][2x_2^{U1} + x_2^{U2}]$$

The equilibrium outputs and total output are given by:

$$\bar{x}_1^{U1} = q_A^0 = \frac{7(\alpha - c)}{33\beta}; \quad \bar{x}_2^{U1} = \frac{(\alpha - c)}{33\beta}; \quad \bar{x}_2^{U2} = \frac{2(\alpha - c)}{11\beta}, \quad (32)$$

$$\bar{x}_2^{U1} + \bar{x}_2^{U2} = q_B^0 = \frac{7(\alpha - c)}{33\beta}, \quad (33)$$

$$q^0 = \frac{14(\alpha - c)}{33\beta}. \quad (34)$$

The equilibrium wholesale price and the final good price are:²⁰

$$w^0 = \frac{4\alpha + 7c}{11}; \quad p^0 = \frac{19\alpha + 14c}{33}. \quad (35)$$

From conditions (29) and (34) we obtain that the change in total output is given by:

$$\Delta Q = -\frac{(\alpha - c)}{132\beta} = -\frac{1}{11\beta} (w_1^1 - w_2^1). \quad (36)$$

This setting satisfies:

- 1) Price discrimination by the multimarket upstream firm harms downstream firm A in its competition with firm B. So firm A (or the FTC) might initiate a case against firm U1 alleging a violation of the R-P Act, in particular invoking a secondary line injury.
- 2) Given that $w_1^1 > w_2^1$, the multimarket upstream firm, firm U1, might use the MCD arguing that it was acting in Good Faith to meet an equally low price of a competitor.

The following proposition states the effect on social welfare.

Proposition 5. Under quantity competition both in the duopolistic input market and the final good market:

- (i) Third-degree price discrimination reduces social welfare.
- (ii) The MCD might be successfully used precisely when price discrimination reduces social welfare.

Proof. It is trivial since third-degree price discrimination reduces total output and increases the price for the final good. See conditions (31), (35) and (36). ■

Under secondary line injury we again obtain the result that price discrimination decreases social welfare and the MCD works in the wrong direction. Note that in our model the multimarket upstream firm discriminates in favor of the final firm producer that buys the input in the more competitive input market. The effect of such secondary line

²⁰ It can be immediately check that the multimarket input seller prefers to serve both markets to sell exclusively in the strong market.

discrimination is to increase competition in the final good market, reduce total output and increase the final price.

5. Concluding remarks

This paper finds that the MCD makes little economic sense under primary line injury. Using standard stylized models with linear demands and symmetric marginal costs, we are able to show, both for the final good market and the intermediate goods market, that third-degree price discrimination which implies a lower price in the market with the higher competitive pressure is welfare worsening. These settings are precisely those in which the discriminating firm might invoke that its low price was set in Good Faith to meet an equally low price of a competitor. The results are robust to different types of competition (price or quantity competition) and different types of market (final or intermediate). We also find that under secondary line injury in the intermediate goods market results remain: when the multimarket upstream firm discriminates in favor of the buyer in the more competitive market social welfare decreases and, therefore, the MCD also goes in the wrong direction.

Further, this research also highlights the necessity of using equilibrium models to analyze the economic effects of the R-P Act. In particular we show that price discrimination reduces social welfare quite generally in both primary line injury contexts (both for final and intermediate good market) and secondary line injury contexts. However, our results depend crucially on the assumption that the markets are served for all firms under both pricing regimes, namely uniform pricing and price discrimination. For example, banning price discrimination might induce some multimarket sellers to exit the weak market, which, consequently, would lead generally to a welfare worsening.

To the best of our knowledge, this paper is the first in studying the economic implications of the MCD by using equilibrium models and so, assuming linear demands and constant marginal cost is not a bad first approach. However, we know from the literature on monopolistic third-degree price discrimination (see, Pigou, 1920, Robinson, 1933,

Schmalensee, 1981, Varian, 1985, and Aguirre, Cowan and Vickers, 2010) that the shape of inverse and direct demands plays a crucial role in determining the effect of price discrimination on total output and, consequently, on social welfare. Therefore, it is needed to extend the analysis to non linear demands and more general cost functions in order to give any Antitrust recommendation.

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