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structural entry barriers in particular markets may not encourage Black firm entry.¹² Finally, the model suggests a normative perspective on whether or not Black firm entry should be subsidized. Demsetz (1982) has argued that entry barriers may constitute an endogenous response to consumer preferences. If for example, the basis for consumers having a taste for discrimination is their inability to gather and process information relevant to the quality of Black firm output, blockaded Black firm entry becomes a second best social welfare optimum as a result of imperfections in the market for information.

¹²In the case of product firms, Heywood (1988) argues that a lowering of structural entry barriers would encourage Black firm entry. For banking firms, Price (1995) provides results showing that Black-owned commercial bank entry is sensitive to deposit market concentration.

Similar to the first subsidy scheme considered, this result also shows that subsidized Black firm entry does not have an unambiguous effect on social welfare. A comparison of the two subsidies reveals that as the size of the required subsidy increases, the scope for successful welfare interventions diminishes.

VI. Conclusion

This paper has provided a simple model of duopolistic competition where consumer discrimination exists with uncertainty, and the only cost of production is a 'loss of sales cost' associated with a duopolist pricing his output higher than a rival. Price-profit equilibria were determined in which the expected rate of profit for a Black firm was lower than that of an identical White firm. Given some restrictions on the probability that the consumer cohort faced by each firm has a taste for discrimination, a unique Nash equilibrium was determined in which the dominant strategy of both firms is to charge a low price. Given that consumer discrimination reduced expected Black firm profit below the owner's opportunity cost, a subsidy scheme to encourage Black firm entry was considered. In addition, a socially efficient subsidy to Black firm entry was considered. A welfare analysis showed that subsidizing the entry of a Black firm does not necessarily increase social welfare. Conditions were derived for which a subsidy to a Black firm increases, decreases, or has no effect on social welfare.

The model offered here, however formal, has additional implications. First, it suggests an alternative perspective on the factors that deter Black firm entry. Stigler (1968) for example, viewed an entry barrier as a cost of producing borne by entering firms that is not borne by firms already in the industry. In this context, entry barriers are not structural.¹¹ For the model offered in this paper, there are no production costs per se. However, the Black firm must bear a loss of sales cost to enter the market. Given the probability that a consumer has a taste for discrimination, there is no price the Black firm can charge to avoid a loss of sales with certainty. The White firm can be certain of not losing sales by simply charging a low price. There are no structural entry barriers for this market, only nonstructural advantages to being an incumbent White firm facing a consumer cohort with a probabilistic taste for discrimination. This model therefore predicts that a lowering of

¹¹If an entry barrier is structural, potential and actual entry depends upon factors such as scale economies, technological advantages, and access to marketing or natural resources [Geroski, Gilbert & Jacquemin (1990)].

$$\frac{\Delta W(N)}{\Delta n_b} = p_l(1 - \theta)$$

Evaluation of the rate of change in social welfare establishes¹⁰:

Black Firm Entry and Social Welfare *Social welfare increases with subsidized Black firm entry if the probability of a consumer having a taste for discrimination is less than 1. If the probability that a consumer has a taste for discrimination equals 1, social welfare is invariant with respect to subsidized Black firm entry.*

This result establishes that subsidizing Black firm entry does not have an unambiguous effect on social welfare. In general, the net social welfare gains of the subsidy decrease with respect to increases in θ . A subsidy scheme where $\kappa = p_l - (1 - \theta)p_l$ encourages the Black firm to enter by virtue of the fact that it ensures the Black owner of earning at least opportunity cost. If long-run social efficiency requires that identical factors earn equal expected return, the required subsidy to encourage Black firm entry will be from case (C): $\kappa = \Pi^w - \Pi^b = \theta p_l$. Under this alternative subsidy scheme, the change in social welfare associated with the entry of a Black firm becomes:

$$\frac{\Delta W(N)}{\Delta n_b} = p_l(1 - 2\theta)$$

Evaluation of the rate of change in social welfare establishes:

Socially Efficient Black Firm Entry and Social Welfare *Social welfare increases (decreases) with subsidized Black firm entry if the probability of a consumer having a taste for discrimination is less (greater) than 1/2. If the probability that a consumer has a taste for discrimination equals 1/2, social welfare is invariant with respect to subsidized Black firm entry.*

¹⁰This result is obtained as follows:

$$\frac{\Delta W(N)}{\Delta n_b} = \frac{\Delta U}{\Delta Q} \frac{\Delta Q(N)}{\Delta n_b} - \kappa$$

The equilibrium condition for utility maximization requires: $\Delta U/\Delta Q = p_l$ (the equilibrium price of firm output). $\Delta Q(N)/\Delta n_b$ measures how market output changes when a Black firm enters. In the model since the output of each firm is normalized to one, $\Delta Q(N)/\Delta n_b = 1$. The value of the subsidy (κ) is from case (C): $p_l - (1 - \theta)p_l = \theta p_l$

than the owner's opportunity cost for $\theta < 0$.⁷ In this context, whether or not the output of the Black firm (q^b) is available in the market is determined by:

$$q^b = \begin{cases} 1 & \text{if } \theta = 0 \\ 0 & \text{if } \theta > 0 \end{cases}$$

If $0 < \theta \leq 1$, the Black firm will not enter the market, as $\Pi_l^b < p_l$. From the perspective of the White firm, there is no Black rival in the market. If the White firm is rational, it will charge p_h , behaving as a monopolist. From a social welfare perspective, the consumer cohort could be made better off if the Black firm enters. The nash equilibrium (p_l^b, p_l^w) is associated with more output, and a lower price. As it stands however, the Black firm has no incentive to enter since $\Pi_l^b < p_l$. From a social welfare perspective a subsidy to the Black firm equal to $p_l - (1 - \theta)p_l$ seems attractive, as it will encourage the Black firm to enter, resulting in a higher level market output, and lower market prices.

A question that arises here is whether or not a policy intervention of this type invariably raises consumer welfare. When the Black firm enters, the equilibrium price decreases as a result of increased market output, and this has a tendency to increase consumer welfare. Nevertheless, providing an incentive to the Black firm in the form of a subsidy imposes a cost on consumers, and this has a tendency to decrease consumer welfare.⁸ To determine the effect of the subsidy on social welfare, we can following Varian (1995) let $Q(N)$ be market output as a function of the number of firms (N). Let the social welfare function be $W(N) = U[Q(N)] - n_b\kappa$, where $N = n_b + n_w$ is the total number of firms, n_b is the number of Black firms, n_w is the number of White firms, and $\kappa = p_l - (1 - \theta)p_l$ is the required subsidy to the Black firm. To evaluate the welfare effects of subsidizing a Black firm, assume that the assigned priors of each firm equal the actual value of θ in the market.⁹ The required subsidy is, from case (C) $\kappa = \Pi^b - (1 - \theta)p_l = \theta p_l$. The change in social welfare associated with the entry of a Black firm is:

⁷In case (C), expected profit for the Black and White firm are respectively: $\Pi_l^w = \theta 2p_l + (1 - \theta)p_l$, and $\Pi_l^b = (1 - \theta)p_l$. For $0 < \theta \leq 1$, the expected profit of the Black firm (Π_l^b) is less than the owner's opportunity cost (p_l).

⁸Although not an explicit assumption, the financing of such a subsidy scheme implies some kind of tax levy on consumers in the market. For expositional simplicity, we can assume that the subsidy is financed with a lump-sum tax on the consumer cohort.

⁹In particular, if θ is determined by say the expected value of some bayesian prior density $g(\theta)$, it is assumed to be equal to the expected value of the actual density generating consumers with a taste for discrimination.

concept for selecting an equilibrium, we can impose rationality on the firms. If so, neither will commit to a strictly dominated strategy. More generally, let P_b and P_w represent the strategy space for the Black and White firm respectively:

Definition For the game $G = (P_b, P_w; \Pi^b, \Pi^w)$, let p' and p'' be feasible strategies for either firm. Strategy p' is strictly dominated by p'' if for each combination of the other firm's strategies, the payoff from playing p'' is strictly greater than the payoff from playing p' .

Given certain restrictions on θ , if a dominant strategy exists for both firms, one of the price-profit equilibria considered above will emerge as a Nash equilibrium. Which of the equilibria in (A) - (D) are compelling? If entry is to be welfare enhancing, a compelling equilibrium is case (C). Given the assumptions of the model, if two firms are to exist in this market, the price charged for output must be less than what a monopolist would charge.⁶

Proposition If each firm assigns the prior $(p_h - 2p_l)/(p_h - p_l) < \theta < p_l/(p_h - p_l)$, the Nash equilibrium is for each firm to charge a low price.

For the Black firm, the best response to a low price charged by the White firm is p_l^b , for $0 < \theta < 1$. If the white firm charges p_h^w , the Black firm's best response is p_l^b for $\theta > (p_h - 2p_l)/(p_h - p_l)$. Thus, for $(p_h - 2p_l)/(p_h - p_l) < \theta < 1$, the dominant strategy for the Black firm is to charge p_l . For the given restrictions on the prior probabilities, for the Black firm p_h is strictly dominated by p_l . A rational firm will not commit to a strictly dominated strategy. If the White firm knows that the Black firm is rational, the White firm will play this normal form game as if though p_h is not in the strategy space of the Black firm. For the White firm, the best response to the Black firm charging p_l is to charge a low price if $\theta < p_l/(p_h - p_l)$. If $\theta > p_l/(p_h - p_l)$, the White firm's best response is to charge p_h . For $(p_h - 2p_l)/(p_h - p_l) < \theta < p_l/(p_h - p_l)$, the dominant strategy for both firms is to charge a low price, establishing (p_l^b, p_l^w) as a Nash equilibrium.

V. Subsidizing Black Firm Entry

The Nash equilibrium (p_l^b, p_l^w) , is a meaningful outcome only if the game actually takes place. From case (C) above, it is apparent that the expected profit of the Black firm is less

⁶In a Bertrand type game, aggregate profit for the duopoly would be maximized when each firm charges p_h . Each firm however has an incentive to deviate from charging a high price when there is a rival that can capture the entire market completely by charging a low price.

provide some useful theoretical insight.

II. The Model

The market is open for one period and consists of two duopolists, identical in every respect except for the race of the owner(s), which it is assumed cannot be concealed from consumers.⁴ Each firm faces a consumer cohort, the size of each normalized to one. Consumers are homogeneous and demand at most one unit of a homogenous good produced by the firms at zero cost. Consumers know whether or not they are willing to purchase one unit of the good from a Black firm at the same price they are willing to purchase it from a White firm. Given a consumer's taste for discrimination, he is only willing to pay a price for the output of a Black firm (p^b) that is less than what he is willing to pay for the output of a White firm (p^w). In particular, for a discriminating consumer, the output of a Black firm and White firm are perfect substitutes if $p^b < p^w$. Each firm assigns the prior probability θ and $(1 - \theta)$ that consumers have a taste for discrimination, or not. There are two prices the firms can charge, a high price (p_h) and a low price (p_l). For each consumer, it is assumed that the reservation price is p_h , and for each firm it is assumed that p_l is the opportunity cost of the owner.

While both firms can produce the homogeneous good at zero cost, there is a cost associated with pricing their output. In particular, the White firm can avoid not selling any output by charging p_l for its output. However, given consumer discrimination, the Black firm cannot select a price which avoids the absence of sales. It is assumed that both firms set prices simultaneously, before the market opens, are not separated geographically, and it costs consumers nothing to contact both firms in the market period.⁵

III. Nash Equilibrium

There are four possible equilibrium price configurations for the two firms: (A) (p_l^b, p_h^w) , (B) (p_h^b, p_h^w) , (C) (p_l^b, p_l^w) , and (D) (p_h^b, p_l^w) . In principal, all the outcomes in (A) - (D) are candidates for an equilibrium. Since the priors θ and $(1 - \theta)$ condition the price that the two firms charge, a unique price-profit equilibrium is possible. To promote a solution

⁴Becker (1971) was one of the first to suggest that where there is contact between producer and consumer, it is easier for a consumer with a taste for discrimination to indulge in his taste, since it is easier to determine the race of the producer.

⁵The model offered here is essentially a one period variation of the model offered by Fishman and Gandal (1994).

I. Introduction

Firm entry, to the extent that it increases market output and lowers market prices, can increase social welfare. In standard Cournot models of industry competition, Von Weisacker (1980), Perry (1984), and Mankiw & Whinston (1986) show that it is possible to have excessive entry, such that social welfare decreases. Varian (1995) shows that in general, entry under Cournot oligopoly will increase social welfare if the elasticity of output with respect to the number of firms is greater than one. The fact that firm entry has social welfare implications is useful for considering the welfare consequences of Black-owned firm entry. Historically, the ownership of firms by Blacks has been low relative to Whites and various rationales have been offered to explain why there are relatively few Black-owned firms.¹ Borjas and Bronars (1989) argue that consumer discrimination explains the low Black self-employment rate. As consumer discrimination lowers the expected rate of return for the Black-owned firm, the number of Black-owned firms in the market will be low relative to firms that face less, or no consumer discrimination in the market. From a social welfare standpoint, consumer discrimination, to the extent that it reduces output, may be welfare reducing. If so, a policy intervention that encourages Black firm entry could increase welfare.

This paper presents a simple model of duopoly, where consumer discrimination exists with uncertainty, and the only cost of production is a 'loss of sales cost' as a result of charging a price higher than a rival.² Given the equilibrium prices charged by the two firms in the market, a Black firm and a White firm, the required profit subsidy to the Black firm is determined, and the conditions for which the subsidy increases, decreases, or has no effect on social welfare are examined. The results derived here, while based on a perhaps unreasonably static model, are of interest. The underrepresentation of Blacks in firm ownership has motivated various public policies to encourage the formation of Black-owned firms.³ Whether or not such policies are desirable has been the source of much political debate. Nevertheless, the social welfare consequences of policies to encourage the entry of Black-owned firms are to a large extent unknown. The results derived in this paper may

¹Census data for 1990 indicate that there are 424,165 firms owned by Blacks. This represents approximately 3 percent of all firms in The United States. As for the organizational form of the Black-owned firm, sole proprietorships accounted for 94.4 percent, Partnerships accounted for 3.3 percent, and Subchapter-S corporations accounted for 3 percent.

²The idea that pricing output involves a 'loss of sales cost' has been recently explored by Fishman & Gandal (1994) in the context of dynamic pricing by duopolists.

³For example, the U.S Small Business Administration's 8(a) program awards federal contracts to eligible socially and economically disadvantaged firms. For financial firms, the Treasury Department encourages federal agencies to place deposits at Black-Owned Commercial Banks through the Minority Bank Deposit Program.

Consumer Discrimination, Duopoly, And Black Firm Entry: The Welfare Effect Of Subsidies

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Consumer discrimination, to the extent that it discourages the entry of Black-owned firms may be welfare reducing, as market output is lower than otherwise. This paper offers a simple model of duopoly in which conditions are derived for which a profit subsidy to Black-owned firms increases, decreases, or has no effect on social welfare.

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