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10453
2023

May 2023

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CESifo

Impressum:

CESifo Working Papers
ISSN 2364-1428 (electronic version)
Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH
The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute
Poschingerstr. 5, 81679 Munich, Germany
Telephone +49 (0)89 2180-2740, Telefax +49 (0)89 2180-17845, email office@cesifo.de
Editor: Clemens Fuest
https://www.cesifo.org/en/wp
An electronic version of the paper may be downloaded
· from the SSRN website: www.SSRN.com
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CESifo *Working Paper No. 10453*

Market Segregation in the Presence of Customer Discrimination

Abstract

I consider a market with two firms, a minority group of customers, and a bigoted (racist, ethnocentric, xenophobic, or sexist) majority group of customers. There exists a Nash equilibrium with full segregation in which a low-price firm serves only the minority and a high-price firm serves only the majority. There is also a partial-integration equilibrium in which a high-price firm serves only the majority while a low-price firm serves both the minority and majority. Paradoxically, if the minority group is sufficiently big and the majority is sufficiently prejudiced, then both equilibria hold in the sense that the high-price firm does not lose customers, although its competitor charges a lower price. If the firms can price discriminate, none of these equilibria will hold. The partial integration equilibrium depends on how the prejudice of the majority is modelled.

JEL-Codes: J150.

Keywords: customer discrimination, majority, markets, minority, segregation.

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April 15, 2023
I have benefitted from a discussion with Henry Thille and comments by seminar participants at Dalhousie University’s economics department.

1. Introduction

Does the market punish businesses that discriminate against employees or customers on the basis of color, sexual orientation, gender, ethnicity, nationality, religion, etc? During the era of Jim Crow in the United States of America when blacks were denied services, did movie theaters, restaurants, etc that engaged in racist practices go out of business or were they less profitable? The historical evidence shows that they were not punished by the market and such discrimination or segregation still exists (e.g., Borooah, 2001; Cook et al., 2023; Darity and Mason, 1998; Lang and Spitzer, 2020; Logan and Parman, 2017; Gil and Marion, 2022).

In Becker's (1957) model of taste-based customer discrimination there are competitive labor and product (service) markets in which prejudiced customers prefer to receive services from majority group workers. This preference lowers the labor demand for minority group workers and thus reduces their wage. In equilibrium there is full segregation with two types of firms: firms that employ low-wage minority group workers, serve non-discriminatory customers, and a charge low price, and firms that employ high-wage majority group workers, serve discriminatory customers, and charge a high price. This theoretical prediction was empirically confirmed in Bar and Zussman (2017) who found that firms employing Arab workers in Israel charge lower prices than those employing only Jewish workers because Jewish customers prefer Jewish workers to Arab workers.[1]

In Becker's (1957) model of taste-based employer discrimination, prejudiced employers suffer non-pecuniary cost (disutility) from hiring minority workers. Thus, minority workers are

[1]Based on a survey of employers in four large metropolitan areas in the United States, Holzer and Ihlanfeldt (1998) found that the racial composition of an establishment's customers is strongly associated with the race of those hired, particularly in jobs that involve direct contact with customers such as sales or service occupations. The race of customers also affects wages, with employees in establishments that have mostly black customers earning less than those in establishments with mostly white customers.

paid less than majority workers. Arrow (1972) argued, contrary to the predictions in Becker (1957), that discriminatory firms will not be able to survive in a perfectly competitive product market because they charge the *same* price for their product as non-discriminatory firms but pay a *higher* wage to their employees. However, this logic does not hold if the customers of the discriminatory firm are bigots (e.g., racists, sexists, etc) who want to served by workers of a particular group. Bigoted customers will pay a higher price for the services of discriminatory firms. Based on historical analysis of civil rights in the American South, Wright (2013) argued that segregation was an equilibrium outcome of profit-maximizing firms.

Discrimination in labor markets can also persist if there are market imperfections (see, Darity and Williams, 1998; Lang and Spitzer, 2020). Darity and Mason (1998, p. 82) correctly observed that:

"Despite the theoretical implications of standard neoclassical competitive models, we have considerable evidence that it took the Civil Rights Act of 1964 to alter the discriminatory climate in America. … Therefore, it is not useful to argue that either racial or gender discrimination is inconsistent with the operation of competitive markets, especially when it has taken antidiscrimination laws to reduce the impact of discrimination in the market. Instead, it is beneficial to uncover the market mechanisms which permit or encourage discriminatory practices."

Formal models in this literature have disproportionately focussed on labor markets in which employers are prejudiced against some groups of workers. In this paper, I do not consider customer or employer discrimination against workers. Discrimination has no labor market effects. Employers are not prejudiced but may discriminate to maximize profits. To be precise, I consider customer discrimination against other customers. In my model, customers of a majority group derive a disutility from consuming a service (e.g., eating in a restaurant, going to the movies, etc) with customers of a minority group. Based on a history of segregation in public accommodations prior to the Civil Rights Act of 1964, Wright (2013) observed that the prejudice of white consumers was the main driver behind the decision of businesses to discriminate against black consumers. Gil and Marion (2022) and Cook et al. (2023) also provide empirical support for this claim.

Bar and Zussman (2017), Gil and Marion (2022), Holzer and Ihlanfeldt (1998), and Leonard et al (2010) are papers that look at the behavior and/or profits of firms that serve bigoted customers. But these are empirical papers and they consider customer or employer discrimination/prejudice against workers, *not* against other customers, except Gil and Marion (2022) who empirically studied the desegregation of movie theaters in Washington DC during the days of Jim Crow.[2] My paper presents a game-theoretic analysis of the behavior of firms in the presence of bigoted customers and looks at whether the minority (e.g., blacks in the USA) will be served and, if so, whether the equilibrium is segregated or integrated. I obtained a partial integration equilibrium and a full segregation equilibrium. To the best of my knowledge, the partial integration equilibrium is new, especially in a model with customers who are prejudiced against other customers. As I later explain, its existence depends on how the prejudice of the majority is modelled.

2. A model of segregation in a market with customer discrimination

Consider a market with a majority group (e.g., whites in the USA) and a minority group (e.g., blacks in the USA). The majority is of measure 1 and each member of the majority has a valuation, w, of a service (e.g., eating in a restaurant, going to the movies, etc) that is distributed on $[w_{min}, w_{max}]$ with density $g(w)$ and cdf, $G(w)$. The minority is of measure λ and each member of the minority has a valuation, v, for the same service that is distributed on $[0, v_{max}]$

[2] In section 3.1, I return to the paper by Gil and Marion (2022).

with density $f(v)$ and cdf, $F(v)$. Given that the majority group is bigger than the minority, it follows that $\lambda \in (0,1)$. Each person only wants a unit of the service and if he does not consume the service, his payoff is zero.

Let m be the measure of minorities who demand the service and n be similarly defined for members of the majority. Members of the majority are prejudiced in the sense that they derive a disutility when members of the minority also consume the service (e.g., eating in the same restaurant). A majority member with valuation, w, derives a disutility of αwm, where $\alpha > 0$ is a parameter that captures the intensity of a majority member's disutility from consuming the service with members of the minority. Note that αwm implies that the higher is the valuation of a majority member, the higher is his disutility from consuming with members of the minority.[3] This may stem from the fact that higher valuations could reflect higher incomes and the majority members with higher incomes, being perhaps more upper class, elitist, or snobbish, derive a higher disutility from consuming with the minority. [4] I assume that the minority is not prejudiced.

2.1 A monopolist in the market

Suppose the service is provided by a monopolist whose cost of production is zero. Suppose p is the price of the service.

A minority member with valuation, v, will buy the service if:

$$v - p \geq 0. \tag{1}$$

The marginal customer with valuation, $\check{v}$, satisfies $\check{v} - p = 0$ or $\check{v} = p$. Thus, the measure of minority members who buy the service is:

[3]As explained below, without this assumption, the partial integration equilibrium in proposition 1 will not hold.
[4]The consumption disutility, αwm, is increasing the size of minority consumers. This is related to but different from models of perceived threats (prejudice) in which group A feels threatened by group B when members of group B are more than a threshold size.

$$\breve{m} = \lambda \int_{\breve{v}}^{v_{max}} f(v)dv = \lambda(1 - F(p)). \tag{2}$$

A majority member with valuation, w, will buy the service if:

$$w - p - \alpha w \breve{m} = w(1 - \alpha \breve{m}) - p \geq 0, \tag{3}$$

The marginal customer with valuation, $\breve{w}$, satisfies:

$$w(1 - \alpha \breve{m}) - p = 0. \tag{4}$$

Equation (4) gives $\breve{w} = p/(1 - \alpha\lambda(1 - F(p))$. Then, the measure of majority members who buy the service is:

$$\breve{n} = \int_{\breve{w}}^{w_{max}} g(v)dw = 1 - G[(p/(1 - \alpha\lambda(1 - F(p))]. \tag{5}$$

The profit of the monopolist, if it serves **both** minority and majority groups, is:

$$\pi_b = p(\breve{m} + \breve{n}) = p\{\lambda(1 - F(p)) + 1 - G[(p/(1 - \alpha\lambda(1 - F(p))]\}. \tag{6}$$

The profit of the monopolist, if it serves **only** the majority group, is:

$$\pi_o = p(1 - G(p)). \tag{7}$$

Suppose that p_b^* is the solution to $\frac{\partial \pi_b}{\partial p} = 0$. By the envelope theorem,

$\frac{\partial \pi_b^*}{\partial \lambda} = p_b^*\big(1 - F(p_b^*)\big) - \alpha g(\breve{w})\big(1 - F(p_b^*)\big)\breve{w}^2 = \big(1 - F(p_b^*)\big)[p_b^* - \alpha g(\breve{w})\breve{w}^2]$ and $\frac{\partial \pi_b^*}{\partial \alpha} = -\lambda g(\breve{w})\big(1 - F(p_b^*)\big)\breve{w}^2 < 0$. An increase in α reduces the firm's payoff from serving both groups because it reduces the majority's valuation of joint consumption and thus reduces their demand (i.e., $\breve{n}$ is decreasing in α). But an increase in λ has an ambiguous effect because it increases the minority's demand (i.e., $\breve{m}$ is increasing in λ) but decreases the majority's demand (i.e., $\breve{n}$ is decreasing in λ). The monopolist will serve only the majority group if $\pi_o^* \geq \pi_b^*$. This may be optimal because, *by serving both groups*, the demand of the majority group is smaller. The parameters I choose below ensure that $\pi_o^* \geq \pi_b^*$.

2. Oligopoly: Bertrand game with customer discrimination

Now suppose there are two firms with a zero cost of production as in the --previous section. Suppose the only strategic variable is price and a customer buys from the firm that offers the higher surplus. If the firms offer the same surplus, the market demand is split equally between the firms. This is a Bertrand game with a homogenous good **and** a differentiated good. That is, from the standpoint of the minority, both firms sell a homogenous good. But from the standpoint of the majority, the firms sell differentiated goods depending on the size of the minority customers who buy from each firm.

2.1 A partial integration equilibrium

Closed-form solutions are difficult in this game, so I assume that $v_{max} = 1$, $w_{max} = 3$, $w_{min} = 0$, $\alpha = 0.5$ and $\lambda \geq 0.6$ and the valuations of the members of each group is uniformly distributed. Then $G(w) = \frac{w - w_{min}}{w_{max} - w_{min}}$ and $F(v) = v$. The majority group is not only more populous but also has a higher purchasing power in the sense that its average (expected) valuation is bigger than the average valuation of the minority group and, for the same price, higher-valuation customers are more likely to demand the service than lower-valuation customers.

Suppose firm j's price is p_j, j = 1, 2. Consider a candidate equilibrium in which firm 1 serves only the majority group and firm 2 serves both groups. The marginal customer, with valuation $\widehat{w}$, who buys from firm 1 satisfies:

$$\widehat{w} - p_1 = \widehat{w} - p_2 - \alpha \widehat{w} \widehat{m}, \tag{8}$$

where $\widehat{m} = \lambda(1 - p_2)$ is the measure of minority customers who buy from firm 2. Equation (8) gives $\widehat{w} = \frac{p_1 - p_2}{\alpha\lambda(1-p_2)}$. For $\widehat{w} > 0$, we require $p_1 > p_2$. This is consistent with $\lambda(1 - p_2)$ minority customers buying from the firm 2 because minority customers, given that they are not prejudiced, only buy from the firm with the lower price.

Given the uniform distribution of the majority customers' valuations on $[0, w_{max}]$, it is easy to show that firm 1's payoff is:

$$\pi_1 = p_1\left(\frac{w_{max} - \widehat{w}}{w_{max}}\right). \tag{9}$$

Recall that $\lambda(1 - p_2)$ minority members will demand the service from firm 2. Consider members of the majority who did not buy from firm 1. Their valuations are uniformly distributed on $[0, \widehat{w}]$ with truncated cdf, $\widehat{G}(w) = w/\widehat{w}$, where $\widehat{w} = \frac{p_1 - p_2}{\alpha\lambda(1-p_2)}$. If they buy from firm 2, then the marginal customer's valuation, $\widetilde{w}$, in this group satisfies $\widetilde{w} - p_2 - \alpha\lambda\widetilde{w}(1 - p_2) = 0$, which gives $\widetilde{w} = p_2/(1 - \alpha\lambda(1 - p_2))$.[5] The measure of majority group customers who buy from firm 2 is:

$$\widehat{n} = \widehat{G}(\widehat{w}) - \widehat{G}(\widetilde{w}) = 1 - \frac{\widetilde{w}}{\widehat{w}}. \tag{10}$$

Then firm 2's profit is:

$$\pi_2 = p_2\left(\lambda(1 - p_2) + 1 - \frac{\widetilde{w}}{\widehat{w}}\right). \tag{11}$$

Note that for both groups to buy from firm 2, we require $p_2 < \min[1, \widehat{w}]$.

A Nash equilibrium (p_1^*, p_2^*) is the solution to $\frac{\partial \pi_1}{\partial p_1} = 0$ and $\frac{\partial \pi_2}{\partial p_2} = 0$. Given $w_{max} = 3, w_{min} = 0$, and $\alpha = 0.5$, we get the following results:

[5]Note that $\widehat{w} - p_1 = \widehat{w} - p_2 - \alpha\lambda\widehat{w}(1 - p_2)$ gives $p_1 = p_2 + \alpha\lambda\widehat{w}(1 - p_2)$ and $\widetilde{w} - p_2 - \alpha\lambda\widetilde{w}(1 - p_2) = 0$ gives $\widetilde{w} = p_2 + \alpha\lambda\widetilde{w}(1 - p_2)$. Then given $\widehat{w} > \widetilde{w}$, it follows that $p_1 = p_2 + \alpha\lambda\widehat{w}(1 - p_2) > \widetilde{w} = p_2 + \alpha\lambda\widetilde{w}(1 - p_2)$. Therefore, in equilibrium $\widetilde{w} < p_1$.

Table 1: prices and profits in partial integration equilibrium with $\alpha = 0.5$.

λ	p_1^*	p_2^*	π_1^*	π_2^*
0.60	0.464	0.279	0.332	0.284
0.65	0.491	0.291	0.349	0.298
0.70	0.517	0.302	0.365	0.313
0.75	0.543	0.312	0.381	0.326
0.80	0.568	0.321	0.396	0.340
0.85	0.592	0.330	0.410	0.352
0.90	0.616	0.339	0.425	0.365
0.95	0.639	0.347	0.438	0.377

If there was a monopolist, it would have set a price of $p_o^* = 1.5$ and served only the majority because $p_o^* = 1.5 > v_{max} = 1$. It would have made a profit of $p_o^* \left(1 - \frac{p_o^*}{3}\right) = 0.75$. Table 1 shows that competition reduces profit. This is not surprising.

I state the following proposition:

Proposition 1: *Suppose $\lambda\alpha \geq 0.3$. Then there exists a Nash equilibrium with partial integration in which one firm serves only the members of the majority group and charges a higher price, and the other firm serves members of both the majority and the minority groups and charges a lower price.*

If a majority customer's disutility from consuming with minority customers is the *same* for all majority customers, proposition 1 will not hold. This is because if a high-valuation majority customer does not buy the service from the low-price firm because the sum of the price **and** the consumption disutility (call it the *full price*) from buying from the low-price firm is higher than the price of the high-price firm, then this will also be true for all low-valuation majority customers. So, low-valuation majority customers will also not buy from the low-price firm. Proposition 1 will not hold. But, as modelled in this paper, if a majority customer's disutility from joint consumption is increasing in his valuation, then the full price of a higher-valuation majority customer is higher than the full price of a lower-valuation customer, so we can construct an equilibrium in which low-valuation majority customers consume with the minority customers while high-valuation customers do not.

2.2 A full segregation equilibrium

In this case, I maintain $w_{max} = 3$ but I change $w_{min} = 0$ to $w_{min} = 1.5$. The rationale will soon be obvious.

Consider an equilibrium in which firm 1 serves only the majority and firm 2 serves only the minority. Let p_1^{**} and p_2^{**} be the equilibrium prices. Suppose firm 2 chooses $p_2^{**} = 0.5$ to maximize $p_2\lambda(1 - p_2)$. No member of the minority will buy from firm 1 if $p_1^{**} > p_2^{**}$. And no majority customer will buy from firm 2 if $w - p_1 \geq w - p_2^{**} - \alpha\lambda w(1 - p_2^{**})$ for all w. This holds if $w_{min} - p_1 \geq w_{min} - p_2^{**} - \alpha\lambda w_{min}(1 - p_2^{**})$,[6] which gives $p_1 \leq 0.5 + 0.75\alpha\lambda$. Note that $p_1 = 1.5$ maximizes $p_1\left(\frac{w_{max}-p_1}{w_{max}-w_{min}}\right)$. Firm 1 chooses p_1 to maximize $p_1\left(\frac{w_{max}-p_1}{w_{max}-w_{min}}\right)$ subject to $p_1 \leq 0.5 + 0.75\alpha\lambda$. Then $p_1^{**} = 1.5$, if $0.5 + 0.75\alpha\lambda \geq 1.5$ or $\alpha\lambda \geq 4/3$.

Next, I show that no firm has a profitable deviation. Firm 1 will not choose a higher price nor will it choose a lower price, $p_1 \in [p_2^{**}, p_1^{**})$ because p_1^{**} maximizes its profit if it serves only the majority. It will not choose a price below p_2^{**} because that will attract some members of the minority group but the high value of $\alpha\lambda$ makes such a deviation unprofitable. In particular,

[6]Given that we require $p_1^{**} > p_2^{**}$, this condition will not hold if $w_{min} = 0$.

note that $\alpha\lambda \geq 4/3$ and $w_{min} = 1.5$ imply that $\Delta \equiv w_{min} - p_1 - \alpha\lambda w_{min}(1 - p_1) \leq 0$ if $p_1 = p_2^{**} = 0.5$. Now $\frac{\partial \Delta}{\partial p_1} = -1 + 1.5\,\alpha\lambda > 0$ because $\alpha\lambda \geq 4/3$.

Then $\Delta \equiv w_{min} - p_1 - \alpha\lambda w_{min}(1 - p_1) < 0$ for $p_1 \in [0, p_2^{**})$. Therefore, if firm 1 deviates by choosing a price below p_2^{**}, it will lose all majority group customers and reduce its profit.

Consider firm 2. If firm 2 deviates to a higher price, it will not attract any majority customers and its profit will fall. If it deviates to a lower price, no majority customer will buy from firm 2 if $w_{min} - p_1^{**} \geq w_{min} - p_2 - \alpha\lambda w_{min}(1 - p_2)$ for all $p_2 \in (0, p_2^{**})$. Noting that $p_1^{**} = w_{min} = 1.5$, this gives $p_2 + 1.5\alpha\lambda(1 - p_2) \geq 1.5$, which holds for all $p_2 \in (0, 0.5)$ if $\alpha\lambda \geq 4/3$. The number of minority customers will increase but firm 2's profit will reduce because p_2^{**} is its profit-maximizing price if it serves only the minority. This completes the construction of the full segregation equilibrium.

Proposition 2: *Suppose $\alpha\lambda \geq 4/3$. Then there exists a Nash equilibrium with full segregation in which one firm serves only the members of the majority group and charges a higher price and the other firm serves only members of the minority group and charges a lower price.*

Having constructed the full segregation equilibrium, one can see how it can be constructed for general distribution functions and parameters.

Define $p_1^{**} = argmax_{p_1} p(1 - G(p))$ and $p_2^{**} = argmax_{p_2} p\lambda(1 - F(p))$, where $p_1^{**} > p_2^{**}$. At these prices, no minority member will buy from firm 1. No majority customer will buy from firm 2 if $w_{min} - p_1^{**} \geq w_{min} - p_2^{**} - \alpha\lambda w_{min}(1 - p_2^{**})$, which holds if $\alpha\lambda$ and w_{min} are sufficiently high. Firm 1 will not choose a higher price because p_1^{**} maximizes its profit if it serves only the majority and it will not choose a lower price if $\alpha\lambda$ is sufficiently large. Firm 2 will not choose a higher price because p_2^{**} as its profit-maximizing price if it serves only the minority and it will not choose a lower price because it cannot attract any majority customers if $\alpha\lambda$ is sufficiently large. The three conditions required to construct this full-segregation equilibrium, (p_1^{**}, p_2^{**}), are (i) $\alpha\lambda$ is sufficiently large, (ii) $w_{min} > 0$ and, (iii) $p_1^{**} = argmax_{p_1} p(1 - G(p))$ and $p_2^{**} = argmax_{p_2} p\lambda(1 - F(p))$, where $p_1^{**} > p_2^{**}$.[7]

2.3 Social welfare

I focus on the social welfare of consumers in the partial integration equilibrium. This is given by:

$$W^* = \int_{\hat{w}}^{w_{max}} (w - p_1^*)g(w)dw + \int_{\tilde{w}}^{\hat{w}} (w - p_2^* - \alpha\lambda w(1 - p_2^*))\hat{g}(w)dw + \lambda \int_{p_2^*}^{v_{max}} (v - p_2^*)f(v)dv$$

Table 2: Social welfare in partial integration equilibrium with $\alpha = 0.5$ and $\alpha\lambda \geq 0.3$

λ	W^*
0.60	1.267
0.65	1.243
0.70	1.222
0.75	1.202
0.80	1.183
0.85	1.166
0.90	1.148
0.95	1.132

[7] So long as α is sufficiently large, we can construct the full-segregation equilibrium even if $p_1^{**} = p_2^{**}$.

3. Discussion

With non-prejudiced majority members, the Nash equilibrium would have been marginal-cost pricing in standard Bertrand game. Each firm would have served customers from both groups. The segregated equilibria and prices above marginal cost by non-prejudiced firms in propositions 1 and 2 are the result of customer discrimination (prejudice).

In table 1 (the partial integration equilibrium), each firm's price and profit are increasing in the size of the minority group (i.e., λ). The co-movement of the firm's prices is consistent with prices being strategic substitutes in a Bertrand game. What needs to be explained is why the prices are increasing in λ. An increase in λ is an increase in demand for firm 2's service by minority consumers. So, firm 2 increases its price. Firm 1 can also increase its price because firm 2 has increased its price and also an increase in λ increases the negative consumption externality to majority consumers of buying from firm 2.

Table 2 shows that social welfare falls as the size of the minority group increases. This is because the negative consumption externality that the minority imposes on the majority is increasing in the size of the minority. However, there is legitimate ground to argue that we should not include the negative consumption externality (stemming from bigotry) in social welfare for the same reason that Stigler (1970) opined that the gain to a person from committing a crime should not be included in social welfare because "… *the society has branded the utility derived from such activities as illicit.*" In the same vein, civil rights laws that ban discrimination on the basis of gender, race (color), ethnicity, religion, etc, do not, in effect, put any social weight on prejudiced preferences.

Given the presence of production that is characterized by increasing returns to scale (not modeled in this paper), the full-segregation equilibrium in which a firm serves only the minority may lead to higher prices to the minority because economies of scale are not exploited (Gil and Marion, 2022). Thus, a partial-integration equilibrium may result in lower prices for both majority and minority groups. Furthermore, higher levels of integration, as a result of desegregation laws, may over time, reduce the intensity of prejudice because of interactions with people of different backgrounds (e.g., Ananat and Washington, 2009; Carrell, Hoekstra, and West, 2015).

Consider the partial integration equilibrium. Given the parameters of the equilibrium, firm 1 --- if it were a monopolist --- would choose a price of $p_o^* = 1.5$ where $\pi_b^* < \pi_o^*$, so it serves only the majority because $p_o^* = 1.5 > v_{max} = 1$. All the minority customers are *priced* out of the market. Competition does not eliminate segregation in the market but it may mitigate segregation as in the partial integration equilibrium in proposition 1. In fact, banning segregation does not eliminate segregation because it is price (not a refusal to serve minority customers who are willing to buy the service) that causes the minority to buy from only one firm. If discriminatory firms do not serve the minority who are *willing to demand the service at the market price* because the managers of the firms and/or customers are prejudiced, then banning segregation will eliminate segregation.

In the case of duopoly, all or some of the members of the minority group are served. Therefore, with the entry of an additional firm, the minority group members are better off. The majority group has the same payoff in the monopoly case and in the full segregation equilibrium because the equilibrium price is the same in both cases. In the partial integration equilibrium, the majority members who buy from firm 1 (i.e., do not consume with the minority) are better off because they pay a lower price than the monopoly price. The majority members who buy from firm 2 also pay a lower price. The highest price that they pay is less than 0.4 (see table 1) while the monopoly price is $p_o^* = 1.5$. Even including the disutility of consuming with the minority, they are better off. Firm entry or competition increases the social welfare of consumers.[8]

In both equilibria, the firm that serves the minority group makes a smaller profit and the firm that serves only the majority group charges a higher price. Paradoxically, if the members of the majority group are sufficiently prejudiced and *if the minority group is sufficiently big*, then these equilibria hold in the sense that the high-price firm does not lose customers, although its competitor charges a lower price. The members of the majority who are served by the high-price firm will not switch to the low-price firm because their disutility from consuming the service with the minority is high if the size of the minority group and their aversion to consuming with the minority are sufficiently large. That is, if $\lambda\alpha$ is sufficiently large.

Recall that in both equilibria, the firm that serves only the majority group makes a bigger profit. It turns out that the equilibria in propositions 1 and 2 will not hold if the firms can choose capacity for each group. To see this, suppose firm 2 serves the minority customers. In both equilibria, firm 2 can undercut firm 1's prices by a *very small* amount. Firm 2, given that it can choose who to serve, will serve *only* members of the majority (capacity restriction) who will leave firm 1 because the firm 2's price is smaller **and** it is not serving any minority customers, although given firm 2's price is less than v_{max} in both equilibria, there are minority customers who will like to buy from firm 2. Firm 2's profit will be higher than its equilibrium profit. Thus, the equilibria in propositions 1 and 2 do not exist if the firms can choose a different capacity for each group. The choice of zero capacity for minority customers is equivalent to price

[8]Using the parameters and distribution functions in the partial integration equilibrium, if there was only one firm in the market, all the members of the minority will be priced out and social welfare will be $\int_{1.5}^{3}(w-1.5)g(w)dw = 0.9375$. This is smaller than all the values for social welfare in table 2.

discrimination in which the firm sets a price that is at least equal to v_{max} for minority customers.

3.1 Exclusion by price versus non-price exclusion

The paper focused on price as a tool of exclusion from the market. However, there are non-price forms of exclusion. An obvious form of non-price exclusion is the outright refusal to sell to a member of the discriminated group *even if the person is willing to pay the price for the service or product*. In the USA, a famous example was Muhammed Ali, then an Olympic boxing champion, being told "sorry, we don't serve negros" in a restaurant in Louisville (Kentucky) in 1960. The restaurant's refusal to serve Ali had nothing to do with his ability to pay. History is replete with many such examples in the USA. Clearly, the seller (firm) was prejudiced. According to a Logan (2022) "Historian Mia Bay finds that more than 90% of US hotels in the 1950s refused service to Black people."

If the discriminated group is priced out of the market in way that does not maximize the seller's **pecuniary** payoff,[9] I can think of two reasons: (1) the seller is not prejudiced but customers are prejudiced and are willing to pay a higher price to buy from a seller who does not sell to members of a particular group, and/or (2) the seller is prejudiced but the law does not allow him to refuse to sell to a customer who is willing to buy from him. So, in order not to break the law, he chooses a price that excludes members of the group against whom he is prejudiced.[10]

[9]By this, I mean from the standpoint of an observer, who is not aware that there is prejudice and thinks that serving both groups maximizes profits.

[10]In the case of firms that could legally practice racial segregation but did not apparently price out the minority group from the market, Gil and Marion (2022) tested the presence of prejudice of firms by checking whether the duration of a theater showing a movie with black actors was consistent with revenue maximization.

Logan (2022) observed that "In North Carolina, for example, business owners worried that if they served all races equally, they would "lose a sufficient percentage of their present patronage" and go from profit to loss. … As a result, many businesses (some begrudgingly) supported non-discrimination ordinances, including the Civil Rights Act of 1964: Such mandates forced both them and their competitors to treat all customers equally, eliminating anyone's ability to profit from racial discrimination."

Therefore, a model with customer prejudice (discrimination) but without firm prejudice need not be inconsistent with historical evidence of discrimination.[11] In fact, a person may be prejudiced in dealing with certain groups in some areas but may not be prejudiced in other areas or he may suppress his prejudice. The owner of a restaurant or hotel may be prejudiced by supporting racial segregation of schools but may n*ot* be prejudiced or may suppress his prejudice by serving black people because his incentive to make money, regardless of the race of his customers, is too strong. Donald Sterling, the former owner of the NBA team LA Clippers, was prejudiced against blacks in the sense he did want to be seen in their company in certain situations but most of the players on his NBA team were blacks and there was no evidence that he tried to underpay them.

4. Conclusion

This paper studied a model of discrimination that is not customer or employer discrimination against workers. Discrimination has no labor market effects. It considered customer discrimination against other customers. Customers of a majority group derive a

[11]Wright (2013), Gil and Marion (2022), and Cook et al. (2023) provided historical evidence that customer discrimination was a primary cause of racial segregation in the US prior to the Civil Rights Act of 1964.

disutility from consuming a service (e.g., eating in a restaurant, going to the movies, etc) with customers of a minority group. Employers are not prejudiced but may discriminate to maximize profits.

The two equilibria in the paper were obtained by using specific parameters and distributions. But after proving the results, it turns that it is a sufficiently large value of size of the minority and the aversion of the majority to joint consumption with the minority that sustains the equilibria. That is the common feature of both equilibria. The partial integration equilibrium hinged on how the prejudice of the majority was modelled.

A feature of the real world that is missing from the model is the minority's disutility from consuming with the majority which may stem from harassment by majority customers. When public schools were desegregated in the USA in the 1950s, some blacks went to integrated schools under police escort because of the fear of harassment by whites.[12] By excluding this cost to the minority group from the model, we have assumed that measures like police escorts were sufficient to eliminate this cost or the members of the minority group derived a positive utility from fighting injustice that nullifies the cost of harassment by the majority.

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[12]Of course, the firms in the model are private entities that charge a price. But I used public schools to give a very well-known example of harassment by a majority group against a minority group in response to desegregation.

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