A discusión

THE ROLE OF THE INTERCHANGE FEE ON THE EFFECT OF FORBIDDING PRICE DISCRIMINATION OF ATM SERVICES*

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ABSTRACT

We consider whether banks should be allowed to set different ATM prices to their customers depending on whether they hold an account on the bank. In Massoud and Bernhardt (2002), without considering an interchange fee, a ban on price discrimination on ATM services increases total surplus. In the present model that considers an interchange fee, the effect of a ban on price discrimination depends on the way the interchange is fixed. If it is fixed to maximize the profits of banks, forbidding price discrimination reduces total surplus. However, if the interchange is fixed to maximize total surplus, banning price discrimination increases total surplus.

Keywords: ATM, surcharge, foreign fee, interchange fee, collusion.
JEL classification: L13, G21.

1 Introduction

Banks not only provide banking services but also ATM services to their customers. When a consumer withdraws money from an ATM of his bank (home bank) she may be charged what is called an "on-us" fee.[1] If she withdraws money from an ATM belonging to a bank with whom she has no account (foreign bank), the transaction can be affected by three different prices. First, the owner of the ATM can charge the customer what is called as a surcharge, the bank of the consumer can charge her the foreign fee whereas the owner of the ATM charges the bank of the consumer the interchange fee.

The present paper wants to contribute to the debate on whether banks should be allowed to charge different ATM prices to their customers depending on whether they hold an account on the bank. In other words, if "on-us" fees and surcharges can take different values. This topic is analyzed in Massoud and Bernhardt (2002). They study a model where the ATM and the banking market are embedded in the same spatial framework: the banking and the ATM services are provided in the same location. To simplify matters, they exclude from the analysis the existence of either a foreign or an interchange fee. They obtain that a ban on price discrimination increases social welfare.

We want to reevaluate their results when the presence of foreign and interchange fees are taken into account. For tractability, we eliminate the spatial nature of the ATM market and we modelled it as in Chioveanu et al. (2007). We consider that ATMs are deployed in locations that are reached by consumers with an exogenous probability. Then ATM prices do not affect the choice of ATMs but the level to which they are used.

We obtain that the introduction of the interchange fee adds a new dimension to the decision

[1] Although less than 1% of banks impose "on-us" fees on home transactions.

to whether to allow price discrimination. If price discrimination is banned, the interchange fee affects both the account fees and the ATM prices. If instead price discrimination is allowed, the interchange fee is completely neutralized, because one of the prices becomes redundant.

The social convenience of the ban on price discrimination will depend on who is in charge of choosing the interchange fee. If it is chosen by banks to maximize joint profits, we obtain that the ban on price discrimination reduces social welfare, because the power of banks is used against the social interest. However, if the interchange is fixed to maximize total surplus, banning price discrimination increases total surplus.

The assumption that the interchange fee is chosen cooperatively by banks is more common in the theoretical work (Donze and Dubek (2006) and it also sounds more realistic . For example, in February 2006, the Italian Competition Authority started a comprehensive investigation of the Italian Banking Association (ABI) and its electronic banking unit Co.Ge.Ban whose main concern was precisely the cooperative determination of the interchange fee, which could prevent competition and violate Art. 81 of the EC Treaty.

This paper is an extension of Chioveanu et al. (2007) where the basic difference between both papers is that in Chioveanu et al. (2007), ATM prices are chosen after consumers has subscribed to a bank whereas here they are chosen simultaneously with the account fee. It turns out that the order of moves considered here complicates very much the computations for the case with price discrimination, so that we are forced to consider symmetric banks. Chioveanu et al. (2007) are able to consider the asymmetric case and this allows them to study the deployment of ATMS. Despite the different order of moves, Chioveanu et al. (2007) also obtain that the interchange fee is neutral when price discrimination is allowed.

In the next setction, the model of the paper is presented. In Section 3, the main results of the paper are obtained. Then in the last section final comments put the paper to an end.

2 Model

We consider a model with two banks (A and B) located on the extremes of a segment of unit length where consumers' locations are uniformly distributed. They obtain gross utility V from banking services. Consumers' transportation cost is given by $C(d) = d$, where d represents the distance. In order to open an account at a bank, customers must pay an account fee F_j, $j = A, B$. The total number of consumers is normalized to one.

Apart from banking services, banks offer to customers ATM cash withdrawal services. The marginal costs of providing ATM and banking services are normalized to zero. A customer of bank j, to use a home ATM of bank j, has to pay the on-us fe p_j. In order to use an ATM of a foreign bank i (with whom the customer does not have an account) she has to pay a surcharge s_i to the owner of the ATM and a foreign fee f_j to the home bank j. Furthermore, the home bank pays an interchange fee a to the foreign bank. Our assumptions on the pricing of ATM transactions are meant to describe actual practices.

ATMs are located in consumer clusters that we call for simplicity, shopping malls. There are M shopping malls and each bank has one ATM in N different shopping malls and no shopping mall has more than one ATM. In other words, each bank monopolizes the ATM services in N shopping malls. For coherence, we must have that $0 \leq N \leq \frac{M}{2}$. Consumers visit any of the M available shopping malls with an exogenous equal probability $\frac{1}{M}$. Observe that this assumption implies that the decision to attend a particular shopping mall does depend neither on the presence of ATMs nor on their pricing policies. Banks cannot affect consumers' decision on where to buy, though they can affect the payment method chosen. Once at a shopping mall, consumers require ATM services that can only be satisfied in that shopping mall. Changing location is assumed to be prohibitively costly. Consumers' valuation of an ATM withdrawal at a shopping mall is denoted by v, where v is a random draw from a uniform distribution on $[0, 1]$.

We analyze the following three stage game. In the first stage, bank i ($i = A, B$) chooses the account fee (F_i) and the ATM prices: the on-us fee (p_i), the foreign fee (f_i) and the surcharge (s_i). In the second stage, consumers choose a bank where to open an account. In the final stage, consumers go to the shopping mall, each of them observes her realization of v and decides whether to use an ATM (if available) or not. For the moment, we consider that the interchange fee is exogenously given and that takes values in $[0, \frac{2}{3}]$ to avoid corner solutions. Proposition 3 deals with the results given two alternative ways of fixing a.

In the last stage, if a customer ends up in a shopping mall with an ATM of her home bank j, she uses that ATM if her valuation exceeds the ATM fee $v \geq p_j$. If the customer is at a shopping mall with an ATM of the foreign bank, she uses the cash dispenser if $v \geq f_j + s_i$.

In stage 2, consumers decide where to open an account.[2] They have to compare their expected utility of opening an account at each bank. For a consumer located at x, these are given respectively by:

$$V - x - F_A + \frac{N(1-p_A)^2}{2M} + \frac{N(1-f_A-s_B)^2}{2M}, \tag{1}$$

$$V - (1-x) - F_B + \frac{N(1-p_B)^2}{2M} + \frac{N(1-f_B-s_A)^2}{2M}, \tag{2}$$

Observe that the first three terms in the expressions above come from general banking services, whereas the last terms come from ATM services. A customer of bank A has the same probability $\frac{N}{M}$, of ending up in a shopping mall with either a home or a foreign ATM. $\frac{(1-p_A)^2}{2}$ is the expected utility in a shopping mall with an ATM of the home bank and $\frac{(1-f_A-s_B)^2}{2M}$ is the expected utility in a shopping mall with a foreign ATM.

Equating (1) with (2), we obtain the market share of bank A:

$$x = \frac{1 - F_A + F_B}{2} + \left(\frac{N}{4M}\right)\left((1-p_A)^2 - (1-p_B)^2 + (1-f_A-s_B)^2 - (1-f_B-s_A)^2\right) \tag{3}$$

[2] We assume that V is high enough so that the market is covered in equilibrium.

In the second stage, banks choose the account fee and ATM prices. Profits of firm A are given by:

$$\Pi_A = xF_A + \pi_A^{ATM}, \tag{4}$$

where the first term captures the revenues of providing banking services and the second term the revenues from the ATM market, given by

$$\pi_A^{ATM} = \left(\frac{N}{M}\right)(x(1-p_A)p_A + x(1-f_A-s_B)(f_A-a) + (1-x)(1-f_B-s_A)(s_A+a)) \tag{5}$$

The first two terms of this expression capture the expected revenues from own customers and the last one the revenues from customers of the rival bank. The following proposition shows the equilibrium prices:

Proposition 1 *In the equilibrium with price discrimination: (i) Banks charge affiliated ATM users the marginal cost of the services:* $p_j^* = 0$ *and* $f_j^* = a$ *(ii) Banks set account fees and surcharges at levels* $F_j^* = 1 + \frac{2N}{9M}$ *and* $s_j^* = \frac{2}{3} - a$ *respectively (iii) Equilibrium bank profits and consumer surplus amount respectively to* $\Pi_j^* = \frac{1}{2} + \frac{2N}{9M}$ *and* $CS^* = V + \frac{N}{3M} - \frac{5}{4}$.

The first important result from the above proposition is that real variables as ATM demands and profits do not depend on a. The reason is that by inspecting (3, 4 and 5), one realizes that if one rewrites profits by using new variables $s_j' = s_j + a$ and $f_j' = f_j - a$, profits do not depend on a. Then the equilibrium values of s_j' and f_j' are independent of a. Therefore neither demands (that depend on $s_j' + f_j'$) nor bank profits (that depend on $s_j' + f_j'$, s_j' and f_j') depend on the interchange fee. This neutrality of the interchange fee distinguishes the case with price discrimination from the case without price discrimination.

The pricing of own customers follows the pattern of two-part tariff pricing: services are priced at marginal cost and all the rents are extracted through the fixed part. The account fee is higher than the one we would have without the ATM market. The reason is that only from

nomembers banks obtain ATM revenues, because the ATM services of members are priced at marginal cost and this implies that they have less incentives to attract customers.

Now, we analyze the case where banks can not discriminate between members and nonmembers i.e. $s_j = p_j$. Taking into account this equality, the stages three and four follow the same lines as the preceding analysis. Then, in stage 2, banks choose prices whose equilibrium values are shown in the next proposition:

Proposition 2 *In the equilibrium without price discrimination: (i) Foreign fees are set to marginal cost* $f_j^u = a$. *(ii) Account fees and prices of ATMs are set respectively to* $F_j^u = 1 + \frac{a^2 N}{2M}$ *and* $p_j^u = \frac{1}{2} - \frac{3a}{4}$. *(iii) Equilibrium bank profits and consumer surplus are given respectively by* $\Pi_j^u = \frac{1}{2} + \frac{(4-a^2)N}{16M}$ *and* $CS^u = V - \frac{5}{4} + \frac{N(4+4a-3a^2)}{16M}$.

The best way to compare the two previous propositions is to realize that when $a = \frac{2}{3}$ (the highest value the interchange fee can take) both yield the same results. Then, the case with price discrimination corresponds to the case without price discrimination when the interchange is fixed to $a = \frac{2}{3}$. This will help to understand the later discussion about the convenience of the ban on price discrimination.

In Massoud and Bernhardt (2002) one of the main results is that without price discrimination, the market for banking services and ATMs are completely separated. We see that when we introduce the interchange and the foreign fee this is no longer the case (except, of course, when $a = 0$). The reason is that banks obtain more expected revenues from nonmembers and this difference increases with a. Then the higher a, the lower the incentives to attract customers and the higher the account fee.

In Massoud and Bernhardt (2002) they obtain the result that price of ATMs without price discrimination is higher than the surcharge. We obtain the opposite result for any value of a.

The result of Massoud and Bernhardt (2002) is surprising, because one would tend to think that banks would inflate surcharges to increase their customer base. However, Massoud and Bernhardt (2002) identify a countervailing effect coming from the competition for ATM services. With price discrimination, the competing bank prices home transactions at marginal cost and therefore to attract the customers of the other bank she has to price foreign ATM transactions very aggressively. They show that this effect dominates. In our model, this latter effect does not exist, because we do not have competition for ATM services. Then, the intention to increase market share explains the comparison of prices with and without price discrimination.

The profits are decreasing in the interchange fee. This results from the balance of two opposite effects. On the one hand, increases in a increase collusion in the market for banking services. On the other hand, it reduces the revenues in the ATM market, because it distorts p_j away from its ATM revenue maximizing level of $\frac{1}{2}$. It turns out that the second effect dominates. Consumer surplus increases with a. Increasing the interchange fee by Δa, the cost of home ATM services decrease by $\frac{3}{4}\Delta a$, while the cost of foreign ATMs increase by $\frac{1}{4}\Delta a$. Then it is easy to understand that the overall effect is positive for consumers given that they use foreign and home ATMs with the same probability.

Comparing the two preceding propositions, we have a clear-cut comparison of both profits and consumer surplus in the two regimes. Profits are higher without price discrimination whereas consumer surplus is always higher with price discrimination. This result follows from the fact that both regimes coincide when $a = \frac{2}{3}$ and profits are decreasing in a and consumer surplus increasing in a without price discrimination. Therefore, any policy to forbid the use of price discrimination has the effect of benefitting banks wile making consumers worse-off. As far as profits are concerned, this result corresponds to the one obtained by Massoud and Bernhardt (2002) while as far as consumer surplus is concerned we obtain a clear effect of price

discrimination while their result was ambiguous.

3 The welfare analysis of the ban on price discrimination

Total welfare without price discrimination is given by:

$$W(a) = V - \frac{1}{4} + \frac{N(12 + 4a - 5a^2)}{M} \tag{6}$$

Social welfare with price discrimination is $W(\frac{2}{3})$. We have that $W(a) - W(\frac{2}{3}) \geq 0$ iff $\frac{2}{15} \leq a < \frac{2}{3}$. Then for those values of a, a ban on price discrimination would increase total welfare.

So far, we have performed the analysis assuming that the interchange fee was exogenous. Now, we enlarge the game analyzed in the previous section to include two initial stages. In the first one (stage -1), a social welfare maximizing planner decides on whether to ban price discrimination or not. In the second one (stage 0), banks cooperatively choose the interchange fee to maximize joint profits. And then stages 1,2 and 3 as defined above proceed.

In Stage 0, the decision of banks depends on whether there is a ban on price discrimination. If there is a ban, we know that bank profits are decreasing in the interchange fee, so that banks would set the interchange fee equal to marginal cost $a = 0$. If there is no ban on price discrimination, profits do not depend on a, so that the decision on the interchange fee is irrelevant.

In Stage -1, the planner decides whether to ban price discrimination. If there is no ban, total welfare is given by $W(\frac{2}{3})$. If price discrimination is banned, the planner knows that in the following stages banks will choose $a = 0$ and total welfare will amount to $W(0)$. As it was said at the beginning of this section we have that $W(\frac{2}{3}) > W(0)$ and therefore price discrimination is not banned by the planner.

So far we have limited the scope of state regulation to whether price discrimination was

allowed or not. One could also analyze what happens if regulation is extended so that the social planner controls the choice of the interchange fee. Then, society can not be worse-off without price discrimination, because the situation with price discrimination can be replicated by choosing $a = \frac{2}{3}$. The idea is that the greater freedom the planner has without price discrimination can not go against the social interest. It is easy to check that (6) is maximized in $a = \frac{2}{5}$ and therefore welfare is strictly higher banning price discrimination. It is interesting to note that the optimal interchange fee is higher than the marginal cost.

Next proposition summarizes the main results of this section.

Proposition 3 *If the interchange fee is chosen cooperatively by firms, social welfare is higher with price discrimination. If the interchange fee is chosen by a social welfare maximizing planner, social welfare is higher when price discrimination is forbidden.*

As propositions 1 and 2 show the interchange fee is neutral with price discrimination while it has an important effect on prices without price discrimination. Then the convenience of the ban depends on whom holds the power to choose the interchange fee. If it is chosen by a social planner, it is optimal to ban price discrimination in order to be able to affect welfare through a. If it is chosen by banks, it is optimal to allow price discrimination to turn the choice of a irrelevant, because bank choice severely reduces welfare.

One last comment about the timing we have chosen. If the order of moves was reversed i.e. banks chose first the interchange fee and then the planner decided on the ban, things would change considerably. Banks would choose the lowest interchange fee such that the planner decides to ban price discrimination. For what it is said at the beginning of the section, this value is $a = \frac{2}{15}$.

4 Conclusions

The present paper contributes to the debate on whether banks should be allowed to charge different ATM prices to their customers depending on whether they hold an account on the bank. In other words, if "on-us" fees and surcharges can take different values. The social convenience of the ban on price discrimination depends on who is in charge of choosing the interchange fee. The most realistic assumption is that it is chosen by banks to maximize joint profits. In this case, we obtain that the ban on price discrimination reduces social welfare. However, if the interchange is fixed to maximize total surplus, a ban on price discrimination increases total surplus.

5 Appendix

With price discrimination, the optimality of the strategy given in the proposition is proven the following way. Consider that banks choose $f'_j = f_j - a$ and $s'_j = s_j + a$ in order that a disappears in the expression of the profits. We analyze the optimal strategy of bank A given that B plays the equilibrium strategies: $p_B = 0$, $f'_B = 0$, $F_B = 1 + \frac{2N}{9M}$ and $s'_B = \frac{2}{3}$. Bank A will optimally set the price of ATMs for own customers at marginal cost. Then $p_A = 0$ and $f'_A = 0$. Then its profit function is only a function of the surcharge and the account fee $\Pi_A(s'_A, F_A)$. The only possible maximizer of this function are the ones satisfying the FOC: $F_A = 1 + \frac{2N}{9M}$ and $s'_A = \frac{2}{3}$. FOC are sufficient, because $\frac{\partial^2 \Pi_A}{\partial^2 F_A} < 0$, $\frac{\partial^2 \Pi_A}{\partial^2 F_A}\frac{\partial^2 \Pi_A}{\partial^2 s'_A} - \left(\frac{\partial^2 \Pi_A}{\partial F_A \partial s'_A}\right)^2 > 0$ when $F_A > \frac{19N}{54M}$ and $\frac{\partial \Pi_A}{\partial F_A} > 0$ whenever $0 \leq F_A \leq \frac{19N}{54M}$.

Without price discrimination, We analyze the optimal strategy of bank A given that B plays the equilibrium strategies: $f^u_B = a$, $F^u_B = 1 + \frac{a^2 N}{2M}$ and $p^u_B = \frac{1}{2} - \frac{3a}{4}$. We know that banks will price the ATM services of own customers at marginal cost and therefore $f_A = a$. Then the

profit function of A only depends on p_A and F_A. It is easy to see that this function is concave on those variables.

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