Paying for ATM Usage: Good for Consumers, Bad for Banks ?

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Introduction

ATMs transactions generate two types of monetary transfers:

- Wholesale level : interchange fee ; exists in most countries ; jointly set by banks
- Retail level, several regimes :
  - Regime one: account fee but no usage fee (France, UK)
  - Regime two: account fee + foreign fee (Australia, South Africa, China, Norway),
  - Regime three: account fee + foreign fee + surcharge (USA)

Main Issues :

- Do ATM usage fees harm or enhance consumer's welfare ?

Two opposite effects :

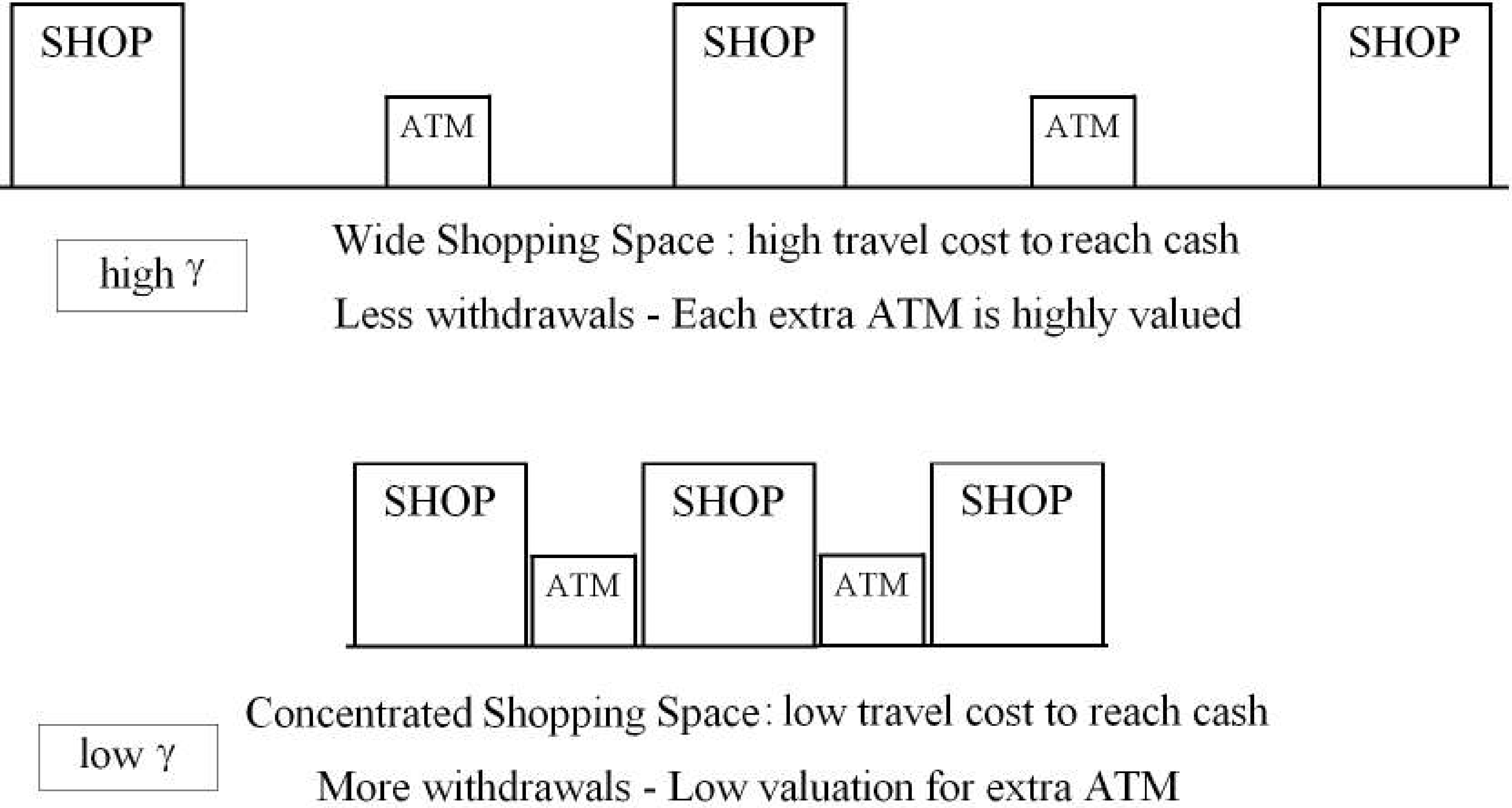
- usage fees (notably surcharges) $\longrightarrow$ more (convenient) ATMs $\longrightarrow$ smaller travel cost to reach cash.
- usage fees $\longrightarrow$ more expensive withdrawals

- Collusive role of the interchange fee ?

Introduction

To answer the questions, we develop a model where :

- ATM deployment is endogeneous
- Consumers' choice of where to bank is endogenous
- The demand for withdrawals depends on a parameter reflecting the travel cost to reach cash.
  (figure)



SHOP
ATM
SHOP
ATM
SHOP
high γ
Wide Shopping Space : high travel cost to reach cash
Less withdrawals - Each extra ATM is highly valued
SHOP
ATM
SHOP
ATM
SHOP
low γ
Concentrated Shopping Space: low travel cost to reach cash
More withdrawals - Low valuation for extra ATM

Our results :

- Increasing the number of available usage fees adversely affects banks profits.

  - more usage fees $\longrightarrow$ more differentiation between banks' networks $\longrightarrow$ more ATMs $\longrightarrow$ higher deployment costs.

  - more usage fees $\longrightarrow$ lower collusive power of the IF.

Introduction

- For consumers, R1 is the worst.

  banks can extract the entire consumers surplus using the account fee.

- When travel costs are high, consumers prefer R3 (FF + surcharges) to R2 (FF)

  under R3 $\rightarrow$ more ATMs highly valued by consumers.

- When travel costs are low, consumers prefer the smaller but less expensive network of R2

The Model

- Two banks provide a bundle :
  - basic banking services
  - ATM access
- Horizontal differentiation for basic services.
- ATMs are located in another space: the shopping space

The Model

Bank i deploys n_i ATMs. n is the total network size.

Each bank uniformly deploys its ATMs *in the shopping space*.

The cost of deploying and operating an ATM is c.

Marginal cost of providing the basic services is c_b.

The cost of processing a withdrawal is normalized to zero.

The Model

Interchange system:

When a cardholder of bank i makes a withdrawal at an ATM of bank j, bank i pays an interchange fee, a, to bank j.

Three pricing regimes :

R1: account fee p_i + no ATM usage fees.
R2: account fee p_i + foreign fee f_i
R3: account fee p_i + foreign fee f_i + surcharge s_i.

The model

Timing of the game

Stage one: banks choose a collectively.

Stage two: banks simultaneously and non-cooperatively choose ATM deployments and prices.

Stage three: consumers choose their home bank

Stage four : consumers make withdrawals in the shopping space.

Consumers

The demand for domestic withdrawals per cardholder is

$$q_i^d = \alpha \frac{n_i}{n} n^\gamma + \beta'(f_i + s_j)$$

and the demand for foreign withdrawals per cardholder is

$$q_i^f = \alpha \frac{n_j}{n} n^\gamma - \beta(f_i + s_j)$$

These demands are generated by a variable net surplus v_i from consuming withdrawals.

The Model

Two independent effects on demands :

• **Network size effect**: assume zero usage fees, the total number of withdrawals per cardholder is αn^{γ}

This number is increasing in n:

> more ATMs $\rightarrow$ lower cost to find a machine $\rightarrow$ more withdrawals

As noted before, γ is the spread of the shopping space.

Among this number, a fraction n_j/n corresponds to foreign withdrawals

$$q_i^f = \alpha(n_j/n)n^{\gamma}$$

• **Price effect**: linear with substitution effect: β'/β

Competition and profits

Bank i's market share of deposits is

$$D_i = \frac{1}{2} + \frac{1}{2t}(v_i - v_j - p_i + p_j)$$

Bank i's profit :

$$\pi_i = (p_i - c_b)D_i + (a + s_i)q_j^f(1 - D_i) + (f_i - a)q_i^f D_i - cn_i.$$

We determine the Nash equilibrium of the game

Pricing for a given interchange fee

Equilibrium account fee :

$$p_i^*(a) = t + c_b + (a - f_i)q_i^f + (a + s_i)q_j^f$$

• $(a - f_i)q_i^f$ are the costs (net of the FF) from foreign withdrawals made by bank i's cardholder.

• $(a + s_i)q_j^f$ are the foregone revenues from accepting the cardholder.

Under R1: $f_i = s_i = 0$

Under R2: $f_i^* = a$; $s_i = 0$; two-part tariff

Under R3: $f_i^* = a$; $s_i^* > 0$; two-part tariff + linear tariff

Deployment under regime one

ATMs are equivalent and banks deploy machines to

- generate interchange inflows
- limit interchange outflows
- (no effect on deposit market shares)

We find

$$n^*(a) = \left(\frac{\alpha a}{2c}\right)^{\frac{1}{1-\gamma}}$$

which is increasing in a.

Profits under regime one

Proposition 1: collusive effect of the IF under R1

Equilibrium profits are monotonically increasing in a on $[0, a^*]$. By setting $a = a^*$ banks take the entire surplus of the indifferent consumer.

Higher $a \longrightarrow$ larger networks $\longrightarrow$ higher deployment costs outweighted by higher account fees.

Deployment under regime two

Networks are differentiated.

Banks deploy machines to :

- attract depositors
- generate interchange inflows
- (as $f_i = a$, no need to limit interchange outflows anymore.)

We obtain

$$n^*_{ff}(a) = \left(\frac{\alpha(3+\gamma)a}{4c} \right)^{\frac{1}{1-\gamma}}$$

which is increasing in a.

Regime 1 vs regime 2, for a given interchange fee

Proposition 2

For any $a \in]0, a^*]$ we have
(i) $n^*_{ff}(a) > n^*(a)$
(ii) $\pi^*_{ff}(a) < \pi^*(a)$
(iii) $w^*_{ff}(a) > w^*(a) \geq 0$.

- Under R2, attracting depositors gives banks more incentives to deploy ATMs, even if there is no more need to limit foreign withdrawals $\rightarrow$ (i).
- more ATMs are deployed under R2 which gives (ii)
- consumers are better off under R2 for two reasons :
  - easier access to cash
  - consumers prefer the two-part tariff of R2 to the lump-sum pricing of regime one.

Profits under regime two

Effects of changing the IF level

Proposition 3 :

Under regime two,
(i) equilibrium profits are increasing in a on $[0, a^*_{ff}]$ and decreasing thereafter,
(ii) if $a = a^*_{ff}$, $w^*_{ff} > 0$.

- As under R1, banks can collude through the IF.
- However collusion is limited:

$a \nearrow \Rightarrow f \nearrow \Rightarrow q_j^f \searrow$ from some level of $a \Rightarrow (i)$ and (ii).

Deployment under regime three

• The differentiation effect is stronger than under R2. High surcharges permit to steal depositors.

• Foreign withdrawals are more lucrative than under R2 because of the double marginalization $(a + s)$.

Hence, for a given interchange fee :

$\Rightarrow$ Surcharges boost ATM deployment.

Regime Three: neutrality of the IF

- As under R2, $fi = a$
- Demand for withdrawals depends on $f_i + s_j = a + s_j$
- Profits depend on $a + s_i$

$\rightarrow$ Only the double margin matters. Hence,

Proposition 4: the neutrality of the interchange fee

Under R3, the IF is neutral : no effect on deployment, profits, or CS.

$\rightarrow$ IF loses its collusive power

- The equilibrium network size is :

$$n^*_{sur} = \left(\frac{\alpha^2 (3+\gamma)}{12\beta c} \right)^{\frac{1}{1-2\gamma}}$$

Regime three: neutrality of the IF

Consider the initial situation where the IF is a.
The symmetric equilibrium is denoted $\{n^*_{sur}, p^*, f^*, s^*\}$

Suppose a becomes equal to $a' = a + \Delta a$.

Banks can preserve the previous equilibrim payoffs (but cannot do better) by setting

$$f' = f + \Delta a$$
$$s' = s - \Delta a$$

Banks get $a' + s' = a + s$ per foreign withdrawal they process
Consumers pay $f^{'} + s' = f + s$ per foreign foreign.

Nothing changes !

Comparison of the three pricing regimes

Banks choose the interchange fee to maximize their joint profits:

- Under R1, banks choose a^*
- Under R2, banks choose a^*_{ff}
- Under R3 the choice of the interchange fee is irrelevant.

The surplus of the indifferent consumer at the symmetric equilibrium is $\widetilde{w}(a)$.

Comparison of the Three Pricing Regimes

Proposition 5

When banks maximize their joint profits we have :

(i) $n^*_{ff}(a^*_{ff}) < n^*_{sur}$;

(ii) $\pi^*(a^*) > \pi^*_{ff}(a^*_{ff}) > \pi^*_{sur}$

(iii) $\forall \gamma < \overline{\gamma}$, $\widetilde{w}^*_{ff}(a^*_{ff}) > \widetilde{w}^*_{sur} > \widetilde{w}^*(a^*) = 0$;
$\forall \gamma > \overline{\gamma}$, $\widetilde{w}^*_{sur} > \widetilde{w}^*_{ff}(a^*_{ff}) > \widetilde{w}^*(a^*) = 0.$

• Very high deployment cost + no way to relax price competition on the deposit market under R3 give (ii).

• Change in consumer's surplus depends on travel costs in the shopping space (iii)

Comparison of the Three Pricing Regimes

- In an empirical work, Knittel and Stango (2008) shows that

"consumers in high travel cost counties experience substantially higher welfare after 1996, while the net effect remains negative for consumers in low travel cost counties."

Direct charging

- Interchange fee is removed
- ATM owners charge ATM usage by non customers

Two main objectives :
i) limiting banks' possibility to collude.
ii) enhancing price competition between ATM deployers.

Proposition 6

The "direct charging model" is equivalent to regime three.

Too many ATMs are deployed.

Conclusion

• Increasing the number of usage fees makes ATM networks more differentiated and larger which leads to higher deployment costs.

• Regime three is specially bad for banks: high costs + neutrality of the interchange fee.

• From the regulator's perspective, our analysis shows the importance of the travel costs to reach cash when deciding to ban surcharges or not.