Plastic Clashes: Competition among Closed and Open Systems in the Credit Card Industry

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Boston, June 2009
Aim of the paper

⇒ to model competition between different credit card schemes
⇒ more specifically: to study the strategic role of the interchange fee by credit card associations

Two types of CC systems:

1. associations (Visa and Master Card): owned and controlled by members (banks and other payment card entities) who issue cards to consumers (issuers) and process merchants’ transactions (acquirers).

2. proprietary/vertically-integrated organization (Amex) that directly issue cards, acquire merchants and set their fees.

Type 1 schemes cooperatively set interchange fees (IF) (wholesale/interconnection payments):

⇒ per-transaction fees that acquiring banks pay to issuing banks for each transaction between a merchant and a cardholder.
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The literature on CC competition

← Rochet and Tirole (2003): competition among symmetric platforms. The price structure depends on the split of total costs between issuers and acquirers, the demand elasticities and the different degrees of competition. No role for the IF.

← Guthrie and Wright (2007) extend Tirole (2003). They model competition among symmetric platforms and the interaction between merchants that have to accept payments cards to steal business. Competition increases IFs.


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- **Chakravorti and Roson (2004)** model competition between differentiated platforms.

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⇒ What about the strategic interaction between asymmetric platforms?
- competition between card association & proprietary platform

- interesting issue:

  - different structure and governance:
    - proprietary platforms are vertically integrated and have two separate instruments, buyers’ and merchants’ fees;
    - card associations have only one instrument at their disposal - the *interchange fee* - being the other fees the result of intra-platform competition between associated members.

  - Antitrust issues:
    - IF anticompetitive device?
    - the collective setting of the IF has been under scrutiny since 1984, when Visa has been sued by NBC claiming that the IF was an illegal agreement
    - in 2003 the EC declared Mastercard’s IF as anticompetitive.

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The model

**Platform 1** is an association jointly run by its members:

- Fees charged to buyers and sellers are independently set by the issuing and acquiring banks resp. (issuers and acquirers are different entities)

- The platform sets an IF \( a \). IF is set to coordinate the two sides of the market. It is customarily assumed that the interchange fee flows from acquirers to issuers.

- The platform maximizes the total value of the network (sum of member’s profits).

**Platform 2** is a proprietary platform:

- It directly sets the fees on the two sides of the market.

Price competition; we restrict the attention to linear per-transaction prices.
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Price competition; we restrict the attention to linear per-transaction prices.
Issuer pays $g - a$ interchange fee

Cardholder pays $g + p^b$

$p^b$: customer fee

Acquirer pays $g - p^s$

$p^s$: merchant discount

Merchant pays $g - p^s$

Net cost $c_i$

Net cost $c_A$

Net cost $c_i + c_A$

System pays $g - p^s$

Cardholder pays $g + p^b$

$p^b$: customer fee

System sells the good at price $g$

Net cost $c_i + c_A$

Merchant sells the good at price $g$
Assumptions

- Value is created by platform-mediated transactions between buyers and sellers (no *multihoming*).
- Actual transactions can take place only if both parties are affiliated to the same platform.
- *No-surcharge rule*: prohibits merchants to pass some or all of the costs of processing credit cards transactions to those buyers who prefer credit card to cash.
Intra-platform vs inter-platform competition

A. *Intra-platform competition*: platform 1 ⇒ issuing banks compete for cardholders while acquiring banks compete for merchants.
   ↪ It relates to the competitive conditions within platform 1

B. *Inter-platform competition*: competition between platforms 1 and 2 on both sides of the market.
   ↪ It depends on the degree of substitutability between the two platforms.
   ↪ It is the main focus of the paper.

**Timing:**

- $t_1$: platform 1 sets the IF
- $t_2$: retail competition takes place (Hotelling type).
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\( t_1 \) platform 1 sets the IF

\( t_2 \) retail competition takes place (Hotelling type).
Intra-platform competition on platform 1

NOTE:
- issuers and acquirers set the fees to (resp.) cardholders and merchants
- to simplify, we take the following

Assumption

Affiliated banks on the two sides of the market are little differentiated:
⇒ intense intra-network competition resulting in per transaction equilibrium margins charged on merchants and cardholders:

\[
p_{1}^s = \sigma (c_A + a) \quad (1)
\]
\[
p_{1}^b = \beta (c_I - a) \quad (2)
\]

where \( \sigma > 1 \) and \( \beta > 1 \) are the degree of intra-network competition.
Consumption’s net benefit is independent from the mean of payment used (cash or card) and we normalize it to zero.

Adoption decision is taken comparing per-transaction utility from using the card issued by platform 1 and 2:

\[ v^b(M_1) - p_1^b - kx \quad \text{and} \quad v^b(M_2) - p_2^b - k(1 - x) \]

The function \( v^b(\cdot) \): buyers’ benefit from holding a card are increasing in the expected number of merchants that accept the card.

For the moment: \( v^b(\cdot) = v \) is independent of the number of merchants adopting each platform.

Demand functions

\[ d_1 = \frac{1}{2} + \frac{p_2^b - p_1^b}{2k} \quad \text{and} \quad d_2 = \frac{1}{2} + \frac{p_1^b - p_2^b}{2k} \]
Sellers’ behavior

The benefit of selling the good through platform 1 and platform 2 are given by:

\[ v^S(D_1) - p_1^S - t \times v^S(D_2) - p_2^S - t \times (1 - x) \]

For the moment: assume away cross-markets effects: \( v^S \) is a positive constant.

Demand functions

\[ m_1 = \frac{1}{2} + \frac{p_2^S - p_1^S}{2t} \quad m_2 = \frac{1}{2} + \frac{p_1^S - p_2^S}{2t} \]

Normalisation:

1. \( t \) and \( k \) \( \Rightarrow \) degree of differentiation between the two platforms on the acquirers’ and issuers’ side respectively.
2. We keep \( t \) constant and equal to 1 and we let \( k \) to vary.
3. \( k \) is a relative measure of the degree of substitution between platforms on the two sides of the market.
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Platforms profits

⇒ $g_i(d_i, m_i)$ is the number of transactions on platform $i$, increases with $d_i$ and $m_i$

- $\pi_1 = \pi_{1,A} + \pi_{1,I} = H(a) g_1(d_1, m_1)$

\[\leftarrow H(a) \equiv (\sigma - \beta) a + (\beta - 1) c_I + (\sigma - 1) c_A\]

is plat. 1 per-transaction margin over total costs.

- $\pi_2 = (p_a^S - c_A) g_2(d_2, m_2) + (p_b^S - c_I) g_2(d_2, m_2)$

Note:

1. $\sigma = \beta$: $H(a)$: is independent from IF
2. $\sigma > \beta$ (resp. $\beta$): $H(a)$ increases (resp. decreases) with IF

⇒ IF transfers funds from the more competitive side of the market to the less competitive one: $p_1^S(a)' > 0$, $p_1^B(a)' < 0$ (see Wright, 2001)
The equilibrium for given interchange fee and b.t.p.:
\[ g_i(\cdot) = d_i m_i \]

Equilibrium total profits as a function of the interchange fee:

\[
\pi_1(a) = \frac{(H(a) - 5 + k)(H(a) - 5k + 1)H(a)}{36k} \tag{3}
\]

\[
\pi_2(a) = \frac{(H(a) + k + 1)^3}{108k} \tag{4}
\]

Proposition

Suppose that platforms' competition is described by the above Hotelling model:

1. when intra-platform competition is symmetric \((\sigma = \beta)\), equilibrium platforms' profits are independent of the IF;
2. platform 2 profits increase with the IF if \(\sigma > \beta\) and decrease otherwise.
Suppose $a \uparrow \Rightarrow p'_i^s(a) > 0, p'_i^b(a) < 0$.

When $\sigma > \beta$ (for $\sigma < \beta$ the reverse is true):

→ a reduction of the price margin on the buyers’ side is more than compensated by the price increase on the merchants’ side and platform 2 profits increase.

**NOTE:**

one of the main concerns of many regulatory authorities is that associations may actually use the interchange fee to foreclose the market.

**Corollary**

*Platform 1 cannot set the interchange fee so as to foreclose the market* ($\forall a \in [-c_A, c_I] \Rightarrow \pi_2 > 0$).
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The optimal interchange fee \( \max_a \pi_1(a) \) s.t. \( a \in [-c_A, c_I] \)

**Proposition**

In the Hotelling model of platform competition, the optimal interchange fee set by platform 1 is given by the following:

If \( \sigma > \beta \)

\[
a^* = \begin{cases} 
    a_{\text{opt}} & \text{if } \beta < G < \sigma < G' \\
    c_I & \text{if otherwise}
  \end{cases}
\]

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\[
a_{\text{opt}} = \frac{1}{3} \left( 3(\beta - 1)c_I + 3(\sigma - 1)c_A - 4(k + 1) + R \right) \frac{\beta - \sigma}{} \\
G \equiv 1 + \frac{4(k + 1) - R}{3c} \quad G' \equiv 1 + \frac{4(k + 1) + 2R}{3c} \\
R \equiv \sqrt{31 - 46k + 31k^2}
\]
The optimal IF

- $a^*$ depends by $(\sigma - \beta)$, the relative intensity of intra-platform competition on the two sides of the market.
- $a^*$ is affected by $k$, the relative intensity of inter-platform competition.

Define

\[ P_j = p_j^b + p_j^s, \quad j = 1, 2: \] price level on each platform
\[ \Delta^i = p_i^1 - p_i^2: \] the same-side platform price differential, $i = b, s.$

**Proposition**

Let $\min \{\sigma, \beta\} < G < \max \{\sigma, \beta\} < G'$. The optimal IF sterilises the effects of different degrees of inter-platform competition on the equilibrium price levels, price differentials, total quantities and platforms profits.
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This Proposition shows that

1. the optimal interchange fee makes platform 1 immune from the degree of competition between member banks on the issuing and acquiring side

   ⇒ increasing competition within platforms is not associated with the usual effects on prices;

2. platform profits depend only on the degree of inter-platform competition, (here represented by $k$);

3. association has little incentive to impose entry barriers to new banks.

The RBA proposal: a ban on the IF

Proposition

The impact of a ban on the setting of an interchange fee on platform 2 profits is ambiguous. $\pi_2 (a = a^*) <> \pi_2 (a = 0)$
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*The impact of a ban on the setting of an interchange fee on platform 2 profits is ambiguous.* \(\pi_2 (a = a^*) \ngeq \pi_2 (a = 0)\)
Robustness

In the second part of the paper we remove one by one the main assumptions and verify the robustness of our results.

a. Linear cross-network effects: \( v^b(M_i) = rM_i \) and \( v^s(C_i) = vC_i \), with \( v, r > 0 \)

b. Unbalanced trading pattern: \( g_i(d_i, m_i) = d_i \epsilon_i m_i \eta_i \) \( \epsilon, \eta > 0 \)

c. Endogenous price-cost markups:

\[
\begin{align*}
p_1^{s*} &= \sigma A + \rho A a \\
p_1^{b*} &= \beta A - \rho A a
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where \( \rho_i \in [0, 1] \), describes how much of the interchange fee is passed on to consumers and merchants by issuing and acquiring banks.

Corollary

Proposition 3 holds also for a, b and c.
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**Corollary**

*Proposition 3 holds also for a, b and c.*
Corollary

Let $\min \{\sigma, \beta\} < G < \max \{\sigma, \beta\} < G'$. $a^*$ exhibits the following properties:

1. If $\sigma = \beta$ then $a^*$ is undetermined;
2. $\text{sign}(\frac{da^*}{d\sigma}) = \text{sign}(\frac{da^*}{d\beta}) = \text{sign}(\beta - \sigma)$;
3. If $k < 1.43$ then $\text{sign}(\frac{da^*}{dk}) = \text{sign}(\sigma - \beta)$; if $k > 1.43$ the converse is true.

- Claim 2: $a$ is used by platform 1 as an instrument to balance prices on the two sides of the market.
- Eg: an increase in the overall degree of intra-platform competition (either $\sigma$ and/or $\beta$ decrease) is matched with a change in the interchange fee such that the price of the less competitive side is increased.
- Claim 3. is related to the effect of inter-platform competition captured by the parameter $k$. The basic intuition behind the