A Theory of Credit Cards

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Credit Cards Are Popular

• Credit cards are the third most popular payment instrument in the United States

• 14.2 billion credit card transactions took place in the United States accounting for $1.10 trillion in 1999

• Despite being the most expensive for merchants to accept
The Merchant’s Cost

<table>
<thead>
<tr>
<th>Cost per $100 of purchases</th>
<th>Cash</th>
<th>Check (verified)</th>
<th>Check (not verified)</th>
<th>On-line debit</th>
<th>Off-line debit</th>
<th>Credit card</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>$.72</td>
<td>$.82</td>
<td>$1.07</td>
<td>$.70</td>
<td>$2.43</td>
<td>$2.41</td>
</tr>
<tr>
<td>1999</td>
<td>$.90</td>
<td>$.60</td>
<td>$3.00</td>
<td>$.80</td>
<td>$1.80</td>
<td>$1.80</td>
</tr>
</tbody>
</table>

Source: Food Marketing Institute, 1998 and 2000
Credit Card Benefits to Consumers

• Extension of short- and long-term credit

• A widely-accepted payment instrument

• Offers several other benefits such as fraud protection, dispute resolution services, frequent-use awards, and ability to make remote purchases
Bilateral Relationships in Credit Card Networks

1. Consumer's Bank
   - Establishes Credit Line

2. Merchant's Bank
   - Credits Account
   - Sends Funds

3. Network
   - Sends Receipt
   - Sends Bill
   - Authorizes
   - Presents Receipts

4. Purchases Good or Service

Diagram shows the bilateral relationships between the consumer, merchant, network, and banks in a credit card transaction.
Two Observations About Credit Cards

• Merchants seldom impose additional fees for credit card purchases

• If consumers do not carry balances, they benefit from credit card use without sharing directly in its costs
Underlying Costs

Consumer → Fixed price → Merchant

Regardless of instrument used

Pays benefit if non-revolving

Pays interest if revolving

Consumer’s Bank → Interchange Fee → Merchant’s Bank

Credit card receipts discounted

Interchange Fee

Underlying Costs
New Approach to Model Credit Card Networks

- Baxter (1983)
- Chakravorti and Emmons (2001)
- Gans and King (2001)
- Katz (2001)
- Rochet and Tirole (2000)
- Schmalensee (2000)
- Schwartz and Vincent (2000)
- Wright (2000 and 2001)
Two Recent U.S. Antitrust Cases

• Department of Justice vs. MasterCard and Visa
  Governance Duality
  Exclusivity

• Group of Retailers vs. MasterCard and Visa
  Tying of credit cards and offline debit cards
Credit Card Networks Under Investigation in Other Countries

• Australia (see Reserve Bank of Australia, 2001)

• European Commission

• United Kingdom (see Cruickshank, 2000)
Trying to Answer the Following Questions

• Why do merchants accept credit cards despite being the most expensive to accept?

• What conditions are necessary for a credit card equilibrium to exist?

• Does the credit card market exhibit network effects?

• Does the decision of a merchant to accept credit cards affect profits of other merchants?
The Model

- Two-period dynamic model
- Agents—Consumers, Merchants, and a Card Issuer
- Card Issuer also acts as acquirer and network operator
Consumers

- Continuum of consumers
- With probability $1 - \gamma$, consumers need to consume one-unit of a specific good
- Receive income $\omega_t$ in each period $t = 1, 2$
- Discount second period consumption by $\beta$
- Earn $R$ where $R > 1$ for any funds not spent in period 1
- Can receive credit card if $\omega_1 > \hat{\omega}$, where $\hat{\omega}$ is the minimum income requirement set by the card-issuer
Merchants

- Continuum of monopolist merchants each selling a different good

- Merchant sells good at $p$

- Merchants earn non-zero profits because $p > c$

- Merchant pays merchant discount, $\rho$, to card-issuer for all credit card sales

- No one merchant can influence its second period sales
Monopolist Card Issuer

- Sets the income requirement, \( \hat{\omega} \), for consumers and merchant discount, \( \rho \), to maximize profits

- Extends credit in period 1 to consumers where \( \omega_1 > \hat{\omega} \)

- Borrows at \( R \) to pay merchants in period 1

- Charges no interest to consumers for credit card purchases

- Collects debt prior to period 2 consumption
Timeline

1

• Issuer sets income limit, \( \hat{\omega} \), and merchant discount, \( \rho \)
• Merchants choose whether to accept credit cards
• \( \omega_1 \) is realized and \( 1-\gamma \) consumers are identified
• Issuer pays merchants for card purchases

2

• \( \omega_2 \) is realized
• Credit-issuer collects payment
• \( 1-\gamma \) consumers consume in period 2 if they have sufficient funds
Equilibrium

Consumers

- Always prefer to purchase good if need to in period 1
- Always prefer to use credit cards even if liquid
Equilibrium

Merchants

• Will only accept credit cards if \( \hat{\omega} < p \)

• Will accept credit cards if \( \pi^c \geq \pi^{nc} \) in first period

• However, by accepting credit cards overall profit is lower than if they did not accept credit cards (Negative externality)

• Depends on 3 factors:
  
  The degree of concentration in the market for card issuers

  The amount of bargaining power by merchants

  The impact of a single merchant’s decision on repeat sales
Equilibrium

The Card-Issuer

• If $R$ is sufficiently close to 1 and $p - c$ is sufficiently large, there exists a $\hat{\omega} \in [\omega, p)$

• Extracts almost all additional revenue from sales to illiquid consumers

• The ability to charge a higher merchant discount is related to the number of additional consumers able to make purchases (network effect)
Extensions

- Allow merchants to set prices to recover credit card costs
- Allow merchants to set prices based on instrument used
- Add an additional period where consumers borrow at $R_{CC} > R$
- Allow more than 1 card-issuer
- Consider competing credit card and alternative payment networks such as debit cards