Do No-Surcharge Rules Increase Effective Retail Prices?

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Motivation

Anti-Steering/No-Surcharge Rules:

- Credit card companies impose anti-steering clauses on merchants.
- The **effective price**—reward inclusive—is the meaningful measure.

Main Questions:

- When is fee pass-through larger than the reward?
- How is the effective retail price impacted by the no-surcharge rule and corresponding merchant fees?

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We find:

- When merchants can surcharge, credit card usage only occurs when the consumer reward is greater than the merchant fee.
- In contrast, when the no-surcharge rule is implemented, the total amount of merchant fees across all cardholders is passed on to *all* consumers.
  - This increases the posted price relative to the surcharge case.
  - The price increase is large when many cardholders exist.
  - When membership is large, the merchant fee pass-through outweighs credit card rewards so that all consumers (credit and cash) pay a higher effective retail price in all markets (relative to the case of surcharging).

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1. Related Literature

2. Model

3. Equilibrium Analysis

4. Prices and Welfare

5. Discussion

6. Concluding Remarks

Related Literature: Seminal Studies

Rochet and Tirole (2002, 2003); Wright (2003, 2004)

- Focus on credit card acquisition and interchange fees
- Unable to study how a variety of payment methods impacts retail prices

Related Literature: No-Surcharge Rules

Carlton and Winter (2018, ***J Law Econ*****)**

- Similarity b/w Most Favored Nation (MFN) Clauses in vertical relationships and No-Surcharge Rules (NSR) in two-sided markets
- They assume that merchants pass through the entire merchant fee onto consumers.
- They show that the NSR ensures credit card fees that are higher than the monopoly credit card company case.
- We show that the NSR can result in higher effective prices for all consumers across all retail markets.

Related Literature: No-Surcharge Rules (cont'd)

Edelman and Wright (2015, *QJE*)

- Consumer surplus is harmed by no-surcharging.
- In their model, the entire consumer demand is satisfied, implying no extensive margin for demand.

Liu, Niu, and White (2021, Unpublished)

- Extensive margin on demand is included.
- But, monopoly merchant.

Model

- Unit mass of retail markets $m \in [0, 1]$
  - Unit mass of consumers with unit demands in each market
  - $v_m \sim G_m(v)$
- Two payment methods are available:
  1. Credit Card (or premium credit)
     - r: Consumer reward
     - F: Consumer sign-up fee
  2. Cash (or standard credit)
- p_m^{credit}: Posted price for credit card payment in market m
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Consumers

Effective Prices

- Given r, F, p_m^{cash}, and p_m^{credit}, a consumer holds a credit card if

$$\int_0^1 \mathbb{1}\{v_m - (1-r)p_m^{credit} \geq 0\} \cdot [p_m^{cash} - (1-r)p_m^{credit}]dm \geq F, \quad (1)$$

  where

  - $\mathbb{1}\{v_m - (1-r)p_m^{credit} \geq 0\}$ captures whether or not the consumer purchases in market m by card payment,
  - $[p_m^{cash} - (1-r)p_m^{credit}]$ captures the savings that the consumer enjoys from using the credit card instead of cash.

Effective Prices (cont'd)

- If merchants are **allowed** to surcharge, p_m^{credit} need not equal p_m^{cash}.
  - The effective price paid by a credit card user is $(1 - r)p_m^{credit}$.
  - Cash users pay an effective price of p_m^{cash}.
- If merchants are **not allowed** to surcharge, $p_m^{credit} = p_m^{cash}$ $(\equiv p_m)$.
  - Credit card users pay an effective price of $(1 - r)p_m$.
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Merchants

Merchants in Retail Markets

- Credit card users generate: $(1-f)\cdot p_m^{credit}$, where $f \in [r, 1)$ is Merchant fee
- Cash users generate: p_m^{cash}
  - We'll largely focus on $1 > f \geq r > 0$.

- Total profit across all merchants in market m is given by:

$$\pi_m(p_m^{credit}, p_m^{cash}) = [(1-f)p_m^{credit} - c_m]Q_m^{credit} + (p_m^{cash} - c_m)Q_m^{cash},$$

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- $c_m \geq 0$ denotes a merchant's marginal cost,

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Merchants in Retail Markets (cont'd)

- and market demands are given by:

$$\begin{cases} Q_m^{credit} = \lambda \cdot [1 - G_m((1-r)p_m^{credit})] \\ Q_m^{cash} = (1-\lambda) \cdot [1 - G_m(p_m^{cash})] \end{cases}$$

Imperfect Competition in Retail Markets

- Introduce the **conduct parameter** in market m, $\theta_m \in [0, 1]$, which captures the (reverse) intensity of competition between symmetric merchants
    - (See below for more.)

The Credit Card Industry

The Credit Card Industry

- The credit card company's profit is given by:

$$\Pi = \left[\int_0^1 (f - r - t) p_m^{credit} Q_m^{credit} dm \right] + \lambda \cdot F,$$

where

- $t \gtreqless 0$ is the transaction level marginal cost
  - $t < 0$: the case of the credit card adding value (e.g., data collection)
- $\lambda \in [0, 1]$ denotes the mass of consumers who use a credit card

Timing

Timing

1. θ_m and $G_m(\cdot)$ are given
2. Credit card provider (or a regulator) chooses whether or not to enforce the no-surcharge rule and then sets fees and rewards (r, f, F).
3. Consumers observe the credit card provider's decisions and they choose whether or not to sign up for the premium payment method.
4. Finally, the equilibrium market prices are determined and consumers make purchases.

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Imperfect Competition in Retail Markets (cont'd)

- If **surcharging** is allowed, $\{p_m^{credit}, p_m^{cash}\}$ satisfies:

$$\theta_m \cdot (1-f) \cdot Q_m^{credit} = -\frac{\partial Q_m^{credit}}{\partial p_m^{credit}} \cdot [(1-f)p_m^{credit} - c_m], \qquad (2)$$

$$\theta_m \cdot Q_m^{cash} = -\frac{\partial Q_m^{cash}}{\partial p_m^{cash}} \cdot (p_m^{cash} - c_m). \qquad (3)$$

- Under the **no-surcharge rule**, p_m satisfies:

$$\theta_m \cdot [(1-f)Q_m^{credit} + Q_m^{cash}]$$

$$= -\frac{\partial Q_m^{credit}}{\partial p} \cdot [(1-f)p_m - c_m] - \frac{\partial Q_m^{cash}}{\partial p_m} \cdot (p_m - c_m) \qquad (4)$$

Simplifying Assumptions

- $v_m \sim U(0,1)$
- $c_m \in [0,1)$

If Surcharging is Allowed

Credit Card Acquisition Subgame

Lemma 1

If merchants can surcharge, then credit card and cash prices are given by

$$p_m^{credit} = \frac{c_m}{(1+\theta_m)(1-f)} + \frac{\theta_m}{(1+\theta_m)(1-r)}, \tag{5}$$

$$p_m^{cash} = \frac{c_m + \theta_m}{1+\theta_m}, \tag{6}$$

and for all θ_m,

- if $f \leq r$, cardholders use their credit card in every market m,
- if $f > r$, then cardholders and cash consumers use cash in every m.

Credit Card Acquisition Subgame (cont'd)

- If $f \leq r$ and a consumer expects prices p_m^{cash} and $p_m^{credit}(r, f)$ in market m, then consumer i will expect to make purchases from $M_i^S \subset [0, 1]$ markets.
- This implies that Equation (1) reduces to

$$F \leq \int_{M_i^S} [p_m^{cash} - (1 - r)p_m^{credit}(r, f)] \, dm := R^S(i).$$

- We order the unit mass of consumers from highest to lowest by expected total rewards so that $R^S(i)$ is decreasing in i.

Credit Card Acquisition Subgame (cont'd)

- We focus on distributions of (θ_m, c_m) so that $R^S(i)$ is continuous in i.
- There exists a $\lambda^S(r, f, F) \in [0, 1]$ implicitly defined by

$$R(\lambda^S(r, f, F)) = F$$

  so that

  - a consumer $i \in \left[0, \lambda^S(r, f, F)\right]$ purchases the credit card,

  - a consumer $i \in \left(\lambda^S(r, f, F), 1\right]$ doesn't.

- Cardholdership $(\lambda^S(r, f, F))$ is decreasing in the membership fee (F).

The Case of Surcharging

- Given this subgame, the credit card company solves the following:

$$\max_{r,f,F} \left[\int_0^1 (f - r - t) p_m^{credit}(r,f) \cdot Q_m^{credit}[\lambda^S(r,f,F)] \; dm \right] \\ + \lambda^S(r,f,F) \cdot F.$$

The Case of Surcharging (cont'd)

Lemma 2

(i) If $t > 0$, then no consumer becomes a cardholder ($\lambda^S = 0$), and the equilibrium price that every consumer pays in market m is given by:

$$p_m^S = p_m^{cash} = \frac{c_m + \theta_m}{1 + \theta_m}.$$

Neutrality Result

Lemma 2 (cont'd)

(ii) If $t \leq 0$, then $r^S = f^S$, $F^S = 0$, and $\lambda^S = 1$ so that all consumers use the credit card and equilibrium prices in market m are given by

$$p_m^S = p_m^{cash} = (1 - r^S)p_m^{credit} = \frac{c_m + \theta_m}{1 + \theta_m}. \tag{7}$$

- Equilibrium effective prices are **neutral** across payment methods and across market structures.

Key Takeaway

- Credit card usage is always efficient with surcharging.
  - Credit card usage occurs exactly when it adds value (i.e., $t \leq 0$).
  - On the other hand, surcharging prevents credit card usage if the credit card is detrimental to surplus (i.e., $t > 0$).

If the No-Surcharge Rule (NSR) is Implemented

Under the No-Surcharge Rule (NSR)

Lemma 3

The subgame equilibrium retail price is

$$p_m = \frac{(1 - \lambda r)c_m + (1 - \lambda f)\theta_m}{(1 + \theta_m)[1 - \lambda(r + f - rf)]}. \tag{8}$$

The No-Surcharge Subgame (cont'd)

- If a consumer expects price $p_m(r, f)$ in market m, then consumer i will expect to make purchases from $M_i^{NSR} \subset [0, 1]$ markets.
- This implies that Equation (1) reduces to

$$F \leq \int_{M_i^{NSR}} (r + b) \cdot p_m(r, f) \; dm := R^{NSR}(i).$$

- We order the unit mass of consumers from highest to lowest by expected total rewards so that $R^{NSR}(i)$ is a decreasing function.

The No-Surcharge Subgame (cont'd)

- We focus on distributions of (θ_m, c_m) so that $R^{NSR}(i)$ is continuous in i.
- There exists a $\lambda^{NSR}(r, f, F) \in [0, 1]$ implicitly defined by

$$R(\lambda^{NSR}(r, f, F)) = F.$$

  so that

  - a consumer $i \in \left[0, \lambda^{NSR}(r, f, F)\right]$ purchases the credit card,
  - a consumer $i \in \left(\lambda^{NSR}(r, f, F), 1\right]$ doesn't.

- Cardholdership $(\lambda^{NSR}(r, f, F))$ is decreasing in the membership fee (F).

The No-Surcharge Subgame (cont'd)

- Given this subgame, the credit card company maximizes the following:

$$\max_{r,f,F} \left[\int_0^1 (f - r - t) p_m(r, f) Q_m^{credit}[\lambda^{NSR}(r, f, F)] \, dm \right] + \lambda^{NSR}(r, f, F) \cdot F.$$

The Case of No-Surcharge

Lemma 4

Equilibrium credit card fees must be such that either

$$F^{NSR} > 0$$

or

$$f^{NSR} > r^{NSR} + t;$$

and the retail price in market m (with $\lambda^{NSR} \in (0, 1]$) is given by:

$$p_m^{NSR} = \frac{(1 - \lambda^{NSR} r^{NSR}) c_m + (1 - \lambda^{NSR} f^{NSR}) \theta_m}{(1 + \theta_m)[1 - \lambda^{NSR}(r^{NSR} + f^{NSR} - r^{NSR} f^{NSR})]}. \tag{9}$$

Comparing Prices

Comparing Effective Prices

- We focus on the equilibrium price comparison across regimes when the no-surcharge fees satisfy constraints observed in the payment industry:

$$1 > f^{NSR} > r^{NSR} \geq 0$$

and

$$F^{NSR} \geq 0.$$

Comparing Effective Prices (cont'd)

Proposition 1

If $0 < f^{NSR} < 1$ and $r^{NSR} < 1$, then retail prices under NSR are higher than that under surcharging:

$$p_m^{NSR} > p_m^S$$

for all $\theta_m \in [0, 1]$.

- With the no-surcharge rule, credit card fees are passed onto consumers in the form of higher retail prices.
    - Every consumer bears some burden of the credit card merchant fee (f), even those consumers that do not use the credit card.
    - This holds across every level of market conduct.

Comparing Effective Prices (cont'd)

Proposition 2

If $1 > f^{NSR} > r^{NSR} > 0$, then there exists a $\overline{\lambda}(\theta_m) \in (0, 1)$ such that

$$(1 - r^{NSR})p_m^{NSR} > p_m^S$$

if and only if $\lambda^{NSR} > \overline{\lambda}(\theta_m)$. Furthermore, $\frac{\partial \overline{\lambda}}{\partial \theta_m} > 0$.

- The effective price for cardholders under NSR is higher than the price they pay under surcharging if and only if the number of cardholders is sufficiently large.
- If cardholdership is sufficiently large ($\lambda^{NSR} > \overline{\lambda}$), then the increase in price outweighs the consumer reward and all consumers (cash and card) prefer surcharging.

Comparing Effective Prices (cont'd)

- A more competitive market (reducing θ_m) requires a lower level of cardholdership to ensure that cardholders are better off $\left(\text{given by } \frac{\partial \overline{\lambda}}{\partial \theta_m} > 0\right)$.
  - Reducing θ_m results in greater pass-through of merchant fees so that cardholdership requires fewer cardholders to remain better off.

Comparing Effective Prices (cont'd)

- Propositions 1 and 2 imply that all consumers pay a higher effective price in every market m when $\lambda^{NSR} > \overline{\lambda}(\theta_m)$.
- Proposition 1 implies that all cash consumers are worse-off with the no-surcharge rule (NSR).

Welfare

Welfare

Proposition 3

If $F^{NSR} = 0$ and $1 > f^{NSR} > r^{NSR} > 0$, then every consumer purchases the credit card and is worse-off under the NSR than under surcharging:

$$\lambda^{NSR} = 1$$

and

$$(1 - r^{NSR})p_m^{NSR} > p_m^S$$

for all $\theta_m \in [0, 1]$.

- In this case, a credit card company that is protected by the no-surcharge rule and offers consumers a free credit card with cash back will acquire every consumer as a cardholder.
- However, the equilibrium effective price will always be greater than the equilibrium price with surcharging.

Welfare (cont'd)

- This outcome is effectively generated by a **prisoner's dilemma game**.
  - Consumers have an individual incentive to acquire the credit card, but all consumers are better off if no consumer acquires the credit card (the surcharge equilibrium).

Welfare (cont'd)

- Many credit cards impose positive annual fees on their consumers so that $F^{NSR} > 0$, $1 > f^{NSR} > r^{NSR} > 0$, and $\lambda^{NSR} < 1$.
- In this case, Proposition 2 implies that a necessary condition (not a sufficient condition) for *some* cardholders to benefit from the no-surcharge rule is that $\lambda^{NSR} < \overline{\lambda}(\theta_m)$ for all m.
- Not all cardholders will be better off when $\lambda^{NSR} < \overline{\lambda}(\theta_m)$ for all m since $F^{NSR} > 0$.
    - Even though they face lower effective prices across all markets.

Welfare (cont'd)

Proposition 4

If $F^{NSR} > 0$, $1 > f^{NSR} > r^{NSR} > 0$, and $\lambda^{NSR} < \overline{\lambda}(\theta_m)$ for all $m \in [0, 1]$, then there exists an $\epsilon > 0$ so that every cardholder i with

$$i \in (\lambda^{NSR} - \epsilon, \lambda^{NSR})$$

is worse off from the no-surcharge rule, and every cardholder i with

$$i \in [0, \lambda^{NSR} - \epsilon)$$

is better off.

- This result highlights how even in the extreme setting where the no-surcharge rule is at its best, some cardholders are still worse off with the no-surcharge rule.

Premium v.s. Standard Credit Cards

- In many ways, our results suggest that credit card usage is harmful.
    - Premium credit cards that are protected by the no-surcharge rule are largely harmful to consumers and merchants.

Optimal Fees

- We do not explicitly solve for the optimal fees set by the credit card company.
- One paper that takes such a holistic approach is Bedre-Defolie and Calvano (2013).
  - They consider payment card fees using a two-sided approach (with a mass of consumers and merchants).
  - However, they impose perfectly elastic demand with monopoly merchants across all product markets.

Competition among Credit Cards

- This restriction may not be important as all our main results follow for any credit card competition structure that produces $f^{NSR} > r^{NSR} \geq 0$ and $F^{NSR} \geq 0$.
  - The surcharging results are effectively independent of credit card competition.
- This implies that if the transaction marginal cost is greater than zero ($t > 0$), then most of our results hold even when the credit card market is perfectly competitive ($f^{NSR} > r^{NSR} + t > 0$ and $F^{NSR} = 0$).

Takeaways

- When a no-surcharge rule is implemented, the credit card merchant fee pass-through is often greater than the credit card reward to cardholders.
    - All consumers, credit card and cash, pay a higher effective price.
- On the other hand, if merchants can surcharge across payment methods, then all consumers pay the same effective price
    - The credit card company loses its users.

Takeaways (cont'd)

- In terms of welfare, a no-surcharge rule always harms cash consumers, merchants, and cardholders on the margin of purchasing a credit card.
- In addition, the non-margin card holding consumers can also be harmed.