On the Level and Incidence of Interchange Fees Charged by Competing Payment Networks

Robert M. Hunt (CFI, Federal Reserve Bank of Philadelphia)

Konstantinos Serfes (Drexel University)

Yin Zhang (Drexel University)

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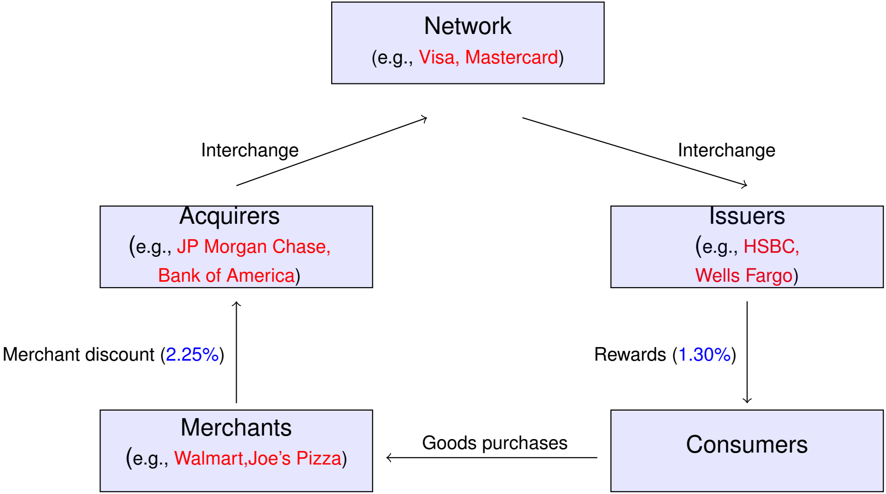
Disclaimer

- The views expressed here are solely the authors, not those of the Federal Reserve Bank of Philadelphia, the Board of Governors, or the Federal Reserve System.
- None of my remarks should be treated as legal advice.

Flows in a payments network



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- Is it because of high network/bank market power?
- Is merchant market power a ‘complement’ or a ‘substitute’ to network market power?
- Should regulators spur network competition, impose price caps, or give merchants more routing options?

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  - Interchange fees for Visa Debit transactions must not exceed 12 ¢ per transaction.

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- The credit card tax incidence also depends on the elasticity effect.

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- Inverse demand function $P(X)$, with elasticity $\varepsilon \equiv \frac{P}{XP_X} < 0$.

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- Each consumer has a more preferred card (horizontal differentiation).

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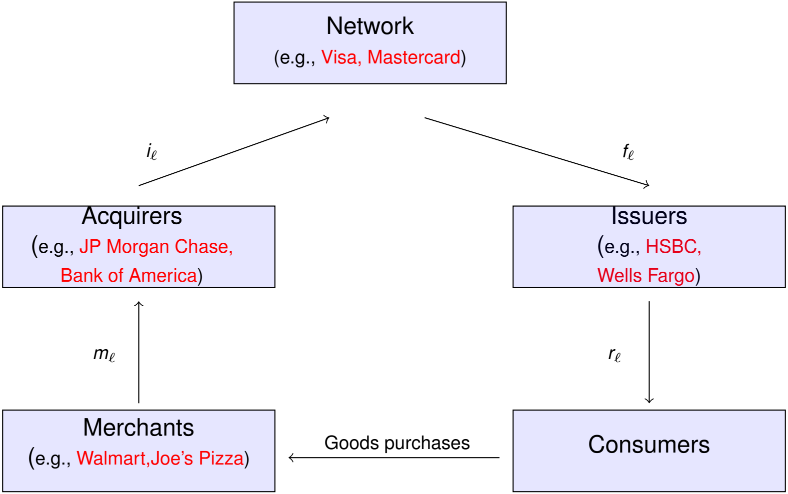

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- Stage 5: Each consumer chooses whether to hold one or both credit cards and makes purchases.

Stage 5

- If merchants accept both cards, then consumers single-home.

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- $z \equiv \frac{(1-r)}{(1-i)} \geq 1$ is the tax due to the credit card, e.g., $\frac{1-0.013}{1-0.0225} = 1.0097 \approx 1\%$.

Conjectural variations

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- Then, $\gamma \equiv \frac{\lambda}{n} \in [0, 1]$.
- $\uparrow \gamma \rightarrow$ higher merchant market power.

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- The subgame-perfect equilibrium tax and price buyers pay must (implicitly) satisfy

$$z^* = \frac{\gamma X \varepsilon' + \varepsilon \cdot (\varepsilon + \gamma)}{\gamma X \varepsilon' + \varepsilon \cdot (1 + \varepsilon + \gamma \cdot (2 - E))},$$

where

$$E \equiv -\frac{P_{XX} X}{P_X}$$

is the elasticity of the slope of the inverse demand.

Specific demands

Types of demand functions	ε	E	ε'
Constant elasticity	$-$	$+$	0
Linear	$-$	0	$+$
Generalized Pareto	$-$	$-, 0, +$	$-, 0, +$

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  - lowers merchant profits
  - increases consumer surplus and network profits.
- Consumers pay the entire burden of the tax, regardless of the intensity of competition in the product market.

Monopoly network: Linear demand, $P = 1 - X$

- Marginal cost $c = 0.8$.

	$\gamma = 1$	$\gamma = 0.75$	$\gamma = 0.5$	$\gamma = 0$
Credit card tax z	1.1213	1.1218	1.122	1.125
Network profits	0.005	0.006	0.007	0.01
Merchant profits	0.00236	0.0023	0.002	0
Price consumers pay	0.948	0.94	0.932	0.9
Price merchants receive	0.846	0.84	0.83	0.8
% of the 'tax' consumers pay	47.29%	54.47%	64.23%	100%

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- It also increases the fraction of the tax consumers pay.

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- As γ decreases, the elasticity effect weakens.
- Network increases its tax.

Generalized Pareto demand

- The distribution of consumer valuations v takes on the generalized Pareto distribution
$$F(v) = 1 - (1 + \xi \cdot (E-1)(v-1))^{\frac{1}{1-E}},$$
where $\xi > 0$ is the scale parameter and $E < 2$ is the shape parameter.

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- The effect of aggregate output on the elasticity is given by
$$\varepsilon' = \frac{1 - \xi \cdot (E-1)}{X^{2-E}},$$
which is negative if and only if $E > 1 + \frac{1}{\xi}$ (sufficiently convex inverse demand).

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	$\gamma = 1$	$\gamma = 0.75$	$\gamma = 0.5$	$\gamma = 0$
Credit card tax	1.0315	1.03142	1.03136	1.03125
Network profits	0.00348	0.00466	0.00615	0.01024
Merchant profits	0.004	0.0023	0.003248	0
Price consumers pay	1.07062	1.0590	1.0487	1.03125
Price merchants receive	1.038	1.0268	1.0168	1
% of the 'tax' consumers pay	120.4%	114.6%	109.3%	100%

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- Entry of a second network, with an infinitesimally small and fixed number of users that is poached from the incumbent, induces the incumbent to increase its equilibrium tax.

Linear demand: Two competing networks with $\mu = 50\%$

	$\gamma = 1$	$\gamma = 0.75$	$\gamma = 0.5$	$\gamma = 0$
Tax $z_1 = z_2$	1.1231 (1.1213)	1.1234 (1.1218)	1.1237 (1.1222)	1.125
$\pi_1 = \pi_2$	0.0026	0.003	0.0034	0.005
Merchant profits	0.0023	0.0022	0.002	0
P^b	0.949 (0.948)	0.942 (0.94)	0.933 (0.932)	0.9
P^m	0.845	0.839	0.83	0.8
Incidence	47.32%	54.51%	64.26%	100%

- Network competition increases the tax and the price consumers pay.
- Welfare decreases.

Intuition (Elasticity effect)

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- $z \uparrow$ after entry of a second network.

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- Networks are sufficiently differentiated: Elasticity effect dominates the competition effect. Entry increases equilibrium taxes and decreases welfare.

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