Credit Card Acceptance and Product Quality

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MOTIVATION

- Credit card network merchant discount fees run from 1% to 3%.
- Credit card issuers act as a buyer's attorney in the case of defective merchandise.
- Credit card acceptance indicates product quality.

NatWest Bank Card

Paying in full with a credit card gives useful protection against faulty goods costing between £100 and £30,000. If you have a compliant about a purchase you have made with your NatWest Credit Card, please contact the retailer first. If the retailer can't resolve the issue or has gone out of business, contact us and we will take up the matter on your behalf.

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- Firms face moral hazard problem: product quality unobserved until sale occurs

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- High effort costs a seller k, low effort costs 0.

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- Last assumption requires $\rho \geq 1$.

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Where

$$W(\pi, x) = (x - c(x))(1 + \bar{n}) + \alpha(\bar{n}) [\pi \lambda_h + (1 - \pi) \lambda_l] u - \bar{n} \pi k.$$

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- Implementation is through contingent transfers

MONEY

- Some medium of exchange is essential for trade in the DM.
- Buyers can use money or a credit card to purchase goods.
- Money is perfectly divisible and agents can hold any non-negative amount.
- Aggregate nominal money supply, M_t, grows at constant gross rate $\gamma < \beta$ so that $M_{t+1} = \gamma M_t$.
- New money is injected (or withdrawn if $\gamma < 1$) by lump-sum transfers (taxes) in the CM.
- Transfers go only to buyers
- Price of CM goods is normalized to 1 the relative price of money is denoted ϕ_t.
- Let $z_t = \phi_t m_t$ be the real value of an amount of money m_t.

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CASH ONLY ECONOMY (cont.)

Definition

A symmetric equilibrium is a set of active submarkets, $\Gamma \subset R^2_+$, to the DM, a function, $\Lambda(z,\theta)$, that specifies the proportion of high quality goods in submarket (z,θ), a function, $n(z,\theta)$, that specifies how many sellers enter submarket (z,θ), and a propensity, π^*, for sellers to exert high effort such that:

1. Given $\Lambda(.,.)$ every $(z^*,\theta^*) \in \Gamma$ solves the buyers' problem for $(\hat{z},\hat{\theta})$.
2. Every $(z^*,\theta^*) \in \Gamma$ solves the sellers' problem for $(\hat{z}_i,\hat{\theta}_i)$ for $i = h$ or l.
3. Rational expectations holds:

$$\pi^* = \int_\Gamma \left(\frac{\Lambda(z,\theta) - \lambda_l}{\lambda_h - \lambda_l} \right) \frac{n(z,\theta)}{\bar{n}}\, dz\, d\theta.$$

4. The population constraints for sellers and buyers hold:

$$\int_\Gamma n(z,\theta)\, dz\, d\theta = \bar{n}, \qquad \int_\Gamma \frac{n(z,\theta)}{\theta}\, dz\, d\theta = 1.$$

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- There exists a unique equilibrium (z^*, θ^*) so that $\theta^* = \bar{n}$.

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- Prices become common knowledge and are used by buyers to direct their search.

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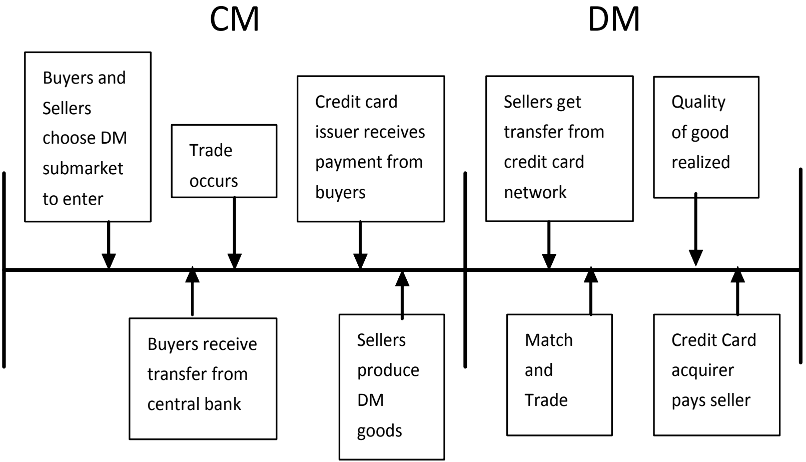
- Any profits are disbursed to sellers at the beginning of the DM

TIMELINE


CM
DM
Buyers and Sellers choose DM submarket to enter
Trade occurs
Credit card issuer receives payment from buyers
Sellers get transfer from credit card network
Quality of good realized
Buyers receive transfer from central bank
Sellers produce DM goods
Match and Trade
Credit Card acquirer pays seller

CREDIT/CASH ECONOMY

- Seller separated equilibria sought
- Submarkets of the DM are indexed by (p, z, θ, ψ, i) ,
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Definition

A symmetric seller separated equilibrium is a set of active submarkets, $\Omega \subset \mathbb{R}^3_+ \times [0,1] \times \{h, l\}$, to each DM, a function, $n(p, z, \theta, \psi, i)$, that specifies how many sellers enter submarket (p, z, θ, ψ, i), the aggregate propensity for sellers to exert high effort $\tilde{\pi}^* \in [0,1]$, and $\tilde{\psi}^* \in [0,1]$, the aggregate propensity for buyers to bring cash to the DM, with:

1. Separation of sellers: $(p, z, \theta, \psi, h) \in \Omega \Rightarrow (p, z, \theta, \psi, l) \notin \Omega$
2. Individual rationality: every $(p, z, \theta, \psi, i) \in \Omega$ solves the buyers' and sellers' problems
3. Buyer population constraint: $1 = \int_\Omega \frac{n(p, z, \theta, \psi, i)}{\theta} \, dp \, dz \, d\theta \, d\psi \, di$
4. Seller population constraint: $\bar{n} = \int_\Omega n(p, z, \theta, \psi, i) \, dp \, dz \, d\theta \, d\psi \, di$
5. RE: $\tilde{\pi}^* = \frac{1}{\bar{n}} \int_\Omega n(p, z, \theta, \psi, h) \, dp \, dz \, d\theta \, d\psi$,
   $\tilde{\psi}^* = \int_\Omega \psi \theta n(p, z, \theta, \psi, i) \, dp \, dz \, d\theta \, d\psi \, di$.

CARD versus CASH

- Buyer indifference:

$$\alpha(\theta_i)\lambda_i p_i = z_i \left[\frac{\gamma}{\beta} - 1 + \alpha(\theta_i)\right] \qquad i = h, l.$$

where θ_i, p_i, z_i are the equilibrium values associated with effort level $i = h, l$.

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- If $\omega = 0$ and $\gamma = \beta$ they coincide.

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- From these, if $\omega < \omega(\gamma, \theta_i)$ where

$$\omega(\gamma, \theta) = \frac{\left(\frac{\gamma}{\beta} - 1\right)}{\left(\alpha(\theta) + \frac{\gamma}{\beta} - 1\right)}.$$

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  no buyers will bring cash to market $i = h, l$.
- This also means that as long as $z_i > \lambda_i(1 - \omega)p_i$ the cash price offered is moot.

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- If $\omega > \omega(\gamma, \bar{n})$ all buyers will bring cash and the equilibrium outcome is identical to the cash only economy.

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- For very low values of $\alpha(\bar{n})$, $\omega(\gamma, \bar{n})$ can be arbitrarily close to 1
- If a buyer has a 50% chance of making the purchase then $\omega(\gamma, \bar{n}) \approx 0.24\%$.

HIGH EFFORT CREDIT ONLY EQUILIBRIUM

- In a high effort credit only equilibrium (when it exists):

$$\theta_h = \bar{n} \qquad p_h = \frac{u\eta(\bar{n})\gamma}{\beta}$$
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- Offering a viable cash price tells buyers that the seller has not incurred high effort.
- Any attempt to offer $z_h < \lambda_h(1 - \omega(\gamma, \bar{n}))p_h$ would open a new market.

INCENTIVE CONSTRAINT 2

Sellers will not choose low effort and enter the high effort market.

- $$\left(\frac{\alpha(\bar{n})\beta p_h(1-\omega)}{\bar{n}\gamma}\right)\lambda_h - k \geq \left(\frac{\alpha(\bar{n})\beta p_h(1-\omega)}{\bar{n}\gamma}\right)\lambda_l$$

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- $\eta(.) < 1$ means even with $\omega = 0$, market economy cannot always achieve first-best.

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  - It has a unique solution
  - No simple algebraic expression emerges

MAXIMUM SIZE OF MERCHANT FEE? (Revisited)

- Functional form:

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- Maximal value of $\omega_{\max} = 4.37\%$.