Interactions Between Naive and Sophisticated Consumers

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Overview

- Markets contain a mixture of sophisticated and naive consumers
- Old intuition:
  - sophisticated consumers protect the naive
  - consumer protection policies only needed when there aren't enough sophisticates
- This talk explores:
  - when sophisticates do protect the naive
  - when sophisticates instead exploit the naive
  - when consumers have aligned or divergent views on consumer policy
  - how policy might affect the proportion of sophisticates
- When the naive are exploited, they may require protection even (or especially) when there are many sophisticates present

Two Notions of Consumer Sophistication

- Consumers might be *well informed* about prices available in the market, and/or be able to discern product quality
  - sophisticated consumer knows quality of wine by looking at the label
  - sophisticated consumer researches prices for TVs before buying
- Consumer might be *strategically* sophisticated, and understand the nature of the market game being played (including knowing which consumer policies are in place)
  - even if she cannot directly observe product quality, she knows the relationship in equilibrium between price and quality
  - even if she doesn't know prices, she knows the equilibrium distribution
  - she foresees her firm's incentives to set future prices
  - is skeptical of unsubstantiated claims by sellers
  - she foresees her own future behaviour

Two Notions of Consumer Sophistication

- These notions are often linked in practice:
  - if consumer misunderstands nature of market, she may make less effort to become informed
  - if there is price dispersion but consumer mistakenly thinks the "law of one price" prevails, she won't search
  - if consumer mistakenly thinks "add-on" prices are regulated, she won't take care to avoid them
- First notion was focus of older IO literature which discussed information problems in markets with rational consumers
  - here, sophisticates usually protect the naive
- Second notion is related more to recent focus on bounded rationality and behavioral economics
  - here, exploitation by sophisticates of the naive seems more frequent
  - [or, less negatively, presence of naives helps market performance]

Who Is Sophisticated?

- Sometimes a policy helps one group and harms the other
  - then need to have an idea of who the sophisticated consumers are
- "Informed" notion of sophistication:
  - informed people may be particularly sensitive to price, and/or have the time to search (lower income on average)
  - informed people may have access to computer or easy private transport (higher income on average)
  - higher level of education needed to be able to judge quality (higher income on average)
- "Strategic" notion of sophistication:
  - to the extent it takes time to understand the market (including the role of consumer policy), it may be the time-rich consumers who are sophisticated
  - it might take "smartness" to understand the market, and smartness also leads on average to higher income

A General Framework

- There are two kinds of consumer—sophisticated and naive—and the proportion of the former is $\lambda \in [0, 1]$
- Consumer policy is represented by α
  - e.g., a price cap on the (main) product's price, a cap on an "add-on" product's price, a cap on commission payments to an intermediary, a minimum quality standard, or antitrust policy affecting the number of firms in the market
- In market equilibrium:
  - $V_S(\lambda, \alpha)$ is the expected surplus of an individual sophisticate
  - $V_N(\lambda, \alpha)$ is the expected surplus of an individual naive
  - expect that $V_S(\lambda, \alpha) \geq V_N(\lambda, \alpha)$
  - total consumer surplus is $\lambda V_S(\lambda, \alpha) + (1 - \lambda) V_N(\lambda, \alpha)$
  - $\Pi(\lambda, \alpha)$ is industry profit
- Sophisticates "protect" ["exploit"] the naive if V_N increases [decreases] with λ

No Interaction Between the Two Groups

- Suppose there is a bogus dieting product:
  - sophisticated consumers know it doesn't work, and will never buy it
  - naive consumers have some demand for the product
  - [apart from possible economies-of-scale effects, or word-of mouth] the proportion of sophisticates does not affect surplus of either group
- More interesting example involves mistaken beliefs about usage (e.g., gym attendance as discussed by DellaVigna & Malmendier)
  - if marginal usage price is p, all consumers will actually use the gym $q(p)$ times
  - sophisticated consumers accurately predict their usage
  - naives are over-optimistic and think they will go $\hat{q}(p) > q(p)$ times
  - competitive gym sector offers contracts aimed at the two types of consumer
  - incentive constraints do not bind: neither type wishes to use the contract aimed at the other type
  - proportion of sophisticates has no impact on the contracts offered

When Sophisticates Protect the Naive: Varian (1980)

- Varian's model:
  - Symmetric firms supply homogeneous product to consumers
  - all consumers willing to pay up to v for unit of product
  - fraction λ of consumers observe all prices in the market and buy from the cheapest supplier
  - remaining $1-\lambda$ consumers visit single supplier and buy if price no higher than v
  - equal shares of captive naive consumers for each supplier
  - [more generally, sophisticated "locals" know about existence of more suppliers on average than naive "tourists"]
- In equilibrium firms choose price according to mixed strategy (unless $\lambda = 0$ or $\lambda = 1$)
  - sophisticated consumer always obtains (weakly) lower price than any naive consumer (so $V_S > V_N$)

When Sophisticates Protect the Naive: Varian (1980)

- Larger λ makes a firm's demand more elastic, and forces firms to set lower prices on average
  - V_S and V_N increase with λ, Π falls with λ
  - consumer policy which boosts λ will be welcomed by all consumers
- Imposing price cap α in market (with $\alpha < v$) forces firms to set lower prices
  - V_S and V_N decrease with α, Π increases with α
  - price cap will be welcomed by all consumers
- If policy α instead represents the number of firms in market
  - higher α induces each firm to concentrate on its captive market, but sophisticates have more options
  - V_S increases with α, V_N decreases with α
  - policy to boost number of firms is therefore contentious

Price Dispersion in Practice: Brown and Goolsbee (2002)

Quotes...

Quotes for Male Non-Smoker Preferred 5 Year Term Life Insurance (MNP5)

Annual Premiums	5 Year Total	Company	Plan
○ $450.00	$2250.00	SECURITY CONNECTICUT LIFE INSURANCE COMPANY	TERMSMART-5
○ $530.00	$2650.00	ZURICH KEMPER LIFE	SUPER-T 5
○ $565.00	$2825.00	CNA LIFE INSURANCE COMPANY	405G
○ $590.00	$2950.00	WESTERN-SOUTHERN LIFE ASSURANCE COMPANY	E-TERM 5 PREFERRED PLUS
○ $640.00	$3200.00	UNITED OF OMAHA	PRIORITY VALUE TERM 5
○ $700.00	$3500.00	WESTERN-SOUTHERN LIFE ASSURANCE COMPANY	E-TERM 5
○ $750.00	$3750.00	THE MIDLAND LIFE INSURANCE CO.	ALTERMATIVE FG

A Variant on Varian: Armstrong and Zhou (2011)

- Suppose that product with value v must be sold through competitive sector of intermediaries ("salesmen")
  - e.g., a financial product which mandates "advice"
  - product suppliers set their retail price, and also try to influence a salesman's unobserved advice via per-sale commission payments
  - a supplier must set same retail price with each salesman
  - intermediaries can charge consumers for advice (though in equilibrium, consultation charge is subsidized below cost by income from commissions, and in many cases is free)
  - fraction λ of consumers choose the cheapest product, remaining $1-\lambda$ consumers always follow their salesman's advice
  - (the naive are either "credulous", or very impatient during the consultation)
  - outcome is that a salesman will recommend the product which pays the highest commission

A Variant on Varian: Armstrong and Zhou (2011)

- As in Varian (1980), equilibrium involves a mixed pricing strategy
  - but conditional on retail price, commission payment is deterministic
  - since a salesman recommends the more expensive product there is "mis-selling"
- With two suppliers and costless supply, minimum retail price is $p_{\min} = (1-\lambda)v$ and with retail price p supplier offers commission payment

$$b(p) = \frac{1-\lambda}{\lambda}(p - p_{\min})$$

  - expected retail price paid by either type of consumer falls with λ, so the naive are protected by the sophisticates
- If $\lambda \approx 1$, there is no attempt to influence salesman, and competition forces retail prices to cost
- If $\lambda \approx 0$, salesman has complete power to influence demand:
  - suppliers compete to set commissions as high as possible
  - prices are driven up to v to fund commissions

A Variant on Varian: Armstrong and Zhou (2011)

- This market performs poorly for both groups:
  - incentive to influence salesmen forces suppliers to offer commission payments
  - these payments artificially increase a supplier's marginal cost, and so harm even the sophisticates
- Natural policy response (followed in the UK) is to limit commission payments
  - in this model, a ban on commission payments will increase one retail price (the fee for advice paid by consumers) but reduce another (the price for the product)
  - the net effect is to benefit both groups of consumers, though suppliers and salesmen are harmed

Sophisticates Observe Quality

- When firms choose their quality, and a fraction of consumers are sophisticated and can directly observe quality, it's plausible that less expert consumers are protected
  - naive/ill-informed consumers take price as signal of quality, and signal is better when more consumers are informed
- To model this need to have competitive signalling model, the easiest of which is perhaps (taken from ??):
  - symmetric Hotelling model, two firms located at each end of $[0, 1]$
  - consumers uniformly located within $[0, 1]$, with transport cost $t \geq \frac{1}{4}$
  - if firm's quality is q and price is p, surplus from firm is $q - p$ (plus constant to ensure full coverage)
  - each firm incurs fixed cost of supplying product with quality q equal to $\frac{1}{2}q^2$ (and no marginal cost)
  - all consumers see both firms' prices
  - a fraction λ of consumers (independent of location) can observe qualities too

Sophisticates Observe Quality

- Suppose the naive/ill-informed consumers are rational, and infer quality from price
  - in equilibrium, suppose naive consumer thinks a firm with price p chooses quality $\hat{q}(p)$
- If firm chooses (p, q), while rival chooses $(\tilde{p}, \tilde{q})$, its profit is

$$\left[\frac{1}{2} + \lambda\frac{[q-p]-[\tilde{q}-\tilde{p}]}{2t} + (1-\lambda)\frac{[\hat{q}(p)-p]-[\hat{q}(\tilde{p})-\tilde{p}]}{2t}\right]p - \frac{1}{2}q^2$$

- Maximizing this respect to q requires that $q = \frac{\lambda}{2t}p$ (regardless of $\hat{q}(\cdot)$ and rival's choices)
  - therefore, unique rational expectations function is

$$\hat{q}(p) \equiv \frac{\lambda}{2t}p$$

Sophisticates Observe Quality

- One can then show the equilibrium price and quality in this market is

$$p^* = \frac{t}{1 - \frac{\lambda(1-\lambda)}{2t}} \quad ; \quad q^* = \frac{\frac{1}{2}\lambda}{1 - \frac{\lambda(1-\lambda)}{2t}}$$

  - both price and quality can vary non-monotonically with λ
  - but surplus $q - p$ rises with λ, so the sophisticates protect the naive
  - since there is no quality dispersion in this model, $V_S \equiv V_N$
  - industry profits rise with λ when λ is small, and fall with λ when λ is close to 1

- One could perform this exercise, but assuming the ill-informed were "doubly naive", in that they don't realize there is link between price and quality (or maybe that there is *too strong* a link between price and quality)

A Market where Having Informed Consumers is Bad

- It seems hard to find examples of markets where "sophistication" involves being more informed, and where higher λ harms consumers
- One nice case, though, is Anderson & Renault (2000):
  - symmetric duopoly with sequential search
  - consumers have idiosyncratic match utility for a firm's product
  - all consumers have to search to discover a firm's price
  - a fraction λ of well-informed consumers know their match utilities in advance (and first visit the firm with higher utility)
  - remaining $1 - \lambda$ consumers only know distribution
  - well-informed consumers have relatively inelastic demand, and so equilibrium price is an increasing function of λ

Sophisticates Exploit the Naive: Gabaix & Laibson (2006)

- Perhaps most famous model which illustrates this less familiar exploitation case is Gabaix & Laibson (2006)
- A ultra-streamlined version (without any "shrouding" decision) is:
  - competitive sellers offer some product
  - a seller's headline price is P and cost is C
  - fraction λ of consumers are sophisticated and only pay P for product
  - remaining $1-\lambda$ consumers are naive and end up making extra payment R to their seller
  - small print "traps", easily avoided and worthless "add-ons", etc.
- If sellers cannot distinguish the two kinds of consumer in advance:
  - equilibrium headline price is $P = C - (1-\lambda)R$
  - sophisticates pay only this price, naives pay $C + \lambda R$
- Each consumer is worse off when fraction of sophisticates rises

Sophisticates Exploit the Naive: Gabaix & Laibson (2006)

- Contrasting views about policy to control R
  - sophisticates like R, since they don't pay it and it subsidizes their price
  - naives dislike R, since they do pay it (and get only a fraction back in subsidy)
  - so consumer policy towards R likely to be contentious
- Industry assumed competitive so no profit regardless of R, except:
  - if λ small and/or R large, subsidy may be so large that $P = 0$ (assuming negative prices not feasible)
  - industry profit then positive, and firms do care about size of R
- Approach can be applied to:
  - bank accounts and unauthorized overdraft charges
  - car rental and extra charges on return of car
  - air tickets and excess luggage charges (etc etc)
  - television and extended warranty
  - "teaser rates" following by default rollover onto expensive service

Illustration: Personal Current Accounts in the UK

- Data: OFT (2008) *Personal Current Accounts in the UK*
- Prevalent arrangement is "free if in credit"
  - no transactions charges or fixed charges if account in credit (but little interest paid on balances either)
  - high penalty charges help sustain this arrangement
- Market for arranged borrowing appears to work relatively well, but unarranged borrowing less so
  - unarranged borrowing necessarily tied to existing supplier
- Banks levy *unarranged overdraft charges* (UOCs), as well as a high interest rate, if balance falls below zero (or some previously agreed overdraft limit)
  - average UOC was about £23 *per item* in 2006
- In 2006, about 50% of PCA revenue came from unpaid credit interest on balances, and about 30% of PCA revenue came from UOCs

Personal Current Accounts in the UK

- No warning given when UOC was about to be levied; consumer might pay a separate UOC on each transaction in a shopping trip
- Incidence of UOCs highly concentrated among consumers:
  - more than 75% of PCAs incurred no UOC in 2006
  - of those who incurred an UOC charge, 40% had at least six
  - 6.5 million paid at least £100 in UOCs
  - 1.4 million paid at least £500 in UOCs
  - of those PCAs which incurred a UOC in 2006, more than half had also incurred a charge in 2005 (e.g., only limited "learning")
  - free banking for those in credit is part-funded by high charges levied on those casually in debt (a "reverse Robin Hood" operation)

Personal Current Accounts in the UK

- Consumer inattention (both *ex ante* and *ex post*) seems widespread:
  - most ($>$95%) consumers say they do not consider level of UOCs when choosing their bank
  - while not "shrouded", they're not been prominent in banks' marketing efforts (unlike interest rates, ATM charges, branch coverage etc)
  - in 2006, about 25% of those who incurred a UOC said they did not know beforehand these charges existed
  - many consumers are over-optimistic about whether they will go overdrawn (in survey, few of those who paid UOCs in 2006 anticipated having to pay these charges beforehand)
  - internal bank documents include statements such as "increasing [UOCs] will have less impact on our marketing position than credit interest charges due to its lower visibility"
  - because of high switching costs for PCAs, early consumer "mistakes" about choice of supplier may endure (even if learning occurs)

Personal Current Accounts in the UK

- *Ex post*, most consumers incur UOCs because they were imperfectly informed about their current balance or about other payments being made that day
  - asked why they most recently incurred an UOC, only 24% of consumers said it was because of "insufficient funds" or "knew it would happen but had to make a payment"
- Many consumers would like a hard budget constraint:
  - 62% of consumers (who expressed a preference) reported that if a debit card payment would take their account into unarranged overdraft, they would prefer their bank to decline the payment
  - 55% of consumers (who expressed a preference) reported that they would prefer to agree up front with their bank that no payments which lead them into unarranged overdraft should be processed

Some Policy Options

- *Caveat Emptor*, or anything goes
  - arguably, close to 2009 UK Supreme Court decision on bank charges which put an end to OFT's court battle against high UOCs
- Emphasize contingent charges and how often they are incurred
  - i.e., aim to increase λ (this was indirect effect of UK court case)
- Require banks to warn consumer that if she make the requested transaction, she moves into unarranged overdraft
- Allow consumers to opt out of unarranged overdraft service
- Force consumers to opt in to unarranged overdraft service (current US policy)
- Cap the permitted contingent charges
- But bottom line is that a policy which protects the "naive" will harm consumers who do not pay the penalty charges
- See Armstrong and Vickers (2012) for detailed analysis

Naive Consumers Help to "Open" Markets: Lemons

- A natural form of "naivety" is to fail to take into account the information content of others' actions (e.g., the winner's curse)
  - Kagel & Levin (1986), Holt & Sherman (1994), Eyster & Rabin (2005)
  - in some circumstances this naivety can be good for welfare
- Consider a "lemons" market (Akerlof, 1970):
  - population of sellers know the quality q of their car
  - willing to sell if $q \leq p$, the market price for a second-hand car
  - let $S(p)$ denote fraction of sellers with $q \leq p$
  - let $\bar{q}(p) = \mathbb{E}[q \mid q \leq p]$ be the average quality of car released on the market when price is p
- Type-θ consumer willing to pay θq for car of (expected) quality q
  - $Q(P)$ is fraction of consumers with $\theta \geq P$
  - fraction λ of consumers (independent of θ) understand adverse selection, and expect quality $\bar{q}(p)$ when price is p
  - fraction $1 - \lambda$ think quality is $\bar{q}$, the unconditional expected value
  - the marginal naive consumer makes a strict loss in the market

Naive Consumers Help to "Open" Markets: Lemons

- Total demand with price p is

$$D(p;\lambda) = \lambda Q\left(\frac{p}{\bar{q}(p)}\right) + (1-\lambda)Q\left(\frac{p}{\bar{q}}\right)$$

  - (suppose D is decreasing with p)
  - crucially, D is decreasing with λ, and having more naive consumers boosts demand

- Equilibrium price solves $S(p) = D(p;\lambda)$
  - equilibrium price is decreasing with λ, and having more naive consumers expands the market
  - suppliers are better off with smaller λ
  - in reasonable cases, both naive and sophisticated consumers are better off with smaller λ

Naive Consumers Help to "Open" Markets: Coase †

- Can perform similar exercise in market with Coasian pricing:
  - naive consumers don't understand that firm has incentive to reduce price over time
- Example: monopoly seller, two periods, no discounting
  - consumer valuation v is uniformly distributed on $[0, 1]$
  - seller does not announce second price until second period
  - fraction λ understand firm's pricing incentives in second period (and will always wait to buy then)
  - remaining $1 - \lambda$ think price will not change (and so buy myopically)
  - one can check that equilibrium prices in periods 1 and 2 are

$$p_1 = \frac{\lambda + 2}{\lambda + 3} \; ; \; p_2 = \frac{\lambda + 1}{\lambda + 3}$$

  - consumers better off when λ smaller

Consumer Protection and Moral Hazard

- Fershtman & Fishman (1994), Armstrong, Vickers & Zhou (2009)
- If consumers are over-protected in the market they may take less care
- Consider market where any consumer can *choose* to become sophisticated (i.e., well-informed about market prices) by incurring *ex ante* search cost
  - otherwise consumer must shop randomly
  - another variant of Varian (1980), now where consumers choose whether to be the sophisticated type
- Symmetric sellers with cost c
  - all consumers identical *ex ante* with value v for the product
  - λ consumers choose to be informed, with search cost e
  - firms choose mixed strategy for prices given λ
  - let $P_S(\lambda)$ be expected minimum price in market (which is the price paid by the sophisticates)
  - let $P_N(\lambda)$ be expected price offered by any seller (which is price paid by naive shopper)

Moral Hazard

- No price dispersion at the extremes:
  - if $\lambda = 0$ then $P_S = P_N = v$
  - if $\lambda = 1$ then $P_S = P_N = c$
- Otherwise there is price dispersion and $P_S(\lambda) < P_N(\lambda)$
- Fraction of consumers who choose to be informed satisfies

$$P_N(\lambda) - P_S(\lambda) = e$$

  - so each consumer is indifferent between being informed and uninformed
  - there is always a trivial equilibrium where $\lambda = 0$: if no consumer chooses to become informed, there is no price dispersion, and hence no consumer has an incentive to become informed
  - similarly, it is never an equilibrium to have $\lambda = 1$: if all consumers are informed, there is no price dispersion, and hence there is no incentive to become informed

Moral Hazard

- In example with two firms, $c = 0$, $v = 1$ and $e = 0.05$
  - only 5% of consumers do not become informed and all consumers have expected outlay (including search cost where incurred) of 0.1
  - however, some consumers do pay high prices in this market (up to 10 times the average price)
- Suppose consumer policy sets a price cap $\bar{p} < v$ in this market
- The *direct* effect is good for consumers:
  - keeping λ fixed, average prices fall
- But there is a negative *indirect* effect due to moral hazard:
  - the price cap reduces price dispersion for given λ, so λ falls
- In above example, suppose $\bar{p} = \frac{1}{2}$ so maximum prices are halved
  - now 25% of consumers choose not to be informed and all consumers have *higher* expected outlay 0.17
  - this is consumer protection that consumers don't need!