U. Porto – Doctoral Programme in Economics

The Economics of Two-sided Markets

3. Application to specific industries

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Learning objectives

- At the end of this lecture, you should be able to…
  - Apply the concepts covered during the previous lectures to specific industries:
    - Media markets
    - Matchmaking services
    - Payment cards
  - Understand the specificities of these industries.
- Background readings
  - Anderson, S., 2011. Advertising and the Internet. Mimeo
  - Belleflamme, P. and Peitz, M. (2010). *Industrial Organization. Markets and Strategies*. Cambridge: Cambridge University Press. **Chapter 22**. **Section 2.**
  - Caillaud, B. and Jullien, B. 2003. Chicken & Egg: Competition among Intermediation Service Providers. *Rand Journal of Economics* 34, 309-328.
  - Rochet, J.-Ch., and Tirole, J. 2002. Cooperation among Competitors: Some Economics of Payment Card Associations. *Rand Journal of Economics* 33, 549-570.

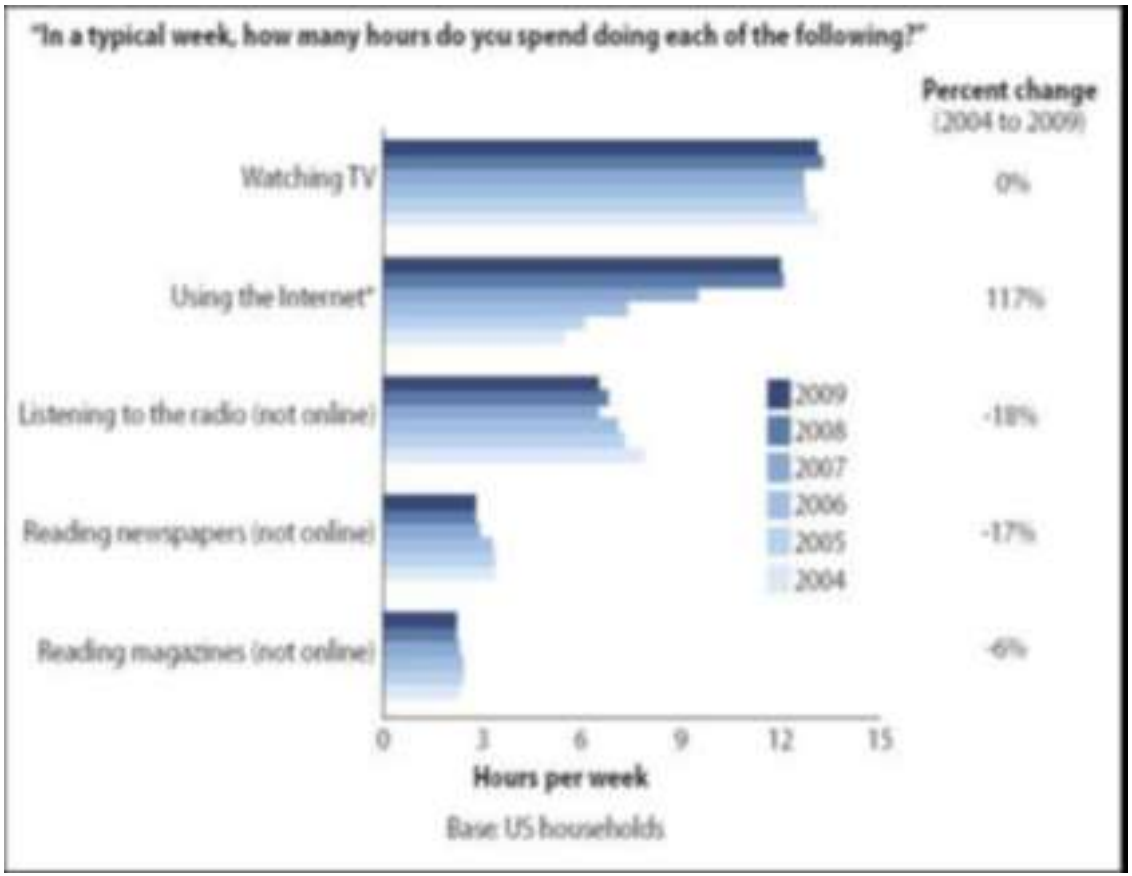
Media markets

Media markets

- Main features
  - Presence of advertisers on one side of the market.
  - Readers or viewers exert positive cross-side effects on advertisers.
  - The reverse is not necessarily true:
    - Advertisers exert positive cross-side effects on “ad-lovers”
    - But negative effects on “ad-haters”.
  - Different from typical model used so far.

Facts about media and advertising

- Comparison across media
  - Amount of time spent using different types of media



- Total time with media has gone up from 2004 to 2009 in the US.
- This is due to the time spent using the Internet, which has increased by 117% over the six years.

Source: Anderson (2011)

Facts about media and advertising (2)

- Comparison across media (cont'd)
  - Changes in advertising expenditures
    - Rise in Internet (Digital/Online) categories, concurrent decline in newspapers (and magazines), and fall in TV.
    - However, the Internet levels still remain significantly lower in dollar terms than the more traditional media:
      - Newspapers: $35b.
      - TV: $34b. for broadcast plus $22b. for cable
      - Internet: $24b.
    - But Internet has surpassed radio ($20b.), magazines ($19b.), and even direct mail (which includes both bulk mail and catalogues).
      (US data, 2008)

Source: Anderson (2011)

Facts about media and advertising (3)

- Comparison across media (cont'd)
  - Comparison between cost per thousand views (CPM rates).

Average CPM by Media, 2008 (cost per thousand views)

Broadcast TV	$10.25
Syndication TV	$8.77
Magazines	$6.98
Cable TV	$5.99
Newspapers	$5.50
Radio	$4.54
Internet Display*	$2.48
Outdoor	$2.26

Source: comScore AdMetrix and eMarketer.com's "Snapshot of the global media landscape"
*2010 data

- Rates for the Internet are among the lowest.
- *Potential explanations*
  - Formats with larger captive audience are worth more to advertisers.
  - TV and radio ads are harder to ignore and bypass because they take up real time.

Source: Anderson (2011)

Facts about media and advertising (4)

- A closer look at the Internet
  - Display advertising revenues

- In 2011, Facebook surged past Yahoo! To become the biggest force in America's online display ad market.

- In aggregate, search sites lead display ad revenues. Business and finance sites and social networks come next.
(see Anderson, 2011)

Source: The value of friendship. Facebook is likely to become a gargantuan company. That will bring risks as well as rewards. *The Economist*, 04/02/2012.

Facts about media and advertising (5)

- A closer look at the Internet (cont'd)
  - Time spent online

- Search sites lead display ad revenues *despite the fact that search activity is not what people spend most time upon on the Internet*.

(see Anderson, 2011)

Source: The value of friendship. Facebook is likely to become a gargantuan company. That will bring risks as well as rewards. *The Economist*, 04/02/2012.

Ad pricing on the Internet

- In traditional media
  - Ad pricing is based on measures of expected impressions.
  - Expressed in terms of the cost of reaching a thousand people
    - **CPM** (Cost-per-mille)
    - Newspaper, radio, and TV ads are typically sold based on estimates of the number of people with certain demographic characteristics who will view an ad that has been placed in one of those media outlets.
- On the Internet
  - 4 categories
    - Search advertising: appears on search-results pages
    - Display advertising: appears on non-search web pages
    - Classified listings: appear on web sites
    - Internet e-mail based advertisements

Ad pricing on the Internet (2)

- On the Internet (cont'd)
  - 3 radical innovations
    - Transformation of the service obtained by the advertiser
      The Internet allows advertisers to track the performance of ads, by monitoring click through rates for ads. The Internet also provides a highly efficient mechanism for delivering ads to individual users and collecting information for targeting ads to those users.
    - Transformation of the process of buying and selling advertising space
      The Internet has enabled the development of more efficient intermediation markets for advertising (e.g., keyword bidding system used for search and contextual advertising).
    - Economies of specialization
      Online publishers are increasingly turning the selling of advertising space over to specialized advertising platforms such as Google or advertising.com.

Ad pricing on the Internet (3)

- On the Internet (cont'd)
  - Pay-per-click (or **PPC**, or performance) pricing replaces CPM pricing.
    - Under PPC, the advertiser pays the website each time the ad is clicked. (This generates the incentive for fraudulent clicking…)

Ad revenue by pricing model (percentage of total)

	CPM	Performance	Hybrid
2004	42	41	17
2005	46	41	13
2006	48	47	5
2007	45	51	4
2008	39	57	4
2009	37	59	4

Source: PricewaterhouseCoopers IAB Internet Advertising Report, April 2010

Source: Anderson (2011)

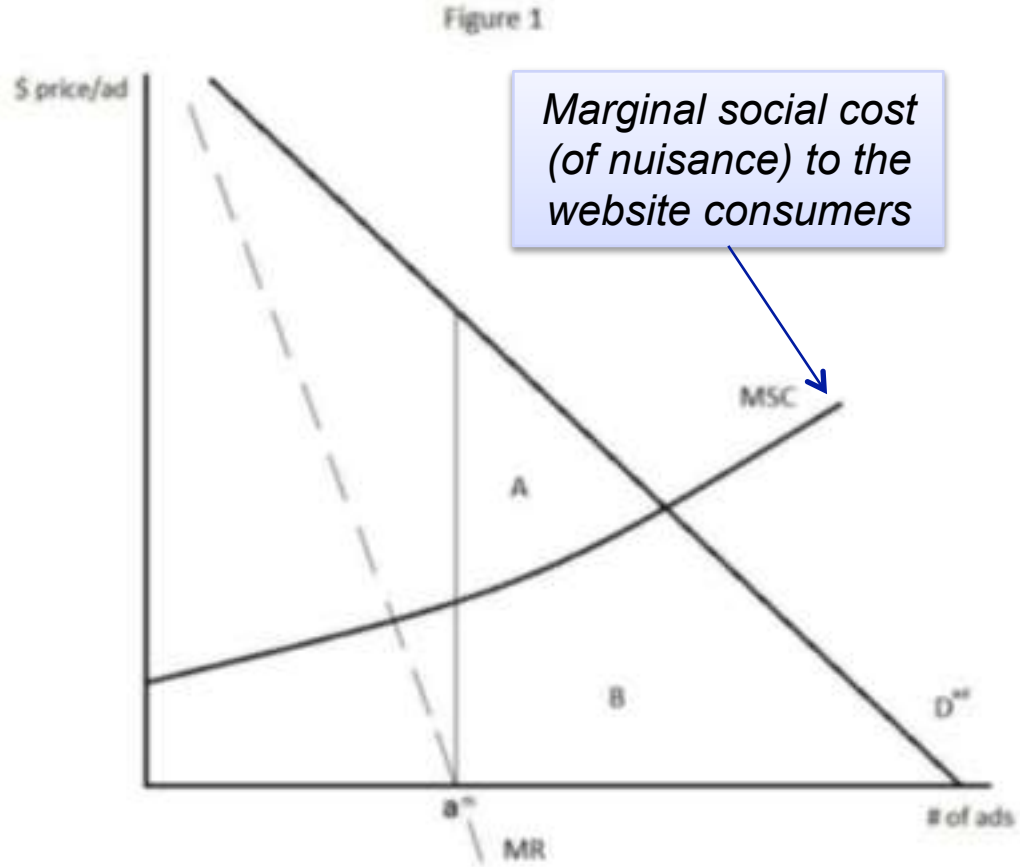
Source: Anderson (2011)

Advertising and media: basic insights

- Advertising-financed business model
  - Basic model (so prevalent on the web)
    - Visitors consume the website content “for free” (no subscription fees)
    - Advertising is the only source of revenues.
  - Extensions
    - Subscription fees as a complementary way of finance
    - Participation constraint of visitors must be taken into account.
  - Demand curve for advertising
    - Advertisers’ willingness to pay for ad-space is the incremental profit associated with the broadcasting of the ad, and is thus a derived demand from the product market.
    - We rank advertisers’ ad demand prices from high to low to trace out the ad demand curve.

Advertising and media: basic insights (2)

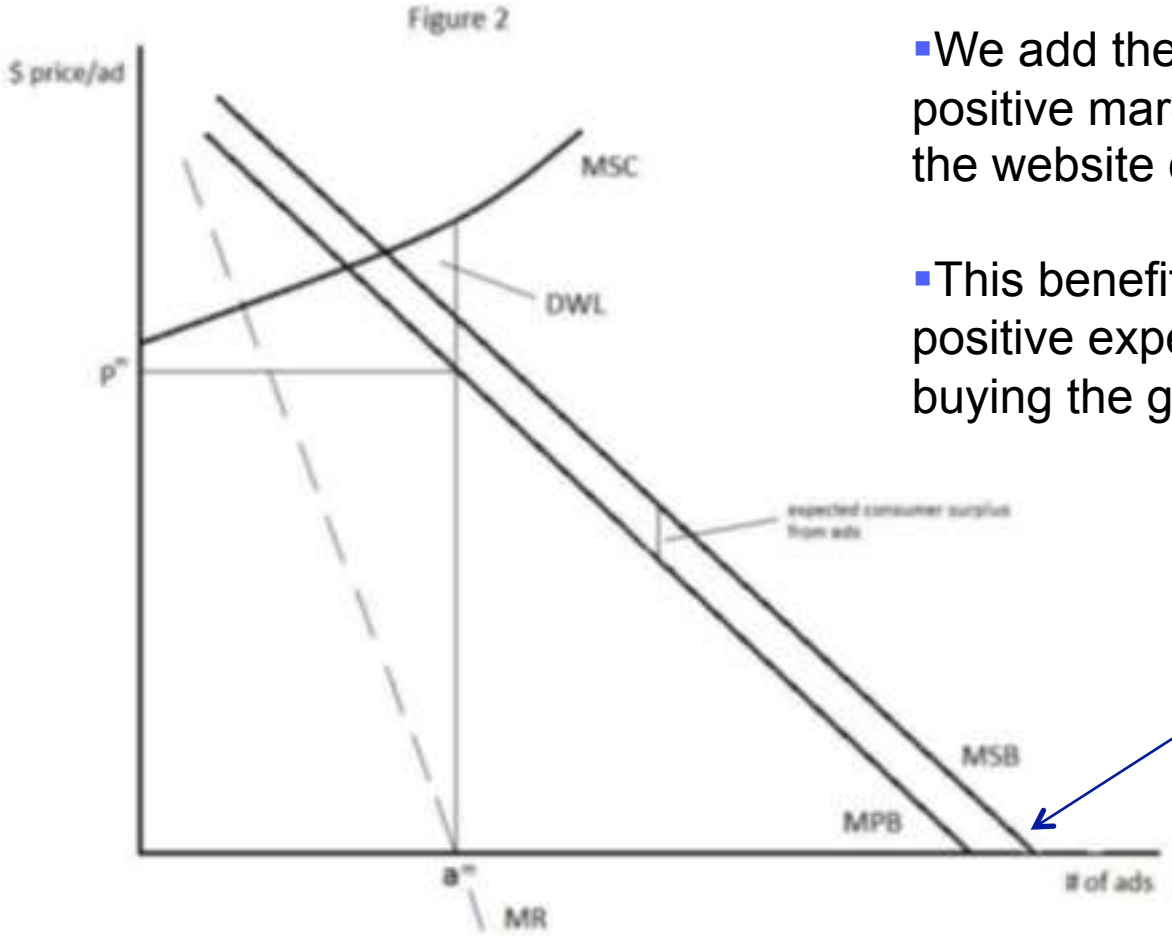
- Basic model



- Take a particular website delivering a visitor.
- How should the site price its ads (supposing MC=0)?
- How does the site's decision compare with the social optimum?
  - On the figure: too little advertising (whether nuisance to consumers are taken into account or not).

Advertising and media: basic insights (3)

- Basic model (cont'd)



- We add the possibility that ads have some positive marginal benefit to those consuming the website content.

- This benefit would be manifested as some positive expected consumer surplus from buying the good advertised.

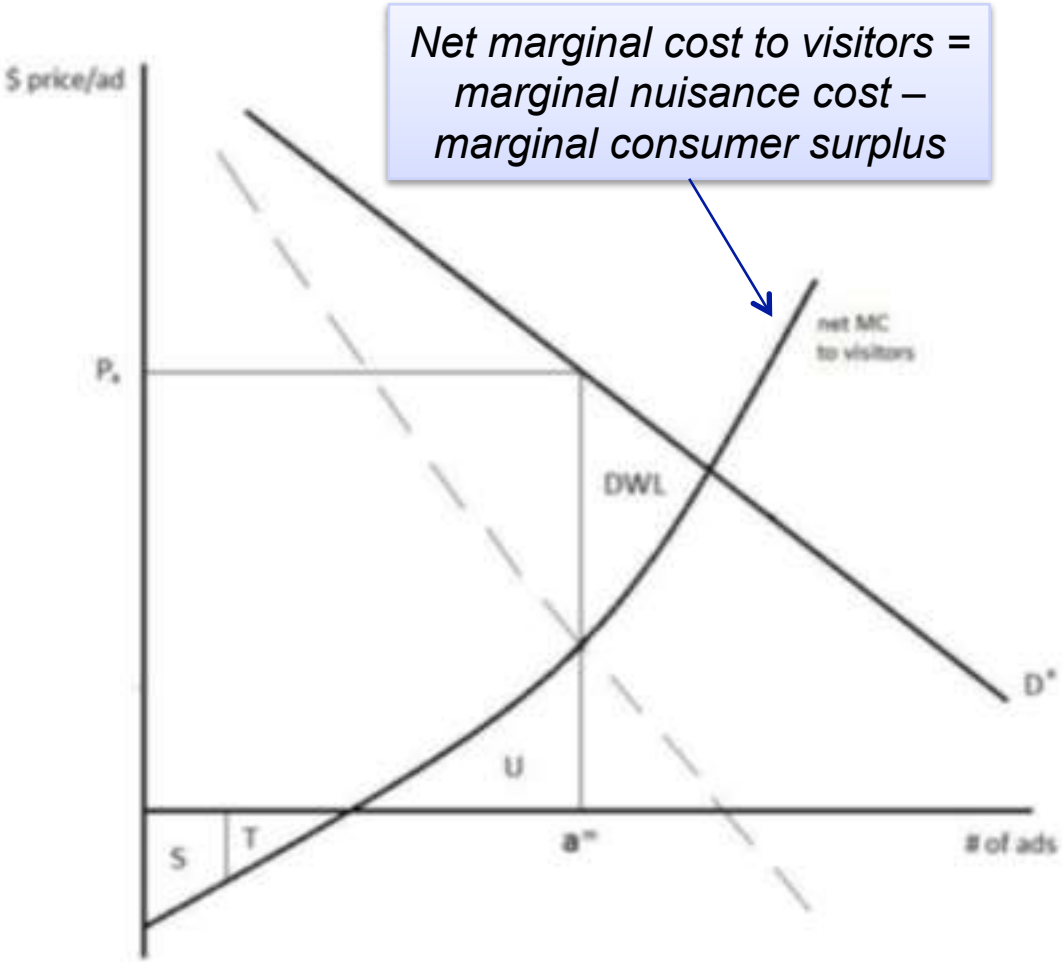
Marginal social benefit = marginal private benefit + expected surplus to consumers

Advertising and media: basic insights (4)

- Lessons so far
  - There can be too much or too little advertising from the perspective of social surplus → Trade-off between
    - Market-power distortion (leads to under-adverstising per se)
    - Negative externality of ad nuisance (leads to over-adverstising per se)
    - Consumer surplus effect (leads to under-adverstising per se)
  - These trade-offs between market power and nuisance underpin much of the analysis of the two-sided business model of media economics.
- 2 ingredients are still missing in the description
  - Consumers' participation constraint
    - Consumers may have to be enticed to visit the website.
  - Other source of revenue
    - Surplus may be extracted from visitors by charging them participation or subscription fees for access to the site.

Advertising and media: basic insights (5)

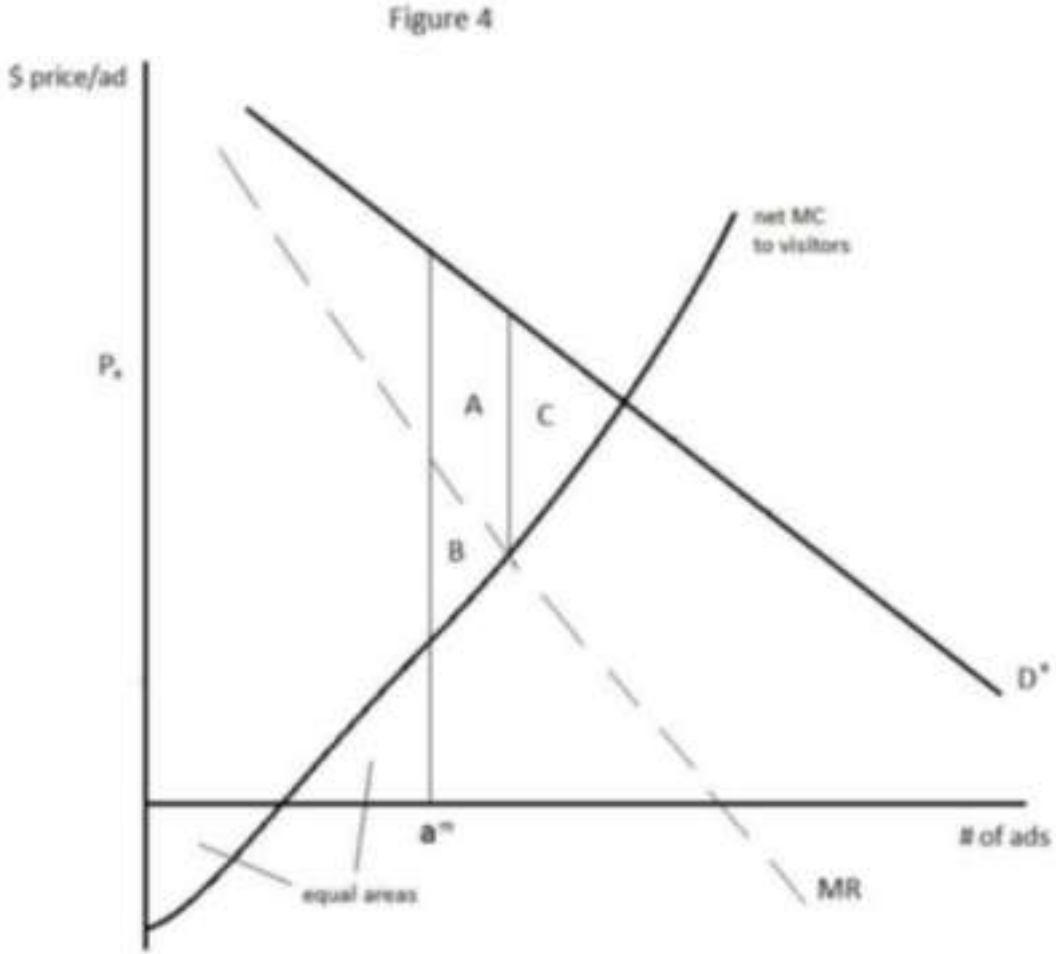
- Extended model



- Define E as the entertainment value of the website content.
- The profit-maximizing advertising level for the platform is at the point where marginal revenue from the advertising side of the market equals the marginal net cost to consumers: a_m.
- Price per ad = p_a
- Access price for consumers = E + $area\ S + T - U$. (! Could be negative)

Advertising and media: basic insights (6)

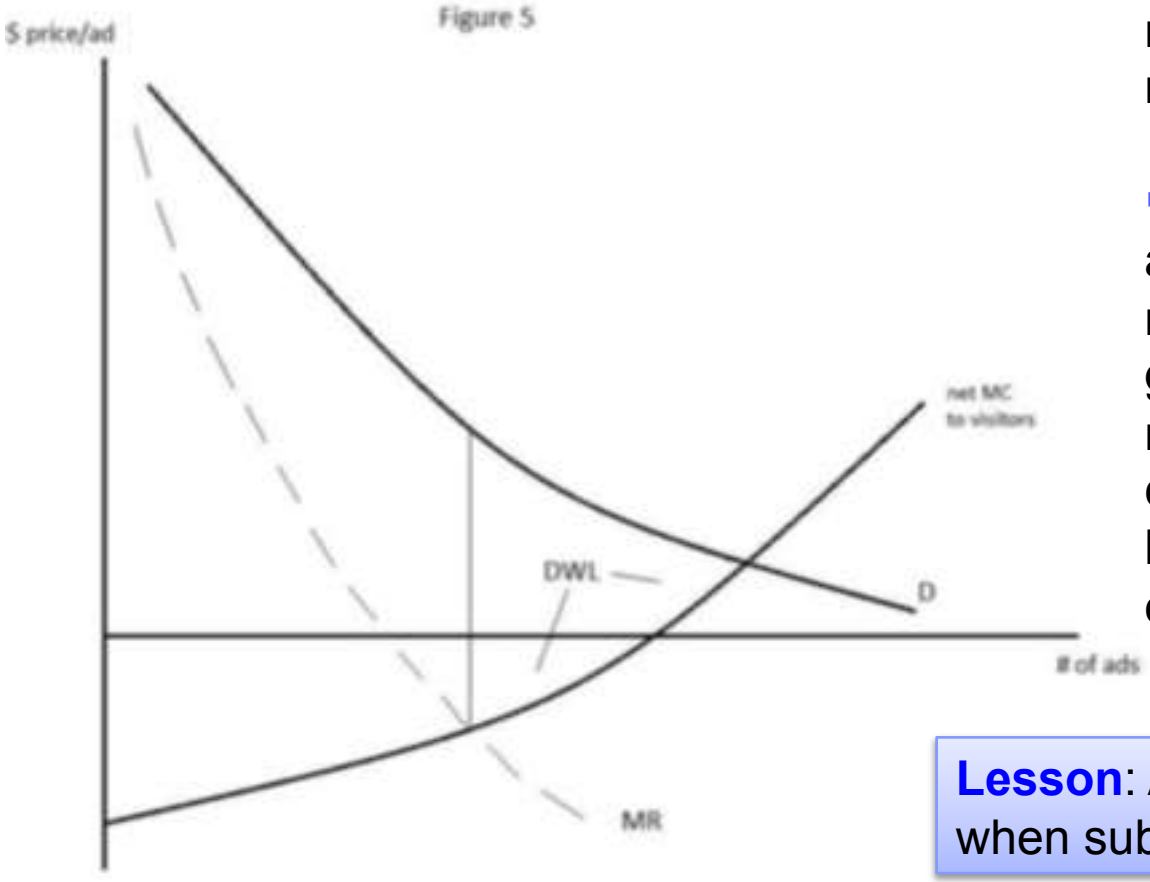
- Extended model (cont'd)



- What if negative subscription prices are infeasible?
- Because subscription price must be positive
  - Lost profit = *area B*
  - Deadweight loss = $A+B$
- Total deadweight loss = $A+B+C$

Advertising and media: basic insights (7)

- Extended model (cont'd)



- Here, there is a negative marginal cost (i.e., a positive marginal benefit) for consumers.

- The marginal revenue from the ad market is negative: two-sided market balance has the web-site going beyond the ad revenue maximizing point because the consumer enjoys the ads and a higher subscription price can be extracted.

Lesson: Advertising is always insufficient when subscription fees are deployed

Matchmaking services

Matchmaking: 2 different environments

- Size effects
  - Agents in one group value the matching services of an intermediary all the more when the participation of the other group is large, because a large pool is more likely to lead to a successful match.
    - e.g., business-to-business (B2B) electronic marketplaces
    - Generates indirect network effects leading to a winner-takes-all situation when intermediaries are homogenous.
- Sorting effects
  - Users care about the characteristics of their trading partner
    - e.g., job search, dating or real estate
    - Joining an intermediary, agent affects the welfare in the other group by changing the composition of the pool of participants in its own group.
    - Endogenous vertical differentiation may allow multiple intermediaries to coexist at equilibrium.

Matchmaking: Size effects

- Model (Caillaud and Jullien, RAND, 2003)
  - Continuum of mass 1 of buyers and continuum of mass 1 of sellers.
  - Unique trading partner in the other population, whom can be found only by using the matching services of an intermediary.
  - If two matching partners registered with the same intermediary, the probability of finding each other is equal to $0 < \lambda < 1$
    - If n_b buyers register with an intermediary, the probability for a seller to find her match is equal to $\lambda n_b \in [0,1]$
    - Gains from trade in case of a successful match are normalized to one and equally shared between the trading partners (efficient bargaining process).
  - Intermediaries compete à la Bertrand
    - Registration fee, M^i_k and transaction fee P^i
    - Constant gains from trade and efficient bargaining
      → only the total transaction fee matters: $P^i = P^i_s + P^i_b$
      → Net surplus to be shared = $1\text{-}P^i$

Matchmaking: Size effects (2)

- Model (cont'd)
  - Intermediaries first simultaneously set their price structure.
  - Then agents choose which intermediary (if any) to register with.
    - Agents can register with at most one intermediary (singlehoming).
    - Utility is zero if they do not register.
  - Expected utilities when registering with intermediary i

$$U_b^i = n_s^i \lambda \tfrac{1}{2}(1 - P^i) - M_b^i$$

$$U_s^i = n_b^i \lambda \tfrac{1}{2}(1 - P^i) - M_s^i$$

Constant cost of providing service to one agent of type k

  - Intermediary's profit: $\Pi^i = \sum_{k=s,b} n_k^i (M_k^i - C_k) + \lambda n_b^i n_s^i P^i$
- Main result
  - **Any equilibrium in the game involves a single active intermediary with zero profits** (which is socially efficient).

Matchmaking: Size effects (3)

- Intuition
  - Suppose all agents register with intermediary 1.
  - It is an equilibrium **if** no pricing strategy allows intermediary 2 to earn a positive profit when agent hold pessimistic beliefs against 2.
    - *Pessimistic beliefs*: after any deviation by 2, agents coordinate on a distribution of agents across platforms that yields minimal profits for 2.
  - → Only choice for 2: Divide-and-conquer strategy
    - 'Divide' by subsidizing one group (say buyers) to convince them to join
    - Subsidy must satisfy: $-M_b^2 > \lambda \frac{1}{2}(1-P^1) - M_b^1$
    - If so, all buyers switch and all sellers follow.
    - This creates maximal surplus; $\lambda - C_b - C_s$, which intermediary 2 can capture by setting $P^2 = 1$.
  - Strategy not profitable if 2 can't recoup the subsidy paid to buyers by taxing away aggregate surplus once all agents have migrated.

Matchmaking: Size effects (4)

- Intuition (cont'd)
  - → In equilibrium agents must receive the total surplus and the active intermediary cannot make a strictly positive profit.
    - Intermediary is constrained to subsidize full participation, charge the maximal transaction fee $(P^1 = 1)$ and make zero profit:

$$M_b^1 + M_s^1 = \lambda + C_b + C_s$$

- Lesson
  - Consider a matching market with two properties: first, participants on both sides of the market care about the size of the other side, and second non differentiated intermediaries compete in membership and transaction fees. Then one intermediary dominates the market but makes zero profit.

Matchmaking: Sorting effects

- Sorting by an intermediary (Damiano and Li, JEEA, 2008)
  - Different assumptions on agents
    - Agents within each group have heterogeneous types (or qualities).
    - Each agent randomly matched with an agent of the other group.
    - Agent's valuation increases when matched with an agent of higher quality.
  - Implications
    - Agents care about the expected quality (and not size) of the pool of participants.
      - Examples: job, dating, real estate markets
    - Affiliation decisions affect the composition of the pool of participants → they create a sorting externality.
  - Main result: 2 matchmakers coexist at equilibrium
    - (In spite of identical matching services and Bertrand competition)

Matchmaking: Sorting effects (2)

- Summary of the model
  - Agents have private information about their type.
  - As long as agents in both groups are heterogeneous enough…
    - They self-select into matching markets based on the prices and their expectations of the quality of the pool of participants from the other group.
    - Sorting role of prices
      → If one matchmaker sets a price equal to marginal cost,
      - the other matchmaker can charge a higher price
      - earn strictly positive profits by attracting the types willing to pay more to be matched with higher types.
- Lesson
  - Due to the sorting role of prices, two matchmakers competing through membership fees may coexist at the equilibrium of a sequential move game as long as the distribution of types is sufficiently diffused; the matchmaker who moves first survives with strictly positive profits.

Matchmaking: Sorting effects (3)

- A simplified model of intermediated trade
  - There exists a decentralized market in which buyers and sellers interact freely in the absence of an intermediary.
    - Buyers and sellers are not charged for joining.
    - They are matched randomly.
  - **Claim**: an intermediary can buy and sell the product at a price difference so that he makes a profit although consumers have the possibility to participate for free in the random matching market.

Matchmaking: Sorting effects (4)

- A simplified model of intermediated trade (con'td)
  - Model
    - Unit mass of buyers: 50% with valuation v_H / 50% have valuation $v_L < v_H$
    - Unit mass of sellers: 50% with costs c_H / 50% with costs $c_L < c_H$
    - If no trade → surplus normalized to zero
    - Assume: $v_H > c_H > v_L > c_L$ → Positive gains from trade for all matches, *except* when a low value buyer meets a high cost seller.
    - Gains from trade are assumed to be evenly split.
  - Expected surpluses

High valuation buyer:	$\frac{1}{2}\left(v_H - \frac{c_L + c_H}{2}\right)$
Low valuation buyer:	$\frac{1}{4}(v_L - c_L)$
Low cost seller:	$\frac{1}{2}\left(\frac{v_H + v_L}{2} - c_L\right)$
High cost seller:	$\frac{1}{4}(v_H - c_H)$

Matchmaking: Sorting effects (5)

- A simplified model of intermediated trade (con'td)
  - First best: all high valuation buyers interact exclusively with low cost sellers
    - Size of trade = 1/2; Welfare = $(v_H - c_L)/2$
  - Matching market is inefficient: too much trade (3/4) and lower welfare:
    - $(v_H - c_L)/4 + (v_H - c_H)/4 + (v_L - c_L)/4 = (v_H - c_L)/2 - (c_H - v_L)/4$
  - Introducing an intermediary may improve the allocation and even implement the first best.
    - Intermediary sets profit maximizing bid and ask prices, (w,p)
    - Prices must be such that
      - high value buyers and low cost sellers prefer intermediated exchange
      - other buyers and sellers refrain from migrating to the intermediary.

Matchmaking: Sorting effects (6)

- A simplified model of intermediated trade (con'td)
  - Intermediated trade
    - Suppose prices satisfy above conditions.
    - High value buyers know that they encounter only high cost sellers in the matching market → indifference if: $(v_H - c_H)/2 = v_H - p$
    - Low cost sellers know that they encounter only low valuation buyers in the matching market → indifference if: $(v_L - c_L)/2 = w - c_L$
    - Hence: $p = (v_H + c_H)/2$ & $w = (v_L + c_L)/2 \rightarrow \text{Profit} = (p - w)/2 > 0$
    - Other buyers and sellers don't join: $v_L - p < 0$ & $w - c_H < 0$ ■

Matchmaking: Sorting effects (7)

- A simplified model of intermediated trade (con'td)
  - Summary
    - Equilibrium in which high value buyers and low cost sellers self-select into the intermediated market.
    - The presence of a profit-maximizing dealer leads to endogenous sorting according to type.
    - The intermediary makes positive profit since he offers high value buyers and low cost sellers a better deal than what the matching market provides.
    - Intermediated trade also improves welfare by avoiding socially inefficient trade.
  - Note
    - There is still room for profitable intermediation when the matching market in isolation operates efficiently (i.e., $v_L > c_H$).

Payment cards

Source: Verdier, M. 2011. Interchange Fees in Payment Card Systems: A Survey of the Literature. *Journal of Economic Surveys* 25 (2): 273-297

Payment cards as two-sided platforms

- Externalities
  - Cross-side effects among merchants and customers.
    - Price allocation between consumers and merchants influences volume of transactions that are paid by card.
  - The consumer's bank (“issuer”) and the merchant's bank (“acquirer”) must cooperate to enable transactions.
- Intermediaries
  - Payment card networks define rules and standards to ensure the acceptance of cards and the security of transactions.
    - Open networks (Visa, Mastercard → not-for-profit joint ventures)
      - Use interchange fees to allocate the total cost of payment card transactions between the issuer and the acquirer.
    - Closed networks (American Express)
      - No interchange fee; direct choice of the prices that are paid by end-users.

Economics of interchange fees

- Interconnection governance of open card schemes
  - Interchange fee: The acquirer pays a collectively determined interchange fee (≈ access charge in telecom) to the issuer.
  - Honor-all-cards rule: Affiliated merchants must accept any card of any issuing member.
  - No-surcharge rule: Affiliated merchants are not allowed to impose surcharges on customers who pay with a card.
- Controversy
  - Banks claim → interchange fees are needed to encourage…
    - … consumers to substitute card payments for cash
    - … efficient use of payment instruments
  - Merchants claim → interchange fees inflate artificially the cost of accepting payment cards.

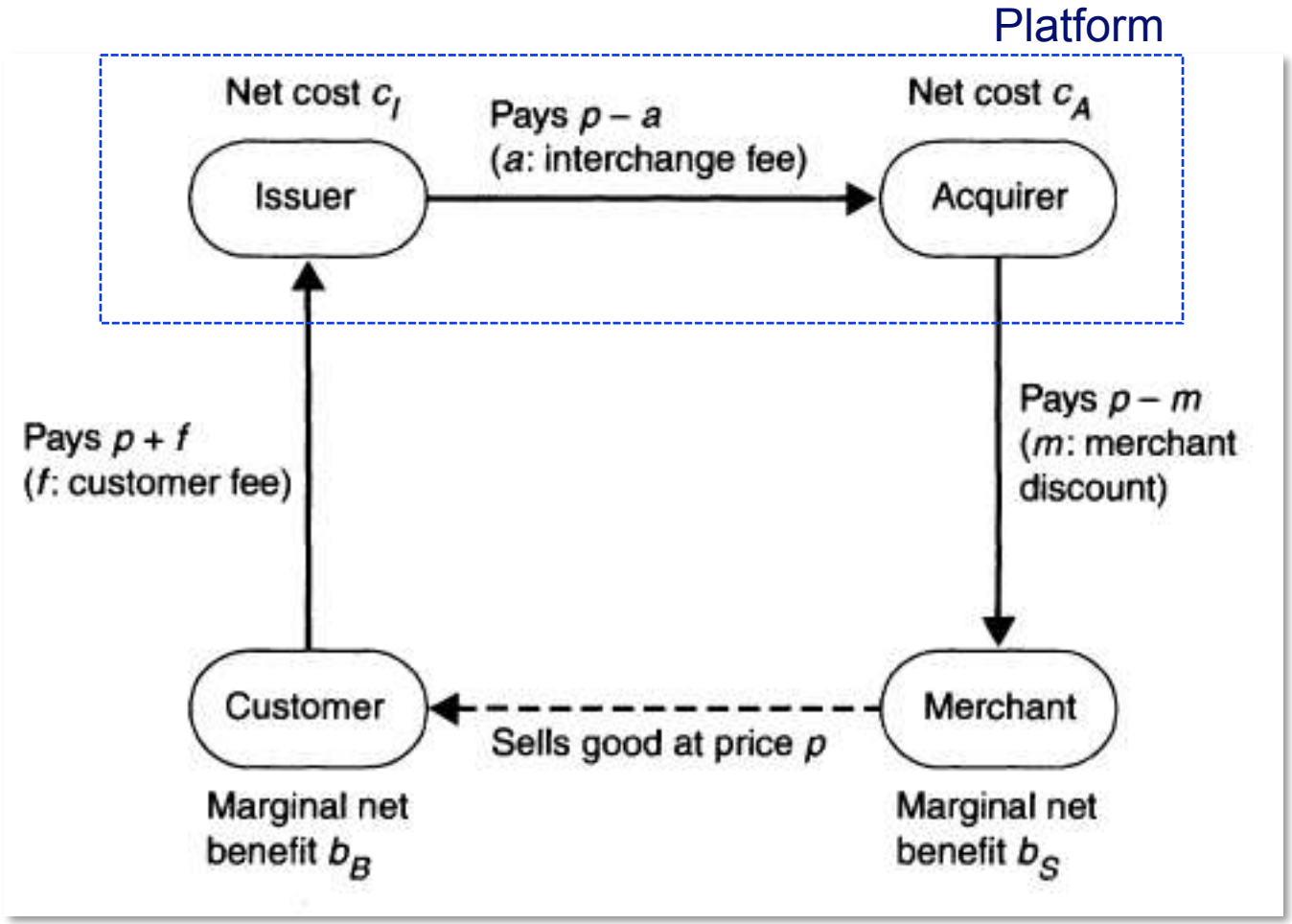
Economics of interchange fees (2)

- Controversy (cont'd)
  - Regulatory concerns
    - *Competition*: Interchange fees = a collective decision that is taken by competitors. Has to be legally justified.
    - *Equity*: Interchange fees → transfers between cash-users, card-users, banks and merchants that may favor one of the parties, and be detrimental to others.
    - → In several countries: intervention to cap the level of interchange fees that is collected by the issuers in payment systems.
- 2 main issues in the debate
  - Do interchange fees distort competition, and if so, how, and on which market?
  - Do interchange fees create efficiency gains that are passed through to the consumers? And, if so, how can efficiency gains be measured?

Economics of interchange fees (3)

- Role of interchange fees (Baxter, 1983)
  - Lesson: interchange fees help correct the usage externalities that arise when consumers fail to choose the payment instrument that maximizes the surplus of the 'joint consumer' (cardholder + merchant)
  - Model
    - A consumer has the choice between using cash and a payment card to purchase a good from a merchant.
    - No-surcharge rule: same price for the good whatever payment system used
    - Net benefits of using card instead of cash
      - For consumer: b_B
      - For merchant: b_S
    - Fees
      - Consumer pays transaction fee to the issuer: f
      - Merchant pays merchant service charge to the acquirer: m.

Economics of interchange fees (4)



Source: Rochet & Tirole, RAND, 2002

Economics of interchange fees (5)

- Role of interchange fees (cont'd)
  - If banks are perfectly competitive: fees → cost of card transaction
    - $f = c_I$ and $m = c_A$
    - Consumer pays by card iff $b_B \geq c_I$
    - Merchant accepts card iff $b_S \geq c_A$
  - Suppose
    - Issuing cost is high: $b_B < c_I$
    - Payment by card is socially efficient: $b_B + b_S \geq c_I + c_A$
    - → Consumer exerts a negative usage externality on the merchant.
  - An appropriate interchange fee can ensure that all socially optimal transactions are completed. Let acquirer pay to issuer $a = b_S - c_A$
    - → issuer's marginal cost becomes $c_I + c_A - b_S$
    - → acquirer's marginal cost becomes b_S
    - Completely passed through to cardholder and merchant ⇒ **OK**

Economics of interchange fees (6)

- Policy implications
  - Market failure if
    - payment cards provide a greater benefit to the society than cash,
    - one agent is more reluctant than the other to use cards.
  - Market failure on the consumer (merchant) side → acquirer pays (is paid by) issuer
  - The efficient level of interchange fee depends on several market parameters, such as end-users' benefits and banks' costs.
- Concern with Baxter's analysis
  - If issuers have market power, they may use interchange fees to increase their profit (not passing it through to consumers).
  - Welfare-maximizing interchange fee?
    - Which criterion? 'Two-sided consumer' surplus? + Banks profits?
    - Heterogeneity of consumers and merchants

Economics of interchange fees (7)

- Extension of basic framework
  - Strategic interactions on banking retail markets.
  - Banks face several consumers.
  - Merchants may differ across their card usage and acceptance benefits.
  - Monopolistic payment platform
- 2 types of models in the literature

Case A: Homogeneous merchants	Case S: Heterogeneous merchants
Rochet and Tirole (2002)	Schmalensee (2002)
Wright (2003a)	Wright (2003b)
Rochet and Tirole (2003b)	Wright (2004)
Guthrie and Wright (2007)	Guthrie and Wright (2007)

Source: Verdier (2011, p. 279)

Economics of interchange fees (8)

- Timing
  - **1.** Payment platform selects interchange fee, a.
  - **2.** Banks choose simultaneously transaction fees, f and m, for consumers and merchants.
  - **3.** Merchants choose simultaneously whether or not to accept cards, and the retail prices, p_{cash} and p_{card}.
  - **4.** Consumers decide which merchant to purchase from, and whether or not to use a payment card.
- Analysis
  - Suppose stages 2 to 4 have been solved by backward induction.
  - Focus on stage 1

Economics of interchange fees (9)

- Stage 4
  - Consumer with card usage benefit b_B pays by card if

$$b_B - f - p_{\text{card}} \geq -p_{\text{cash}} \Leftrightarrow b_B \geq p_{\text{card}} - p_{\text{cash}} + f \equiv b_B^m$$

  - Demand for card payments: $D_B(b_B^m) = P(b_B \geq b_B^m)$ (decreasing with f)
- Stage 3
  - Merchant accepts cards if higher profits when consumers pay by card.
    - Either, higher net benefit per transaction when consumers pay by card
    - Or, decision to accept cards increases market share.
- Stage 2
  - Identical issuers set $f(c_I - a)$
  - Identical acquirers set $m(a + c_A)$
  - Fees are increasing with banks' perceived marginal costs

Economics of interchange fees (10)

- More specific assumptions for stage 3
  - (Case A) Homogeneous merchants
    - All merchants obtain the same benefit of being paid by card: b_S
    - All merchants accept cards if the interchange fee is not too high: $a \leq \hat{a}$.
    - Transaction volume = probability consumer uses card: $V = D_B(b_B^m)$
  - (Case S) Heterogeneous merchants
    - Continuum of retail sub-sectors, each corresponding to a value of b_S
    - Banks are able to discriminate among retailers for the merchant fee.
    - Number of merchants who accept cards: $D_S(b_S^m)$ ← Marginal sector
    - Volume of card transactions: $V = D_B(b_B^m) \times D_S(b_S^m)$

Economics of interchange fees (11)

- **Volume** maximizing fees
  - Case A. $a^V = \hat{a}$
    - To maximize transaction volume, platform chooses highest interchange fee compatible with merchants' acceptance (as consumers' demand increases by assumption with the interchange fee).
  - Case S. a^V is chosen such that $\eta_S\big|_{a=a^V} = -\eta_B\big|_{a=a^V}$

    Elasticities of the cardholders' and merchants' demand to the interchange fee
    - Fee is chosen so as to balance demands between each side of the market.
    - The extra card usage must compensate exactly the loss in card acceptance.
    - $\rightarrow$ Price structure affects transaction volume (classical property of 2SPs)
    - Special case: perfectly competitive banks, identical and linear demands

$$c_I - a^V = c_A + a^V \Leftrightarrow a^V = (c_I + c_A)/2$$

Economics of interchange fees (12)

- **Joint-Profit** maximizing fees
  - Definitions
    - $|df/da|$ & $|dm/da| \rightarrow$ Pass-through rates of issuer & acquirer
  - Case A. If $|df/da| < |dm/da|$, then $a^P = a^V = \hat{a}$. Otherwise, $a^P \leq a^V = \hat{a}$.
  - Case S.
    - a^P chosen such that $\eta_B + \eta_S = \varepsilon_T$ (elasticity of total price to interchange fee)
    - If $|df/da| < |dm/da|$, then $a^P > a^V$. Otherwise, $a^P \leq a^V$.
  - $\rightarrow$ the joint-profit and volume maximizing interchange fees are different.
    - **Why?** If one side is more profitable than the other, the payment system wants to shift revenues from one side of the market to the other.
  - Policy implication: If regulator wants to encourage card payments, it has to take into account the nature of competition on banking retail markets, and the asymmetries between the issuing and the acquiring activities.

Economics of interchange fees (12)

- **Welfare** maximizing fees
  - Case A. If $b_S + f(c_I - a) + c_I - c_A < 0$, then $a^W < \hat{a}$. Otherwise, $a^W = \hat{a}$.
  - Case S. At the welfare maximizing interchange fee

$$\frac{\eta_B}{\eta_S} = \frac{m - c + \beta_B(b_B^m)}{c - f - \beta_S(b_S^m)}$$

← Average surplus of cardholders who use their cards

← Average surplus of merchants who accept cards

$$\text{If, at } a = a^V,\ b_B^m + \beta_S(b_S^m) > b_S^m + \beta_B(b_B^m),\ \text{then } a^V < a^W.$$

  - Trade-off between consumers' and merchants' surplus.
    - Case S. Small increase in interchange fee
      → # of card users ↑ by dD_B/da; # of merchants accepting cards ↓ by dD_S/da
      → surplus change = $\left[D_S(b_S^m) - D_B(b_B^m)\right] \times (b_B^m + \beta_S(b_S^m) - c_I - c_A)$
      → a^W chosen such that consumers' surplus increase compensates exactly the loss in merchants' surplus.

Economics of interchange fees (12)

- Competition between payment platforms
  - Questions
    - Does it improve social welfare?
    - How does it impact the choice of the profit maximizing interchange fee?
  - Main conclusions of the literature
    - Equilibrium depends on multihoming possibilities.
    - Platform competition may increase the price distortion between the consumer and the merchant side.
      - Competing networks tend to undercut prices to attract the users that singlehome.
    - The tilted price structure that results from platform competition does not necessarily improve social welfare.