Economics of two-sided markets


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Two-sided markets: definition

- a two-sided market is one in which
  1) two sets of agents interact through an intermediary or platform
  2) the decisions of each set of agents affects the outcomes of the other set of agents, typically through an externality

Examples:
- credit cards
- video games
- market-places (e.g. Amazon, Groupon, …)
- newspapers
- search engines
- operating systems
- dating services
- …

A defining characteristic is that, taking as an example the case of video games, **neither consumers nor game developers will be interested in the PlayStation if the other party is not**
The literature on two-sided markets is distinguished by its focus on the actions of the market intermediary. Generally speaking, research in two-sided markets explores choices by market intermediaries, particularly pricing, when there is some kind of interdependence or externality between groups of agents that the intermediary serves.

The externality could involve usage or membership.

- For instance, payment card users care about how many merchants are members of the same card network, not about how much any merchant transacts over the network.
- In contrast, in picking which networks to accept, merchants care more about which networks consumers actually use rather than which networks consumers hold cards on.
Two-sided markets: definition

- One-sided markets have intermediaries, too.
  - For example, consider a farmer that sells a product to a grocery store once and does not otherwise interact with the grocer.
  - The grocer then picks a retail price based on inventory and demand. In this one-sided market, the farmer collects the wholesale price and is then indifferent to the success of the grocer in actually selling the good.
  - The distinguishing feature in this case is whether the seller is paid based on the success of the platform with the buying side.
  - One-sided and two-sided selling strategies exist side-by-side at Amazon.com.
    - For some products, like certain new books, Amazon (basically) buys at a wholesale price and sells for a retail price, which is a one-sided model. But for many other products, Amazon provides a web portal for a producer that sets the retail price.
Two-sided markets: pricing

- Pricing looks unusual in two-sided markets.
  - Consumers pay to receive most newspapers, but not a Yellow Pages directory or an Internet search engine.
  - Consumers do not pay per advertisement in their newspaper but must pay to use more video games with their game console.
  - Many consumers are in effect paid to use a credit card—with rewards programs such as contributions to frequent flyer plans.
- Theoretically, it is often hard to establish whether a given price in a two-sided market is higher or lower than socially optimal, or even whether greater competition would make the existing price rise or fall.
Two-sided markets: pricing

- Pricing to one side of the market depends not only on the demand and costs that those consumers bring but also on how their participation affects participation on the other side and the profit that is extracted from that participation.
- In a one-sided market, we can characterize the price–cost mark-up in terms of elasticity of demand and the marginal cost.
- In a two-sided market, pricing decisions will also include the elasticity of the response on the other side and the mark-up charged to the other side.
- Since the platform faces a similar computation on the other side, prices on both sides of the market depend on the joint set of demand elasticities and marginal costs on each side.
Two-sided markets: pricing

- In any market, prices typically fall as the price elasticity of demand increases.
- But in a two-sided market the effect can be even larger:
  - The low price on one side not only attracts elastic consumers on that side but also, as a result, leads to higher prices or more participation on the other side.
  - The increased value extracted from the other side magnifies the value of having consumers on the first side, which leads to a yet bigger price decrease and quantity increase for the side that experiences the increase in elasticity.
- Price below marginal cost or even negative prices can easily arise in a two-sided market.
  - For example, a platform might charge a price below cost on one side if those agents have a large price elasticity and their participation attracts a large number of participants on the other side who are relatively price inelastic (and have a high mark-up). (E.g. Microsoft and developers)
Two-sided markets: pricing

- If there are multiple competing market intermediaries, the effect of participation of one side on the other has even more bite.
- Consider two competing platforms pricing to consumers and sellers.
- As without competition, the consumer price depends on consumer demand, consumer cost, and the mark-up to sellers.
- But now, lowering the consumer price attracts consumers from the competing platform, which degrades the value of the competitor to buyers, and hence leads to a larger increase in buyer interest in the original platform (e.g. Amazon, which is becoming the dominant marketplace).
- The extent of this effect is in part determined by the way in which agents move from one platform to another
  - do they shift only some usage from one platform to another or do they move all of their usage?
  - In the real world, we observe both outcomes, often in the same market. Merchants typically accept payment on multiple networks. Meanwhile, consumers typically stick to a single card for months at a time.
Two-sided markets: pricing

- Two-sided markets often seem to evolve toward to a situation where members of one side use a single platform and the other side uses multiple platforms.
  - Payment cards and newspapers are two examples.
    - Consumers typically read only one newspaper whereas advertisers appear in all of them.
  - This is less true in video games, although even there consumers usually (but not always) buy only one console, and video games distributed for multiple consoles are becoming more common.
Two-sided markets: pricing

- Why does this issue matter?

- It is because the intermediary can be viewed as a monopolist over access to members that do not use other intermediaries.

- Hence, firms compete aggressively on the side that uses a single network in order to charge monopoly prices to the other side that is trying to reach them.

- As a result, competition between platforms can have large price effects on the side of the market that uses a single platform and little or no effect on the side that uses multiple platforms.

- This result might explain why payment card pricing has increasingly favored consumers over time rather than merchants (for instance, with the rise of rewards programs), since consumers and not merchants typically use a single network and competition among card networks has become more important relative to competition between card networks and cash.
Two-sided markets: pricing

- In a situation of demand heterogeneity, standard **price discrimination**, by manipulating the prices for participation and usage, allows a platform to capture more of the surplus on the side with discrimination.
- Thus, discrimination increases the value extracted on one side, which leads to lower prices on the other side which has now become more valuable.
- In addition, two-sided markets allow for a new form of price discrimination: discrimination based on heterogeneity in the attractiveness of an agent to the other side
  - e.g. credit card offered supermarkets relatively low interchange fees, which led to the adoption of payment card usage by supermarkets.
  - Similarly, Sony and Microsoft have given Electronic Arts, the largest game manufacturer, advantageous contracts in order to attract games to their consoles.
Two-sided markets: pricing

- Two-sided markets raise questions for **dynamic pricing** as well.
- Penetration pricing, such as when an intermediary lowers price early in the product life cycle and raises it after having established a base, is a natural outcome in two-sided markets.
  - For instance, the independent Yellow Pages publisher “Yellow Book” has a policy of offering advertisement for free in the first year it enters a new city. This strategy makes sense because Yellow Book recognizes that doing so will generate usage, which Yellow Book can capitalize on in the future.
  - Similarly, it is common to establish a technological standard through free distribution of a basic product (for instance, Adobe’s free distribution of Reader popularizes the PDF standard) and then profit on peripheral products (such as Adobe Acrobat)
Two-sided markets: openness

- Openness refers to two specific strategic issues.
  1) number of sides to pursue:
     a potential platform firm must choose whether to be one-sided, two-sided, or multi-sided.
  2) how to relate to competing platforms:
     platforms may seek incompatibility, compatibility, or some sort of integration.

- Consider operating systems.
  - Apple produces both its computer hardware and its computer operating system, whereas Microsoft controls only the operating system and counts on independent manufacturers to supply hardware. In this sense, Microsoft is more open than Apple.
  - We can characterize Microsoft as managing a three-sided market between consumers, software providers, and hardware providers, whereas Apple manages only a two-sided market between consumers and software providers.
Two-sided markets: openness

- A platform may decide to change its strategy toward integration as its market evolves.
  - For instance, Microsoft has controversially included software applications in its operating system that were also supplied by third party suppliers, such as browser software, media players, and video editing.
- Being one-sided is in effect an extreme move away from openness where a firm integrates to the extent that there is no longer a two-sided market interaction.
- Firms generally begin with a one-sided model and switch to a two-sided model as they become more established.
  - For example, Amazon first established itself as a fairly standard on-line book retailer before introducing its “marketplace” options where sellers set prices and interact with consumers.
- Two-sidedness is an endogenous choice in some markets, not a technologically determined outcome.
Two-sided markets: openness

- Whereas the first meaning of openness refers to whether to be multi-sided, the second meaning of openness refers to the decision over compatibility and inclusiveness toward rival platforms.

- If the first meaning of openness is similar to the choice over vertical integration, this second meaning is akin to choosing horizontal relationships. **Compatibility refers to the ability of a consumer using one platform to reach a seller using another**.

- Visa payment system is open in the sense that any bank can join, but it is closed to nonbanks—particularly American Express.

- For newspapers, compatibility may seem impossible; a consumer reading one newspaper cannot see the advertisements in another newspaper.

- However, newspapers can pursue horizontal integration through merger. When the New York Times purchased the Boston Globe, one justification was the ability to sell newspaper advertisements throughout the northeastern United States.
  - These joint sales represent a form of compatibility to the advertising buyer, who used to have to negotiate with two separate sellers.
Two-sided markets: openness

- Providers of platforms often prefer incompatibility on the grounds that it locks in current customers and locks out competitors.
  - For instance, there has been no movement toward cross-brand compatibility in the video game market.
- But agents can circumvent incompatible platforms by using multiple platforms.
- If one side of the market can be made exclusive, there is usually little reason to seek exclusivity on the other side.
  - if members of one side use only one platform at a time, the platform can charge monopoly prices to the other side for access
Two-sided markets: openness

- What determines when markets with platform competition evolve to a “winner-take-all” standard, or when they evolve toward coexisting platforms, or when markets fail altogether?
  1) if standards can differentiate from each other, they may be able to successfully coexist
    - Arguably, Apple and Microsoft operating systems have both survived by specializing in different markets: Microsoft in business and Apple in graphics and education.
    - Magazines are an obvious example of platforms that differentiate in many dimensions and hence coexist
  2) tipping is less likely if agents can easily use multiple standards
    - the fixed cost of producing a video game for one more standard have reduced over time relative to the overall fixed costs of producing a game, which has led to increased distribution of games across multiple game systems (for example, PlayStation, Nintendo, and Xbox) and a less-concentrated game system market.
Two-sided markets: openness

- What determines when markets with platform competition evolve to a “winner-take-all” standard, or when they evolve toward coexisting platforms, or when markets fail altogether?

  3) the ability of providers of complementary goods to differentiate themselves after picking a platform makes tipping more likely

  - movie producers provide a differentiated product and so are willing to coordinate on the same standard, which was an element in the successful coordination on the VHS standard in the video cassette-recorder market.

  - If the sellers cannot differentiate aside from adopting a standard, they must differentiate by choosing separate standards, which leads to the adoption of multiple standards.

    - The lack of opportunities for differentiation is a common explanation for the failure of many websites that were meant to facilitate business-to-business sales. Sellers see little benefit to listing their services on a website in which they are placed in practically perfect competition.
Two-sided markets: innovation

- Platform or intermediary firms can affect the level of innovative investment by participating firms.
  - The platform can shape the market structure in a way that encourages investment.
  - For example, a platform can control market structure through fees, barriers to access, or the direct exclusion of some firms and thus affect incentives for innovation.
- In the market for operating systems for mobile devices such as personal digital assistants and cellular telephones allowing a large number of software developers encouraged incremental innovation
  - but that large systemic innovation—such as that associated with a new version of the operating system—was better accomplished by operating systems with a relatively small set of software vendors.
  - This point appears relevant for the many innovations associated with the largely technologically closed iPhone.
Two-sided markets: advertising

- Advertising on one side raises participation and usage on that side, which raises demand on the other side, and so advertising on one side can lead to higher prices on the other.

- Advertising to one side that raises the mark-up on that side leads to lower prices on the other side, and vice versa.
  
  - For instance, suppose that advertising to consumers by Sony for the PlayStation 3 raises sales.
  - As a result, demand by game developers increases, which allows Sony to increase royalties it collects from developers.
  - However, suppose that the advertising also causes consumers to be less price sensitive and hence causes Sony to increase the price to consumers further.

  - As a result, the benefits of attracting a game developer are higher since the resulting consumers are more valuable, which causes Sony to lower the royalty rate, or at least moderate the increase that came from higher demand.

  - If advertising had attracted more price-sensitive consumers, the effect would have been to raise the royalty rate an additional amount.
We often distinguish between “persuasive” advertising that raises the utility of all consumers for a product and “informative” advertising that informs consumers about a product’s existence or features.

Persuasive advertising most often increases the mark-up a firm may charge by raising utility, whereas informative advertising can reduce the mark-up by attracting relatively low-demand consumers.

Thus, persuasive advertising on one side can lead to lower prices on the other side, whereas informative advertising on one side leads to higher prices on the other.

Similarly, the effects of quality investment will depend on whether it generates relatively price-elastic or -inelastic consumers on the margin, and on whether it attracts consumers that are more or less responsive to participation on the other side.
Two-sided markets: quality

- A platform firm must be concerned not only with its own quality and advertising, but also that of the vendors who operate over its network.
  - For instance, a franchisor operates a two-sided market in the sense that it attracts consumers to its brand and franchisees to operate outlets—similar to how an operating system attracts consumers and software vendors.
  - Franchising contracts typically specify numerous “investments” in advertising and quality, such as advertising by the franchisor and cleanliness, and possibly also local advertising, by the franchisee.