

An Introduction to Two-Sided Markets and Platforms

Two-sided markets: general features (1)

- In two-sided markets there are two sets of customers who need each other, and the transactions among them are made possible by a third subject who helps them to “get in touch”
- The third subject is usually called “platform” and the service it sells to both sides is to facilitate the completion of a transaction among them
- The number of the customers on both sides is important for the success of the platform: in such markets the product or service is consumed jointly by two customers, therefore each type of customer values the service more if the other type of customer also buys the service
- Businesses act as “matchmakers.” The more customers they have on the two sides, the more transaction will be concluded, and the more the profits they realize
- Two-sided markets are typical of the Internet economy

Two-sided markets: general features (2)

- There are many different kinds of two-sided markets, which fulfill several functions:
 - Market Makers—Matching Buyers and Sellers
 - Advertising-Supported Media
 - Computer Software – operating systems
 - Video Games
 - Payment Systems

Market makers – matching buyers and sellers

- Residential real estate sales in the United States is an example of a market maker that typically charges one side (the seller) while providing free (or low cost) services for the other (the buyer)
- Most residential property sales result from the services of a real estate agent or broker. Real estate agents place the property on a common database called a multiple listing service (MLS), where sellers are able to show their homes to a large audience of buyers, thus potentially increasing the number of offers that they would otherwise receive without the help of a broker
- Full- service agents typically list the property on a local MLS as part of the overall service package without explicitly charging for the listing. Real estate agents then charge the property seller a commission when the property is actually sold
- Potential buyers and sellers are not charged for access to the MLS. They also are not charged for house showings. Potential sellers pay a commission only if a sale is consummated. The prices to potential buyers and sellers do not bear any obvious relationship to any costs that are specific to serving each side.
- Three points are worth noting:
 - First, potential buyers and sellers of real estate benefit from having someone organize a “bazaar” for them
 - Second, potential buyers and sellers have no practical way to internalize externalities from this “bazaar”
 - the market intermediary internalize the externalities deciding the price structure which gives the highest probability to conclude the transactions

Advertising-Supported Media

- In media markets, the intermediaries match a group of buyers with a group of sellers, not individual buyers with individual sellers
- The sellers in this case are the advertisers looking for a platform to pitch their products to a receptive group of readers or viewers. The newspapers, television channels, and Web sites that form media platforms are “audience makers” rather than “market makers”
- Advertising-supported media providers are interested in attracting advertisers on one side and subscribers on the other to form an audience for the advertisers
- Most audience makers earn a disproportionate share of their revenues from one side of the market: normally the fees that media platforms collect from advertisers pay for the content that the media presents to the audience
- The audience/users pay only an implicit price: the cost of being exposed to commercials or the value of personal data used for targeting them
- The pricing structure does not have a direct relationship to the marginal cost of providing the media or its content to either side of the market: the economist’s usual “marginal revenue equals marginal cost” condition does not help to understand pricing structure

Computer software – operating systems

- Computer operating systems are two-sided markets comprising applications software developers and people who use the operating system—usually in conjunction with one or more software applications programs
 - A typical applications program consists of lines of interrelated code that carry out various tasks necessary for accomplishing whatever purpose the software was designed to do—word processing, game playing, or statistical analysis. Many of the tasks that different kinds of applications must accomplish are similar—drawing dialog boxes on the screen, saving documents, and providing “help” information to users. Therefore, it is possible for the computer industry to reduce the duplication of effort across software developers by having common tasks performed by the operating system rather than each program. This is accomplished by having code in the operating system that accomplishes these tasks, and interfaces that enable the software developers to use this code
 - Of course, the applications software developer can rely on the operating system code only if the user has this operating system running on her computer. The user is more likely to have this operating system if many applications are available that she wants to use that rely on this operating system
 - To be successful, then, the operating system vendor has to persuade many applications developers to rely on its operating system in writing software and many software users to install this operating system on their computers. All computer operating systems must appeal to users and developers
- There is nothing preventing operating system sellers from collecting revenues from both sides of the market. Users can be charged license fees for the software. Software developers can be charged for information, tools, and other services necessary for accessing the code they want to rely on in their programs. In fact, all operating system vendors have chosen to get most of their revenues from the user side of the market; vendors differ in the extent to which they invest in the applications side of the market

Video Games

- Video game business models resemble the operating system approach in that companies entering the market make significant efforts to attract independent game developers
 - In the process of promoting the Xbox console, for example, Microsoft announced two programs, the Independent Developer Program and the Incubator Program, to encourage smaller developers by providing free software tools and waiving normal pre-publishing requirements. Furthermore, Microsoft had extensive meetings with developers before the hardware specs for the console were set and incorporated many of their suggestions into the final design. Microsoft also made it easier for developers with PC experience to develop games for the Xbox by relying on DirectX (a collection of APIs that serves as the foundation for most PC games) in the design of the console
- During the story of the video game industry different pricing schemes were adopted by the different competitors (Atari, Nintendo, Sega, Sony). It is possible that slight differences in technology and demand lead to different pricing structures for internalizing externalities
- There is another possibility though. Coming up with the right pricing structure is a difficult problem that requires more information than setting the price of toothpaste. It may take time and experimentation for industries to converge on the optimal structure

Payment Systems (1)

- MasterCard and Visa are associations whose members consist of banks that provide payment services to individuals (“issuing”) or merchants (“acquiring”) or both
- In the case of individuals, the services include providing a card that can be used to make payment at merchants and that may provide some long-term credit—the issuing bank makes arrangements to pay the merchant and then bills the cardholder and may offer to finance the purchase.
- In the case of merchants, the services include providing technology for processing card transactions and paying the merchant. Frequently, the issuing and acquiring banks differ.
- The associations provide coordination: they operate networks and accounting systems that authorize and process transactions and provide the appropriate credits and debits to member accounts
- Getting both sides of the market on board requires that these associations provide members with the proper incentives to service both sides of the market and that there is a pricing structure that provides the proper incentives for individuals and merchants to use the cards

Payment Systems (2)

- A company that both issues cards and acquires merchants (American Express, for example), should devise a pricing structure consisting of a price to cardholders (primarily an annual card fee) and a price to merchants (merchant discount)
- In contrast, the issuing and acquiring members of an association can only determine their own prices (card fees and interest charges in the case of issuing members and merchant discount and related fees in the case of acquiring members). They cannot determine the relative price of card services to individuals versus merchants; that must be done centrally.
- The associations have done this through setting an “interchange fee.” This is a fee that the bank that acquires a card transaction from a merchant charges the bank that issued the card to the individual who made that transaction.
- Acquiring banks usually pass that fee on to the merchant as either an explicit or implicit part of the merchant discount.

Two-sided markets: a more formal definition

- A market is two-sided if at any point in time there are:
 - a. Two distinct groups of customers
 - b. The value obtained by one kind of customers increases with the number of the other kind of customers
 - c. An intermediary is necessary for internalizing the externalities created by one group for the other group
- Two-sided markets tend to result in business that supply both sides of the market, that adopt particular pricing and investment strategies to get both sides of the market on board, and that adopt particular pricing and product strategies to balance the interests of the two sides

What Makes Two-Sided Markets Different: Network Effects

- Two-sided markets must be distinguished from those with network effects and those involving complementary products. Network effects and complementarities are important aspects of two-sided markets but do not by themselves distinguish two-sided from one-sided markets
- In general, a market is said to have network effects (also known as network externalities or positive-feedback effects) when consumers value a product more, the more other consumers use that product
- We can have:
 - Direct network effects: A customer values (and therefore have a stronger demand for) the product because other customers have purchased it as well (they can, for example, communicate with each other using this technology)
 - Indirect network effects: A customer values (and therefore have a stronger demand for) the product because other customers' purchase means that the demand for complementary products is higher, and the supply of those complementary products will benefit her
- Two-sided markets have *indirect* network effects. In this case, each side values having the other side on board and benefits the more, the more customers there are on the other side

What Makes Two-Sided Markets Different: Multiproduct Firms

Usually the firms in two-sided markets sell multiple products. One (or more), for each side of the market. What are the advantages?

A. Cost side

- Economies of scope (same technological system – more products)

B. Demand side

- There are advantages to pricing complementary products together (with complementary products a problem very similar to that of the externalities of production arises. A joint pricing increases profits, and benefits customers, because both prices tend to be lower than when they are priced separately)
- Selling multiple products in two sided markets helps the seller to increase indirect network effects. Many firms have to produce multiple products to sell any product at all

Profit Maximizing Pricing in Two-Sided Markets: Differences Between one-sided and two-sided markets

Rochet and Tirole provide a simple model to explain pricing rules in two-sided markets, and to compare with pricing rules in single-sided markets:

For a one-side market:

- Firm S is in a single-sided market and sells q_s . S has a constant cost of production c_s
- Profits of firm S are $\pi_s = (p_s - c_s)q_s$
- Lerner formula for Firm S is $\frac{p_s - c_s}{p_s} = \frac{1}{\varepsilon}$

Profit Maximizing Pricing in Two-Sided Markets: Differences Between one-sided and two-sided markets (continued...)

Let consider a match-maker two-sided market:

- Firm T is the platform, and sells q_T^1 and q_T^2 . T incurs a marginal cost of c_T for each transaction
- The prices charged to buyers and sellers are p_T^B and p_T^S
- The buyer's demand $D_T^B(p_T^B)$ depends only on the price faced by the buyer
- The seller's demand $D_T^S(p_T^S)$ depends only on the price faced by the seller
- The demands can be thought of, roughly speaking, as the number of buyers and sellers using the system
- Total demand equals the product of the two demands $q_T = D_T^B(p_T^B) D_T^S(p_T^S)$ (this assumption underestimates the importance of the indirect network effects. It ignores the fact that the value that each side obtains from the other side increases with the number of customers on the other side)
- The two-sided monopoly's profits are $\pi_T = (p_T^B + p_T^S - c_T)q_T$

Profit Maximizing Pricing in Two-Sided Markets: Differences Between one-sided and two-sided markets (continued...)

A key difference between the one-sided and two-sided firms is that the two-sided monopolist must choose a pricing level (what total price to charge to buyers and sellers), and a pricing structure (how to divide the total price between buyers and sellers)

The pricing level condition is: $\frac{(p_T^B + p_T^S) - c_T}{(p_T^B + p_T^S)} = \frac{1}{\varepsilon^B + \varepsilon^S}$

The optimal pricing structure depends on the following condition $(D_T^B)' D_T^S = D_T^B (D_T^S)'$.

According to the pricing structure condition, in equilibrium the effect on profits must be the same from increasing the seller side price versus the buyer side price.

That implies that $\frac{p_T^B}{\varepsilon^B} = \frac{p_T^S}{\varepsilon^S}$

Profit Maximizing Pricing in Two-Sided Markets: Differences Between one-sided and two-sided markets (continued...)

None of the conditions for determining the price level or the price structure in two-sided markets corresponds to marginal revenue equalling marginal cost on either side of the market.

Such conditions have no meaning in two sided markets because there is no way to allocate the increases in revenues from changes in prices to one side or the other. Changes in prices result in more “transactions” from which each side jointly benefits.

Nor is there any way to allocate costs. Often costs are jointly referable to both parties to a transaction, and we have the usual issue that any allocation of cost is arbitrary

The Case of Competing Two-Sided Firms

The results are broadly similar when there are competing firms selling both sides of the market. This can happen when customers tend to engage in multihoming

Multihoming can be considered under the further assumption – often true in practice – that one side of the market can dictate which two sided firm must be used in any particular transaction (es. payment cardholders usually decide which card to use; computer users usually decide which operating system to use)

The main difference in this case is that the relevant demand elasticities are increased by a factor that reflects the extent to which consumers multihome, and therefore have substitutes readily available

Business Models in Two-Sided Markets

Several issues occur repeatedly in two-sided markets:

1. *Getting both sides on board*. Investing and pricing strategies are key to getting both sides on board
2. *Balancing interests*. Even with both sides on board, businesses have to carefully balance their two demands. They always have to consider how changing prices on one side of the market will impact the other side of the market
3. *Multihoming*. Firms sometimes compete to become the dominant two-sided provider. A monopoly provider can emerge:
 - if consumers are sufficiently homogeneous (so that one firm can provide for them all)
 - the indirect network effects are strong enough
 - there are sufficiently large scale economies in production

At the start of an industry, however, and sometimes during its maturity, several two-sided firms could co-exist and compete with each other

Business Models in Two-Sided Markets: Getting Both Sides on Board

An important characteristic of two-sided markets is that the demand on each side vanishes if there is no demand on the other, regardless of what the price is. How to solve the “chicken and egg” problem?

A critical mass of users on one side of the market can be obtained:

1. by giving them the service for free, or even paying them to take it (especially at the entry phase)
2. Investing in one side of the market to lower the cost to consumers on that side of participating in the market

The participation of the benefited group, due to indirect network effects, encourages the participation of the non benefited group: “divide and conquer”

Another effect is that this assistance can discourage use of competing two-sided firms

Business Models in Two-Sided Markets: Pricing Strategies and Balancing Interests

Discerning the optimal pricing structure is one of the challenges of competing in a two-sided market.

- In most observed two-sided markets, companies seem to settle on pricing structures that are heavily skewed towards one side of the market
- Sometimes all the platforms converge on the same pricing strategy (es. operating systems)
- The competition among different platforms can be based on the adoption of different pricing structures (credit vs. debit cards)
- There may be certain customers on one side of the market (marquee buyers”) that are extremely valuable to customers on the other side of the market. The existence of marquee buyers tends to reduce the price to all buyers and increase it to sellers.

TABLE 1: SOURCES OF PLATFORM REVENUE IN SELECTED TWO-SIDED PLATFORMS

INDUSTRY	TWO-SIDED PLATFORM	SIDE ONE	SIDE TWO	SIDE THAT GETS CHARGED LITTLE	SOURCES OF REVENUE
Real Estate	Residential Property Brokerage	Buyer	Seller	Side One	Real estate brokers derive income principally from sales commissions. ¹
Real Estate	Apartment Brokerage	Renter	Owner/Landlord	Typically Side One	Apartment consultants and locator services generally receive all of their revenue from the apartment lessors once they have successfully found tenants for the landlord. ²
Media	Newspapers and Magazines	Reader	Advertiser	Side One	Approximately 80 percent of newspaper revenue comes from advertisers. ³
Media	Network Television	Viewer	Advertiser	Side One	For example, FOX earns half of its revenues from advertisers. ⁴
Media	Portals and Web Pages	Web “Surfer”	Advertiser	Side One	The average portal gets slightly over half of its revenues from advertisements. All other web pages generally receive about a tenth of their revenue from advertisements. ⁵
Software	Operating System	Application User	Application Developer	Side Two	For example, Microsoft earns at least 67 percent of its revenues from licensing packaged software to end-users. ⁶
Software	Video Game Console	Game Player	Game Developer	Neither – Both sides are significant sources of platform revenue.	Both game sales to end-users and licensing to third party developers are significant sources of revenue for console manufacturers. ⁷
Payment Card System	Credit Card	Cardholder	Merchant	Side One	For example, in 2001, American Express earned 82 percent of its revenues from merchants. ⁸

Business Models in Two-Sided Markets: Multihoming

Most two-sided markets we observe in the real world appear to have several competing two-sided firms and at least one side appears to multihome

Multihoming affects both the price level and the pricing structure

- The price level tends to be lower with multihoming because the availability of substitutes tends to put pressure on the two-sided firms to lower their prices (the seller has more options when dealing with a multihomed buyer on the other side and can steer towards its preferred platform. As buyer multihoming becomes prevalent, prices to sellers will tend to decrease since they have more substitution options)
- Even when multihoming is not prevalent on one side of a two-sided market, the possibility of multihoming may have significant consequences for pricing. It may encourage firms to lower their prices on the side of the market in which multihoming could occur. By lowering their prices, firms discourage customers on that side from affiliating with other two sided firms. The firm can then charge more to customers on the other side, for whom fewer substitutes are available

TABLE 2: THE PRESENCE OF MULTIHOMING IN SELECTED TWO-SIDED PLATFORMS

TWO-SIDED PLATFORM	SIDE ONE	PRESENCE OF MULTIHOMING FOR SIDE ONE	SIDE TWO	PRESENCE OF MULTIHOMING FOR SIDE TWO
Residential Property Brokerage	Buyer	<i>Uncommon:</i> Multihoming may be unnecessary, since an MLS allows buyers to see property listed by all member agencies. ¹	Seller	<i>Uncommon:</i> Multihoming may be unnecessary, since an MLS allows the listed property to be seen by all member agencies' customers. ¹
Securities Brokerage	Buyer	<i>Common:</i> The average securities brokerage client has accounts at three firms. ² Note that clients can be either buyers or sellers or both.	Seller	<i>Common:</i> The average securities brokerage client has accounts at three firms. ² As mentioned, clients can be either or both buyers or sellers.
B2B	Buyer	<i>Varies:</i> For example, multihoming may be unnecessary for some online B2B sites, since buyers can go directly to the B2B platform instead of contacting multiple individual suppliers. ³	Seller	<i>Varies:</i> Multihoming may be unnecessary since the B2B can inexpensively reach a large audience. ⁴
P2P	Buyer	<i>Varies:</i> Multihoming may be unnecessary for buyers using online auction sites since eBay holds 85% of the market share (i.e. it seems that most people purchase their online auction products at eBay). Alternatively, multihoming may be more common for online dating services where there are many sites and a large audience of online singles at each site (considered to be available singles, as opposed to buyers). ⁵	Seller	<i>Varies –</i> Multihoming may be unnecessary for sellers using online auction sites since eBay holds 85% of the market share (i.e. it seems that most people auction their products at eBay). Alternatively, multihoming may be more common for online dating services where there are many sites and a large audience of online singles at each site (considered to be available singles, as opposed to sellers). ⁵
Newspapers and Magazines	Reader	<i>Common:</i> In 1996, the average number of magazines issues read per person per month was 12.3. ⁶	Advertiser	<i>Common:</i> For example, Sprint advertised in the New York Times, Wall Street Journal, and Chicago Tribune, among many other newspapers, on Aug. 20, 2002. ⁷
Network Television	Viewer	<i>Common:</i> For example, Boston, Chicago, Los Angeles, and Houston, among other major metropolitan areas, have access to at least four main network television channels: ABC, CBS, FOX, and NBC. ⁸	Advertiser	<i>Common:</i> For example, Sprint places television advertisements on ABC, CBS, FOX, and NBC. ⁹
Operating System	Application User	<i>Uncommon:</i> It is unlikely that an individual will switch to a new operating system. ¹⁰	Application Developer	<i>Common:</i> As noted earlier, the proportions of developers that develop for various operating systems total to 205 percent, indicating significant multihoming by developers. ¹¹
Video Game Console	Game Player	<i>Varies:</i> The average household (that owns at least one console) owns 1.4 consoles. ¹²	Game Developer	<i>Common:</i> For example, Electronic Arts, a game developer, develops for Nintendo's GameCube, Microsoft's Xbox, and Sony's Playstation 2, among other consoles. ¹³

(...continued)

Payment Card	Cardholder	<i>Common:</i> Most American Express cardholders also carry at least one Visa or MasterCard. ¹⁴	Merchant	<i>Common:</i> American Express cardholders can use Visa and MasterCard at almost all places that take American Express. ¹⁴
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Two-Sided Markets and Social Welfare: concentration

A relatively small number of firms tend to compete in two-sided markets. Because of the presence of network effects:

- The firms have to incur substantial fixed costs for getting one or both sides on board.
- Larger firms have advantages over smaller firms. Their larger size delivers more value, that is a bigger network of customers on one side of the market to customers on the other side of the market
- The existence of heterogeneous customers on one side of the market or the other, tends to limit the importance of network effects so that is possible for multiple firms to compete in two-sided markets

Two-Sided Markets and Social Welfare: Market Power

Firms in concentrated two-sided markets may have opportunities to earn supra-competitive profits (profits that exceed those necessary to attract capital to the industry after accounting for risk) because of several factors:

1. *The extent to which firms are competing to become established in a two-sided market.* Firms tend to compete to establish customer bases on both sides of the market. This results in investments to court customers, to provide them with subsidies in the form of equipment, and to offer them low or negative prices. If the competition is sufficiently intense, the losses incurred during the “getting both sides on board” stage may significantly offset the profits earned during the mature phase of the industry
2. *The extent to which there are first-mover advantages in getting either side of the market on board.* Supra-competitive profits could arise if one firm has an advantage that other firms cannot replicate. The network economics literature argues that the first mover in an industry always has an advantage. Since customer value other customers, whoever gets customer first naturally wins. It could also be that a firm has some assets that gives it a hard start. For example, a firm may have developed a product that gives it a large customer base on one side of the market. When the demand for a two-sided version of this (or a related) product appears, it will have a significant head start over rivals.

Two-Sided Markets and Social Welfare: Market Power (continued)

3. *Even markets that appear to be dominated by a single player may in reality be contestable.* Model suggest that it may be easier than expected for a superior technology to enter, provided that the quality improvement is large enough. Because many of the two sided markets are fast moving, current leaders often face considerable competition in the form of potential entrants
4. *Two-sided markets in which non-profit associations determine the pricing structure are not likely to permit the participants to earn supra-competitive profits.* In many cases non-profit institutions are in charge of managing a physical network for members

The consequences of having relatively few competitors in two-sided markets, and the existence of network effects, raise familiar issues concerning the efficacy of competitive markets and the possible roles for government intervention

However, economics showed that even if price level ensures supra-competitive profits, the price structure adopted by monopolistic or oligopolistic two-sided firms is, normally, not biased toward one side of the market or the other side compared to pricing structure that would be adopted by a benevolent social planner