What Is a *free* Customer Worth?

Armchair calculations of nonpaying customers' value can lead to flawed strategies.

by Sunil Gupta and Carl F. Mela

CUSTOMERS WHO PAY little or nothing and are subsidized by another set of customers are essential to a vast array of businesses, including shopping malls, real estate brokerages, information technology providers, auction houses, print and online media, and employment and dating services. According to one estimate, this business model accounts for a majority of the revenues of 60 of the world's 100 largest companies.[1] With the explosion in the number of free services offered on the internet, the prevalence of so-called two-sided markets is likely to grow.

Pep Montserrat


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The rationale for this approach, of course, is that by charging one set of customers little or nothing, the business will attract the critical mass of them required to draw in large numbers of another set of customers, and the income generated by the latter will handsomely exceed the cost of acquiring and serving the former. The high-stakes challenge is figuring out the true value of each "free" customer. Although executives know that free customers matter, they tend to underestimate their significance for two reasons: First, managers naturally focus more on customers who generate the bulk of revenues, and second, they lack a rigorous method for calculating the lifetime value of free customers. In this article we will offer a high-level description of a model we've developed for obtaining this information and explain how to use it.

Knowing the lifetime value of free customers is crucial to determining the following:

The optimal way to grow – how much should a company spend at various points in time to acquire and retain free or heavily subsidized customers?

The real value of the enterprise – how much should investors or acquirers pay for all or part of a business with such customers?

The best organizational design – how should the business and its incentive systems be structured to encourage the units responsible for the free and the paying customers to work together?

If you answer these questions wrong, your company may go out of business. But traditional customer-valuation models are of no help. For one thing, they focus exclusively on paying customers (estimating the net present value of their purchases minus the cost of marketing to them) and ignore the nonpaying ones. Additionally, although some approaches factor in *direct* network effects, where a buyer attracts more buyers or a seller attracts more sellers (see "How Valuable Is Word of Mouth?" HBR October 2007), we have yet to come across any that take into account *indirect* network effects, or how a greater number of buyers or users of a service or product attracts more sellers and vice versa. Our valuation model considers both kinds of network effects. It draws from our extensive experience helping firms develop predictive models of demand and was tested and refined during work for a major auction house.

IDEA IN BRIEF

» Free customers who are subsidized by paying customers are essential to many businesses – such as media companies, employment and dating services, and even IT providers. But what are free customers worth, and how much should firms invest in them?

» Companies need to take into account **direct network effects,** or how buyers attract more buyers or sellers attract more sellers, and **indirect network effects** – how buyers attract more sellers and vice versa. When these effects are strong, the lifetime value of each customer increases dramatically.

» Gupta and Mela have devised a customer-valuation model that incorporates these network effects and pinpoints the true value of free customers – which helps executives make better decisions about how to grow the business.

Deciphering Network Effects

Our model considers the precise role that each customer segment plays in growing the business and creating value. It takes into account how the number of free customers influences the number of paying customers and vice versa, and how both are affected by the firm's marketing efforts. This allows us to deduce the impact that the addition of each customer (whether paying or not) has on the profits of the firm over the long term. Essentially, the lifetime value of a free customer is his or her incremental effect on the net present value of cash flows from the population of fee customers. It depends on the degree to which a free customer attracts other fee and free customers and the ripple effects those customers have on still other customers. When these network effects are large, payments flow to the firm, and the lifetime value of the customer increases.

Direct network effects (how a buyer attracts more buyers or a seller more sellers) can be positive or negative. For example, they are positive for video game services such as Xbox Live: The more users who are online playing Xbox Live, the more additional users are likely to join. In contrast, direct network effects may be negative in employment sites or malls. Employers may not want too much competition from other firms for good job candidates, or stores in a mall may not want a lot of direct competition for traffic. When direct network effects are strong and negative, a firm faces the challenge of building a critical mass of players on the side in question. Many of the online exchanges launched during the dot-com boom failed because firms did not want to participate in an exchange with their competitors.

Indirect network effects, between buyers and sellers, can be positive or negative as well. They're positive in the video game industry, where a larger number of people who own a particular console will attract more developers to create new games for that console, increasing the variety of games available and attracting more users. Similarly, auction houses and real estate agencies see positive effects if more buyers attract more sellers and vice versa. The same is generally true for employment and dating services. When indirect network effects are strong and positive, the firm benefits tremendously from the snowball effect and may eventually become the sole industry standard. Recently, Sony experienced this when its Blu-ray format for high-definition DVDs achieved a critical mass of adherents

among consumers, retailers, and studios, which caused Toshiba to exit the market. In such situations, free customers in the early stages of the business are crucial, and the firm should be willing to invest a lot of resources to get them on board.

In the media industry both positive and negative indirect effects are operating. Advertisers are attracted to large numbers of viewers or readers (a positive effect) but increasing the amount of advertising relative to programming or editorial content may drive away viewers or readers (a negative effect). The television industry manages this by either limiting the amount of advertising airtime for each hour of programming or, in the case of premium channels such as HBO, eliminating it and charging higher subscription fees. In television the amount of time is fixed, of course, but newspapers have the option to add pages to accommodate more advertising. However, if the effect of ads on readers is strong and negative, there is a limit to the number the paper can carry.

Clearly, these media players can raise their prices in response to increasing demand from advertisers. The challenge is to find the right balance between price and number of ads. That balance cannot be achieved without a clear understanding of the nature and magnitude of the network effects between the two sets of customers.

IDEA IN **PRACTICE**

BY UNDERSTANDING THE NETWORK EFFECTS at play in their businesses, companies serving "free" and "fee" customers can figure out the real lifetime value of both and use that knowledge to maximize growth and profits.

EXAMPLE Auctions.com, a disguised online auction house, had steadily increased the resources it was devoting to sellers – its paying customers. Although the company was growing rapidly, several competitors were trying to challenge it. Its managers worried that they might not be spending enough to woo new buyers (its free customers) and maintain market leadership. The managers recognized the value of buyers but had no way to quantify it.

Auctions.com built a model that calculated the total long-term impact that each additional buyer had on the firm's profits. It took into account the degree to which each new buyer attracted other buyers and new sellers, and the ripple effects those customers in turn had. The auction house then used the model in the following ways:

» **To determine how much to spend on marketing to buyers.** The model revealed that additional buyers had a powerful effect on the firm's ability to attract paying sellers, especially during its early years. This made buyers worth much more than Auctions.com had anticipated. Partly as a result of this study, it increased its advertising to buyers.

» **To test different pricing strategies.** The firm discovered that a penetration strategy of charging sellers a low fee early on would be most effective because it would attract many more sellers, who, in turn, would attract many more buyers. The firm also found that sellers became less price sensitive over time and that it could raise prices in its later stages of growth.

» **To cater more to buyers.** Auctions.com focused more people and resources on understanding the buyers' behavior and improving their experience. That effort led to the creation of an improved search engine for shoppers and service policies like delisting sellers with poor buyer ratings.

» **To make a case to Wall Street.** The company used the network model to forecast the growth of its buyers and sellers and estimate their combined value. That number was in line with the company's market value and so could help address any concerns among investors that its high-flying stock price was unwarranted.

Building a Model for Auctions.com

Our work for a major international online auction house in 2006 illustrates how to apply our model. Given the proprietary nature of the project, we can't identify the firm, which we'll call Auctions.com, and we have disguised its data and sales history here. This auction house had been in operation for five years and had slowly but steadily increased the attention and resources it was devoting to sellers – after all, they were the paying customers. Although the auction house was a leading player in the market and growing rapidly, several competitors were challenging its position. As a result, its managers worried that they might not be spending enough to woo new buyers and maintain market leadership. Although the managers recognized the value of buyers, they had no way to quantify it.

The buyers paid nothing to the auction house for bidding or for winning an auction. Sellers paid both a per-item fee and a commission, which are combined for purposes of this example into a single "take rate," or blended price. However, the prices were based on a model intended to maximize short-term revenue; it did not rigorously consider network effects and their long-term impact on the firm's profitability. It employed faulty rules of thumb like those described in the sidebar "Inadequate Remedies." Auctions.com's managers wanted to take a more sophisticated approach to figuring out how much to spend on marketing to buyers and what prices to charge sellers. We helped the firm resolve those issues by taking it through the steps outlined next.

In some situations, acquiring free customers in the early stages of a business is crucial.

1. Auctions.com collected historical data on the numbers of its sellers and buyers, the growth rates of those groups, the prices it charged sellers, and the marketing expenses it incurred to attract sellers and buyers.

2. Using those data, Auctions.com examined how the growth in the number of both sellers and buyers was affected by (a) the firm's marketing strategies – advertising, pricing, and so on; (b) direct network effects; and (c) indirect network effects. We devised two related equations that captured those relationships: one for the growth in the number of buyers and the other for the growth in the number of sellers. The two equations formed the core of our *network model,* which was used to determine the magnitude of the network and marketing effects. (For details on the specific equations in the model, see "The Value of a 'Free' Customer," by Sunil Gupta, Carl F. Mela, and Jose M. Vidal-Sanz, Harvard Business School working paper, 2008, http://www.hbs.edu/research/pdf/07-035.pdf.)

Auctions.com used the model to project the growth in sellers and buyers and obtained the results depicted in the chart "The Growth Patterns of Buyers and Sellers." (Again, the actual figures are disguised.) The results suggested that the growth of both groups would be extremely rapid until the company's 11th year but then would slow down, and that the firm would most likely reach a saturation point of about 10 million buyers and 2 million sellers in about 150 months, or 12 to 13 years.

The model revealed that the direct network effects among both sets of customers were positive, but they were stronger among buyers than among sellers. The indirect network effects were also positive: More buyers made the site more attractive to potential sellers and vice versa. Finally, the effect of buyers on sellers was greater than the other way around – in other words, a larger pool of buyers was a more powerful magnet for potential sellers than the reverse. This sizable indirect effect of buyers made them especially valuable to the firm, a point we consider next.

3. Auctions.com then assessed the monetary value of acquiring a new free customer at different points in time. Each

additional buyer, the model showed, would have the ripple effect of bringing in more buyers and sellers. By multiplying the resulting growth in sellers by the fees they would pay, netting out marketing expense, and discounting the remainder to present value, Auctions.com could assess the corresponding increase in firm profits added by each buyer.

The chart "How the Value of a Newly Acquired Buyer Changes Over Time" shows that a bidder acquired early in the life of the company, when he or she was critical to starting the virtuous cycle of buyers attracting sellers and vice versa, was worth about $2,500. However, this value decreased over time. For example, a bidder acquired in month 50 was worth about $1,360, and one acquired later, in month 100, was worth just a couple hundred dollars. These estimates made the firm's managers realize that buyers were worth much more than they'd anticipated, and helped them decide how much to spend to acquire buyers at different stages of the firm's life.

4. Auctions.com was unclear about what would be the best pricing strategy. Was it a *skimming strategy* of charging a high fee to sellers during its early-growth stage to maximize short-term revenues, and then lowering its fee in later periods to ward off competing products and counter slowing demand? Was it a *penetration strategy* of charging a low fee to its early paying customers to attract more of them, and then raising its rates over time? Or was it a *constant strategy,* charging the same fee to all sellers, regardless of when they came on board? To address this question, Auctions.com used our network model to simulate the effect of the different price strategies on profits. (In our work we actually calculated all the possible pricing paths, applying a tool called dynamic optimization, which uses powerful algorithms.) To make the scenarios comparable, Auctions.com made sure that the average price over the 100 months of analysis was exactly the same. The chart "The Effect of Pricing Strategies on Profits" shows the simulation results for the total profits in the three scenarios.

This graph clearly indicates that the penetration pricing strategy increases profits the most. This is because a low price in the initial period attracts many more sellers, who in turn attract more buyers. At least partly because sellers had become less price sensitive over time, the firm raised its prices.

The analysis of the results also helped Auctions.com with three other critical tasks:

■ **Strengthening its marketing operations.** Historically, Auctions.com had organized its marketing activities by the product category of the goods listed for sale. Armed with new insights about buyer value, the company hired more people to focus on the bidder's experience and attract and retain more buyers. In addition, the firm's market research team allocated more resources to understanding buyer behavior and analyzed customer interactions over several years instead of one (for example, which buyers tended to buy from which sellers and for how long).

Inadequate Remedies

Companies employ a variety of crude approaches to place a value on free or heavily subsidized customers. Because these techniques do not rigorously quantify the impact of network effects, their valuations are wild guesses.

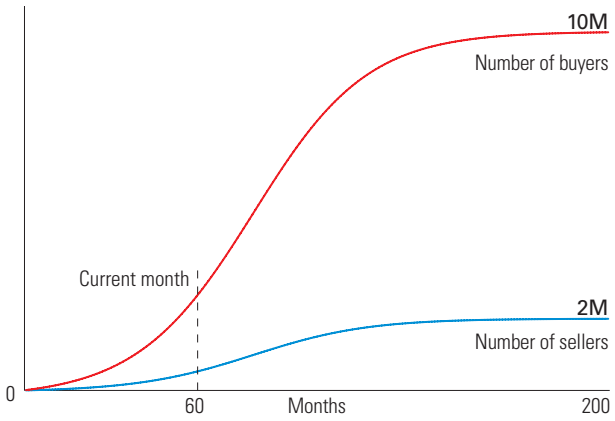
One simple approach apportions the prior period's profits equally among free and paying customers. This method ignores the relative size of the two groups as well as the degree of influence each has on the other. Imagine a real estate brokerage that sells high-end properties and has many buyers but few properties, which limits its ability to attract more buyers. In this context, a new listing might be worth more than a new buyer. If the firm had many listings and few customers, however, an additional customer might be worth more than an additional listing.

Another approach assigns profits according to the proportion of buyers to sellers. For example, if there are five buyers for every seller, then each seller is assumed to be five times as valuable as a buyer. This method can grossly miscalculate the value of buyers and sellers because it ignores network effects and the changing value of buyers and sellers over time.

The best of the common approaches is one employed by publications whose subsidized customers (subscribers) pay something. In valuing a subscriber, these companies typically take into account both subscription fees and advertising revenue per reader. For example, a newspaper with an advertising rate of $41 per thousand readers may infer that the value of a reader is 4.1 cents per ad plus the subscription fee. While this is a reasonable approach, it, too, ignores the rippling impact that readers' referrals can have on circulation and ad revenues.

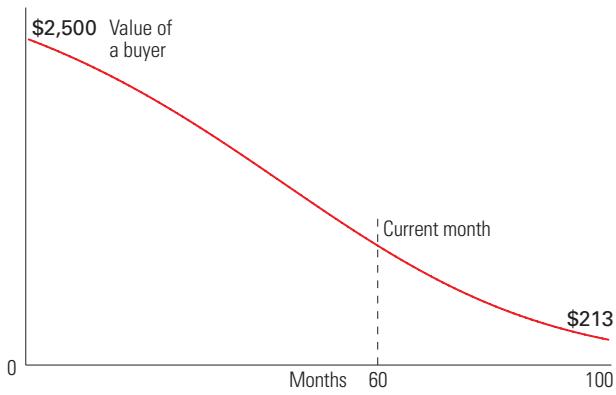
In markets where network effects are not strong, such simple approaches may suffice. Yet even mature businesses like newspapers can find themselves subject to much stronger network effects as their markets evolve. Executives of some papers are grappling with the issue of whether to charge subscription fees to their online readers. In September 2007, the *New York Times* dropped its program that required users to pay to access its columns and archives. In October 2007, the *Financial Times* followed suit by allowing users free access to 30 articles a month. After acquiring the *Wall Street Journal* in December 2007, Rupert Murdoch suggested that he might eliminate the then $99 annual fee for subscribing to the paper's online edition in the hope of increasing the number of daily readers from 1 million to 10 million or more. In all these cases, the idea is that increased ad revenue will more than make up for the loss in subscription fees.

The Network Model Gave Auctions.com Three Vital Pieces of Information



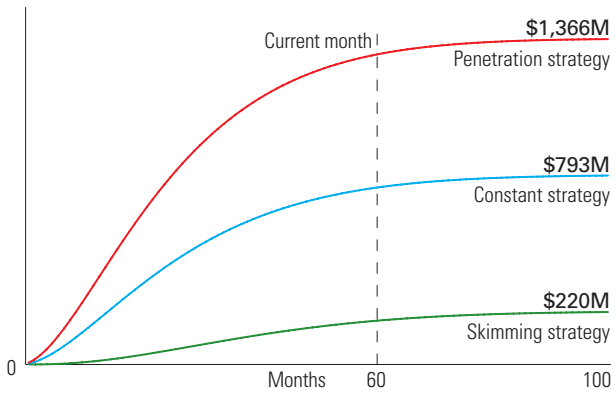
The Growth Patterns of Buyers and Sellers

Auctions.com collected historical data on the growth of its buyers (its free customers) and sellers (its paying customers) and built a model projecting each group's future growth. It saw that the growth of both would be rapid at first but would slow down, approaching saturation at about 150 months.



How the Value of a Newly Acquired Buyer Changes Over Time

The network model showed that buyers acquired early in the life of the company were extremely valuable because of their ripple effect of bringing in more buyers and sellers. As the business matured, however, the network effect of each new buyer – and the amount of incremental profit that buyer contributed – would decrease.



The Effect of Pricing Strategies on Profits

The model also helped Auctions.com set a pricing strategy for sellers. It projected the effects of a skimming strategy (initially charging high fees to increase profit and then lowering them to ward off competition), a penetration strategy (initially charging low fees to attract many customers and then raising prices), and a constant strategy (charging the same fees throughout). A penetration strategy, the company saw, clearly increased profits the most.

■ **Catering more to buyers.** The deeper knowledge of buyer behavior, in turn, led the company to make a number of changes. It increased its expenditures on advertising aimed at buyers. Auctions.com also created a new search engine that made it easier for shoppers to find the products they desired on the site. And it adopted new service policies that improved the buying experience, including tougher rules on delisting sellers with low ratings from buyers.

■ **Making its case to investors.** Our research had shown that the estimated lifetime value of the forecasted number of buyers and sellers is, in most instances, closely aligned with a company's market value. That was true for the auction house, which gave its managers ammunition to address any of Wall Street's concerns that its high-flying stock price was unwarranted.

Since many of these changes were implemented only recently, it's still too early to pronounce them a success, but the early results are promising.

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Understanding customer value in networked settings is a new and exciting frontier. We have taken a first crack at the problem, but more work remains to be done. For example, our model requires at least four to five years of historical sales data to assess the value of a free customer. So it would not help start-up ventures or firms in the very early phase of their growth. In addition, our model can be used only in companies that have two sets of customers. Many platform businesses – including social networks such as Facebook, computer operating systems such as Windows, and media companies such as television networks (which deal with content providers, advertisers, and viewers) – have three or more sets of players. Quantifying the value of those relationships would require more sophisticated models.

While our model is not a panacea, it is an important step in understanding the value of free customers. If properly understood, the free customer can be a powerful weapon.

1. Thomas Eisenmann, "Managing Networked Businesses," Harvard Business School Note (Harvard University, 2007).

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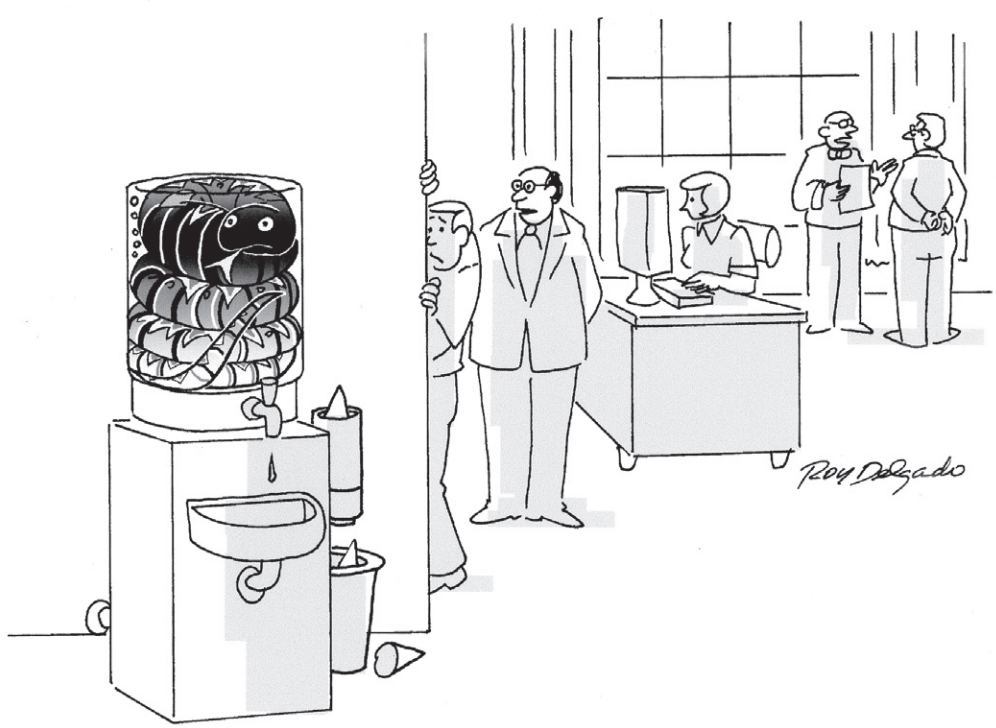

"You laugh, but you don't see people hanging around, do you?"

Roy Delgado