

# Did Google Make the Right Choice?

## 1. Introduction

On August 19, 2004 Google shocked the investing world by performing an IPO using an auction foregoing the traditional book building method. Typically companies go public when they need capital to expand their businesses, but Google produced plenty of free cash flow, instead they were going public to allow some of the insiders and early investors to realize gains on their investments. This motivation and their desire to allow everyone to participate in the IPO led them to choose a sealed-bid multi-unit auction. They offered 19,605,052 shares, or about 7% of the company, and the price was set at \$85 per share, giving Google an initial valuation of \$23.1 billion.

The way a company goes about performing an initial public offering (IPO) can have huge effects on the proceeds they receive. In America IPOs are typically performed using a book building method, where an investment bank is hired to assign a price to the shares, and allocate them among large investors. Auctions are a much more popular method of going public internationally, and there recently has been an influx of auction IPOs in America. W.R. Hambrecht is a San Francisco based investment bank which specializes in auction IPOs and has performed many of them recently, most notably Google and Morningstar, a

stock research company. This paper will compare the traditional book building IPO method with the auction method, to determine which would have maximized Google's proceeds from going public. This will be done by first analyzing the theory behind each, then using a model to determine the hypothetical proceeds derived by each method.

## **2. Book Building**

Book building, a process where firms choose investment banks to underwrite their IPO is the most prevalent issuing method for companies going public in America. Often banks will not want to carry the risk of an entire new issue alone, so they form an underwriting syndicate which one bank is chosen to lead. The firm then negotiates the deal with the underwriters, including the amount of money to be raised, the percent of equity to be sold, and the fees paid to the underwriters. There are two main types of contracts, the "firm commitment" and the "best effort" approach. In the firm commitment approach, the underwriters guarantee the amount to be raised by buying the entire issue from the company and then reselling it to the public. The best effort approach, on the other hand, does not offer a guarantee, but rather, the underwriters facilitate the sale of the securities from the issuing company to the public.

Once they have a contract, the underwriters file a registration statement with the Securities and Exchange Commission (SEC) containing information about both the offering and the issuing company. These statements include financial data, as well as information about management, legal issues and the

planned use of the proceeds. The underwriters then create a prospectus containing all the material information about the issuer except the offer price.

Using this prospectus, the underwriters present the information to large institutional investors to gauge interest in the offering. The investors then give non-binding indications of interest to the underwriter, who uses these to formulate a price at which to offer the issue. The underwriter and the company set a price, and then the underwriter has discretion in allotting the shares. Often shares in a highly anticipated IPO are allotted to the underwriter's larger clients, and individual investors are unable to get an IPO allocation. In exchange for their services, the company typically pays 7% of the capital they raise to the underwriters (Chen and Ritter 2000).

There are significant informational asymmetries involved in the underwriting process. On one side, the issuing company has much better information about their business than investors do. However investors may know more about the competitive landscape a firm is entering, or might be able to judge quality of management more efficiently. These asymmetries make the underwriters necessary, since they can objectively portray the information about the company to investors, and ascertain their level of interest in the offering so as to set an efficient price.

The key to this process is the ability of the underwriters to selectively and strategically allocate shares. If not for this, the investors would have incentive to withhold their information so they can obtain shares at a discount to their true value in the open marketplace and sell them for profit (Benveniste Spindt 1989).

With the ability to allocate shares, underwriters remove the incentive for investors to withhold information, because if they downplay their interest they will not receive the shares they wanted. They only allocate shares to the people who say that they value them highest, making it advantageous to state the company's true value, since stating a lower value will decrease the chances of receiving the shares desired.

This process reduces underpricing by giving the underwriters access to the information held by the investors. However, underpricing can never be entirely eliminated through book building because investors would have no incentive to share their information unless they were rewarded in turn with positive profits. If underpricing did not exist, then investors would simply purchase the shares when the company went public as opposed to buying them in the pre-market. Thus, the value of the information is directly related to the required level of underpricing, making riskier issues have a higher level of underpricing (Benveniste Spindt 1989).

Ann Sherman argues that underpricing can be reduced in a repeated setting by granting allocations to the same investors each time. Underwriters can reduce underpricing by using the same investors in a repeated setting by forcing the investors to take shares in a less desirable IPO by threatening to cut them out of a more profitable one, reducing aggregate underpricing (Sherman 2000). This decreases the risk of undersubscription for the companies going public.

This model works along the assumption that underwriters accurately portray the information they received from both sides; however, in reality, this

does not always happen. There have been many allegations of improprieties committed by investment banks relating to IPOs in recent years. In 2003 ten major investment banks including Citigroup/Salomon Smith Barney, Merrill Lynch, J.P. Morgan Chase, Credit Suisse First Boston, Morgan Stanley, Goldman Sachs Group were ordered to pay fines totaling \$1.4 billion for illegally touting stocks. These banks were trading positive analyst coverage in exchange for highly profitable underwriting business.

There have been many allegations of investment banks issuing shares of highly desirable IPOs to preferred clients in exchange for future business. The Economist published an article detailing Wall Streets improprieties:

“In a recent speech, the SEC's Mr. Pitt said that the main issue with the second area of concern, the IPO process, was that “valued brokerage-firm clients are given investment opportunities, but only in return for kickbacks to the brokerage firms that made the opportunity available”. This seems to have happened quite often recently. Indeed, one investment bank, CSFB, paid \$100m to settle an investigation into its habit of allocating shares in IPOs to favoured clients who repaid a chunk of any profits that they made by subsequently conducting unnecessary trades with the broker.” (Economist 2002)

This gives banks incentives to further underprice issues, since a larger profit is more probable from future business if the present investors make large profits on the IPOs. In addition, some banks would grant managers in the issuing company preferential allocations of their own IPOs in exchange for choosing the bank to do the underwriting, thus aligning the managers' interests with the banks instead of with their respective companies. In 1999 and 2000 alone IPO shares appreciated \$66 billion on the first day of trading alone; the issuing company did

not receive any of these profits (Economist 2002). However, the amount of the underpricing which is due to the conflict of interest is unknown, and it is safe to assume that banks minimize this behavior to the extent that is verifiable, because their ability to attract customers depends largely on their reputation.

### **3. Auctions**

Auctions have often been used to allocate securities, and were brought into the limelight as an alternative to book building by Google's choice to use a sealed bid uniform price auction for their IPO. Securities auctions are best known in America for their use in the process of issuing government debt and share repurchases by public companies. However, due to government regulations, IPOs in Europe have historically been performed using auctions to allocate the shares. IPO auctions, although rare in America are not unheard of, there is an investment bank in San Francisco named W.R. Hambrecht which specializes in performing IPO auctions through their "Open IPO" format.

When people think of auctions, they usually think of a group of people placing successively higher bids until only one remains, and that is the price the product sells for. This is an English auction, and it is only one of many types. This paper will focus on multi-unit auctions, as those are relevant to IPOs. There are two main formats for these auctions; ascending-bid multi-unit auctions and sealed-bid multi-unit auctions.

Ascending-bid multi-unit auctions have been used extensively for sales of telecommunications and energy contracts. There are two main kinds of

ascending-bid multi-unit auctions, the first of which is simultaneous ascending auctions. This auction is set up in rounds, where one bids a price which is higher than any other price for that particular item in each round until there are no new bids, with the high bid for each item being the winner. These auctions are common for telecom contracts, including 3G and PCS. The other type is ascending clock auctions, which is also split into rounds, but instead of bidders setting the price, the auctioneer announces a price for an item and buyers bid with the quantity they want at that price. This continues until aggregate demand falls below aggregate price. Both of these methods are commonly used for large quantities of identical items, such as debt or equity issuances (Ausubel, 2001).

Sealed-bid multi-unit auctions have been used extensively for the sale of government securities, and share repurchases by public firms. There are two main types of sealed-bid multi-unit auctions: pay-as-bid and uniform-price. For pay-as-bid auctions, bidders submit sealed bids naming prices and quantities which determine the clearing price, each bidder above that price then wins the amount they demanded at the price they bid. For uniform-price auctions, bidders submit the quantity demanded and price they are willing to pay, which is then used to determine the clearing price, and then all people who bid at or above that price are awarded the amount of shares they bid for at the clearing price. Google performed their IPO using a variation of the uniform-price auction.

Auctions are judged based on their efficiency in maximizing seller's revenue and allocating goods to the buyers who value them most highly. Depending on the type and quantity of good being sold, some auctions are better

at arriving at efficient outcomes than others. Multi-unit auctions are most successfully used for issuing items such as common value items or securities. In these, buyers place bids based on what they perceive as the item's worth as well as what they believe this item is worth to other buyers. This method incorporates a congregate of opinions to ensure fair pricing, so no one overpays or receives something worth less than the price paid.

This phenomenon of paying more than an item is worth is called the winners curse, where the winner of an auction is disadvantaged because they paid more for the item than it was worth to anyone else. The winner's curse is not usually as serious of a problem for items of subjective worth, such as a painting, where the bidders have independent private values and some may assign it a higher value than others. The winner's curse, however, does become a more serious issue when homogenous commodities, such as shares in an IPO, are auctioned. The effects of the winners curse are magnified in auctions with more participants, since an increased number of participants result in increased exchange of information and scrutiny regarding the item of sale, resulting in more conservative bidding after adjusting for information revealed by other bidders (Bulow and Klemperer 2002).

The winners curse is further amplified in cases of slightly asymmetric information, where there are two groups of bidders and between these two, one is generally considered advantaged (Bulow and Klemperer 2002). This situation often leads to even lower prices, since the uninformed group is likely to further reduce their estimate of value to avoid overpaying. Since retail investors often

assume that money managers and institutional investors have more valuable information, it is a relevant concern in IPO auctions as this affects the price of the offering. This can lead retail investors to either avoid the auction or bid well below the item's perceived value allowing institutional investors, to also bid low, leading to underpricing.

Sealed bid auctions are particularly susceptible to the winner's curse, since there is no feedback relating to other bidders valuations like there is in an ascending price auction. IPO auctions adopt the uniform price auction format in an attempt to try to minimize the winners curse. When all the winners pay the clearing price, there is incentive for all bidders to bid closer to their true value. Since all buyers will pay the same price, their bids are mainly used for allocating shares. An especially effective method of minimizing the winner's curse is utilizing a second-bid auction, where the winner pays the price bid by the second highest bidder. This encourages buyers to bid their true value, knowing that the price is set by incorporating everyone's values, thus minimizing the effects of the winners curse (Milgrom 1989). For IPO auctions, the uniform price auction can be viewed as equivalent to a second bid auction since there will be such a large cluster of bids right at the clearing price, so there will not be a significant difference between the lowest winning bid and the highest non-winning bid.

#### **4. Google's IPO**

Google is a unique company, and their IPO was equally unique. Everything from their motivation for going public to the format of their IPO and

their behavior leading up to it was far from typical. Most companies who perform an IPO do so because they need capital to expand their business, but Google was producing very strong cash flows, so that was not an issue for them. Their main motivation for going public was to provide liquidity so early investors and insiders could realize gains on their investments. The other goal of their IPO was to perform it in a way that anyone who wanted to participate could. They decided to eschew the traditional book building method, thinking that an auction would be a more efficient way to accomplish these goals. In addition, by performing an auction, they only had to pay underwriting fees of 2.8% versus the typical fee of 7% (Bloomberg 8/22/2004). Google also wanted to retain complete control over the company, so they would be able to make decisions on their own. This led them to offer mainly class B shares with very limited voting rights - virtually unheard of for a technology company. In their registration statement, the founders Larry Page and Sergey Brin explained their reasoning:

“Now the time has come for the company to move to public ownership. This change will bring important benefits for our employees, for our present and future shareholders, for our customers, and most of all for Google users. But the standard structure of public ownership may jeopardize the independence and focused objectivity that have been most important in Google’s past success and that we consider most fundamental for its future. Therefore, we have designed a corporate structure that will protect Google’s ability to innovate and retain its most distinctive characteristics. We are confident that, in the long run, this will bring Google and its shareholders, old and new, the greatest economic returns. We want to clearly explain our plans and the reasoning and values behind them” (S-1 Registration Statement).

When Google filed for their IPO they suggested a range for bids from between \$108 and \$135 per share and planned to offer 25.7 million shares,

raising \$3.6 billion. This is much higher than the 19.6 million shares at \$85 each that were sold by the auction, leading many people to proclaim the IPO and the auction format in particular a failure. Things were not that simple however, and the lower than expected returns could be attributed to any number of events which occurred in the interim, including their reluctance to issue guidance or share information instead the auction format of the offering.

In the period between when they filed for the IPO, and when they actually performed it, Google ran afoul of the SEC on two separate occasions. Before an IPO there is a mandatory “quiet period” where executives are not allowed to speak with the media. Larry Page and Sergey Brin violated this by granting Playboy magazine an interview in the September issue which hit stands August 13, less than a week before the IPO. This caused a lot of negative publicity and sparked an SEC investigation into the company, which forced them to correct inaccuracies in the article but did not halt the IPO. This made many people question whether the Google founders were savvy enough to handle taking a company public if they could not even keep up with the SEC regulations (CBS Marketwatch 9/4/04). In addition to violating the quiet period, Google was the subject of an additional SEC inquiry; Google illegally granted shares and options to many of its employees between September of 2001 and July of 2004 without registering awards with regulators (Wall Street Journal, 8/17/04).

Another possible reason for the lower than expected proceeds from the IPO was the decline in valuations of technology stocks. The TSC Internet stock index dropped over 13% in the month and a half leading up to the IPO date. This

weakness in the sector also could have contributed to the lower share price. Investors did not have a lot of faith in internet stocks at the time, dampening the enthusiasm for Google's IPO. Another factor, which might have led to the low number of bidders, is the large amount of publicity the auction generated and the strong following Google had. It has been shown that often auctions with more potential bidders can generate less revenue, and have less actual bids (Sherman 2005). This is because people are less likely to choose to bear the cost of information and placing a bid when they think their chances of winning without overpaying are small.

A few days before the auction was supposed to commence, Google realized that there was not enough demand to make the IPO successful, so they decided to lower their price target from between \$108 and \$135 to between \$85 and \$95. However in order to participate in the auction, one had to have registered for a unique bidder ID weeks before, and Google did not re-open registration, so this change in pricing only affected people who already registered to participate. With the lower expected price, most of the early investors and venture capitalists decided to lower the amount of shares they were contributing to the offering, reducing the number of shares offered from 25.7 million to 19.6 million. The stock closed at \$100.34 up 18% after its first day of trading. The important question is whether Google would have had higher proceeds had they chosen to use the book building method. A model will be used to simulate their returns from a book building IPO, and also to find their expected proceeds from

an auction holding the same factors constant to control for outside factors such as bad publicity.

## **5. The Model**

The model being applied is one which Ann Sherman created in her article “Global trends in IPO mechanisms: Book building versus auctions with endogenous entry,” published in the Journal of Financial Economics in 2005. In Sherman’s article, there is a model for both the book building method as well as the uniform price auction, similar to what Google used. Her article also dictates a method to calculate the sellers’ estimated proceeds (SEPs) generated by the offering.

These models make some assumptions which may or may not hold in reality. The first assumption is that the investment banks always act in the best interest of the issuing firm instead of colluding with customers. As was stated above, this does not always hold true in reality but the underwriters business greatly depends on reputation, so it would be in the underwriter’s best interest to consistently behave in a manner that does not damage reputation. In addition, the assumption that people can only bid once in the auction is necessary in order to better simulate Google’s IPO. Google assured this one-bid policy by requiring all bidders to obtain a unique ID and each ID could only place one bid, thus giving Google an idea of the number of bidders as well as preventing potential free riders from joining in once information has been revealed by other bidders. These assumptions are necessary to make the calculations reasonable, and

should not have a significant impact on the results of the reasonable first approximation.

When a firm chooses to use the book building approach, the issuer and underwriter have full control in picking the potential investors and allocating the shares amongst them. They choose to allocate shares based on the signals reported by the investors, and this way they control the price accuracy of the offering by only granting shares to people who report a high valuation. This works because informed investors are less risk averse than uninformed investors, so they are more willing to give a positive signal (Sherman 2005).

The issuer can choose how much they value price accuracy by choosing how heavily to reward information. There is, however, a tradeoff since information is expensive so more accuracy means more underpricing. For this model, I will assume that the issuer wants to obtain the highest proceeds possible, since Google was willing to undertake an auction in which they had no control over the price, accuracy is probably not as important to them. The equation which shows the expected proceeds for a book building IPO is as follows:

$$SEP_B = \theta X - K [C(\alpha) + e]$$

Where:

$\theta$ : the average value assigned to a share of the IPO

X: the amount of shares sold in the issue

K: the number of investors

$C(\alpha)$ : the cost of the information obtained by the investor

e: a fixed cost associated with participating

This equation shows that the proceeds for the issuing company are equal to the average value of the shares times the amount of shares sold, minus the cost of obtaining information and participating in the IPO.

In a uniform price auction, the company has much less control over the outcome since they cannot set the price or determine the allocation. It is also more risky due to a chance of undersubscription which does not occur in a book building situation. Investors choose  $p$  the probability which they enter the auctions, and  $\alpha$ , the accuracy of the information they purchase. People choose to enter the auction if the following is satisfied:

$$PC = \alpha \theta R_A(b|H) + (1-\alpha) R_A(b|M) - C(\alpha) - e \geq 0$$

Where,

PC: is the expected profit from entering the auction

$R_A(b|H)$ : is the expected return if they receive a signal for high returns

$R_A(b|M)$ : is the expected returns for a signal for medium returns.

For auctions where the probability of entering is less than one, the above equation must be satisfied as an equality, making the investor indifferent about entering the auction (Sherman 2005). The equation for the issuers expected proceeds from an auction IPO is:

$$SEP_A = \theta X \left( \sum_{i=0}^{i=x-1} P(i = \text{entry}) (1 - i \setminus X) \right) - pN[C(\alpha) - e]$$

Where,

$i$ : represents the amount of investors who enter the auction

$p$ : is the probability of an investor entering the auction

N: is the potential amount of bids.

This equation is very similar to the book building equation, with two major differences. The first being that there is a risk of undersubscription, which is represented by the first term in the equation, and has been shown to be negligible in the case of Google<sup>1</sup>, and the second, is that the issuer has no control over the amount of information purchased.

To simulate Google's IPO, assumptions had to be made for the values of some of the variables. In order to maximize the accuracy and impact of the simulation, a sensitivity analysis was performed by running the simulation three times - once with inputs which were believed to be accurate, once representing a bull market, and once representing a bear market - so as to analyze the effect of the changes across a range of possible parameters. This will show whether the results change when the values are different, or if one method always generates superior returns. In addition to estimating the proceeds generated by each method, the fees paid to the underwriters; 7% for book building and 2.8% for auctions, will be subtracted to determine the actual cash received by the issuer.

The first case tested was an estimation of the most reasonable values for the IPO. The average value per share was assumed to be \$100.34, since that was the closing price on the first day of trading; it is safe to assume that was a

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<sup>1</sup> The term  $\sum_{i=0}^{i=x-1} P(i = \text{entry})(1 - i \setminus X)$  represents the likelihood and effect of undersubscription on the issue. In the case of Google, since there were such a large number of potential bidders, all the possible levels of subscription were broken down into deciles, and then assigned a probability that the number of bidders would fall into that decile. Then the effect it would have on the issue was calculated by assuming that if it fell into that decile the expected value would be halfway, i.e. if it was in the first decile, there would be 5% subscription level. By multiplying the probabilities by the effects of the levels of undersubscription, the effects were shown to be so close to zero that the term was not included in the calculations. The reasons that the risk of significant undersubscription are so low are, the willingness Google showed to lower the price range in order to increase bids, and the ability of investors to bid for multiple shares.

fair value at the time of the IPO. The number of shares is 19,605,052 which is the amount of shares Google sold in their IPO. It is also assumed that the average cost of entering the IPO was \$5 per share for both the auction and the book building methods. This represents setting up an account with the brokers, filing for a bidder identification number or attending road shows. The cost of the information is assumed to be equal to  $\alpha^2$ , with the average  $\alpha$  equal to 0.4, meaning that there is on average a 40% probability of the information purchased giving you an accurate signal, with more accurate information being more expensive. It is also assumed that  $N = 30,000,000$  and the probability of bidding is 40%. Additionally, for the book building method there was assumed to be 1000 investors, since most investors who are chosen to participate in IPOs buy substantial amounts of the issue.

The results show that the book building method would have raised \$1,967,165,758, or \$100.34 a share before fees. Once the 7% fee is collected by the underwriting syndicate, the company raised \$1,829,464,155 or \$93.32 a share. For the uniform price auction, Google theoretically would have raised \$1,963,970,918, or \$100.18 per share before fees and once the 2.8% fee is collected by the underwriting syndicate, Google would net \$1,914,871,645, or \$97.67 per share. For this case, book-building would have had slightly lower underpricing before fees are taken into account, but all things considered the Google would have netted significantly higher profits.

The second example is to show the effects of having the IPO in a bull market. In a bull market, it is more expensive to participate in an IPO, and there

are many more potential bidders, which lowers the probability of bidding. In this case, it is assumed to cost on average \$10 per share to participate in the IPO. It has been shown that underwriters have a harder time getting investors to come to road shows in hot markets where there are a lot of other potential investments where they would not have to invest as much time (Sherman 2005). This can be expanded to cover auction IPOs as well, since investors are less likely to spend the time to set up an account and register for an IPO if they do not even know if they will receive shares when there are other good opportunities available. The bull market assumption also explains the increase in potential bids, since people are more likely to invest in stocks, in a bull market. However as has been shown with more potential entrants, everyone's probability of entry goes down, as they assume they will have to overpay to win. For this example the potential number of bids increases to 75,000,000, and the probability of entry drops to 20%. The number of investors that attend the road show would decrease to 750, since more of them will be focusing on other opportunities, however, those who attend will be more highly rewarded for their time, so they will still fully subscribe the offering.

In this simulation, the book building method raised \$1,967,163,298, or \$100.34 per share before fees. After the 7% was paid to the syndicate, Google would have netted \$1,829,461,867, or \$93.32 per share. An auction in these circumstances would have raised \$1,964,770,918 or \$100.22 per share before fees. After the 2.8% fees were paid, Google would have raised \$1,915,651,645 or \$97.71 per share. Even with the higher cost to enter the IPO and more

potential bidders, the change in results were negligible, with book building still having higher gross proceeds than uniform-price auction and lower net proceeds.

In a bear market, it is easier for underwriters to get investors to attend road shows; since there are fewer investment alternatives and the cost to enter is lower because of the lack of alternatives. There are also assumed to be less potential bidders in the auction, since fewer people buy stocks during bear markets. However, the probability of entry would be higher, since there is less competition and because people who are buying in a bear market are usually more serious investors. For this model, there would be 1500 investors in the book-building model, and the cost to enter the offering was on average \$3 per share. The number of potential bids would be 25,000 to reflect less speculative interest, and the probability of entry would be 50%.

In a bear market, Google would have raised \$1,967,166,178 or \$100.34 per share before fees through a book-building IPO. After fees this would have been \$1,829,464,545 or \$93.32 per share. An auction would have raised \$1,965,170,918, or \$100.24 per share before fees. After fees, Google would have raised \$1,916,041,645, or \$97.73 per share. This shows that as long as investors' beliefs about the value of the share do not change, the costs of information do not have a significant impact on the success of the issue.

## **5. Conclusion**

It has been shown that given their objectives, Google made the right choice in choosing to use an auction for their IPO. They were able to have the

IPO open to investors who are usually excluded from IPOs, and still raise more money than if they had used the book building method.

The simulations showed that the results for the two methods were almost equivalent in all cases on a before-fee basis, and strictly higher for auctions once the fees are subtracted from the proceeds. The fact that the results were so similar in all three cases shows that these findings are applicable in the majority of cases. It also shows that the advantages gained by having an underwriter perform the book building are greatly outweighed by the fees the underwriter demands. In most cases companies would be better off performing an auction, and paying significantly lower fees, since the underwriters are not worth the top dollar they command.

One possible exception to this is for very small under publicized companies. For these companies, there is a more significant risk of undersubscription, which would lower the expected proceeds, and increase the risk for the issuer. In these cases it might be better to pay the higher fees for greater certainty in the proceeds. However more research needs to be done in this area before making conclusions, as this paper did not examine any of these situations.

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