Discussion of
Valuation of Internet Stocks—An IPO Perspective

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ABSTRACT

The discussion reviews BMS’s analysis of how summary financial data from the IPO prospectus are associated with the IPO offer price and the initial market price. The authors focus on whether the value drivers associated with these prices differ between internet and non-internet firms, and between the offer price and the day one ending price. They conclude that there are differences in the value drivers used to value Internet versus non-Internet firms, and further differences in the value drivers used to arrive at the offer price and the day one ending price. The review raises several concerns about these conclusions. One concern is that the reader confronts a challenge in trying to interpret the differences between the value drivers affecting the offer price and the day one ending price. The review discusses two factors for the reader to consider before interpreting these differences. The review also critiques the paper’s avoidance of disaggregated financial statement information in the value driver analyses and details several research design concerns.

1. Introduction

The study by Bartov, Mohanram, and Seethamraju (BMS) explores how a limited set of nonfinancial variables and aggregate financial statement measures (such as earnings, sales, and book value of equity) are associated with IPO prices. Aggregate financial statement measures combine more detailed information into a single summary measure (e.g., revenue and

* The Wharton School, University of Pennsylvania. I have benefited from access to Cathy Schrand’s literature review on IPO underpricing, the bibliography of academic IPO research at Ivo Welch’s IPO Resources website (www.iporesources.org), and the comments of Ray Ball, Eli Bartov, and Partha Mohanram.
expense line items are combined in arriving at aggregate earnings). The paper’s focus is on contrasting which summary financial statement measures are significant value drivers across two comparisons: (1) Internet versus non-Internet IPOs and (2) the initial IPO offer price versus the final offer price versus the day one ending price. The comparison between Internet and non-Internet IPOs is motivated by the desire to investigate claims that traditional valuation methods do not apply to internet firms. No motivation is offered for the comparison between the value drivers affecting the offer prices and those affecting the day one ending price. One can, however, view these tests as indicating how the relative importance of historical financial statement measures versus nonfinancial data shifts as more information is gathered about the firm going public.

As discussed in section 2, the main claimed contribution of the BMS paper is to document some differences in the value drivers that are associated with internet versus non-Internet IPO prices. Section 3 discusses some problems with the paper’s limited use of theory to guide its tests. The potential to expand the paper’s contribution by examining more disaggregated financial statement data is detailed in section 4. Section 5 critiques several of the paper’s research design choices, and a brief summary and conclusions are offered in section 6.

2. Summary of Findings

The results point to a very limited pricing role for the financial statement data contained in the IPO prospectus. Earnings, book values and negative cash flow are generally found to have no association with the initial offer price, the final offer price, or the day one ending price. The exceptions are that positive book values are positively related to the day one ending price for the internet firms only, while negative cash flow has a negative association with the (initial and final) offer price for the internet firms. The financial data appear somewhat more relevant for explaining the offer price than the day one ending price. The offer price is positively associated with both positive cash flow and sales, whereas neither of these variables is associated with the day one ending price. Finally, there are not many major differences between Internet and non-Internet firms in the importance of the financial variables. Sales growth, however, is positively associated with the offer price and the day one ending price only for the Internet firms.

The authors’ interpretations of these results focus on the notion that differences in the magnitude or significance of the variables are indicative of different value drivers. Their emphasis is thus on whether the value drivers differ between Internet and non-Internet IPOs, and between the offer price and the day one ending price. The basic conclusion is that there are some differences in the value drivers used to value Internet versus non-Internet IPOs and in the value drivers used to arrive at the offer price versus the day one ending price. The authors make very little effort to interpret
the individual estimates on the financial variables, perhaps because they are at such an aggregate level and have been used in so many prior papers. The exception is when there is an “unusual” sign on a coefficient estimate.

The non-financial variables serve essentially as controls. Consistent with numerous prior papers, BMS find the percentage of shares outstanding offered in the IPO is generally negatively related to price. The most prominent explanation for this result is that greater retention of insider ownership at the IPO signals that insiders are not using the IPO merely as a means to cash out (Leland and Pyle [1977]).

The other main non-financial variable, PARTIAL, is used only in the day one closing price regressions and is the key non-financial variable because it is used to control for the extent of IPO underpricing. As discussed below, not fully controlling for the extent of IPO underpricing could invalidate the authors’ attempt to compare the value drivers “used” to arrive at the day one ending price versus the offer price. PARTIAL measures the position of the final offer price relative to the expected price at the time the prospectus was filed. Consistent with prior empirical papers, BMS find that PARTIAL is positively associated with the day one closing price.

3. The Limited Use of Theory to Guide the Tests

Interpreting the comparisons between the offer price regressions and the day one ending price regressions is difficult because the authors offer no theory for what might cause the importance of various value drivers to change as the process moves from setting the initial offer price, to the final offer price, and finally to the first day of post-IPO trading. The prior literature raises two issues in this regard. First, there is evidence that the information set changes during the first day of trading, so that market participants are not limited to the same information set used by the underwriters. Second, incentives may be such that the offer price does not reflect the underwriter’s best attempt to rationally price the offer.

To illustrate the issue of the information set changing, consider the suggestion from conference participants that BMS provide a comparison of the adjusted $R^2$ in the table 6 (final offer price) versus table 7 (day one ending price) regressions when the variable PARTIAL is removed from the table 7 specification (to make the explanatory variables identical in both tables). In other words, conference participants wondered whether finding a lower adjusted $R^2$ using the day one ending price as the dependent variable could provide support for BMS’s conference conjecture that the day one ending price is effectively set by less sophisticated investors. The idea was that if this conjecture were true, the day one ending price might be just a noisy transformation of the offer price.

Putting aside for the moment the difficulty that underpricing of IPOs presents for this suggestion, consider why such a finding might arise, as it
in fact does in a very similar comparison by Klein [1996]. The conference conjecture of BMS would explain such a result as arising from the unsophisticated day one investors adding noise to the price. The noise would be introduced by these investors interpreting the same fundamentals used by the underwriter in a different (and less correct) manner. An alternative viewpoint is that additional information gets revealed during day one that is not fully subsumed by the information in the IPO prospectus and the information about investor demand obtained by the underwriter. Evidence on this issue is provided by Kim and Ritter [1999], who use comparable firm multiple techniques applied to the IPO prospectus’s earnings, book value, and sales numbers to calculate value estimates for IPOs. They exploit three pricing stages of the offering process by examining the valuation errors in explaining: (1) the preliminary offer price, which is measured as the midpoint of the offering range, (2) the final offer price, and (3) the first market price. They predict and find that the valuation errors increase at each of these three stages. Their explanation is that additional information that gets revealed during the IPO process leads to the price changes in the latter two stages.

Whether or not the underwriter is making his best attempt to rationally price the offer also affects the interpretation of BMS’s comparison of the value drivers that are related to the offer price versus the day one closing price. Rationality appears to be consistent with BMS’s adoption of the well-regarded Benveniste and Spindt [1989] model, which explains IPO underpricing in terms of dynamic information acquisition by the underwriter. The model has both regular, informed investors (institutions) and occasional, uninformed investors (individuals). Each regular investor observes private information, which isn’t known to the issuing firm or its underwriter. Benveniste and Spindt solve a mechanism design problem and show that state-contingent underpricing and discriminatory allocations are part of the optimal contract, both for a one-time sale and for repeat interactions. Thus, their solution is a set of pricing and allocation rules that closely resembles the book-building IPO mechanism (often referred to as the firm commitment mechanism in the U.S.). In order to induce truthful revelation for a given IPO, the investment banker must underprice issues for which favorable information is revealed by more than those for which unfavorable information is revealed. The underwriter is, however, attempting to obtain the best available price for the issuing firm given the information constraints.

A recent alternative explanation for underpricing in firm commitment IPOs is offered by Loughran and Ritter [2001]. Relying on the assertion of prospect theory (Kahneman and Tversky [1979]) that people’s behavior focuses on changes in their wealth rather than the level of their wealth,

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1 Klein [1996] compares the value drivers for the offer price to those for the price at the end of week one and finds that the adjusted $R^2$ is lower for the market price regression (0.44 vs. 0.62). The shrinkage in $R^2$ is due primarily to the marked increase in variance of the dependent variable, with the variance of the market price almost double that of the offer price.
Loughran and Ritter contend that issuing firm executives bargain less hard for a higher IPO price when the offer price is already being revised upward during the book-building process. The prospect theory explanation implies that the underwriter is not necessarily attempting to obtain the price justified by the value drivers of the issuing firm. In other words, the prospect theory explanation differs from the dynamic information acquisition theory of underpricing by implying that an agency problem may exist between the issuing firm and its underwriter. As discussed in section 5 below, Loughran and Ritter devise tests to distinguish between these two competing explanations and find support for the prospect theory view.

There is also anecdotal evidence suggesting that agency problems between issuing firms and their underwriters played an increasingly important role in internet IPOs during the latter part of BMS’s sample period. To explain this evidence, note that the dynamic information acquisition theory of IPO underpricing is meant, in part, to justify a controversial feature of the book-building mechanism that is also its main point of distinction from other mechanisms. This feature is that shares are allocated by the underwriter on a discretionary basis. Underwriters attempt to create excess demand and then allocate the securities to investors based on various criteria. Investors expected to buy and hold are favored as are investors willing to buy issues when demand is weak (Cornelli and Goldreich [2001]). This intertemporal pooling lessens the winner’s curse problem and, in equilibrium, results in less underpricing than if shares were allocated on a pro rata basis when there was excess demand.

There is also, however, a downside to the discretionary allocation of shares by the underwriter when facing excess demand on a firm commitment IPO offering, because of the potential for agency problems between the underwriter and issuer. During January 1999–June 2000, the average first day IPO return equaled an unprecedented 70% in the U.S. In this period, IPOs were increasingly allocated as if they were the reward for providing profitable business to an underwriter, with a number of U.S. underwriters allocating IPOs almost exclusively based on commission volume. In December 2000, a Wall Street Journal article (Smith and Pulliam [2000]) revealed that some institutions were paying commissions of ten times the normal amount on trades of hundreds of thousands of shares in order to get IPOs, and that some underwriters were allocating shares based on commitments to buy additional shares once the stock started trading. A follow-up Wall Street Journal article in August 2001 (Pulliam and Smith [2001]) asserted that during 1999 and 2000 Credit Suisse First Boston trading executives told some institutional investors to pay a set percentage of their IPO profits in the form of stock-trading commissions. Although these practices occurred prior to 1999, their incidence and magnitude appear to have greatly intensified in 1999 and 2000. If, as this anecdotal evidence suggests, agency problems between the issuer and the underwriter are a dominant factor in the underpricing of new issues during part of the period examined by BMS, it becomes difficult to accept the premise that the offer price reflects the
underwriter’s best judgment about how to price the value drivers described in the prospectus.

4. Learning About Value Drivers from More Disaggregated Financial Statement Information

BMS use only aggregate earnings, cash flow, sales, sales growth, and book value measures as their financial statement variables because prior research has shown that these variables are important for equity valuation in non-IPO contexts. Although these are reasonable aggregate variables, they do not facilitate analysis of what might be fundamentally different about the valuation of internet firms. BMS do therefore briefly examine web metrics, but they do not study the effects of cash burn rates, analyst forecast information, or other non-financial statement variables that have been argued to affect valuations of publicly traded internet firms. Moreover, even within the confines of the traditional valuation metrics used there are not many decompositions to break out key expense components from total earnings. Similarly, although BMS note some of the concerns regarding the quality of internet firms’ revenues, they make no attempt to test any of these revenue quality issues. For example, Davis [2001] finds that use of grossed-up and barter revenue is common for certain internet sectors, but not pervasive across sectors, suggesting that differences in the use of these practices across internet sectors will affect the association between revenue and price. Davis also finds that, for firms reporting grossed-up or barter revenue, the pricing of revenue before versus after the April 2000 “crash” declines more for firms with relatively high levels of active individual investor following. BMS’s attempt to compare the pricing of revenue between Internet and non-Internet firms may therefore be clouded by not disaggregating the revenue measure.

Of course, if disaggregating the revenue measure affords additional insights about the value drivers for internet firms, the same is likely to be true for earnings. Prior evidence supports this view. Like BMS, Trueman, Wong, and Zhang [2000] find generally insignificant coefficients on the net income summary measure in their regressions of market value (of seasoned internet firms) on various financial and non-financial measures. Trueman, Wong, and Zhang also find, however, that decomposing net income provides important additional insights, with internet valuations in the 1998–1999 period being consistent with investors differentially weighting permanent and transitory income statement components.

5. Research Design Issues

Several research design issues arise in the BMS study. These include the matching process, controlling for IPO underpricing, lack of out-of-sample model validation, disadvantages of using historical financial statement data instead of forecasted data, the lack of analysis of sell-side analyst behavior around the IPO, the failure to specify anything about the valuation model
being used, the impact of real options and accounting conservatism on the implied valuation model being used, the limited consideration of simultaneities in the estimations, and the apparent lack of correspondence between the test structure and either the hypotheses or the institutional setting.

The matching process used to generate the control sample of non-Internet firms raises concerns. The non-Internet firms are matched to the Internet sample using two criteria: (1) the non-Internet firm’s offering must occur within three days of the Internet IPO and (2) the non-Internet firm closest in size to the Internet IPO is then selected. IPO size is measured as the product of the final offer price and the number of shares offered. BMS do not specify where they obtain the data on the number of shares offered, but it appears they use the figure from the IPO prospectus. If so, measurement error is introduced into the IPO size match by the fact that overallotted shares are not included in the prospectus’s figure for the number of shares offered.\(^2\) Of greater concern is the fact that, as BMS acknowledge, the matching is not very successful. The Internet IPOs are smaller, less profitable, and generate less operating cash flow than the matched firms. Underpricing is more severe for the Internet IPOs even though retained ownership is higher. The substantial differences between the Internet and non-Internet samples provide a rather extreme illustration of the “curse of dimensionality.” That is, given that there are many possible reasons why firms choose whether to belong to the internet industry, partial matches based on one or two characteristics may not yield the most relevant group for comparison. More fundamentally, given that being an Internet firm is a choice variable (particularly at the IPO stage), the use of a one-step method such as linear regression is of concern. If the authors were able to successfully specify an econometric model of which firms choose to be Internet firms, their estimates would be improved by two-stage methods (see, e.g., Lalonde [1986]).

A key research design issue faced by BMS is how to deal with the well documented phenomenon of IPO underpricing. Their approach is to treat the extent of underpricing as a separate, additive component that affects the day one closing price. BMS thus view the extent of underpricing as being unrelated to the other model variables and they capture the underpricing effect with a single variable, \textit{PARTIAL}, which is the final offer price scaled by the midpoint of the anticipated price’s range as disclosed in the preliminary prospectus. If the extent of underpricing is related to other variables, or if more than one variable is needed to capture the underpricing effect, the BMS regressions could be misspecified.

BMS note that the Benveniste and Spindt [1989] model leads to the prediction that there will only be partial adjustment of the offer price from that contained in the preliminary prospectus to that in the final prospectus. In

\(^2\) When taking a firm public using a firm commitment contract, the underwriter usually presells more than 100\% of the shares offered. Almost all IPOs therefore include an overallotment (or “Green Shoe”) option, in which the issuing firm or selling shareholders give the underwriter the right to sell up to 15\% more shares than guaranteed.
other words, those IPOs for which the offer price is revised upwards will be more underpriced than those for which the offer price is revised downwards, a prediction that has been supported empirically by Hanley [1993]. The Benveniste and Spindt model predicts there should be partial adjustment to private information only, so to the extent that the private information of regular IPO investors is uncorrelated with the public information in the IPO prospectus the additive specification used by BMS may be reasonable.

Loughran and Ritter’s [2001] alternative (prospect theory) explanation for Hanley’s empirical regularity differs from the dynamic information acquisition explanation by predicting that there is partial adjustment to public as well as private information. Loughran and Ritter support this prediction by showing that the market’s return during the three weeks prior to issuance is positively associated with PARTIAL. This evidence suggests that other public information, such as that contained in the prospectus, may also be related to PARTIAL. If so, a proper model specification may require interactions between PARTIAL and the financial statement variables, consistent with suggestions made by conference participants (and now implemented by BMS in their final sensitivity test).

The valuation models specified by BMS could be improved by incorporating control variables from prior papers examining the valuation of IPOs and/or Internet firms. Conference participants noted that a number of prior IPO papers have documented negative stock returns when lockup provisions expire, indicating that these provisions may help to explain the IPO’s offer price and its initial trading price. Trueman, Wong, and Zhang [2000] find that Internet valuations in the 1998–1999 period were consistent with investors relying on non-financial measures of Internet use and using different models for e-tailer versus portal and content/community firms.

Kim and Ritter’s [1999] study of IPO valuations also suggests potential additions to the BMS analysis. They find that P/E multiples using forecasted earnings result in much more accurate valuations than multiples using the trailing earnings contained in the IPO prospectus and they speculate that one reason is that historical earnings of IPOs may be very transitory and thus have little value relevance. This finding is consistent with the lack of significance BMS generally find on their positive and negative historical earnings variables, and suggests that using forecasted earnings would improve their model specification. Unfortunately, because the safe harbor provisions for forward-looking statements in the Private Securities Litigation Reform Act of 1995 do not apply to IPOs, earnings forecasts in U.S. IPO prospectuses are very rare. Thus, in order to incorporate earnings forecasts BMS would need to obtain research reports from sell-side analysts covering the IPO, and such coverage is unlikely to occur for all IPOs in their sample. On the other hand, if analyst earnings forecasts were used it would also allow for other potentially useful analyst-based variables to be incorporated. For example, Rajan and Servaes [1997] examine analyst following for an IPO sample consisting of issues during 1975–1987. Even after correcting for previously documented influences, they find that more underpriced issues
attract larger analyst following. Analysts then systematically overestimate the earnings of these firms, with forecast errors averaging 5% of the firm’s stock price. Nonetheless, the Kim and Ritter results suggest that even these biased forecasts are much more highly associated with IPO prices than are the historical earnings figures from the prospectus.

The valuation models used by BMS would also be more convincing if they, like Klein, validated their model with out-of-sample tests. She uses a holdout sample of 40 IPOs contemporaneous with the estimation sample and a sample of 13 “high-profile” IPOs occurring on or after June 30, 1995 (such as Yahoo). Her model predicts quite successfully on both holdout samples and actually does somewhat better on the more recent IPOs.

Some conference participants questioned the incremental contribution of examining the pricing of Internet firms in the IPO setting, as opposed to the seasoned public firm setting. Others argued that the main potential advantage of the IPO setting is the ability it affords to examine pricing at four distinct stages: (1) the preliminary offer price, (2) the final offer price, (3) the first market price, and (4) the market price after the lock-up period expires. BMS make a limited assessment of the preliminary offer price, but they choose to focus on the middle two stages of this process. It is worthy of note that Kim and Ritter find that valuation errors from their comparable firm pricing models increase when moving from the preliminary offer price to the final offer price, and again in moving from the final offer price to the first market price. Their evidence suggests that the value driver information in the IPO prospectus can be most clearly assessed by examining associations with the preliminary offer price.

Another concern with BMS’s analysis of the value drivers of IPO prices is that they make no attempt to specify what valuation model underlies their regression framework. The implicit underlying model seems to be based on the Ohlson model (Ohlson [1995] and Feltham and Ohlson [1995]). This type of model is implied because the financial explanatory variables always include book value of equity, an operating performance measure, and a measure that proxies for expected growth in future operating performance. Thus, the valuation model underlying the BMS regressions seems to follow the empirical papers in which the value of future abnormal earnings is replaced in the residual income valuation model by current earnings (or current operating cash flow, or current sales). The implicit justification for BMS’s approach is then Ohlson’s [1995] derivation of a residual income model that can express market value as a linear function of current earnings, dividends and book value by making assumptions about the behavior of earnings and their relation to the information in stock prices (i.e., the information dynamics of earnings). The tests BMS perform should thus be viewed as joint tests of the (modified) residual income valuation model and the assumed information dynamics.

The implicit valuation model used by BMS has a number of limitations. For example, real options (e.g., growth, abandonment) will interfere with the assumed linear relations of market value to current earnings, dividends
and book value. Moreover, Ritter [2001] notes that the concept of staged
financing in IPOs (as discussed by, for example, Mayers [1998]) is closely
related to the notion that abandonment options are valuable for firms going
g public. BMS incorporate the resulting nonlinear relations only to the extent
of splitting the earnings, cash flow, and book value variables into positive
and negative components.

A similar limitation of the implicit valuation model arises because of the
impact of accounting conservatism. This accounting convention implies that
in bad news years the earnings will be more transitory because the losses are
more fully recognized in the current period than are the gains. In good news
years, earnings will be more permanent and will thus have greater power
to explain variation in the IPO price. Thus, accounting conservatism could
account for some of the intertemporal variation observed by BMS (although,
as noted above, the regressions do split several variables into their positive
and negative components).

Participants also raised concerns about the testing structure. The hypothe-
ses seem to suggest examining whether the value drivers have greater ex-
planatory power for non-Internet versus Internet firms, or for the day one
ending price compared to the offer price. The tests, however, compare the
magnitudes of the coefficient estimates rather than their incremental ex-
planatory power. Another concern with the testing structure comes back to
the issue of how underpricing is addressed in the study. Some conference
participants suggested that attempting to control for the impact of under-
pricing in the day one ending price regressions is a flawed approach that
cannot allow for a meaningful comparison with the offer price regression
results. Their concern was that although the tests are structured as a com-
parison of how two valuations are made under one model of behavior, the
offer price and day one ending price might be better viewed as resulting
from two different models of behavior. These participants suggested a more
promising approach might be to try to explain only the day one ending
price, while incorporating as fully as possible the extent of underpricing in
the analysis.

A final concern about the testing structure noted by the conference partic-
ipants is that the offer price is likely simultaneously determined with \(F\text{FLOAT}\),
the percentage of outstanding shares offered in the IPO. BMS note (in their
footnote 9) that they have conducted a sensitivity test to address this con-
cern. Participants also argued, however, that the day one ending price is
likely simultaneously determined with both \(F\text{LOAT}\) and \(\text{PARTIAL}\). The re-
sulting concern is that not considering these simultaneities in the day one
ending price estimations leads to inconsistent estimates.

6. Summary and Conclusions

Bartov, Mohanram, and Seethamraju examine how summary financial
statement data from the IPO prospectus are associated with the IPO offer
price and the market price at the end of the first day of public trading. They
focus on assessments of whether the value drivers associated with these prices differ between Internet and non-Internet firms, and between the offer price and the day one ending price. The fundamental conclusions of the paper are that there are differences in the value drivers used to value Internet firms compared to non-Internet firms, and further differences in the value drivers associated with the offer price versus the day one ending price.

One challenge in reading the study is deciding how to interpret the observed differences in the associations of the offer price versus the day one ending price with the same explanatory variables. A factor to consider is provided by Kim and Ritter’s [1999] explanation for their finding that prospectus-based valuation errors increase as the offer process moves from the preliminary offer price to the final offer price, and again from the final offer price to the initial market price. They contend that the additional information revealed during the book-building process and during the initial public trading in the stock results in prices further into the offering process being based less and less on information from the prospectus. In other words, the same underlying information set may not be used for both the offer price and the day one ending price. A second consideration in comparing the value drivers associated with the offer price and the day one ending price is that underwriters may not be trying to set the offer price to fairly reflect issuing firm value. Instead, there is growing evidence that agency conflicts between issuing firms and underwriters may explain a significant portion of the unusually large magnitude of IPO underpricing during the Internet boom period.

One drawback of the paper’s empirical analysis is the avoidance of disaggregated financial statement information in the value driver analysis. Both the authors’ own motivating discussion and prior research suggest that disaggregating the earnings, revenue, and book value of equity figures could provide evidence on issues that the authors instead can only address with speculation and cursory analysis.

Some additional research design issues limit the reader’s confidence in the paper’s inferences. These include the matching process, controlling for IPO underpricing, lack of out-of-sample model validation, disadvantages of using historical financial statement data instead of forecasted data, the lack of analysis of sell-side analyst behavior around the IPOs, the failure to specify anything about the valuation model being used, the impact of real options and accounting conservatism on the implied valuation model being used, the limited consideration of simultaneities in the estimations, and the lack of correspondence between the test structure and either the hypotheses or the institutional setting.

Bartov, Mohanram, and Seethamraju set out to learn what the value drivers of IPO prices are and how they may differ between Internet and non-Internet firms and between different pricing stages of the IPO process. These are interesting questions, but the answers that the authors obtain are subject to several caveats. Thus, I expect that future researchers will continue to pursue these questions using alternative approaches.
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