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## WORKING PAPERS

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### THE INTERNET AND INVESTORS

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This is the first in the series of working paper abstracts.<sup>1</sup> Given that the *JOIM* will be one of the first journals in finance to be electronically delivered (i.e. an e-journal), we aptly begin this series with a wide coverage of papers on the relationship between the internet and investing.

The extant research abstracted here falls into a few broad (and natural) categories.<sup>2</sup> (a) Not surprisingly, the vast majority of working papers cover financial and non-financial drivers for the valuation and pricing of internet stocks. (b) IPOs of internet stocks comprise another area of interest, since they provide a focused laboratory for a fresh investigation of IPO anomalies (underpricing, hot markets, and long-run under-performance). (c) The internet boom and bust motivated many papers attempting to explain the phenomenon, espousing both rational and irrational models. (d) Other papers deal with the impact of the internet on investor behavior, such as the role of internet trading and corporate use of the internet for investor relations. (e) Finally, many papers undertake a discussion of internet information exchange and virtual markets.<sup>3</sup> Many

interesting common findings are to be found within these research areas.

A consistent finding is that internet firm valuations depend on *non-financial factors*, the most widely explored one being *web traffic*. Trueman, Wong, and Zhang [32] show that net income is not as related to stock prices as gross income. Further, web traffic, proxied by “eyeballs” (page views and unique visitor counts) is a useful explanatory variable. These results are complemented in Kozberg [23], Martinez and Clemente [27], Rajgopal, Kotha, and Venkataraman [31], where it is suggested that the market uses web traffic as a proxy for firm network effects. Consistent with Metcalfe’s Law of network effects,<sup>4</sup> market valuation is non-linear in web traffic. Hand [19] shows that only firm economic fundamentals, measured by short- and long-run profitability measures can explain firm value, and web traffic provides only weak explanatory power (he finds that unique visitors is better than page views as an explanatory variable). Jorion and Talmor [21] find that web traffic matters empirically, and put forward the hypothesis that as firms

mature, this non-financial factor loses importance. Hence, investment managers should be cognizant of life-cycle effects in the valuation of internet firms.

Internet valuations are closely tied to a firm's *marketing activities*. This is possible because of the link between market valuations and revenue announcements and expense projections. Hand's [20] work suggests that breaking down profits into revenues and expenses is useful. The intuitive case to be made is that internet valuations are convex in revenue news and concave in marketing expenses. This may have led to internet firms reporting gross revenues and even barter revenues to leverage the convexity effect, consistent with Davis [11]. Kou and Kou [22] find that, based on a birth–death process, the market capitalization of growth internet stocks may be represented by a power function of firm relative ranks by size. Demers and Lewellen [14] suggest that IPO underpricing by internet firms, and the attendant media attention is an effective strategic marketing device. Noe and Parker [28] offer a game-theoretic justification for the phenomenon in a winner-take-all model.

Many papers have explored the *initial public offerings* of internet firms in order to (a) examine IPO anomalies and (b) to assess whether these IPOs varied from those of non-internet firms. IPO underpricing increased sharply during the internet boom (by three times on a conservative basis). Loughran and Ritter [26] argue that this might have been more for strategic reasons than the increased risk of the firms that went public. Arosio, Giudici, and Paleari [5] find a similar phenomena occurs with European IPOs as well, and show that positive accounting data and market momentum are plausible reasons for underpricing in the range of 75% for internet IPOs. Ducharme, Rajgopal, and Sefcik [16] find evidence that media hype and the need to revisit the financing market support the observed underpricing of IPOs. They note weak evidence that post-IPO returns are actually lower for firms with more underpricing.

Hence, there is consensus that internet IPOs displayed exacerbated levels of underpricing relative to non-internet offerings. Bartov, Mohanram, and Seethamraju [7] provide related evidence that the relative size of the internet offering and the information gathered by the underwriter matter more in valuations than in the case of non-internet deals.

Given some consensus that internet stocks spanned a different set of factors than others, it is hardly surprising to find papers presenting *alternative valuation techniques*. Estrada [17] suggests the use of semi-deviation to account for the different downside risk of internet stocks when computing the cost of equity. It is shown that semideviation empirically explains the cross-section of internet stock returns. Fernandez [18] shows that accounting for downside risk (bankruptcy) and high variance in scenarios from investing in internet stocks delivers very different valuations for such firms when compared to traditional techniques. Perotti and Jansen [30] offer survey evidence that during the boom, valuation methods for internet firms were neither new or useful, and that the downturn in the sector was responded to by the dispensing with of simplistic valuation methods in favor of more complex ones using real options.

The exuberant rise and cataclysmic downfall of the internet sector has prompted many papers. Leaning on “behavioral” premises, over-optimism has been invoked to explain this *boom–bust* period. Ofek and Richardson [29] present a framework with heterogeneous agents, where the over-optimistic ones swamp pessimistic investors in the presence of short-sale constraints, resulting in a boom. They document that the bursting of the internet bubble was caused by excessive sales by insider's on the expiry of lock-up periods.<sup>5</sup> Ljungqvist and Wilhelm [24] link the over-optimism bubble to specific firm characteristics such as pre-IPO ownership structure and insider selling behavior. Insiders incentives to minimize underpricing were ameliorated, and

pricing behavior rejected this. Complementing these incentive effects, Liu and Song [25] argue that financial analysts share some of the blame, as they too rode the over-optimism wave and over-hyped stocks, to the detriment of the investor community. Antunovich and Sarkar [2] show that buy recommendations by NASDAQ analysts result in sharp improvements in short- and long-run prices and liquidity of stocks. Given the changing regulatory regime facing analysts, one can only speculate on whether the next boom–bust period will share the characteristics of the late 1990s.

The web has also changed the way in which *individual investors* relate to their portfolios, particularly with internet stocks. Companies are using the web to simplify and improve investor relations, and brokerage firms use the web to reduce costs and attract and retain business. Deller, Stubenrath, and Weber [12] survey web-based investor relations methods across countries and find that this approach quickly becomes pivotal when the investor base is diverse, and internet usage becomes widespread.<sup>6</sup> The presence of stock message boards has heightened small-investor debate about stocks. This discussion, labeled variously as “noisy, small, cheap” talk is being studied for valuation insights. Admati and Pfleiderer [1] examine equilibria when web opinions are known to be over-confident, and show that, in the presence of overconfidence, rational responses may, in fact, circumscribe the number of equilibria, resulting in an improvement in informational efficiency. Das and Chen [10] develop text analysis algorithms to parse investor sentiment from web postings on stock message boards. Many papers undertake an examination of investor messages on web forums with a view to detecting predictability. Wysocki [34] finds that changes in daily posting volume are correlated with earnings-announcement events, trading volume, and returns. Overnight message-posting volume is predictive of next day’s stock trading volume and returns. These results are extended by Antweiler and Frank [4], who find

that stocks with high posting volume tend to display high ensuing volatility and low returns. In another paper [3], they find significant relationships between message posting volume, trading volume, and volatility. Dewally [15] finds that stock recommendations on the internet result in no abnormal returns.<sup>7</sup> The jury is still out on whether this cheap talk has value.

Investment management is experiencing a closer relationship with the internet sector. There is growing evidence that valuations of internet firms depend on unique characteristics, different from non-internet firms. Product market interactions result in the increasing influence of non-financial factors in valuation methods. Internet firm IPOs are qualitatively and empirically different. The internet is changing the way investor relations are implemented by corporations, and modifying the information processing investors undertake and the way they trade. In the extreme, the internet creates markets in “virtual assets”, which may one day become an accepted asset class (see Castronova [8]).<sup>8</sup>

## Notes

- 1 Writing the initial “abstract” always raises the natural question of ground rules, which are best kept simple. They are as follows:
  - 1 Preference will be given to *topical* papers, that is, those that comprise the current “fashion” in the investment management business.
  - 2 The abstracts will try to draw papers from a single area, though this should not be a steadfast rule. An innovative, path-breaking paper should not be excluded simply for lack of quality companions. Commonality of topic amongst working papers need not comprise a “review” of the new literature in the area; this would be too ambitious.
  - 3 Quality and coverage of the selection is emphasized.
  - 4 The abstracts should comprise direction to interesting recent work, and not be taken to be a review or critique of the papers surveyed.

5 The abstracts will ignore many recently published papers, and hence by definition, are not necessarily or sufficiently a survey of the literature.

Material for the abstracts is drawn from the many working paper sites on the web, especially those of universities and other collections. Precise attribution of the dating of the paper will be avoided, as index searches may not always bring up the latest versions. However, every attempt is made to access the latest versions of the papers by visiting researcher's personal web pages.

- <sup>2</sup> There are likely to be many different ways to categorize this literature, and even more criticisms of any one classification. One can but invoke literary license as a defense.
- <sup>3</sup> This classification shamelessly ignores the entire literature on venture capital and private equity, certainly related to the internet. But this would not be manageable within the scope of this abstract.
- <sup>4</sup> The Law: "The value of a network is proportional to the square of the number of users."
- <sup>5</sup> See the published paper by Demers and Lev [13], which looks at the bust period more closely with a view to examine the characteristics of firms that survive the shakeout. They present a model to detect overvalued firms and find that it consistently predicts which firms experience greater drops in prices in the downturn period.
- <sup>6</sup> In a recently published paper, Choi, Laibson, and Metrick [9] examine investor trading in 401(k) plans and find that volume doubles with access to web-based trading facilities.
- <sup>7</sup> See Tumarkin and Whitelaw [33] for confirming evidence, and Bagnoli, Beneish, and Watts [6] for contradictory results, albeit in different information domains.
- <sup>8</sup> See *Wired* magazine, vol. 11.01, January 2003, pp. 108–113, where Julian Dibbell writes about how trading in virtual economies may be sufficiently lucrative for people to abandon day trading in stocks for assets in virtual economies.
3. Werner Antweiler and Murray Frank (UBC). "Is All That Talk Just Noise? The Information Content of Internet Stock Message Boards".
  4. Werner Antweiler and Murray Frank (UBC). "Internet Stock Message Boards and Stock Returns".
  5. Roberto Arosio (Politecnico di Milano), Giancarlo Giudici (Univ. Bergamo) and Stefano Paleari (Politecnico di Milano). "Why Do (or Did?) Internet-Stock IPOs Leave So Much 'Money on the Table'?"
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