One News, Many Views:

Strategy, Investor Disagreement, and Performance of Ventures Going Public

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Job market paper.Dated 21st June, 2020.
Work-in-progress.Confidential.

ABSTRACT

Evaluating an investment opportunity entails making decisions under uncertainty. If the future is inherently uncertain, not all investors will converge to an identical investment decision. While management research explains how investors respond - on average - to a wide range of factors, including the strategy disclosed by firms, it has generally overlooked how investors might come to disagree in response to such information. Investor disagreement matters insofar it determines several facets of financial-market performance, such as IPO underpricing, long-term stock price change, reaction to bad earnings news, and the cost of capital. I harness the research opportunity to examine how characteristics of firm strategy might determine the extent of investor disagreement in the context of going public. I argue that investor disagreement will be high when the strategy disclosed by a firm undergoing an IPO has high (a) imbalance between information about strategy and environment factors, (b) novelty vs peers and (c) degree of contingency projected in its plans. I find support for my predictions after analyzing disagreement sing a novel measure based on tweets posted to an investor-focused social-media platform during 577 US IPOs during 2015-2019, bypassing the inherent imprecision of traditional disagreement proxies. I inform extant knowledge on (a) financial resource acquisition and (b) investor behavior.

INTRODUCTION

The ability to acquire financial resources is key to the growth and survival of organizations, big or small. Funding performance is a function of how investors infer the underlying firm quality and value from signals and cues disseminated by the firm (Cohen & Dean, 2005). Literature provides a large body of evidence pertaining to broadly two categories of such signals or cues: a) "hard" information, such as on inter-organizational ties (Gulati & Higgins, 2003), intellectual property (Heeley, Matusik & Jain, 2007), and social capital of CEOs (Fischer & Pollock, 2004); or b) subtle or implicit cues, such as tone (Loughran & McDonald, 2013), figurative language (Cornelissen, Clarke & Cienki, 2012), and optimism (Anglin et al., 2018). In their effort to explain financing outcomes, most scholars have directed their efforts towards explaining one dominant distributional property of investor response – the average. The focus is justifiable because, in many contexts, higher (lower) investor evaluations would translate to raising more (less) capital or superior (inferior) resource-acquisition outcomes, more broadly.

However, little scholarly focus has been accorded to another attribute of investor response: variance. No investor can know for sure what the future holds for a firm seeking capital (Knight, 1921; LeRoy & Singell, 1987). They can, at best, arrive at well-informed conjectures about the firm value or stock price. If the future is obviously uncertain, investors cannot somehow converge to a uniform investment outlook, a phenomenon widely labeled as investor disagreement in financial economics. Disagreement or variance is the response to true uncertainty, as opposed to true risk, where the distribution of future returns is known with certainty.

> Peloton's suspect accounting and outrageous claims about its total addressable market suggest a WeWork-like perception of reality. (Forbes, 16 October 2019, questioning the high valuations accorded to the IPO of Peloton, a home exercise equipment startup)

> In the eyes of some, the high market valuations commanded by technology stocks, relative to other stocks, were the result of collective irrationality on the part of these investors and were not indicative of the underlying value of these firms. In the eyes of others, these valuations were reasonable indicators that the future belongs to these internet interlopers. (In Ch. 1 of The Dark Side of Valuation, by Aswath Damodaran)

> No one knows what anything is worth. (TechCrunch, 12 June 2019, in the context of valuing IPOs of pre-revenue startups)

What might organizational scholars miss out on if we do not research how investors come to disagree among themselves? It is disagreement, rather than the average investor response, that determines a host of critical long- and short-term capital-market outcomes. Some notable consequences of higher investor disagreement are; higher IPO underpricing (Miller, 1977; Hong & Stein, 2007); lower future stock price growth (Kim, Ryu & Seo, 2014); greater failure rates of M&A deals (Lee, 2020); increased cost of capital (Bloomfield & Fischer, 2010); amplification of negative reaction to bad earnings news (Mashruwala & Mashruwala, 2014); value stocks outperforming growth stocks (Doukas et al.,2004); and greater risk-premium-seeking by investors (Carlin et al., 2012). Thus, developing a more comprehensive understanding of organizational performance entails research into possible antecedents of investor disagreement.

In this study, I take one step towards harnessing this promising research opportunity by studying one class of factors causing investor disagreement. I ask if the *characteristics of the strategy disclosed by a firm affect the extent of investor disagreement?* I also look to establish certain possible *economic consequences of investor disagreement.* Through this effort, I aim to add to extant knowledge of financial resource-mobilization as well as investor in response to uncertainty.

I consider three elements of strategy, each accounting for an important facet of a firm's interactions with the world. I hypothesize that investor disagreement will be high when a firm's strategy has high (a) imbalance between strategy and environment elements, with the locus of strategy tilted one way or the other, (b) novelty, in terms of how the strategy relates to that of comparable firms, and (c) contingency, reflecting how realizing targeted performance depends on performance drivers materializing as predicted. Strategies high on imbalance, novelty, and contingency impede fluent information processing (Rindova et al., 2010) by investors. The impediment results in investors experiencing a loss of control while interpreting and analyzing firm strategy. They aim to regain control by seeking non-existent patterns among information (Whitson & Galinksy, 2008). In other words, investors proceed by connecting the dots. The higher the scope for conjecturing and subjectivity, the higher the disagreement or polarization among the investor pool.

I articulate and ground my theory in the event of going public - in order to leverage two advantages. First, at IPOs, firms are mandated to disclose substantial volumes of information about its strategy, providing an opportune setting to study the effect of strategy on investor disagreement. Second, the key IPO performance metric – IPO underpricing (the "money left on the table" by the firm) - rises with rising disagreement among prospective first-day investors, letting me measure performance implications of disagreement at the most high-profile event in a growing firm's lifecycle. I assess support in the empirical context of IPOs of 577 ventures that went public on NYSE and NASDAQ during 2015-2019 and find evidence consistent with my hypotheses. Notably, I exploit the proliferation of user-generated content on social media to pinpoint disagreement in stock evaluations tweeted on a leading investor social-media platform. The move enables me to overcome the imprecision unavoidable in conventional, trading-volume

proxies of disagreement. I use computer-aided and dictionary-based text analysis techniques to characterize firm strategy from information disclosed in IPO prospectuses. Finally, I bring to bear recent advances in matching techniques to aid causal inferencing. Key findings are robust to a set of theoretical and empirical concerns about validity.

THEORETICAL FRAMEWORK

Investor Response: The Average and Beyond

Capital-raising exercises witness firms communicating their past and planned future strategy. The audience comprises market participants such as investors, analysts, and the media. Funding performance is a function of how investors infer the future prospects of a firm from information disseminated by it (Cohen & Dean, 2005). In many contexts, higher investor evaluations translate to raising more capital or having better financing terms, more broadly. Conversely, lower investors evaluations generally usher in inferior financing outcomes. In their effort to explain financial-market performance, organization scholars have justifably focused on one dominant distributional property of investor response – the average.

In doing so, to their great credit, they have built a substantial body of research into attributes of information about the strategy that explains average investor response. Such factors may have to do with "hard" economic observables, such as founders'/ CEOs background (Burton, Sørensen & Beckman, 2002), social capital of CEOs (Fischer & Pollock, 2004), attainment of patents (Hsu & Ziedonis, 2013; Heeley, Matusik & Jain, 2007), and affiliation with prominent industry players (Stuart et al., 1999; Gulati & Higgins, 2003) or trusted parties (Shane & Cable, 2002; Kirsch et al., 2009). At the same time, uncertainties may render a rational-deductive investment decision difficult (Simon, 1972), and investors can resort to subjectively

constructing investment opportunities in their minds. Such investors are prone to be sensitive to "soft" dimensions of the communicated strategy- ranging from the form (Kirsch, Goldfarb & Gera, 2009), content (Gorbatai & Nelson, 2015), tone and sentiment (Loughran & McDonald, 2013), to metaphors elaborating strategy (Sarkar & Crilly, 2019). Finally, investors could be sensitive to factors originating from outside the firm-investor pair, for example, emotions triggered by such incidental factors as daily sunshine (Dushnitsky & Sarkar, 2018).

However, the scholarly focus accorded to another distributional property of investor response has been rather frugal: variance. No investor can know for 100% sure what the future holds for a firm (Knight, 1921; LeRoy & Singell, 1987). They can, at best, arrive at well-informed conjectures about the firm value or stock price. If the future is obviously uncertain, investors cannot somehow converge to a single investment outlook. While some investors would be willing to invest, others will decide to abstain. Investor disagreement, as financial economics scholars call it, is, therefore, hardly surprising. However, does investor disagreement merit the attention of management researchers simply because we have not charted this territory so far?

Uncertainty, Disagreement, and Performance

The phenomenon of investor disagreement is of theoretical as well as pragmatic interest to the study of organizations. First and foremost, the theoretical consideration. Disagreement/ variance and the average capture investor response to two theoretically very different states of the world. The average captures investor response to risk, i.e. the distribution of possible outcomes is known even if the precise outcome is uknown. For all its virtues, impounding the response of the investor pool to one metric rests on one restrictive – if implicit – assumption. All investors are assumed to have identical estimates of the expected return and the probability distribution of return from the contemplated investment. Or at least the investors are free to have

an identical estimate. Sharpe (1964) called this a homothetic expectations model. To illustrate: suppose three investors value a firm X at $6, on average. All we needed to know was the average; $6. The three might as well had valued firm X identically at $6. All the average reveals is that, a different firm Y was valued at $4 on the average. The discernment is between a "good" and the null of a "bad" firm. It is as if the investors could zero in on these valuations with unhindered clarity and ease. Focusing on the average allows for the investor pool effortlessly comes to a single, overall response. In other words, the average captures a response to risk, i.e., a known unknowns (think of a roll of dice).

Investing in a firm's equity is placing bets on the future. It is an exercise in true uncertainty, i.e., unknown unknowns (Knight, 1921). It is unrealistic to expect the investor pool to have an identical estimate of the future when the very distribution of future returns is essentially speculative. This should be especially relevant in the case of young or private firms. Disagreement captures the response to this uncertainty. The more truly uncertain the prospects of a firm are, the more unlikely will it be for investors to approach a consensus. Thus, while the average valuation can be the same ($6) in the following two cases, three investors valuing a firm at $10, $6, and $2 is a different state of the world that them valuing the firm a $7, $6, and $5. The extent of disagreement is higher in the former, symptomatic of difficulties in ascertaining the "true" value of the firm. Conversely, a convergence of estimates, it stands to reason, projects that investors face less difficulty in coming up with their valuations. The discernment is between an "easy to value" firm against the null of "difficult to value" firm.

Investor disagreement serves as a platform to study response to true uncertainty- as distinct from true risk. Many studies have treated risk and uncertainty interchangeably (and somewhat justifiably so because disentangling the two can be empirically difficult (Miller,

1977), and the economic implications can be hard to pinpoint). However, such constraints aside, risk and uncertainty are theoretically distinct notions, however subtle the distinction may be. Discerning between easy- and difficult-to-value firms is a different prospect from discerning between good and bad firms. Studying only the average investor response makes us lose sight of the former dimension.

The second important implication is that disagreement has its independent bearing on organizational performance. It is investor disagreement, rather than the average investor response, that determines a host of critical long- and short-term financial performance metrics. Some notable outcomes determined or predicted by higher investor disagreement are; higher IPO underpricing (Miller, 1977; Hong & Stein, 2007); lower future stock price growth (Kim, Ryu & Seo, 2014); greater failure rates of M&A deals (Lee, 2020); increased cost of capital (Bloomfield & Fischer, 2010); amplified stock price fall to bad earnings news (Mashruwala & Mashruwala, 2014); value stocks outperforming growth stocks (Doukas et al.,2004); and investors demanding higher risk premiums (Carlin et al., 2012); Thus, examining the relationship between firm strategy and investor disagreement can open the door to a more comprehensive understanding of performance variance among organizations.

Going Public, Strategy, and Disagreement

Henceforth, I will articulate and ground my theory in the context of IPOs to leverage two advantages on offer. First, the key IPO performance metric – IPO underpricing, i.e., the "money left on the table" by the firm – rises with a rise in disagreement among potential first-day investors (e.g., Gouldey, 2006; Hong & Stein, 2007; Miller, 1977). I will elaborate on this relationship subsequently. This allows me to shine a spotlight on organizational performance at arguably the most high-profile milestone in the lifecycle of a growing firm. Investor

disagreement leads to poor IPO performance, and thus bears implications for the scholars of organizations.

Second, in this study, I will double down on one set of possible drivers of investor disagreement: firm strategy as disclosed to financial market participants. IPOs are highly-regulated and scrutinized events where going public mandatorily disclose a substantial quantum of information about its past and future strategy (e.g., Carpenter, Pollock & Leary, 2003; Cohen & Dean, 2005). Thus, IPOs provide an opportune setting to study rich strategy information as an antecedent of investor response, something of long-standing interest to management research.

Attributes of firm strategy can systematically elicit heterogeneous interpretations. I start with this rather general and unrestrictive axiom. Hence my theory does require assumptions about the distribution of documented heterogeneities among investors or informational inefficiencies in the financial market. To the extent that some strategies may have multiple interpretations, there is scope for the investor pool to polarize among optimists and pessimists. The strategy itself can cause investors to disagree - and IPO underpricing to materialize. I should note that the appropriate counterfactual is investor convergence, regardless of whether they converge towards a high or low average outlook. I will go on to evaluate three dimensions to characterize the strategy of a firm going public, each accounting for an important dimension of a firm's interactions with the world outside. These are (a) locus, (b) novelty, and (c) contingency.

I coin the term "locus" to denote whether a firm's strategy is more developed around factors within firm boundaries or the environment, or has an equitable balance between the two classes of factors. Strategy scholars have time and again surfaced the intermeshing of strategy and the environment in driving performance (e.g., Hansen & Wernerfelt, 1989). Investors are

thus likely to weigh the two aspects against each other while making investment decisions. Second, novelty…A firm's performance depends on how its strategy plays vis-à-vis the strategies of comparable firms. Thus, investors attach importance to gauging how novel or differentiable a firm's strategy is by comparing it against strategies of comparable firms (e.g., Navis & Glynn, 2011). Finally, consider contingency. Investment decisions are placing bets on the future performance of a firm. And, the future is not 100% certain, as it is contingent on various business conditions, strategic decisions, etc. materializing as per plan. Thus, the investor relies heavily on subjective projections of how such contingencies will unfurl with the passage of time (e.g., Huang, 2018). In summary, the scope of the study is about how investor disagreement is driven by investor's interpretation of firm strategy in the light of three important extra-firm influences; (a) the environment, (b) other firms, and (c) the future.

Strategy Locus: Tilting Towards the Firm or the Environment?

Organizational performance does not depend on its strategy alone, nor does the environment determine it solely. Strategy literature has a rich history of documenting how performance follows from an interdependent, co-evolving relationship between strategy and the external environment (Hansen & Wernerfelt, 1989; Kotha & Nair, 1995; Venkatraman & Camillus, 1984). Unsurprisingly, during capital-raising events, firms will disseminate information that can be categorized as being about the strategy or the environment, or about factors controllable and uncontrollable by the firm (Ackoff, 1967). For example, core strategic aspects such as product development, manufacturing, supply chain, and capital structure are under the firm's control to a much greater extent than environmental elements such as the regulatory regime, market trends, or competitor moves.

It stands to reason that investors, while evaluating investment opportunities in a firm, will form their judgment after combining their evaluations of firm strategy and its environment holistically. Key actors such as investment advisory firms and equity investors surface the importance of analyzing strategy and the environment together.

> The [process] for building a sturdy, durable business plan… involves a rigorous examination of the substance of the plan – how it compares with market trends. The second step tests for ambition level—how far-reaching the plan is. It draws on external market data (Anatomy of an Ideal IPO Candidate, BCG, 2018)

> I cannot see a strategy in isolation from what's happening in the market. Similarly, just because the market is projected to grow doesn't automatically mean you have the right strategy. (Interviewee, 2018)

The cognitive process that an investor has to undertake, in essence, is information organization (Zadeh, 1997; Rindova et al., 2010), where they process information about parts (strategy and the environment) into the whole (their overall outlook on the firm). Indeed, the decision science posits information organization – combining smaller units of information and processing them holistically – as one of the fundamental cognitive processes (Zadeh, 1997), a concept that has found application in management research (e.g., Campbell et al., 2016). The right balance between the strategy and environment leads to a clear understanding of the IPO firm's future growth potential and, by extension, convergent investor opinions on the aggregate. Gestalt research in strategy corroborates the combining-parts-into-whole view. In the Gestalt view, processing fluency is enhanced when interconnected buckets of information are in relative balance or match well (Rindova et al., 2010). A well-balanced strategy – in terms of the equitable level of development or detail of "strategy" and "environment" factors is very likely to facilitate fluent processing of prospectus information.

Conversely, if the focal firm's strategy is much more developed and detailed on strategy/ controllable aspects rather than environment/ uncontrollable aspects, one's questions about what market or industry trends the firm is addressing will remain unanswered. These open questions will induce heightened conjecturing. Similarly, disproportionately high levels of environmental information would make investors speculate about what strategies the firm has in place for enmeshing with the current and future environment. If there is a mismatch in levels of information in the two buckets, organizing information to paint a holistic picture becomes difficult. When fluent information processing is hindered because of the nature of the stimuli at hand, prospective investors are said to experience a loss of control. Recent advances in cognitive psychology demonstrate that under such conditions, individuals resort to a compensatory mechanism called (illusory) pattern perception (Whitson & Galinsky, 2008). This involves seeking patterns or connecting information in ways that simply do not logically or objectively follow from the information at hand.

Simply put, an imbalance between the level of information provided about a firm's strategy and the environment leads to investors making their own subjective analyses or conjectures to carry on with the investment decision-making process (Rindova et al., 2010). While some investors may be swayed into taking a positive investment outlook, it is similarly possible for investors to be negative. I articulate the following hypothesis.

Hypothesis 1: The extent of imbalance between strategy and environment aspects of the firm's strategy is positively associated with the level of disagreement among prospective investors.

Strategy Novelty: Inevitable Comparisons With Other Firms

The strategy of any firm will comprise elements similar to strategies of comparable firms, as well as elements that differentiate itself from peers (Hanley & Hoberg, 2010). There are two sets of countervailing economic considerations that result in this similarity-novelty mix. First, consider the strategy of a focal firm. In the literature, there is well-established evidence that managers live under pressure to simultaneously project the conformity and uniqueness of their strategies (Navis & Glynn, 2011). While high novelty may engender positive evaluations on account of perceived differentiation, it can elicit discounting by prospective investors on account of low interpretability and relatedly, high risk. On the contrary, very low novelty can facilitate strategy interpretation but can make investors struggle to see how the firm will differentiate itself from its competitors.

Second, consider this phenomenon from the lens of regulatory compliance. On the one hand, most strategies – as communicated to stakeholders – will have "boilerplate" legal and financial jargon. These might render a firm's strategy similar to others. On the other hand, the board of directors is liable for misrepresentation and concealment of information, inducing firms to disclose ample information that is idiosyncratic to its strategy (Hanley & Hoberg, 2012). Hence all strategies, even for undifferentiated products and services, are certain to appear as novel to some extent

How might investors interpret novel strategies? Paradoxically, investors compare and contrast focal firm strategy against those of a comparison set of firms. Over and above management scholars, investors have articulated this apparent paradox.

> Ensure that each claim in your story can be compared with the claims that your peers make. By doing so, you'll address the themes that are relevant to your potential investors and analysts. And you'll validate whether your

> company truly has a unique position in its industry. (Anatomy of an Ideal IPO Candidate, BCG, 2018)

> One of the most important things, to begin with, is by mapping a company's business plan and business model to what others have been doing the same industry. (Interviewee, 2018)

What happens when a particular firm's strategy comes across as too novel? For example, if a firm describes its technology in a novel way, with no clear mapping to existing technologies, investors will be left to speculate about future performance. While, if the same technology is described in a standard way, the investor can make up their mind more readily, and converging – either towards optimism or pessimism – on the aggregate. Prior research points towards investors having difficulties in interpreting novel strategies or changes in technological paradigms on account of the said poor mapping (e.g., Benner, 2007, 2010; Benner & Zenger, 2016). While some investors may assume a positive outlook, others may be liable to evaluate the strategy negatively. This can lead to highly-dispersed opinions in aggregate.

Individuals process complex information by breaking it down into smaller pieces of information, a process called information granulation (Zadeh, 1997). Granulation is a key cognitive process through which individuals make decisions in environments of imprecision, uncertainty, and partial knowledge. Then individuals compare these new information granules against information granules, making up their existing knowledge schema, and evaluate the new information (Yao, 2001). The existing knowledge schema, it stands to reason, is a function of investor interpretations of strategies of other IPO firms from the same consideration set. This set comprises (potentially) rivalrous and contemporaneous IPOs (Hanley & Hoberg, 2010).

When the focal firm's strategy is structured in a novel or unique way, it becomes difficult for investors to clearly process and interpret the granules, as they do not correspond well to

existing knowledge schema. What ensues is a pattern-seeking effort to compensate for the processing difficulties (Whitson & Galinksy, 2008; Rindova et al., 2010). The heightened speculation will surface as a dispersed or polarized investor outlook on the aggregate.

Hypothesis 2: The extent of the novelty in the strategy of the firm, vis-à-vis strategies of comparable firms, is positively associated with the level of disagreement among prospective investors.

Strategy Contingency: The Prospect of Plans Materializing

Strategies – especially those communicated by firms to market participants – are almost by definition forward-looking in nature. They enable market participants to evaluate what lies ahead, and infer future economic potential (Jegadeesh & Wu, 2013). It is obvious that the future is uncertain and not entirely controllable, yet entrepreneurs and managers are mandated to competently communicate about the future. Indeed, a firm's strategy will succeed (fail) only if several factors such as demand growth, regulatory climate, manufacturing capabilities, to name a few, gel well.

An important way to communicate such contingencies is through subjective or verbal probability expressions (Savage, 1972) in strategy documents such as prospectuses. For example, words and phrases such as could, might, possibly, if…then, variability, potential, subject to, etc. Note that I use the term contingency in this paper as distinct from (wilful) use of linguistic hedges as a smokescreen device to hide negative information from investors. First, the said expressions help managers convey the inherently uncertain nature of strategy in a readable, standard manner. Given how managers can never predict the future with 100% certainty but only

place bets on it, a certain degree of contingency is unavoidable – and even necessary – to be built into a firm's strategy and how it is communicated to investors.

Second, given that firms can be held liable for misrepresentation and concalment of material strategy information while filing for an IPO, managers would prefer to frame statements in a way that does not tantamount to promising certainty. This induces them to make salient the contingent nature of their firm's future performance. Furthermore, managers are often capable of demonstrating cognitive sophistication (Crilly & Ioannou, 2017) – for example, being aware of the interconnected and often conflicting nature of various strategic initiatives. They are hence likely to depict the various contingencies while communicating strategy to stakeholders.

The presence of contingencies can affect strategy interpretation in a profound way. Such expressions do not automatically confer precise numeric probabilities to a set of counterfactual future states. Rather, it is made incumbent on the investors to do so (Tinsley & Weiss, 1975; Winkler, 1968). The basic cognitive process that they have to undertake is causation, i.e., inferring cause-and-effect patterns and assigning numeric probabilities to future outcomes in order to make their investment decisions (Kahneman & Tversky, 1982). Literature has rich evidence of how one-to-one mapping does not exist between verbal and numerical probabilities. Even subject matter experts are polarized when tasked with interpreting verbal probabilities (Hampton et al., 1973). For example, "possible growth" may be interpreted as an 80% chance by an investor; another can easily interpret it as 50%. Unsurprisingly, prominent investor resources emphasize the inevitability - and the importance of taking into account - of such contingencies in decision-making.

> Every forward-looking figure in the prospectus is only a projection. Therefore, there is no guarantee the company will meet all or even any of its targets for

> sales and profits. Because of the inherent uncertainty of these projections, investors must ask themselves whether they feel the assumptions are realistic. (Investopedia's Interpreting a Company's IPO Prospectus Report, 2020).

In the absence of any unequivocal mapping between numeric probabilities and such contingencies, investors experience difficulties in assigning causation. As a response, they resort to pattern perception as a compensatory mechanism to facilitate investment decision-making. The ensuing subjectivity and conjecturing lead to dispersed evaluations among the investor pool.

Hypothesis 3: The extent of contingency in a firm's strategy is positively associated with the level of disagreement among prospective investors.

Investor Disagreement and IPO Performance

I come back to the performance implications of investor disagreement. As surfaced previously, disagreement determines the financial performance at the most high-profile juncture of growing ventures – that of going public. IPO underpricing, the key performance metric at IPOs, is the increase in the price of a stock as measured at the close of the first day of the IPO, relative to the offer price at which it was listed for sale. IPO underpricing tantamounts to money left on the table by the ventures going public, because it is the extent of shortfall in cash proceeds (vs. the market-determined price) the IPO firm receives in lieu of sale of equity (Cohen & Dean, 2005; Heeley et al., 2007; Pollock & Rindova, 2003). Literature in financial economics documents that IPO underpricing increases with an increase in disagreement among prospective first-day investors, rather than the average investor sentiment (e.g., Miller, 1977; Hong &stein, 2007; Goudey, 2006).

Consider a common value action – the way most US IPOs are designed - wherein the bidders (i.e., prospective investors) do not know the item's true, intrinsic value when they bid. Instead, they independently estimate the value of the item before bidding (Thaler, 1988), in this case, based on publicly available information about the IPO firm's past and future strategy. The auctioned asset goes to the bidder(s) with the most optimistic bid(s). The bidders' average bid has no direct bearing on the sale price. Similarly, in the case of IPOs, as long as there is no perfect convergence, and the entire supply of shares can be bought out a finite number of investors, firm value or stock price will reflect the preferences of optimists to a greater extent than that of the pessimists. An increase in disagreement between optimists and pessimists will increase the market-clearing price of the IPO firm's stock for the same average bid (Figure 1).

Insert Figure 1 about here

Securities regulations in the US serve to further solidify the said disagreement-underpricing relationship. The US Securities and Exchanges Commission (SEC) prohibits short selling of shares during the month or so from the opening of an IPO (Edwards & Hanley, 2010). This results in pessimistic investors being crowded out by their optimistic peers (Mei, Scheinkman & Xiong, 2009) since the former group of investors cannot short IPO shares and drive the share price down by artificially expanding supply of shares. Thus, there will always be a polarization between optimistic and pessimistic investors at IPOs, serving to sustain IPO underpricing. Consistent with the literature thus reviewed, I seek to validate the disagreement-underpricing relationship in the specific context of this study. This hypothesis can serve to quantify the performance consequence of investor disagreement at perhaps the most high-profile event in the life-cycle of a growing organization.

Hypothesis 4: The extent of disagreement among prospective investors at an IPO is positively associated with IPO underpricing.

RESEARCH DESIGN

Research Setting

The institutional setting is that of US IPOs during the five years spanning 2015-2019. The sample comprises 577 "true" IPOs (e.g., Pollock & Rindova, 2003), after disregarding secondary offerings, real estate investment trusts, exchange offers, American Depository Receipts, etc. I list the year-wise, industry-wise, and funding summary of the IPOs in Table 1.

Insert Table 1 about here

I create a proprietary dataset by combining data from several databases. The key data sources are; StockTwits, a leading investor-focused social-media platform with Twitter-like interface (Cookson & Niessner, 2019) for investor opinions; CRSP (Pollock & Rindova, 2003), Yahoo Finance (Mao et al., 2012), and Crunchbase for stock price data; SEC EDGAR for IPO prospectuses (Pollock & Rindova, 2003); Compustat for accounting data (Sanders & Boivie, 2004); Thomson Reuters I/B/E/S for analyst forecasts (Rao, Greve & Davis, 2001); Factiva for pre-IPO media coverage (Gupta, 2018); USPTO and Stanford Law School databases for IP and IP litigation (Heeley et al., 2007); and Stanford Topic Modeling Toolbox (nlp.stanford.edu) for Topic Modeling analysis (Kaplan & Vakili, 2015). In addition, I interview 12 individuals – equity investors, investment bankers, and stock exchange senior executives to inform my hypothesis, and if practitioners echo my findings. I summarize the interviewees' profiles in Table 2.

Insert Table 2 about here

Investor Disagreement & Social Media

I calculate investor disagreement from user-generated opinions at an investor-focused micro-blogging platform. The approach has important advantages over imputing disagreement from conventional, trading volume proxies. First, this helps account for "bearish" investors, i.e., prospective investors who chose not to invest in the IPO after considering it. Second, this helps pinpoint actual investor evaluations, regardless of their eventual trading decision (which can incorporate considerations other than investment attractiveness, such as liquidity constraints, investment portfolio rebalancing, or capital gains tax) (Cookson & Niessner, 2016).

Investor Disagreement equals variance (bullish, bearish, neutral), derived from the proportion of posts with bullish, bearish, and unclassified sentiment tags, respectively, posted on Stocktwits, from seven days prior to the IPO and until the close of the stock market on IPO first day. StockTwits was founded in 2008 as a social networking platform for investors to share their opinions and predictions about companies and their stock prices. It runs a web-based as well as a mobile application. See Figure 2 for an image of its web interface. The website has a Twitter-like user-interface where participants post tweets (currently up to 1,000 characters) and – along with similar social media platforms, have been used in recent work (e.g., Cookson & Niessner, 20186; Antweiler & Frank, 2004).

Insert Figure 2 about here

On StockTwits, users regularly express their opinions predicting the future movement of stock price/ firm valuation. They also have the option of categorizing or labeling each tweet with a "bullish" (i.e., optimistic or willing to invest) or "bearish" (i.e., pessimistic or not willing to invest) sentiment. Figure 3 shows the posting interface that is available to the users.

Insert Figure 3 about here

To register with StockTwits, a user reports via an online form his or her investment approach, investment horizon (or holding period), and experience level. For most users, I can observe a self-reported investment approach (e.g., technical, fundamental, momentum), user's holding period (e.g., day trader, swing trader, long term investor), and their experience level (e.g., novice, intermediate, or professional). I also observe their engagement and influence on social media (tweeting frequency, followers, subscribers) as well as the viral spread of each tweet (likes, retweets). Figure 4 shows the image of a sample Stocktwits user bio.

Insert Figure 4 about here

Finally, I am interested in knowing when investor posts their tweets and how it matches with IPO timelines. For example, the investor may be posting just before, during, or after the IPO opening day, or when they update their beliefs, or in the evenings after work when they have more free time. From my data, it is evident that investors predominantly post messages (about 80% of total) when the markets are open (Monday-Friday and between 9 am and 4 pm). These are consistent findings in recent work that find that investors are updating their messages in real-time as financial events unfold (Cookson & Niessner, 2016).

In addition, notwithstanding the limitations inherent with conventional trading volume proxies for investor disagreement, I will use it to check the robustness of the main results (described subsequently). I measure *disagreement (trading volume)* as the ratio of the number of shares traded on opening day and the number of shares available for sale at the IPO, in line with past research (e.g., Bamber, Barron & Stober, 1997).

Capital-Raising Performance

The other key variable is*; IPO underpricing*: IPO underpricing (which is the relative change in an IPO firms' share price, from the offer price to the price at the close of first day's trading in the stock market (e.g., Pollock & Rindova, 2003). It is widely acknowledged and documented as the key measure of fundraising performance at IPOs. Higher the underpricing higher is ‘money left at the table by the firm, i.e., lower the cash proceeds that accrue to the firm relative to the market-determined value at the close of the IPO. Despite the unusual nomenclature, underpricing is bad. In other words, a superior IPO performance means an underpricing as close to zero as possible.

Main Independent Variables

I compute the strategy variables from analyses of the text of the Risk Factors section of the final IPO prospectuses of the firms in my sample. The final IPO prospectus, also called filing number 424(b)(4), provides information about the offering itself, a brief history of the firm’s business, information related to past financial performance, ownership details, and the risks associated with the investment. The investment community recognizes that the most detailed and precise information about the issuing firm is found in the prospectus (Hanley & Hoberg, 2010). Second, the prospectus is made public in the days and weeks prior to IPO going live, so all investors in the population have free access to an identical information set. Finally, the SEC mandates a "silent period" in the run-up to an IPO, where firms and information intermediaries are prohibited from broadcasting information that is extraneous to the prospectus. These collectively point to the primacy of IPO prospectus as the source of information on IPO firms’ strategies.

Now, the entire prospectus is a voluminous body of text, often exceeding 100,000 words. It stands to reason that investor focuses their attention on certain sections which they deem to be more informative than others, and containing information not available from other sources such

as news reports. Scholars have found Risk Factors section information to be a significant predictor of future outcomes such as survival and long-run stock price (e.g., Bhabra & Pettway, 2003). Furthermore, the informativeness of Risk Factors was articulated by interviewees.

> "Media coverage is mostly neutral or positive. That is not a true reflection of reality. Devil is in the Risk Factors section." (Interviewee, 2018)
>
> "The true colors of the business model, the strategy is only revealed in the Risk Factors section. Very few investors in practice have the resources to analyze the full contents of a Prospectus. Risk Factors is the single-most-important section." (Interviewee, 2018)

Locus (H1): Is the absolute difference in frequency of words belonging to two dictionaries, "strategy" and "environment." A high level of *locus* variable indicates a high degree of imbalance between the extent to which the strategy and environment portions of the prospectus is developed. A score closer to zero indicates a relatively better balance. In the absence of well-established dictionaries in the literature, I constructed the dictionaries using the services of two independent finance experts blind to the purpose of the study. The interrater agreement was very high (Cronbach's alpha=0.77). All disagreements were resolved through discussions with the author. Tables 3-4 list the strategy and environment dictionaries.

Insert Tables 3-4 about here

Novelty (H2). I measure this variable from an unsupervised learning-based text analysis method. I equate *novelty with* Jensen- Shannon (JS) Divergence – a Topic Modeling measure - which takes a value between 0 and 1 depending on cosine distance between the distributions of topics of two documents (Lin, 1991). The final value of *novelty* is the average of all JS scores for all pairs of risk factor sections of prospectuses in the comparison set, comprising all IPOs (a) in the same industry, as identified by the 2-digit SIC code and (b) listed the same calendar year. This is a methodological move in line with Kaplan & Vakili (2015), who argue that readers often

sense novelty through shifts in how content topics relate to each other in a corpus of textual information. I implement the procedure using a Python program, which took as inputs the text files, the number of topics (which I set at 20), and the number of iterations (which I set at 1,000).

Contingency (H3). I measure this as the frequency of words from the "uncertainty" dictionary developed by Loughran & McDonald (2011). This is a well-established dictionary of words carrying connotations of imprecision or vagueness, a notion inseparable from subjective or verbal probability expressions. I should note that the notion of imprecision implied here is different from the notion of risk, as explained by the aforementioned authors. I list the contingency dictionary in Table 5.

Insert Table 5 about here

Estimation Strategy for H1-H3

An important concern I account for is the possibility of self-selection. In the current setting, this translates to firms with higher intrinsic quality having superior, ex-ante information about how the properties (locus, novelty, contingency) of their strategy influence investor disagreement. These firms will be in a position to use the information to select into more promising types of strategies. In the absence of a natural experiment, I use a matching technique to perform an as-if random assignment. In an observational study, the treated and untreated groups are not directly comparable, because they may systematically differ at baseline. Matching techniques can play an important role in balancing the study groups to make them comparable to quality while differing on the treatments. The treatments are endogenized. Then, the net effect of treatment on the outcome is estimated after accounting for possible selection effects. In this analysis, the treatments are the three properties of firm strategy of interest (H1-H3).

Specifically, I bank on recent methodological advances and use a technique known as Covariate Balancing Generalized Propensity Score (CBGPS). Let us look at what the method can deliver according to scholars instrumental in developing this method, including Imai & Ratkovic (2014) and Bia & Mattei (2008). First and foremost, the propensity score approach is used to adjust for observed confounders/ self-selection drivers through matching treatment and a control group. To perform this matching-on-observables operation, I marshal the raft of predictor variables that I will describe at a subsequent section. Second, conventional propensity score methods compare across only two subgroups – one treatment and another control group. In this study, impounding all variation among firms to only two levels could entail discarding useful variation in quality among firms. A more promising approach would not require such restrictive assumptions on the data. This concern is addressed by the second key element of the method: generalized, thus being capable of accounting for multiple or continuous treatments. Finally, the element of covariate balancing…This approach exploits the dual characteristics of the propensity score as a covariate balancing score and the conditional probability of treatment assignment. This is said to dramatically improve the poor empirical performance of many older, conventional propensity score matching and weighting methods. The improvement is useful as even slight misspecification of the propensity score model can result in substantial bias of estimated treatment effects.

In terms of implementation, the CBGPS method works in two steps. The first step estimates the propensity score based on the vector of predictor variables. In this step, I run the procedure with five treatment levels. The cut-points I use are the 20,40, 60, and 80 percentile points of the corresponding treatment variables (locus, novelty, contingency). The second step computes the average treatment effect – the causal effect I am interested in – using the

propensity score thus estimated. Here, investor disagreement is regressed on the propensity score and the treatment variable. I also include as covariates the square of the treatment variable and the interaction of the treatment and the propensity score.

Variables for Matching

This is a comprehensive set of drivers of IPO performance, documented in studies such as Butler et al. (2014), Bhabra & Pettway (2003), Certo, et al., (2003), and Cohen & Dean (2005). See Figure 5 for the process flow, timelines, and key actors involved in a typical US IPO that helps see how these variables fit into the larger picture.

Insert Figure 5 about here

These are; company financials (*log revenue* (in US$ millions), *return on assets* (%), *leverage,* the scope for information asymmetry and moral hazard (*post-IPO equity retention by insiders* (% of total shares outstanding), *asset tangibility* (%)), innovation and associated risks *(R&D expenses to assets, log patents, number of current or past patent litigations*), expert certification (*VC-backed IPO?, underwriter prestige* (coded as 1 if the lead or co-lead underwriter was one of the five largest banks, by underwriting market share in my data, and 0 otherwise. The banks are; Goldman Sachs, JP Morgan Chase, Bank of America Merill Lynch, Morgan Stanley, and Credit Suisse.), underwriter incentives and motives (*underwriting fees and discounts* (% of gross IPO proceeds)*, firm-commitment or best-efforts basis IPO?),* strategic due diligence and hence, IPO pricing quality and reliability (*number of price revisions* (between IPO registration and final prospectus filing*),* governance quality and independence (*CEO elite education (*measured as the count of elite institutions attended, from the list of Finkelstein, 1992) *board size, number of outside directors, insider-outsider directors ratio, board members' total*

work experience), overall financial market sentiment (*NYSE composite index,* the average for the month preceding the IPO*)* and uncertainty *(Chicago Board of Exchange Volatility Index, the* average for the month preceding the IPO*)*, and media coverage *(log of unique English-language news articles* over the period of 12 months preceding an IPO*).*

Furthermore, I also include as predictors: (log of) word count of the risk factors section of the prospectus as a measure of overall quantum of disclosure, and the industry average of corresponding independent variables to account for heterogeneity in information interpretation and prospectus styles across industries. Finally, I control for average investor sentiment on StockTwits. This serves a twofold purpose. First, it helps account for the alternative explanation that strategies with high locus, novelty, or contingency are negatively evaluated by investors. And underpricing results from such investors seeking compensation for the risk of purchasing the IPO shares (e.g., Carpenter & Pollock, 2003; Arthurs et al., 2008). This, in a way match firms at the same level of risk. Second, to the extent that the mean and the variance of the distribution of investor sentiment might be correlated, it helps account for a potential correlated omitted variable bias. I report key descriptive statistics of the variables in Table 6.

Insert Table 6 about here

RESULTS

Main Analysis (H1-H3)

In this section, I describe the causal impact of (a) locus, (b) novelty, and (c) contingency on investor disagreement. Now, the CBGPS method is a two-step procedure. In the first step, the three treatment variables – locus, novelty, and contingency, are separately regressed on the vector of covariates that are used to estimate the propensity score. In the second step, investor

disagreement is regressed on (a) the propensity score thus estimated and (b) the respective treatment variable – locus, novelty, or contingency. As is customary, I also include the following as covariates: (a) the square of the treatment variable and (b) the treatment-propensity score interaction term. I report the two steps in Tables 7 and 8, respectively, with the latter being of greater immediate interest.

Insert Tables 7-8 about here

In Table 8, Model 1, I report the key results pertaining to strategy locus. The coefficient of locus on investor disagreement is positive (.06) and statistically significant (p=.02). This lends support to the relationship laid out in H1. In addition, interviewees surface opinions that points towards a demand for an equivalent level of detail for aspects internal and external to the firm.

> "You cannot fool me by showing me pretty market projections. Tell me more about you're the features of your Saas product so that I can judge better for myself." (interviewee, 2019)
>
> "You have a new biologics molecule under development – fine – but is there a market where you can monetize it? Will big pharma companies value your product enough to eventually acquire you?" (interviewee, 2019)

In Model 2, I report the key results pertaining to strategy novelty. The coefficient of novelty on investor disagreement is positive (1.07) and statistically significant (p=.07). This lends support to the relationship laid out in H2. Interviewees, too, echoed their ambivalence while interpreting novel firms and strategies.

> "If everything about you is "innovative," it is a foregone conclusion that analysts and media, too, are polarized. In such cases, I end up deciding about stock according to my gut feeling at that moment." (interviewee, 2019)
>
> "You must compare and contrast against enough existing players in the same industry. Benchmarking gives me confidence." (interviewee, 2019)

In Model 3, I report the key results pertaining to strategy contingency. The coefficient of contingency on investor disagreement is not significant; however, the coefficient of the square term is positive and significant (coeff.=.02, p=.01). This indicates an upward-bending curve. Furthermore, I check sensitivity using an alternative specification without the square term of the treatment. Therein, the coefficient of contingency on investor disagreement is positive (coeff.=.04) and statistically significant (p=.01). These lend partial support to the relationship laid out in H3. Interviewees articulated the paradox of contingencies in a strategy: contingencies were viewed as at once unavoidable and unappealing.

> "Some ifs and buts are fine in a prospectus; however, after a certain point, the company also needs to sound confident about its plans." (interviewee, 2019)

H4: Disagreement & Underpricing

I proceed to validate if IPO underpricing indeed increases with an increase in the level of disagreement among prospective first-day investors, as argued in extant research. Higher the level of disagreement, the higher the underpricing, and hence, more is the money left on the table by the firm. In my sample, the two are indeed strongly correlated (coeff.= .19; p=.03). Thus, I am able to validate/ replicate the findings from prior IPO literature. I report the regression results in Table 9.

Insert Table 9 about here

Supplementary Analyses

In this section, I briefly describe a set of robustness checks to address certain potential threats to validity. I also report follow-on analyses that help deliver a more nuanced picture of the investor disagreement phenomenon.

Ecological Validity of Tweet Sentiment: Wisdom of the Crowd or Cheap Talk?

One important concern with using social-media-based measures is that of "cheap talk," i.e., social media users face no costly penalty for posting messages that don't accurately reflect the reality. Interestingly, scholars have found evidence of sentiments expressed on social media to be reflective overall stock market movements, as well and predictive of experts' sentiments. Documented reasons include reputational concerns and social learning. Furthermore, manipulation of stock prices through fake news has been found to be confined to only a few small, illiquid stocks. Examples of such studies are Antweiler & Frank (2004), Azar & Lo (2016), Kim & Kim (2014), and Schijven & Hitt (2012). Taking a cue, I determine if the sentiments of users on the StockTwits platform are indeed representative of the overall financial market's response to IPOs.

First, I examine the correlation between the StockTwits-based investor disagreement measure and that of the conventionally used proxy of stock-market-wide disagreement, measured as the ratio of (a) the total number of shares traded on IPO opening day and (b) the total number of shares available for sale at the IPO. As I report in Table 11, I find the correlation between the social-media and trading-volume measures to be positive and highly significant (coeff.=1.63; p=.00). This demonstrates that the sentiment expressed on StockTwits platform is indeed representative of the sentiments held by the overall financial markets at the same point in time, viz. the opening day of the IPO.

Insert Table 10 here

In addition, I check if the sentiments expressed on StockTwits resonate well with expert opinions. I examine the correlation between the StockTwits-based investor disagreement measure on the first day of the IPO and dispersion of analyst recommendations expressed at the time these newly-public firms publish their first-quarter financial results. The association is

positive and statistically significant (coeff.= .53; p=.01). See Table 11. I should note that the latter can be disseminated as far behind as 1-3 months after the IPO. This is because the regulators prohibit information intermediaries from broadcasting stock recommendations during the first 25 days following an IPO ("silent period"). The finding demonstrates that the sentiment expressed on StockTwits is not only reflective of experts' opinions but also has the ability to foreshadow the experts. These two analyses serve to allay the cheap-talk concern.

Insert Table 11 about here

Alternative Sentiment Measurement

As described previously, StockTwits users can post a message and indicate their sentiment as bullish, bearish, or unclassified (the default option). Refer to Figure 3. The empirical move I have made in the main analyses is to treat all unclassified sentiments as neutral. The pivotal assumption is that the absence of a bullish or bearish label indeed accurately describes the user's underlying neutral outlook. However, it may be possible that the content of some messages is consistent with an underlying positive or negative sentiment, and the user may have simply not paid attention to choosing the appropriate sentiment tag. I check the sensitivity of the main results to this possibility.

To incorporate this information (content-label sentiment mismatch), I use a machine learning method to classify all unclassified messages in the original sample as either bearish or bullish. In the first step, I train a Naïve Bayes classifier algorithm (similar to Cookson & Niessner, 2016) with a training data set of 500 bearish and 500 bullish messages. In the second step, I run the trained algorithm on the test data set of all unclassified messages and re-label them as either bullish or bearish. Third, I rerun the main analyses pertaining to H1-H3 with the investor disagreement measure now computed form the re-classified sentiment data.

I report the key results of the treatment effect estimation (i.e., the second stage of the propensity score matching) n Table 12. I find evidence that provides partial support to H1-H3. The coefficient of H1 and H3 are positive and significant for a second-stage regression that includes the squared treatment, whereas that of H2 is positive and significant for the regression without the squared treatment term.

Insert Table 12 about here

Expertise & Disagreement

Do all investors react alike to the same firm strategy? Do some types of investors disagree or converge more than others in the wake of an IPO? Any potential heterogeneity among investors in their ability or willingness to interpret strategy can help build a more nuanced picture of the composition of investor disagreement. This can even encourage future research on the interplay of strategy and investor heterogeneity.

In this light, I examine two dimensions of investor expertise: (a) experience, and (b) investment approach, as self-reported on StockTwits. Experienced investors have at their disposal a greater knowledge base and heuristics to parse uncertainty and ambiguity; a skill novice investors might lack. Second, I discern between fundamental and technical investors. The former group bases its investment decisions on analyzing company financials and earnings and may have built greater expertise in making judgments about the future when compared to technical investors, who primarily invest based on stock price history, which an IPO firm lacks.

In addition, I examine how different investment time horizons might matter to investor disagreement. Arguably, predicting the short-term price of a stock is more difficult than predicting it’s the long-term price. In the short-term, a stock's price is subject to greater volatility in the stock market. Long-term investors might be able to predict stock price with greater

consensus as the stock price can exhibit a long-term regression to mean. I thus compare the level of disagreement among StockTwits users who self-report different holding periods.

I find empirical support for the three aforementioned predictions. In summary, I find the extent of disagreement to be systematically greater among novice, technical, and short-term investors than among professional, fundamental, and long-term investors, respectively. I report the key results of a comparison of means tests in Table 13.

Insert Table 13 about here

Social-Media Self-Report Validity

StockTwits users self-report investment experience, investment approach, and investment holding horizons. It is, therefore, important to carefully validate if such self-reports reflect true underlying investment experience or philosophies. An absence of a good adherence between self-report and reality can cast doubts about the truthfulness of the sentiments StockTwits users express ("cheap talk"). Conversely, a good fidelity will serve to increase confidence in the main results. To this end, I analyze the platform activity and textual content of tweets posted by users.

First, I analyze the self-reported experience. I find that experienced users systematically follow more stocks, post more tweets, and attract more followers than novice users. See Table 14. This demonstrates that users who report themselves to be experienced are likely to be more sophisticated and influential than self-reported novice users.

Insert Table 14 about here

Second, self-reported investment approach… I find that users proclaiming different investment approaches systematically use distinctive language consistent with respective approaches. For example, fundamental investors discussing earnings and accounting metrics,

technical investors discuss price multiples. To quantify language usage patterns, I develop two short dictionaries with keywords commonly used in fundamental or technical analysis based on an examination of online investor resources. Table 15 lists the dictionaries, while Table 16 reports the key results of the comparison between fundamental and technical investors.

Insert Tables 15-16 about here

Finally, short-term investors demonstrate a greater extent of short-terminism in their tweets when compared to long-term investors. To quantify such short or long-term approaches, I use the dictionaries developed by Brochet et al. (2015), which I reproduce in Table 17. I summarize the key results of the comparison between short- and long-term investors in Table 18. These indicate that StockTwits users' self-reports of investment holding periods are consistent with their underlying temporal horizons.

Insert Tables 17-18 about here

From Individual Tentativeness to Aggregate Disagreement

In the main hypotheses, I argue that prospectuses with high imbalance, novelty, and contingency will lead to difficulties in fluent interpretation by individual investors, which, in turn, will lead to polarized evaluations on the aggregate. Here, I double down on the latter part of the argument and validate if, for a given IPO, the tentativeness of individual users indeed translates to overall disagreement at the social-media level.

To quantify tentativeness, I use the "tentative" word category in Linguistic Inquiry and Work count (LIWC 2015) by Pennebaker et al. (2015). I find that the proportion of tweets having tentative content is indeed positively associated (coeff. = .30; p=.00) with overall disagreement at the IPO level. The finding, reported in Table 19, lends support to the arguments in question.

Insert Table 19 about here

Outlier IPOs

Finally, I check the robustness of the main finding pertaining to H4, i.e., if the association between investor disagreement and IPO underpricing is driven by IPOs with extreme levels of underpricing. First, I re-examine H4 by disregarding the 10 IPOs with the highest and 10 IPOs with the lowest levels of underpricing. This amounts to taking out about 3.4% extreme observations. I find that investor disagreement continues to have a positive (coeff. =.15) and statistically significant (p=.03) association with IPO underpricing. I report this in Table 20.

Second, I repeat the above but now only with underpriced IPOs. In other words, I disregard all IPOs that were overpriced, i.e., witnessed a negative underpricing or an opening day closing stock price lower than the offer price. The effect of investor disagreement is indeed positive (coeff. =.33) and significant (p=.00), which I report in Table 21.

Insert Tables 21 about here

DISCUSSION

Acquiring financial resources is key to the growth and survival of organizations – big or small. Understanding the determinants of variation in financing performance is an important priority for organization scholars. And, performance in a wide range of investor-facing scenarios is determined by what prospective investors – on average – evaluate the future prospects of firms. The prospects are imputed from a variety of "hard" and "soft" information about firms' strategy, market conditions, founders or senior management, and so on. And the scenarios include not only public equity markets, such as acquisition announcements (e.g., Reuer, Tong &Wu, 2012), joint-venture formation (e.g., Koh & Venkatraman, 1991), and earnings announcements

(Whittington et al., 2016) but also private equity markets, such as online crowdfunding (Li et al., 2017) and accelerator demo-days or similar pitching events (e.g., Kanze, et al., 2018). Understanding the average investor response is key to understanding financing performance.

However, despite its wide-ranging explanatory power, the average investor response is not the be-all and end-all in understanding heterogeneity in financing performance. Rather, it is investor disagreement that determines many important facets of long- and short-term capital-market performance. Investor disagreement can have a bearing on; IPO underpricing, future stock price growth, failure rates of M&A deals, cost of capital, stock-market reaction to bad earnings news relative performance of value and growth stocks, and risk-premium-seeking by investors. A fuller understanding of heterogeneity in organizational performance, thus, requires greater scholarly attention towards understanding the rise of investor disagreement.

The current study is a first step in answering this call. To the best of my knowledge, this is one of the first – if not the first – studies to explicitly analyze the emergence and consequence of investor disagreement. I examined three elements of strategy, each accounting for an important facet of a firm's interactions with the world. I hypothesized that investor disagreement would be high when a firm's strategy has high (a) imbalance between strategy and environment elements, with the locus of strategy tilted one way or the other, (b) novelty, in terms of how the strategy relates to that of comparable firms, and (c) contingency, reflecting how realizing targeted performance depends on performance drivers materializing as predicted.

I articulated my theory in the context of IPOs – capital-raising exercises which (a) witness substantial strategy disclosure by firms and widespread investor attention and (b) are arguably the most important milestone of a firm's lifecycle where performance is determined by investor disagreement. I analyzed in detail investor social-media activity around IPOs of 577

companies that went public on NYSE and NASDAQ during 2015-2019 and found evidence consistent with my hypotheses. In doing so, I believe the study stands to complement extant research on (a) financial resource-acquisition and (b) investor behavior and fuel ideas for future work.

Determinants of Funding Success

The contribution of most immediate interest to organization scholars has to do with the ability to explain performance in scenarios where performance is determined by variance or disagreement, rather than their average investor response. While I articulate my theory and empirical investigations in the important and well-documented context of IPOs, going public is not the only scenario where investor disagreement has performance implications. Understanding disagreement can lead us to a more comprehensive understanding of performance drivers at a host of important information-dissemination events, such as M&A or JV announcements, or publication of earnings. In doing so, I complement such studies on this topic as Hayward & Fitza (2017), Pfarrer, et al. (2010), Zhang, et al. (2008); Graffin et al. (2016), Whittington, et al. (2016), Crilly (2017), to name a few.

Investment Decisions Under Uncertainty

The second, and perhaps more conceptual, contribution lies in demonstrating how understanding the investor better calls for a more nuanced approach. In most prior studies, the center of attention has been on what factors influence investors' average response. For all its virtues, impounding the response of the investor pool to one metric rests on one restrictive – if implicit – assumption. All investors are assumed to have identical estimates of the expected return and the probability distribution of return from the contemplated investment. Or at least they are free to

have an identical estimate –Sharpe (1964) called this homothetic expectation. This is not realistic, and we lose sight of this reality unless we study variance or disagreement.

Investor disagreement is not a pejorative. Rather, it is how most investment decisions transpire. This paper offers a new angle for organization scholars to ground their efforts in reality as they study investors wade through uncertainty as they various information, signals, or cues at capital-raising exercises. In doing to, I complement studies on the same tradition as Huang & Pearce (2015), Huang, et al. (2013), Sapienza & Gupta (1994), Sapienza & Korsgaard (1996), Wiltbank, et al. (2009), Sanders & Boivie (2004), Cholakova &Grandori (2012), Clarke, et al. (2019), Zott & Huy (2007).

Potential Extensions

The first opportunity lies in developing a fuller understanding of the consequences of investor disagreement. While in the current study, I examine IPOs, going public is not the only scenario where investor disagreement has performance implications. Settings such as M&A or earnings announcements can offer opportunities to develop a more comprehensive picture of why and how disagreement influences performance.

Second, locus, novelty, and contingency are only three of possibly many ways to characterize firm strategy. Future scholars can explore what other important strategy dimensions or specific strategic actions might have bearings on disagreement. Furthermore, these dimensions can not only pertain to hard, economic criteria but also soft dimensions of the information that firms communicates to market participants.

Third, a growing steam of research looks at how investment decisions are swayed by a host of interpersonal or incidental factors, such as entrepreneur-investor chemistry, perceived

passion, or even changes to daily weather. It could be interesting to examine how such factors might determine investor disagreement at various investment-contemplation scenarios.

Finally, investors are not alike. Do different types of investors differ in how and why they disagree? While this study quantifies some emergent patterns that investor disagreement might vary with investors' sophistication or approach, future scholars may wish to have a deeper look at possible factors that might drive within-groups variance.

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FIGURES & TABLES

Figure 1. Investor Disagreement & Stock Price at IPO

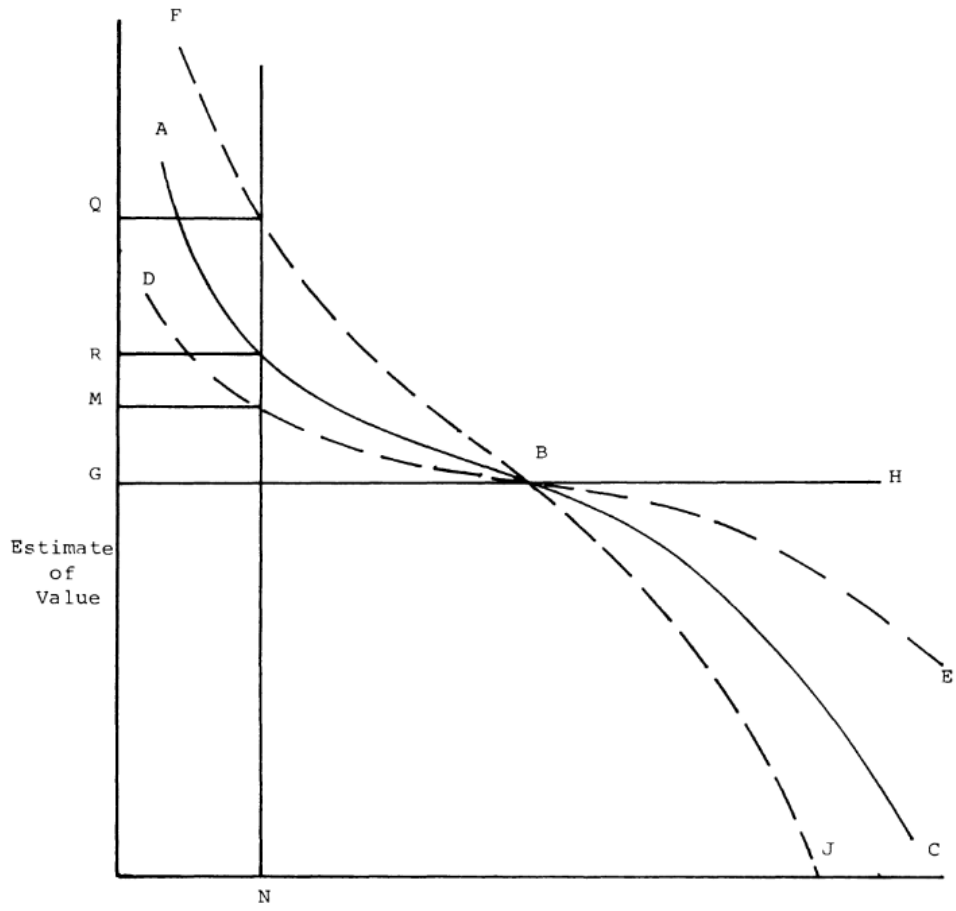

FIGURE 1.

Graph reproduced from Miller (1977). N represents the IPO stock supply curve. AC, DJ, and EF are various demand curves under moderate, low, and high investor disagreement levels. M, R, and Q are the respective market-determined prices (at close of opening day's trade). G is the average investor evaluation (taken as the IPO offer price). IPO underpricing (MG, RG, or QG) increases monotonically with disagreement.

Figure 2. StockTwits User Interface (Web)

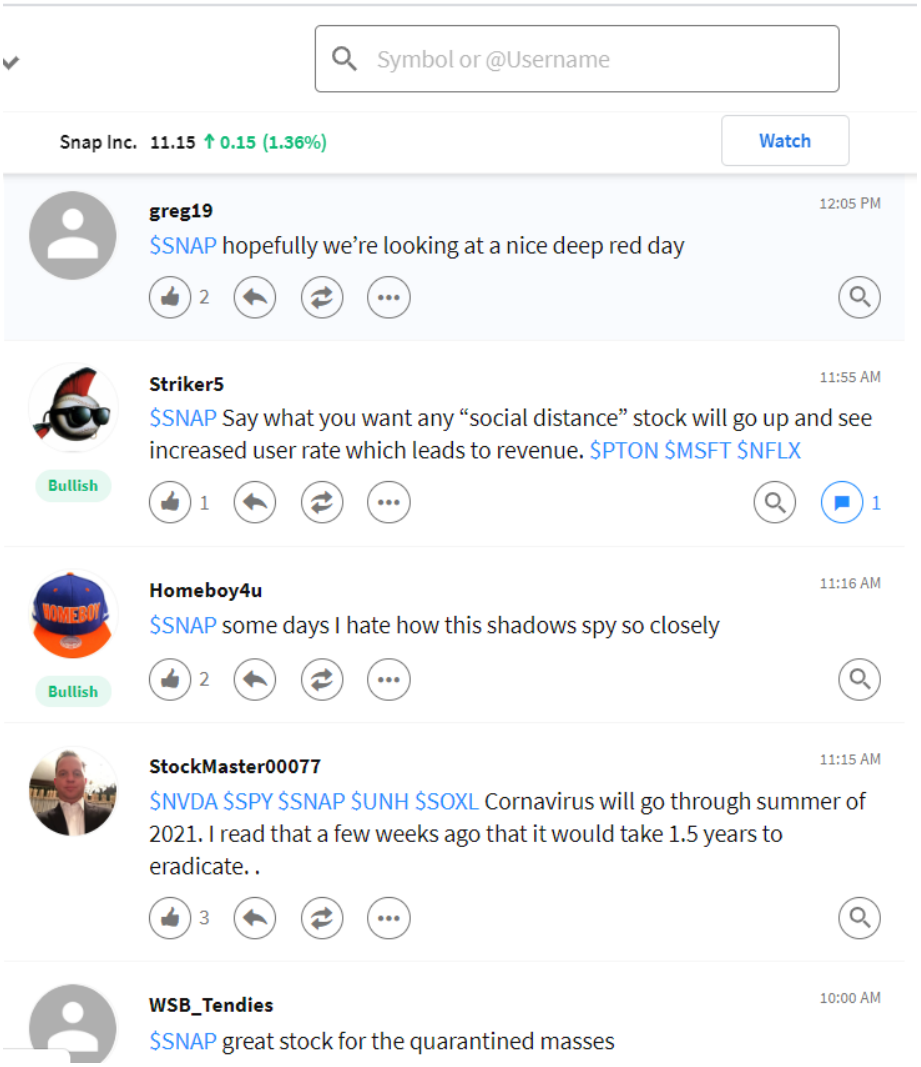

Figure 3. StockTwits Message Sentiment Button

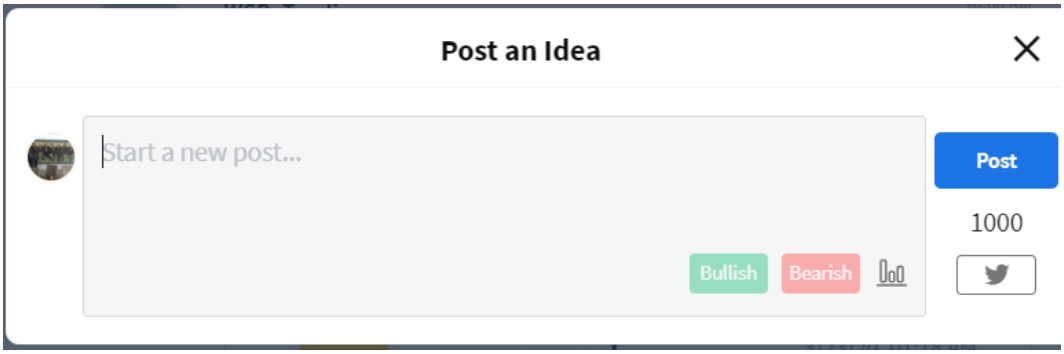

Figure 4: StockTwits User Bio Page

Figure 5. Key Processes and Timelines of US IPO

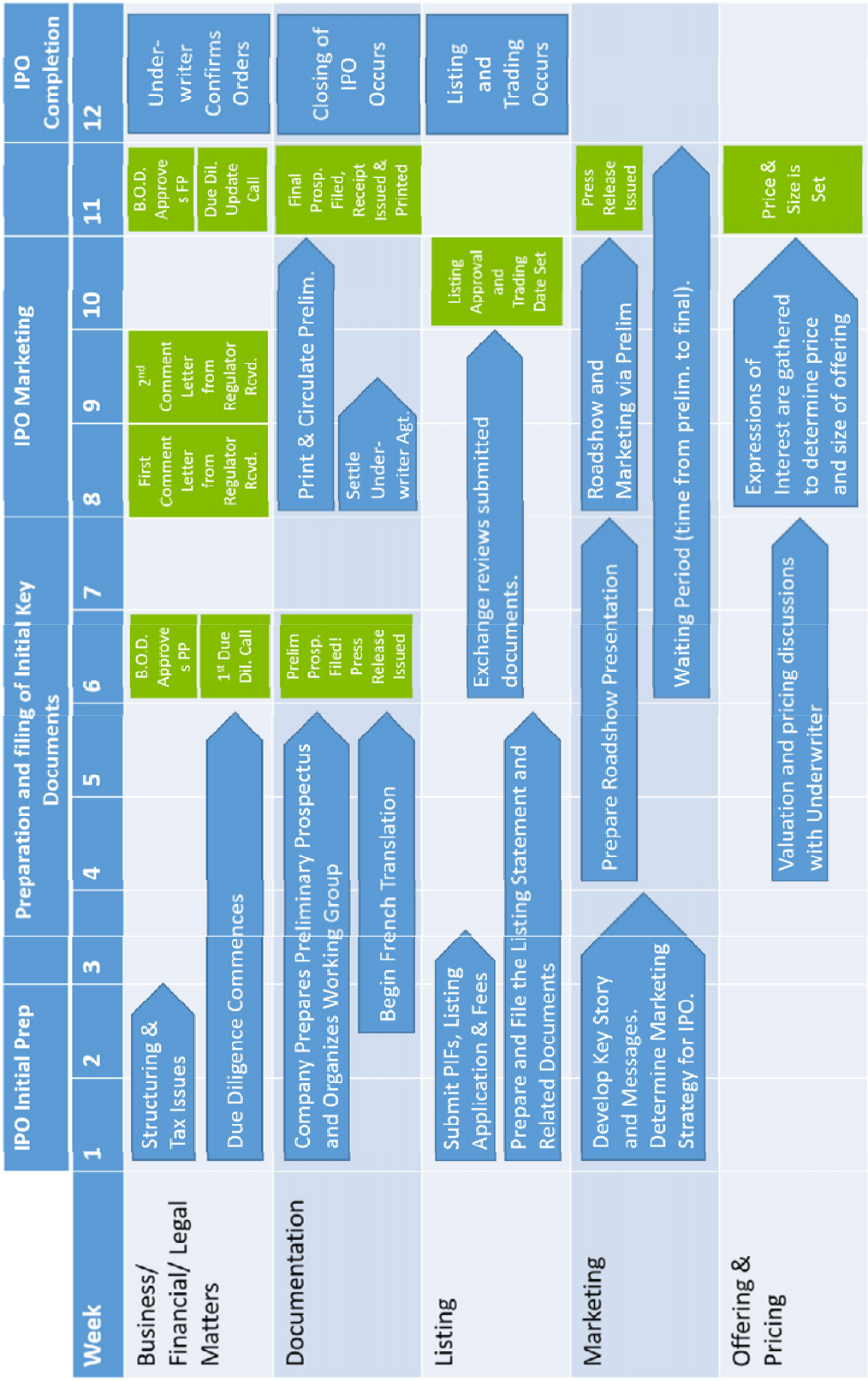

Table 1. Overview of IPOs in sample (n=577)

Panel a. Timing

Panel b. Key industries

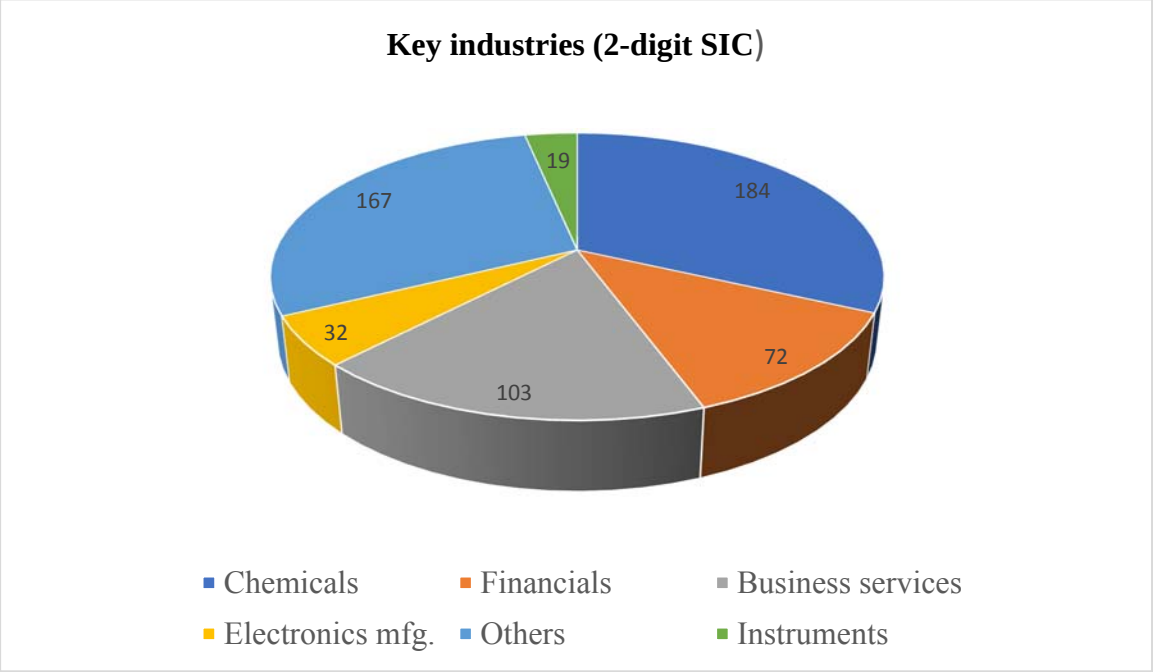

Table 2. Interviews

Interviewee role/ instutional afflication	**Number of individuals**	**Number of interviews**
Equity investors	4	6
Investment banks	4	6
Brokerage/ funds	2	3
Stock exchanges	1	2
Corporate Communications	1	2
Total	**12**	**19**

Interviews took place over 2018-2019. A mix of in-person and telephonic modes, and were 30-60 minutes long.

Table 3. Strategy dictionary

ABC	defect	math	mortgage	debt	model
ABM	failure analysis	chemistry	ammortiz	return	configuration
activity based costing	fault	physics	adjust	IRR	concurrent
activity based management	assembl	biology	annuity	NPV	R&D
additive	generic	value engineer	liability	interest-rate	control limit
approval	intellectual property	version control	cost	inventory	hire
architecture	productivity	robot	trade	invoice	CTQ
beta	GUI	upgrade	put option	continuous improv	ship
bill of material	circuit	date center	capital	CRM	transport
blueprint	laboratory	business intelligence software	money	inbound	train
BPR	operate	artificial intelligence	merger	facility	performance
business process reengineer	interoperable	cloud hosting	acquisition	logistics	scorecard
CAD	skunk	payable	revenue	lead time	retain
CAM	specification	receivable	sales	turnaround time	compensate
clinical trial	knowledge	customer relationship management software	pledge	outbound	recruit
component	structure	navigate	budget	source	feature
compute	IP	marketing automation	expense	warehouse	induct
computer-aided	system design	accrual	earning	lean	talent
concept	synthesis	rate	loaned	maintenance	accordant
conversion	graph	update	call option	insource	package
design	ISO	content management system	monetary	SCM	BSC
development	copyright	wireframe	ask	contract	cost benefit ratio
engineer	electronic	NPI	spread	agreement	process improv
equipment	plant	cybersecurity	estimate	procure	device
flowchart	animal testing	virtual private network	equity	SRM	schedule
innovat	software	verification	balance	simple interest	quality
input	interface	results	profit	outsource	SOP
invent	hardware	waterfall	money	compound	COQ
manufactu	life cycle	validation	asset	ROIC	concept test
module	efficien	radar screen	broker	channel	diagram
process	ergonomic	NPD	bond	capacity	critical to quality

product	durabl	usability	security	invest	control chart
accordant	correlated	syncretism	optimal ratio	ERP	raw material
across the boundaries	correlational	synergistic	activity	OKR	research
across divisions	correlation	synergetic	schedule	goal	stage gate
across the company	correlative	synergize	plan	process	system
associate	cross-divisional	synthesized	maximize	physical	testing
consolidative	plays as one	facility	output	improve	program
collaborated	harmonious	throughout the organization	agile	bill	project
complemented	interacts	work together	CE	workflow	prototyp
concerted	interventional	working together	safe	bottleneck	factory
consolidate	mutual	competency	TQM	engage	patent
congeniality	mobilize	performance	sensor	suggest	human testing
congenially	multidisciplinar y	productivity	PCB	layer	form
cooperative	simpatico	response	robot	SKU	six sigma
coordinate	symbiosis	economy	system	incentive	simulation
consolidates	mutually	know-how	brainstorm	idea	human subject
collaboration	incorporating	unite	viable	variance	IT
cooperates	reciprocal	quantity	log	tag	trial
coordinated	symbiotic	scales	automat	bonus	guarantee
coordinates	symbiotically	diminishing returns	report	skill	open source
complemental	interactional	unity	use	breakeven	hacker
connect	multi-disciplinary	adequacy	circuit	reduce	biotech
coalesce	fused	teamwork	iterate	KPI	accounts
coalescence	fusing	throughout our company	MVP	master	machine learning
collaborative	incorporation	unitedly	part	fixed	warranty
concerting	joined together	ability	mockup	rule	margin
associating	cross functional	synthesizes	sustainability	perpetual	bid
company-wide	interact	unitize	demo	contribution	share
coaction	diverse team	synthesizing	measure	EOQ	business cycle
amalgamate	cross functional	synthesis	cost benefit analysis	repeat	arbitrage
collaborates	harmony	unification	professional	material	price
collaborate	fusions	throughout the company	sprint	schedule	stock
amalgamation	cross-company	synthesize	abandon	separate	beta
purchase	unites	precision	standard	concurrent	policy
supply	teams	six sigma	bug	collaborating	dashboard
fulfill	capability	data	PE	amalgam	control
commodity	unified	concept model	project	cooperating	label

value	synergy	reception	freeze	congenial	exception
cycle time	suitability	tender	version	coactive	just-in-time
order	expertise	cost of quality	IEEE	integrates	joint task
covenant	team up	company-wide	variable	fuse	in-concert
procedure	review	coadjutant	plan	entire organization	cross brand
reciprocity	jointly				

Table 4. Environment dictionary

abandon	clinician	discount	inflation	physician	somebody
ability	clinicians	distribute	internet	physicians	someone
activity	co-creation	doctor	kiosk	plan	spectator
adequacy	co-customer	doctors	know-how	policyholder	spend
anybody	collect	downswing	lead	poverty	stagflation
anyone	competency	downturn	lease	price	stagnation
app	consult	ecommerce	low-end	productivity	store
applicant	consume	economical	luxury	project	subscribe
application	consumer	economy	market	prospect	subscribed
attend	consumers	emptor	market segment	purchaser	subscriber
attendee	consumption	end market	market segments	qualified	subscribing
auster	convenience	end markets	marketplace	quantity	subscriber
bargain	co-pay	end-user	maximize	recession	suitability
basket	co-purchase	expertise	middle-class	recipient	supermarket
benefactor	cost benefit analysis	facility	offtake	renter	sustainability
bespoke	credit	forecast	online	requester	tailor
boom	crunch	frequent	optimal ratio	response	target
boutique	customer	frugal	outlet	restaurant	tenant
branch	customer-first	funnel	own	retail	trade
brick and mortar	customer-focus	GDP	partaker	sale	transport
buoyan	customer-friendly	GNP	passenger	scales	upscale
bust	customer-orient	goods	passengers	schedule	upsell
buyer	customers	grocery	patient	sector	upswing
buying	customer-specific	gross domestic product	patients	selling	uptrend
capability	customer-base	gross national product	patron	services	user
capita	deal	guest	patronage	sharer	users
cater	deflation	habitué	patronize	shopper	vend
client	deli	high-end	patronized	shoppers	vended
clientele	demand	hypermarket	performance	showroom	vendee
clients	diminishing returns	income	personal	slump	vending
vendor	venture	visit	visitant	visitor	wealth

Table 5. Contingency dictionary (1/2)

contingently	abeyance	approximations	fluctuate	nonassessable
contingents	abeyances	arbitrarily	fluctuated	occasionally
could	almost	arbitrariness	fluctuates	ordinarily
crossroad	alteration	arbitrary	fluctuating	pending
crossroads	alterations	assume	fluctuation	perhaps
depend	ambiguities	assumed	fluctuations	possibilities
depended	ambiguity	assumes	hidden	possibility
dependence	ambiguous	assuming	hinges	possible
dependencies	anomalies	assumption	imprecise	possibly
dependency	anomalous	assumptions	imprecision	precaution
dependent	anomalously	believe	imprecisions	precautionary
depending	anomaly	believed	improbability	precautions
depends	anticipate	believes	improbable	predict
destabilizing	anticipated	believing	incompleteness	predictability
deviate	anticipates	cautious	indefinite	predicted
deviated	anticipating	cautiously	indefinitely	predicting
deviates	anticipation	cautiousness	indefiniteness	prediction
deviating	anticipations	clarification	indeterminable	predictions
deviation	apparent	clarifications	indeterminate	predictive
deviations	apparently	conceivable	inexact	predictor
differ	appear	conceivably	inexactness	predictors
differed	appeared	conditional	instabilities	predicts
differing	appearing	conditionally	instability	preliminarily
differs	appears	confuses	intangible	preliminary
doubt	approximate	confusing	intangibles	presumably
doubted	approximated	confusingly	likelihood	presume
doubtful	approximately	confusion	may	presumed
doubts	approximates	contingencies	maybe	presumes
exposure	approximating	contingency	might	presuming
exposures	approximation	contingent	nearly	presumption

Table 5 contd. Contingency dictionary (2/2)

presumptions	reexamine	speculating	undocumented	unusual
probabilistic	reexamining	speculation	unexpected	unusually
probabilities	reinterpret	speculations	unexpectedly	unwritten
probability	reinterpretation	speculative	unfamiliar	vagaries
probable	reinterpretations	speculatively	unfamiliarity	vague
probably	reinterpreted	sporadic	unforecasted	vaguely
random	reinterpreting	sporadically	unforseen	vagueness
randomize	reinterprets	sudden	unguaranteed	vaguenesses
randomized	revise	suddenly	unhedged	vaguer
randomizes	revised	suggest	unidentifiable	vaguest
randomizing	risk	suggested	unidentified	variability
randomly	risked	suggesting	unknown	variable
randomness	riskier	suggests	unknowns	variables
reassess	riskiest	susceptibility	unobservable	variably
reassessed	riskiness	tending	unplanned	variance
reassesses	risking	tentative	unpredictability	variances
reassessing	risks	tentatively	unpredictable	variant
reassessment	risky	turbulence	unpredictably	variants
reassessments	roughly	uncertain	unpredicted	variation
recalculate	rumors	uncertainly	unproved	variations
recalculated	seems	uncertainties	unproven	varied
recalculates	seldom	uncertainty	unquantifiable	varies
recalculating	seldomly	unclear	unquantified	vary
recalculation	sometime	unconfirmed	unreconciled	varying
recalculations	sometimes	undecided	unseasonable	volatile
reconsider	somewhat	undefined	unseasonably	volatilities
reconsidered	somewhere	undesignated	unsettled	volatility
reconsidering	speculate	undetectable	unspecific	
reconsiders	speculated	undeterminable	unspecified	
reexamination	speculates	undetermined	untested	

Table 6. Descriptive statistics of key variables

Variable	Obs	Mean	Std. Dev.	Min	Max
investor disagreement	577.00	0.16	0.15	0	1.00
IPO underpricing	577.00	0.17	0.33	- 0.41	2.98
locus (H1)	577.00	3.83	1.27	1.39	7.50
novelty (H2)	577.00	0.14	0.13	0.01	0.67
contingency (H3)	577.00	1.45	1.10	0.37	7.50
log of word count	577.00	10.06	0.46	4.80	11.56
investor sentiment	577.00	0.12	0.12	- 0.33	0.78
ROA	577.00	- 0.52	1.92	- 19.31	4.70
R&D to assets	577.00	0.23	0.64	0	7.83
leverage	577.00	0.17	0.48	0	3.97
# price revisions	577.00	1.73	2.18	0	21.00
log of revenue	577.00	4.39	4.94	0	16.24
underwriter fees	577.00	6.43	1.20	1.31	9.00
underwriter prestige	577.00	0.54	0.50	0	1.00
firm commitment underwriting	577.00	0.95	0.21	0	1.00
equity retention	577.00	40.52	26.24	0	100.00
asse tangibility	577.00	0.72	0.42	0	1.00
VC-backed IPO	577.00	0.44	0.50	0	1.00
NYSE composite index	577.00	0.42	0.49	- 0.06	1.08
CBOE volatility	577.00	0.44	0.53	- 0.38	1.55
log of patents	577.00	0.58	1.15	0	5.42
# patent litigations	577.00	0.07	0.26	0	2.00
log of news coverage	577.00	2.18	2.27	0	9.95
CEO elite eductaion	577.00	1.01	0.79	0	3.00
board size	577.00	7.37	3.73	1.00	12.00
board members' total age	577.00	307.46	277.29	0	619.00
# other directoships	577.00	0.46	1.13	0	12.00
insiders-outsiders ratio	577.00	0.50	0.72	0	7.00

Table 7: Main analysis step 1: Propensity score estimation

DV=treatment	H1 (locus)		H2 (novelty)		H3 (contingency)	
	coeff.	**std. error**	**coeff.**	**std. error**	**coeff.**	**std. error**
log of word count	- 0.053	0.031	0.071	0.015	- 0.060	0.018
investor sentiment	0.245	0.107	- 0.004	0.054	- 0.072	0.065
ROA	- 0.008	0.007	- 0.002	0.004	- 0.001	0.004
R&D to assets	0.047	0.023	0.017	0.011	0.014	0.014
leverage	0.023	0.028	0.011	0.014	- 0.006	0.017
# price revisions	0.006	0.006	0.000	0.003	- 0.003	0.004
log of revenue	- 0.010	0.003	- 0.007	0.002	0.004	0.002
underwriter fees	0.009	0.013	- 0.017	0.006	0.018	0.007
underwriter prestige	0.073	0.029	0.004	0.015	0.004	0.018
equity retention	0.002	0.001	0.000	0.000	- 0.000	0.000
asset tangibility	- 0.062	0.042	- 0.012	0.021	- 0.043	0.026
VC-backed IPO	0.001	0.029	- 0.016	0.014	0.034	0.017
NYSE composite index	0.047	0.072	- 0.096	0.036	1.428	0.044
CBOE volatility	0.021	0.057	0.009	0.028	0.054	0.034
firm commitment	0.193	0.065	0.014	0.033	- 0.002	0.039
log of patents	0.020	0.012	- 0.011	0.006	0.008	0.007
# patent litigations	0.047	0.052	0.013	0.026	0.045	0.031
log of news coverage	- 0.019	0.010	- 0.016	0.005	0.018	0.006
CEO elite education	0.034	0.020	0.026	0.010	- 0.014	0.012
board size	0.003	0.006	0.002	0.003	0.005	0.004
insiders-outsiders ratio	- 0.033	0.023	- 0.004	0.012	0.003	0.014
board members' total age	0.000	0.000	0.000	0.000	- 0.000	0.000
# other directorships	0.022	0.012	- 0.005	0.006	0.010	0.007
constant	0.191	0.309	- 0.726	0.153	- 0.138	0.189
locus industry avg	0.314	0.016				
contingency_industry avg					0.021	0.028
Wald chi-squared	963.31		281.32		9559.91	
Obs.	577		577		577	

Significance stars not shown because of formatting constraints. Available from the author upon request.

Table 8: Main analysis step 2: Treatment effect estimation

DV= investor disagreement	H1 (locus)		H2 (novelty)		H3 (contingency)	
	coeff.	std. error	coeff.	std. error	coeff.	std. error
locus	0.06*	0.03				
locus squared	-0.01*	0.00				
locus*propensity score	0.02	- 0.56				
novelty			1.07+	0.60		
novelty squared			0.74+	0.44		
novelty*propensity score			0.08	- 2.62		
contingency					0.04*	0.02
contingency*propensity score					0.01	- 1.98
propensity score	0.03	0.04	0.20**	0.07	0.01*	0.02
constant	0.08*	0.04	0.50**	0.19	0.13	0.03
Adjusted R-squared	0.02		0.04		0.01	
F-statistic	3.28		5.35		3.08	
Obs.	577		577		577	

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 9. Effect of investor disagreement on IPO underpricing (H4)

	DV=IPO underpricing
Opening-day StockTwits disagreement	.194*
	(.093)
Constant	.138***
	(.020)
R-squared	.01
F-statistic	4.29
Observations	577

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 10. Wisdom of the crowd: StockTwits & trading-volume disagreement

	DV=Trading-volume disagreement
Opening-day StockTwits disagreement	1.631***
	(.330)
Constant	.156*
	(.064)
R-squared	.12
F-statistic	24.40
Observations	577

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 11. Wisdom of the crowd: StockTwits disagreement & analyst dispersion

	DV=Q1 analyst recommendation dispersion
Opening-day StockTwits disagreement	.531*
	(.212)
Constant	.546***
	(.038)
R-squared	.04
F-statistic	6.23
Observations	175

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 12: H1-H3 using machine-learning disagreement step 2: Treatment effect estimation

DV= investor disagreement	**H1 (locus)**		**H2 (novelty)**		**H3 (contingency)**	
	coeff.	**std. error**	**coeff.**	**std. error**	**coeff.**	**std. error**
locus	0.38***	0.09				
locus squared	-0.06**	0.01				
locus*propensity score	0.06	.02				
novelty			0.49*	0.22		
novelty*propensity score			0.13	10.71		
contingency					0.51***	0.07
contingency_squared					0.05***	0.01
contingency*propensity score					0.02	1.72
propensity score	-0.24**	0.08	-0.96	0.10	0.08*	0.03
constant	0.06	0.11	0.41**	0.16	1.02***	0.07
Adjusted R-squared	.08		0.34		0.75	
F-statistic	12.13		99.52		427.11	
Obs.	577		577		577	

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 13: Disagreement by investor categories

a. Professional vs. novice investors paired t-test

Variable	Mean
Disagreement (professional investors)	.177 (.020)
Disagreement (novice investors)	.233 (.015)
Difference of means	.046* (.021)

b. Fundamental vs. technical investors paired t-test

Variable	Mean
Disagreement (fundamental investors)	.079(.010)
Disagreement (technical investors)	.178 (.014)
Difference of means	.099*** (.015)

c. Short-term vs. long-term investors paired t-test

Variable	Mean
Disagreement (short-term investors)	.251(.014)
Disagreement (long-term investors)	.172(.014)
Difference of means	.078***(.015)

Standard errors in brackets

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

I recognize StockTwits users who self-identify as “momentum” or “swing” investors as short-term investors, and those who self-identify as “long-term” or “position” investors as long-term investors.

Table 14: Self-report validity: Investment experience

Experienced vs. novice investors paired t-test

Variable (mean)	# cumulative tweets	# subscribers	# stocks followed
Experienced investors	144,187 (1316)	362 (2.62)	11.98 (.16)
Novice investors	7,609 (115)	37 (.92)	10.60 (.22)
Difference of means	136,577*** (2341)	324*** (5.24)	1.38*** (.34)

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 15: Investment approaches dictionary

Fundamental approach	**Technical approach**
fundamental	technical*
multiple*	alpha
earnings	beta
accrual*	trend*
ratio*	volatil*
valuation*	

Table 16: Self-report validity: Investment approach

Fundamental vs. technical investors paired t-test

Variable (mean)	# fundamental words per tweet	# technical words per tweet
Fundamental investors	4.39 (.16)	1.06 (.07)
Technical investors	3.48 (.08)	4.80 (.09)
Difference of means	.92*** (.17)	-3.73*** (.16)

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 17: Temporal horizon/ investment holding period dictionary

Short-term	**Long-term**
day	long-term
week	long-run
month	year
quarter	annual*
this year	look forward
short-term	going forward
short-run	looking forward
today	trend
	expect
	anticipate
	outlook
	intend
	looking ahead

Table 18: Self-report validity: Investment holding period

Long-term vs. short-term investors paired t-test

Variable (mean)	# long-term words per tweet	# short-term words per tweet
Long-term investors	2.44 (.11)	12.56 (.23)
Short-term investors	1.69 (.04)	14.81 (.12)
Difference of means	.74*** (.10)	-2.25*** (.28)

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Refer to Table 13 for a definition of short – and long-term investors.

Table 19: Tentative tweets & IPO disagreement

	DV= Opening-day StockTwits disagreement
Proportion of tweets with tentative language	.166***
	(.042)
Constant	.130***
	(.007)
R-squared	.06
F-statistic	15.44
Observations	577

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 20. H4, extreme IPOs removed

	DV=IPO underpricing
Opening-day StockTwits disagreement	.180*
	(.072)
Constant	.125***
	(.015)
R-squared	.01
F-statistic	6.15
Observations	555

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 21. H4, overpriced IPOs removed

	DV=IPO underpricing
Opening-day StockTwits disagreement	.331**
	(.114)
Constant	.219***
	(.024)
R-squared	.01
F-statistic	8.32
Observations	414

Standard errors in brackets

+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001