Private Firm Investment and Public Peer Misvaluation

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We examine whether misvaluation of publicly traded industry peers is associated with capital expenditures by privately-held firms. An *economic competition hypothesis* predicts a negative relation because misvaluation-induced new investment by public firms crowds out investment by private firms when they share common input or output markets. An alternative *shared-sentiment hypothesis* predicts a positive relation because private firm stakeholders share in the sentiment associated with misvaluation in public markets. Misvaluation is proxied using both the price-to-fundamental ratio and an exogenous instrument obtained from mutual fund flows. The evidence is consistent with the shared-sentiment hypothesis, and robust to alternative treatments for growth opportunities. We find expected cross-sectional variation in the strength of the positive relation between public-peer misvaluation and private firm investment. Our results indicate that private firms finance misvaluation-induced investment primarily internally or externally with debt, not equity. Finally, misvaluation-induced investment increases future return on investment for private firms in contrast with public firms. Overall, these findings suggest that overvaluation in public markets increases private firm investments and has beneficial effects on private firm investments by relaxing financing constraints.

Keywords: private firms, investment, misvaluation, overvaluation, catering pressure, debt issuance, equity issuance, agency costs

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1. Introduction

Tobin's (1969) Q theory predicts a relation between stock prices and capital expenditure investments because stock prices contain information about growth opportunities. However, there is extensive evidence that the stock market is in some respects informationally inefficient and subject to investor sentiment effects, so stock prices sometimes deviate systematically from fundamentals (Daniel, Hirshleifer and Teoh 2002; Baker and Wurgler 2007; and Hirshleifer 2015). Keynes (1936, chapter 12-VII) writes that "certain classes of investment are governed by the average expectation of those who deal on the Stock Exchange as revealed in the price of shares, rather than by the genuine expectations of the professional entrepreneur" and that the average investor is motivated in part by "whim or sentiment or chance." Under this view, *mis*valuation, as opposed to simply valuation, also affects firm investment behavior.

Whether equity misvaluation affects investment decisions has been studied for public firms,[1] but not for private firms. In this paper, we examine empirically whether misvaluation of publicly-traded firms is associated with the capital expenditure investments of *privately-held* firms in the same industry. Despite their large economic role, private firms are rarely studied in the academic literature due to a lack of available firm-level data. We are able to study private firms using anonymized balance sheet and income statement data, from Sageworks, for a large sample of 121,892 private firm-years (51,191 firms) covering a ten-year period from 2001 through 2010.[2]

Investment decisions of private firms are important to study for at least two reasons. First,

[1] For example, see Morck, Shleifer and Vishny (1990), Stein (1996), Baker and Wurgler (2000), Bond and Cummins (2001), Baker, Stein and Wurgler (2003), Shleifer and Vishny (2003), Gilchrist, Himmelberg, and Huberman (2005), Dong et al. (2006), Polk and Sapienza (2009), Bakke and Whited (2010). Chirinko and Schaller (2001), Dong, Hirshleifer and Teoh (2012), Arif and Lee (2014), and Warusawitharana and Whited (2016).

[2] The Sageworks data does not include a statement of cash flows. Because the data is anonymized, we are also unable to study the characteristics of the new capital raised through debt or equity issuance in response to public peer misvaluation, so we use changes in debt and equity to approximate the new capital amounts.

private firms, in aggregate, form a much larger component of the U.S. economy than publicly-traded firms. Whether judged in terms of the number of firms, size of investments, amount of assets, number of employees, or amount of revenues, privately-held firms dominate publicly-traded firms. For example, Biery (2013) reports findings from Renaissance Capital's 2012 research study that indicate virtually all 27 million businesses in the U.S. are privately held, and of the 5.7 million firms with employees, less than 1% are publicly traded. Even among large firms, defined as those with more than 500 employees, 86.4% are private. Asker, Farre-Mensa and Ljungqvist (2015) estimate that, for 2010, private U.S. firms account for approximately 59% of sales, 49% of aggregate pre-tax profits, and 53% of aggregate non-residential fixed investments. Regarding investments, which are the focus of this study, private firms, on average, invest nearly 7% of their total assets annually, whereas public firms invest only 4%. Second, if public firm misvaluation effects spill over to the private sector, a complete accounting of the economic impact of misvaluation on the public stock market needs to include private sector effects as well.

Misvaluation may occur because of false reporting or for many other reasons, such as high investor sentiment or overoptimistic perceptions about growth opportunities, even when financial reporting complies with GAAP. The emerging evidence in the 1980s of informational inefficiencies in stock market prices led Morck, Shleifer and Vishny (1990) to ask whether swings in the stock market drive firm investment or are largely irrelevant in investment decisions. Since then, scholars have studied how stock market sentiment and misvaluation affect firm investment. While some papers find little relation, several provide evidence that publicly-traded firm investments are sensitive to stock market sentiment and misvaluation (see note 1 and Section 2). We extend this research by investigating how public firm misvaluation affects privately-held firms.

We propose two hypotheses for how misvaluation in the public markets may affect investments by private firms in opposite predictions. We refer to the first as the *shared-sentiment hypothesis* of private firm investment and it predicts a positive relation between overvaluation and investment. In this hypothesis, the sentiment driving public firm misvaluation is also shared by private firm stakeholders through spillover/sentiment contagion, independent common sentiment, or other pathways of causality. Section 2 describes how shared positive (negative) sentiment by various private firm stakeholders, such as consumers, suppliers of capital and labor, and managers, effectively increases the net present value of projects, thereby encouraging new investments by private firms. We discuss in Section 2 how these effects may occur even if the manager is rational and cognizant of public peer misvaluation (Stein 1996), or if new financing is absent but the manager is subject to 'catering' pressure (Polk and Sapienza 2009).

In contrast, the second hypothesis, termed the *economic competition hypothesis*, predicts a negative spillover effect from public peer misvaluation to private firm investments. Public and private firms often operate in overlapping markets for inputs such as labor and capital, as well as for products. Overvaluation of public firms will drive these firms to increase investment, increasing their demand for labor and capital, and increasing their supply of outputs in product markets. This makes resources scarcer and prospects dimmer for private firms in the same industry. This expansion by public firms causes private firms to cut back on investment—a crowding-out effect. Similarly, a pullback by public firms in times of undervaluation may allow private firms to increase investment, exploiting the drop in competition.

Our study extends Asker, Farre-Mensa and Ljungqvist (2015) who compare private and public firm investment behavior. Asker et al. (2015) find that private firms invest more and have higher investment sensitivity to their firm's growth opportunities than public firms, perhaps because private firms have less severe agency problems and a longer-term focus. We move beyond investment sensitivity differences to examining the incremental effect of public firm *mis*valuation on private firm investment, controlling for own-firm and industry growth opportunities.

Our study also contributes to the accounting literature on information spillovers and the usefulness of financial statement information for major business decisions such as capital expenditure investments. Public firm investment is found to respond to industry Q (Foucault and Fresard 2014) and public peer's fraudulent financials (Beatty, Liao, and Yu 2013; Li 2016). Badertscher, Shroff and White (2013) find that private firm investment sensitivity to own firm growth opportunities is higher in industries with more public peers or with higher public peer information quality. In contrast, we examine misvaluation effects on private firm investment coming from sentiment spillovers directly to private firm stakeholders or from economic competition with public firms.

We use the price to residual income (*PV*) ratio to estimate misvaluation (see Appendix A for details). Section 3 and Appendix A discuss various advantages of *PV* as a misvaluation measure. By using analysts' growth forecasts to estimate fundamental value, *PV'*s key advantage is that it is more likely to prune away growth opportunities than a simple book-to-price ratio. The ratio may still contain growth opportunity effects when either growth opportunities tend to be mispriced, or analysts' growth expectations deviate from the market's expectations. To address this concern, we employ a variety of methods such as additional controls for firm and industry growth opportunities (Section 4), an instrument for misvaluation derived from extreme mutual fund flows, and *PV* and the mutual fund instrument orthogonalized to several further growth opportunity variables (Section 5). Our results are robust.

We find evidence that private firms increase investment when overvaluation increases, consistent with the shared-sentiment hypothesis. The effects described by the economic competition hypothesis may also be occurring, but the net positive relation suggests that sentiment-related misvaluation effects dominate economic competition effects. The misvaluation effect on investment is incremental to both own firm and industry growth opportunities.

In terms of economic magnitude, not surprisingly, the private firm's own growth opportunity has the largest effect on investment. More relevantly to our research, the incremental industry misvaluation effect on private firm investment is also economically meaningful. For comparison, the effect of a one standard deviation increase in industry misvaluation on private firm investment is between 8% and 18% of the effect of a one-standard deviation increase in own firm growth opportunities. The misvaluation effect on investment is either comparable or significantly larger than the effect of industry growth opportunities. Furthermore, the misvaluation-investment relation is stronger in industry-years with smaller variation in *PV* among industry peers, with more public firms, and with higher cross-company correlations in stock returns, which are situations where sentiment spillover are likely stronger.

To provide further insight on the sentiment spillover, we examine how private firms finance misvaluation-induced investments. For public firms, investment responds to misvaluation via an equity financing channel (Baker, Stein and Wurgler 2003; Dong, Hirshleifer, Richardson and Teoh 2006; Dong, Hirshleifer and Teoh 2012, 2016) and via a non-financing channel from pressure on managers to cater to investor beliefs (Polk and Sapienza 2009). Using a path analysis, we separate private firm investment response to misvaluation into four paths: debt financing, equity financing, internal financing using retained earnings, and the remainder.

We find that less than 2% of the new investment triggered by misvaluation is funded by equity, consistent with equity financing being scarce for private firms. Debt-financing, at 60.5%, comprises the largest funding channel, which suggests that the perceptions of lenders play an important role in how misvaluation affects private firm investment. Retained earnings funding comprises 11.1%, and the remainder is 26.8%.

Finally, we compare the performance consequences of misvaluation-induced investments by private and public firms. The prior literature hints that misvaluation-driven investments may be inefficient for public firms (Dong, et al. 2006; Polk and Sapienza 2009; Arif and Lee 2014). We therefore investigate the return on investment (ROI) over one and two year horizons on misvaluation-induced investment for private and public firms.

The difference in ROI between private and public firms is striking. Misvaluation-induced investment incrementally *increases* future ROI significantly in both years for private firms, but decreases ROI for public firms, with varying significance levels across specifications. We offer a potential explanation for the difference in Section 4. Thus, misvaluation-induced investment is more productive for private firms than public firms in the sense of generating higher incremental profits. A one standard deviation increase in misvaluation-induced investment is associated with a 19.8% increase in the median value of subsequent-years' ROI for private firms. The positive effect for private firms is novel; this is the first paper to document a positive effect of overvaluation.

Section 2 discusses the background literature and hypotheses. Section 3 describes sample selection and defines key variables. Section 4 presents results for the misvaluation-investment relation, additional cross-sectional results, financing paths, and profitability of the misvaluation-induced investments. Section 5 presents additional analyses including the use of extreme mutual fund outflows as an instrument for misvaluation. Section 6 offers concluding remarks.

2. Motivation and Test Predictions

To predict how public firm misvaluation affects private firm investment, let us first consider the mechanisms through which misvaluation can affect *public* firm investment. In the model of Stein (1996), a rational public firm manager takes advantage of market inefficiency when making an investment financing decision for the firm. When the firm is overvalued the manager may invest more based on short-term market valuations. Shleifer and Vishny (2003) present a model where overvalued firms use their overvalued equity as currency to finance takeovers. They reason that when the firm is overvalued, equity capital becomes relatively cheap; if holding excess cash is costly and dividend payouts are tax-inefficient, rational managers of overvalued public firms use the excess cash raised through the cheap new issuance to invest more heavily in the form of capital expenditures or acquisitions.

Several studies find evidence that overvalued public firms raise new equity (Dong, Hirshleifer and Teoh 2012; Warusawitharana and Whited 2016). Using the residual income to price ratio to proxy for misvaluation, Dong et al. (2006) find evidence consistent with Shleifer and Vishny (2003) that firms use their overvalued equity to finance takeovers. Dong, Hirshleifer and Teoh (2016) examine how misvaluation affects public firm R&D and capital expenditures. Extending Stein's model, Baker, Stein and Wurgler (2003) predict and provide evidence that equity-dependent firms' investments are more sensitive to book-to-market ratio (which reflects inversely both investment opportunities and market overpricing) than other firms' investments.

A large set of papers, both theoretical and empirical, suggest that misvaluation affects public firm investment through equity financing (Chirinko and Schaller 2001; Gilchrist, Himmelberg, and Huberman 2005; and Polk and Sapienza 2009).[3] The private versus public dichotomy does not fit neatly into the distinction between firms that are more versus less equity-dependent. On the one hand, private firms are generally more severely financially constrained than

[3] Some research suggests a weaker effect. Morck, Shleifer, and Vishny (1990) find that misvaluation estimated by CAPM alpha has minor incremental effect. Bond and Cummins (2001) and Cummins, Hassett, and Oliner (2006) find statistically weak effects of misvaluation after controlling for analyst forecasts. Bakke and Whited (2010) find that misvaluation only influences small firms that rely on equity finance and have low levels of mispricing.

public firms, so they may be expected to be more sensitive to misvaluation in their investment decisions. However, since the public equity market is unavailable for private firms to access for raising capital, private firms may be less able to exploit sentiment driven misvaluation.

Nevertheless, misvaluation does likely still matter to private firms that are financed by a substantial block of outside private investors, such as angel investors, venture capital firms, or banks. To the extent that these capital providers share sentiment similar to those of public firm investors, they would provide financing at more (less) favorable terms when there is overvaluation (undervaluation).[4] In short, public investor sentiment shared by private firm capital providers leads to a similar positive misvaluation-investment relation for private firms as for public firms.

Polk and Sapienza (2009) suggest an alternative channel for public firm investments to respond to misvaluation, independent of financing. Under their catering hypothesis, the manager of an overvalued public firm undertakes investments *using internal funds* to cater to investor optimism about the firm, thus sustaining the overvaluation. Private firms that are closely held by the original founding families may be less subject to pressure to cater to the perceptions of poorly-informed outside investors than public peers.[5] Nevertheless, private firms that are financed by a

[4] Two examples illustrate the possibility of shared sentiment affecting private firms. First, overvaluation of dot-com and other tech companies peaked in 2000. Venture capital (VC) funding of related industries (Networking and Equipment, Semiconductors, Software, Telecommunications), also peaked in the same year (Buyouts Insider, 2016). The percentage of bachelor's degrees in the "Computer Science" area peaked in 2002, indicating enthusiasm among prospective employees as well (Bui, 2014). Second, based on our misvaluation measure, overvaluation of the "Healthcare, Medical Equipment, and Pharmaceutical Products" industry peaked in 2006 and 2007. VC funding of both the "Biotechnology" and "Medical Devices and Equipment" industries peaked in 2007 and 2008, respectively (Buyouts Insider, 2016). Private firms in these industries may have increased investment during these periods, when they had easier access to capital and a growing number of prospective employees.

[5] A large literature examining differences between small investors and large investors consistently shows that smaller investors invest in a less sophisticated and informed manner, and are more subject to behavioral biases, than large investors. For example, small investors buy on the days of negative earnings surprises (Lee 1992), are slow to trade on stock price momentum (Hvidkjaer 2006), have naïve earnings expectations (Bhattacharya 2001, Battalio and Mendenhall 2005), react as if trends will continue (Shanthikumar 2012), are naïve about analysts' conflicts of interest (Malmendier and Shanthikumar 2007, 2014, Mikhail, Walther and Willis 2007), and trade too strongly on pro-forma earnings information (Bhattacharya, Black, Christensen, and Mergenthaler 2007). Because private firms are closely held, they have fewer, larger, investors, and are unlikely to have many of these small individual investors who are most susceptible to misperceptions and behavioral biases.

substantial block of outside investors, such as angel investors or venture capital firms, may experience pressures to cater to the sentiment of providers of capital even when no new funds are raised. Michaely and Roberts (2012) find evidence of private firms catering to investors' dividend preferences. Managers may also care about the perception of customers, suppliers, and employees. Furthermore, catering pressure works independently of whether the manager is fully rational and aware of the misvaluation. These differences suggest that private firm investments may still be sensitive to misvaluation catering, albeit more weakly than public firms.[6] In other words, the shared-sentiment hypothesis may extend to private firms independently of new financing.

A third, more direct, mechanism arises if misperceptions of public market investors are shared by private firm managers, either through sentiment spillover from public firms, or from private and public firm sentiment sharing a common source. Private firm managers may be subject to similar behavioral biases and misperceptions as public firm managers. Several past studies document a strong influence of behavioral biases or sentiment on public manager actions. For example, CEO overconfidence is associated with overinvestment in firms with abundant internal funds (Malmendier and Tate 2005), less use of external finance (Malmendier, Tate and Yan 2011) and bad takeovers (Malmendier and Tate 2008). Hirshleifer, Low and Teoh (2012) find that CEO overconfidence is a determinant of public firm investment and beneficial innovation. Alti and Tetlock (2014) find that investment choices in public firms are consistent with managerial and/or investor behavioral biases. Moreover, Greenwood and Hanson (2013) find that managers over-extrapolate exogenous demand when investing. Thus, optimism in the public markets may spill over to private firm managers and boost their confidence to undertake expansions.

Fourth, product- and labor-market sentiment may spill over to or be common with private

[6] Michaely and Roberts (2012) find evidence that private firms with dispersed ownership cater their dividend policies to investor preferences in a manner, similar to, but to a lesser extent than, public firms.

firms. For example, private firm suppliers may be more likely to extend favorable terms, consumers may be particularly excited about the industry's products, and prospective employees may disproportionately seek employment in the given industry to improve the quality of the labor pool.[7,8] These changes increase the net present value of existing investment opportunities or open entirely new opportunities. In sum, the shared-sentiment hypothesis predicts that private firm investments respond positively to public firm misvaluation due to underlying sentiment affecting both segments of the economy in a similar direction.

The second hypothesis, which we call the economic competition hypothesis, predicts a negative relation between public peer misvaluation and private firm investment. The increase in investment by public firms in response to overvaluation may crowd out investment by private firm peers. Private firms compete with public peers in several arenas. Consider the competition for financing in the capital markets. Investors enthusiastic about equities may divert funds from debt instruments and bank deposits to invest in public equities. If overvaluation for public peers is greater than the (unobservable) overvaluation of private firms, then the greater competition for financing by public firms during periods of overvaluation reduces the supply of capital to private firms, increasing the borrowing costs of private firms. This would reduce private firm investment. The inverse would be true during periods of public firm undervaluation.

Private firms also compete with public firms in input and product markets. Labor and tangible capital resources such as real estate and equipment may become more costly when public peers increase capital expenditures and labor. This can raise production costs for private firms,

[7] The importance and relevance of sentiment for private firms is also of interest to the public sector. Specifically, the National Federation of Independent Businesses (NFIB) Research Foundation has been collecting small business confidence surveys since 1973.
[8] Private firm suppliers may directly benefit from increased demand when their public firm customers expand their investment. Robustness tests in Section 5 attempt to refine positive sentiment spillover effects by removing industries where economic complementarity effects are more likely to be present.

thereby making it optimal to reduce investment. Similarly, expansion by public peers could cause downward pressure on product prices, reducing the gross margins and profits of private firm competitors, thereby causing private firms to reduce investment. These competitive arguments imply that private firms will decrease investment when public peers are overvalued.[9]

The *misvaluation* effect on investment discussed above, that operates through one of the four shared sentiment pathways or via economic competition, is distinct and incremental to rational learning by private firms from public peer valuation. Foucault and Fresard (2014) predict positive spillovers between peer firm (e.g. industry) valuation and investment due to rational learning about growth opportunities. However a fully rational manager can separate the growth opportunity information from misvaluation, similar to how we as researchers are able to estimate *PV* using publicly available information. Absent shared sentiment or economic competition effects explained above, rational private firm managers would respond only to the growth opportunity information imbedded in public peer stock values.

Prior studies documenting a positive relation between Q and firm investment need not imply a positive relation between misvaluation and investment for our private firm sample. Q and *PV* are distinctly different concepts, with the former reflecting growth opportunities and the latter reflecting misvaluation. Past studies measure Q using a price-to-book ratio but price reflects both normal valuation from growth opportunity effects and misvaluation effects. Empirically, Q and *PV* have low correlations (0.18 Spearman and 0.26 Pearson at the firm level; 0.28 Spearman and

[9] To illustrate, consider the drop in coal-industry misvaluation in 2008 and 2009. Price-to-value ratios peaked in 2007 after a gradual four-year increase and then dropped. While both public and private firms increased investment as misvaluation increased, public coal companies may have been more strongly affected by the drop, leading to an economic competition spillover benefiting private companies. Consistent with this interpretation, we find that private firms continued to invest highly in 2008, while public firms decreased investment. Consistent with a cut in public-firm investment affecting overall supply, coal prices increased in 2008 and 2009 (US Energy Information Administration, 2012). If private companies, seeing both an increase in the price of their product and a decrease in public competition, were able to exploit this, they might increase investment just when misvaluation of the public market dropped – a negative relation between investment and misvaluation.

0.45 Pearson at the industry level). While growth opportunities are likely to have a first order effect on investment, there remains a potentially large and distinct misvaluation effect that remains untested for private firms.[10] In all our regressions, we control for private firms' own investment opportunities, and in additional analyses we further control for industry growth opportunity and use multiple additional approaches to separate growth opportunity and misvaluation effects. The former is important because private firms may have unique investment opportunities unavailable to public firms, perhaps because of their smaller size, higher concentration, or regulatory preferential treatment (small business subsidies).

Note that the economic competition hypothesis still predicts a negative relation between *mis*valuation and private firm investment even though the relation between Q and investment is positive. Under normal valuation, high Q encourages both public and private firm investment because the increase in public firm investment is less likely to crowd out private firm investment when both enjoy higher industry growth opportunities. In contrast, in the case of misvaluation, public firms may increase investment without higher industry growth opportunities, due to the ability to access overvalued equity for financing. The additional public firm investment, in the absence of improved industry growth opportunities, can crowd out private firms.

We next investigate the various financing pathways for misvaluation to encourage private firm investment. Specifically, we use a path analysis first to calculate how misvaluation affects the amount of new financing (debt, equity or retained earnings) available to fund private firm investment and then we compare the amount of new investments funded by these three fund sources and the remainder not associated with these three sources. Since equity financing is much

[10] Another difference between Q and misvaluation arises in cross-sectional predictions. Foucault and Fresard (2014) predict and find that firms just prior to their IPO react more strongly to public-peer Q than just after their IPO; Private firms are *more* sensitive to public-peer Q than public firms. Given the discussion above, e.g., differences in investor bases and financing, we expect that private firms are *less* sensitive to public-peer *misvaluation* than public firms.

more limited for private firms than debt financing, we expect the debt-financing channel to be relatively more important than the equity-financing channel. While the path analysis is not definitive, it helps shed light on which stakeholders are likely to share in public firm investor misperceptions that are fueling the misvaluation. Evidence of significant debt (equity) channel financing would suggest that bank lenders (private equity investors such as angel investors) share in the public investor misperceptions underlying the misvaluation.

To the best of our knowledge, this is the first study of private firm investment sensitivity to misvaluation and investor sentiment. There have been few studies on private firms because of the difficulty in obtaining large sample data. Gompers, Kovner, Lerner and Scharfstein (2008) examine the effect of public market industry valuation, estimated using Tobin's Q, on venture capital financing of private firms; they do not examine effects of *mis*valuation nor study capital expenditure decisions. Asker, Farre-Mensa and Ljungqvist (2015) are the first to compare the investment behavior of public and private firms but they also do not examine misvaluation. Allee, Badertscher and Yohn (2014) compare the drivers of profitability between public and private firms, and find that private firms have higher operating efficiency, primarily from higher profit margins. Burgstahler, Hail and Leuz (2006) and Hope, Thomas, and Vyas (2013) find less earnings management by public firms, from which they infer that the disciplining force of financial reporting dominates the incentive to meet expectations in the capital market.

3. Sample Selection and Data

We obtain balance sheet and income statement data for private firms from Sageworks Inc.[11]

[11] Sageworks collects private firm data from accounting firms, including large national accounting firms and smaller regional firms. Sageworks collects confidential financial statement information of non-listed clients of large and regional accounting firms, and sells the data, aggregated by industry and region, and with financial tools to its clients: accounting firms, banks, and other financial institutions. For research purposes only, Sageworks granted some

The available data items generally include those from the income statement and balance sheet, and are similar to those of Compustat for public firms. Additionally, basic demographic information such as geographic location and North American Industry Classification System (NAICS) industry codes are provided. The latter enables us to find comparable peer firms that are publicly traded.

< TABLE I >

The private firm data covers an interesting period of ten fiscal years from 2001 through 2010. It covers the post-2000 bubble crash period, as well as the run-up directly prior to the recent financial crisis and its subsequent recovery. Investment decisions are expected to show considerable variation in this period. In addition, individual industries were differently affected by these economic events, allowing us to further identify effects of public-firm industry misvaluation on private firms.

We follow Minnis (2011) and Badertscher, Shroff and White (2013) in excluding observations with missing financial data or for which the accounting numbers fail to satisfy basic accounting identities, suggesting data errors. In addition, we eliminate observations for which the Sageworks data is not based on audited, compiled or reviewed financial statements, and is thus less reliable. Finally, we follow Badertscher, Shroff and White (2013) in excluding financial firms (finance and insurance industries, NAICS code 52) and utilities (NAICS code 22) because of their different investment models. Finally, we follow Badertscher, Shroff and White (2013) in eliminating firms with annual sales less than $100,000 and total assets less than $500,000. Since we utilize assets as a scalar, values less than $500,000 (i.e., 0.5) could cause our variable of interest to be misrepresented. Table I, Panel A, describes the sample selection process. This gives us a

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researchers confidential access to the non-aggregated data with firm names removed and unique firm identifiers substituted. For the purposes of this study, Sageworks granted us confidential access to their data.

sample of 51,191 private firms, with 121,892 firm-year observations.[12]

In order to put our sample of private firms into perspective, we obtain a sample of public firms from Compustat that meet the same criteria as our private sample. We then compare the number of private and public firms that are in a variety of size categories. Specifically, in Panel B of Table II, we follow the National Center for the Middle Market at Ohio State University and define "middle market" firms as those with annual sales between $10 million and $1 billion. We use the center's partition of $10-$50M, $50M-$100M and $100M-$1B in sales for smaller, medium and larger middle market firms, respectively. In this construct, "small firms" are firms with sales below $10M, and "large firms" are those with sales above $1 billion.[13] We find that the largest overlap between the private and public firm samples is in the smaller two subsamples of the middle market size range. Specifically, 40% of private firms fall in the $10-$1B sales range, while 59% of public firms fall in this range. In contrast, 60% of private firms are small firms with sales below $10M while only 18% of public firms fall in this category, and only 0.15% of private firms have sales above $1B while 23% of public firms do.[14]

Table I, Panel C, lists the number of firms in each of 30 Fama-French industries for our private firm sample and our comparable public firm sample, as well as the percentage of the samples in each industry. The largest percentages of private firms are in the "Construction and Construction Materials" industry, followed by "Personal and Business Services." The distribution of public and private firms across industries is generally quite similar. For example, 3.5% of private

[12] Private firms enter and exit our sample at a much higher rate than Compustat firms. To ensure our results are not driven by sample selection criteria, we re-run our analyses for the 3,410 (17,050) private firms (firm-years) that remain in our sample for fiscal years 2005 through 2009. The untabulated results are qualitatively similar to those of the full sample.
[13] http://www.middlemarketcenter.org, accessed May 2017.
[14] Based on our conversations with Sageworks, all of our sample firms have some level of attestation that their financial statements conform to U.S. GAAP, either by compilation, review, or audit. However primarily the larger firms tend to be audited. As a robustness check, we also restricted our private sample to only those firms that are audited and our results are similar and the economic significance is often stronger than for the reported results.

firms are in the "Recreation" industry, while 2.4% of public firms are in the "Recreation" industry. The difference in percentage of 1.2% is statistically insignificant. The only four industries with a significant difference in the percentage of private and public firms in the industry, are "Healthcare, Medical Equipment, and Pharmaceutical Products," "Construction and Construction Materials," "Business Equipment," and "Wholesale."

Table II reports summary statistics for key variables. The key dependent variable for capital investment is *INV* which is estimated as the annual increase in gross fixed assets scaled by beginning-of-year assets.[15] The dependent variable for future profitability, *ROI*, is the return on investment calculated as the ratio of operating income for years *t*, *t+1* and *t+2* to net fixed assets at the beginning of year *t*.[16] For examining the financing channels for firms' response to misvaluation, we estimate new debt financing using *CHG_DEBT*, measured as the change in short-term and long-term debt scaled by beginning-of-year assets, estimate new equity financing using *CHG_EQUITY*, measured as the change in stockholder's equity minus the change in retained earnings plus dividends, scaled by beginning-of-year assets, and internal funds using *CHG_RE*, measured as the annual increase in retained earnings, scaled by beginning of the year assets .[17]

The key independent variable is industry-level misvaluation. The misvaluation measure, *PV*, is the ratio of price to residual income value as has been widely used in the accounting and finance literatures; see Appendix A for construction details and a discussion of strengths and weaknesses of the *PV* measure. Residual income value is estimated following standard procedure

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[15] We follow Asker, Farre-Mensa and Ljungqvist (2015) and Badertscher, Shroff, and White (2013) in our definition of *INV*. We also replicate our results using two alternate measures of investment. The first is based on net fixed assets, and the second includes intangible assets. We find similar results. Sageworks data does not include a measure for R&D expenditures, thus our investment measures do not include investments in internally developed intangible assets.
[16] Due to data limitations, our ROI_{t+1} (ROI_{t+2}) sample contains 69,070 (39,048) private firms-years and 39,692 (32,535) public firm-years.
[17] New debt and new equity issuance are more directly reported in the statement of cash flows but Sageworks does not provide this statement in the private firm database.

in the accounting literature where abnormal earnings are relative to the I/B/E/S analyst benchmark (Lee, Myers and Swaminathan 1999). We determine *PV* for a specific year-Fama-French 30 industry using public firms since private firms lack stock prices and analysts' forecasts. Section 5 examines alternative measures derived from extreme mutual fund flows.

Prior literature uses three other measures of misvaluation. Baker, Stein and Wurgler (2003) use the book-to-market ratio for public firms as a misvaluation measure to study misvaluation relation with investment. However, the book-to-market ratio contains elements of both growth opportunities and misvaluation, which our study attempts to directly control for using other empirical variables. Polk and Sapienza (2009) use discretionary accruals as an indirect proxy for overvaluation to study the relation between misvaluation and capital expenditures for public firms. As Polk and Sapienza (2009) acknowledge, discretionary accruals provide only indirect evidence regarding mispricing. There are economic and accounting reasons why accruals may be correlated with investment even if there were no misvaluation (Dechow, Sloan, and Sweeney 1995), and there are sources of misvaluation other than accruals. Morck, Shleifer and Vishny (1990) use CAPM alpha controlling for sales growth, earnings after tax, and interest, but before depreciation to study the relation between misvaluation and capital expenditures for public firms. More modern empirical implementations of asset pricing theory include multiple factors beyond the CAPM market factor so that the CAPM alpha is not, in current literature, viewed as an adequate proxy for misvaluation.

Our *PV* variable has crucial advantages. It is a more direct measure of misvaluation than accruals, and is invariant to accounting choice. Furthermore, by estimating residual income value using analyst forecasts, *PV* is better able to filter away a substantial portion of growth opportunity versus the other methods, so we can more clearly control for Q-theory effects to test the predictions of the misvaluation and economic competition hypotheses. Finally, prior research has shown that the return predictability of the *PV* measure is robust to alternative discount rate estimates (Frankel and Lee 1998).

Similar to Asker, Farre-Mensa and Ljungqvist (2015), we use sales growth as our primary measure for investment opportunities (*INV_OPP*) and predicted Tobin's Q (*PTQ*) as an alternate measure to ensure that our results are not sensitive to the specific investment opportunity measure we use.[18,19] Measurements for other control variables are described in Appendix B.

< TABLE II >

Table II presents summary statistics for our key variables of interest and control variables, winsorized at the 1% and 99% levels. The private firms in our sample are of sizeable magnitudes and are not "mom-and-pop" firms, with mean (median) assets of 7.4 (3.0) million dollars. The private firms have mean debt to asset ratios of 26%. Average return on assets, defined as operating income before depreciation scaled by beginning of year total assets is 0.5%, and median *ROA* is more similar to what we would expect for public firms, at 4.1%.

Focusing on our key variables, the firms in our sample grow their asset base (*INV*) by an average of 4.9% per year, and have positive investment opportunities as measured by sales growth (10.4% on average) or predicted Tobin's Q (1.31 on average). As expected, the private firms in our sample tend to increase debt more than equity as indicated by the higher amounts of *CHG_DEBT* relative to *CHG_EQUITY*. We have future *ROI* data for only a fraction of the firm-

[18] Public firm Tobin's Q can be estimated using Compustat items prcc_f×cshpri + pstkl + dltt + dlc – txditc divided by beginning-of-year total assets. However, stock prices are unavailable for private firms. Therefore, we modify the estimation using a regression model for predicted Tobin's Q, *PTQ*. For each public firm year-industry (Fama-French 30) combination, Tobin's Q is first regressed on sales growth, return on assets, net income before extraordinary items, and book debt. The regression coefficients are then used to generate *PTQ* for private firms.

[19] Morck et al. 1990 also examine cash flow growth, measured as after-tax corporate profits plus depreciation, as a proxy for investment opportunities. We re-run our analysis using cash flow growth as an alternative investment opportunity proxy and the results are similar to when sales growth or predicted Tobin's Q are our proxies for investment opportunity.

years in our sample, but within that subsample, mean (median) subsequent-year *ROI* is −0.6% (4.7%). With regards to our main variable of interest, *PV*, mean and median *PV* are both approximately 1.98, which is consistent with prior research (Dong, Hirshleifer and Teoh 2012).[20]

Finally, Table II, Panel B presents correlations among the main variables. The positive correlations between *SALES_GR*, *PTQ*, and *INV* are consistent with Asker, Farre-Mensa and Ljungqvist (2015) and support the use of *SALES_GR* and *PTQ* as proxies for investment opportunities. We find a positive correlation between our mispricing proxy, *PV,* and *INV*, providing univariate evidence consistent with the shared-sentiment hypothesis. As expected, we find positive correlations between *CHG_DEBT* and *INV*, consistent with the presence of new debt financing for new investments, and with our proxies for investment opportunity (*SALES_GR* and *PTQ*) and future returns on investment (*ROI_t+1* and *ROI_t+2*).

4. Results

4.1 Investment sensitivity to misvaluation

We use regression analysis to examine how private firms respond to misvaluation and growth opportunities in their decisions about capital expenditures. We run the following cross-sectional regression,

$$INV = intercept + b1\ PV + b2\ (SALES\_GR \text{ or } PTQ) + controls + error, \quad (1)$$

where the dependent variable, *INV,* is a measure of capital expenditures, defined as the annual increase in gross fixed assets scaled by beginning of year assets. The key independent variable is

[20] Consistent with past studies (e.g. Dong et al. 2006, Dong, Hirshleifer and Teoh 2012), the reported levels of *PV* are generally too high because terminal values tend to be underestimated, so that residual income fundamental values are generally too small. Thus, a mean value of 1.98 does not imply that the average firm is overvalued as is also discussed in Appendix A. However, relative values of *PV* appear to reflect differences in misvaluation appropriately in past studies and this is our focus.

misvaluation, *PV,* measured at the industry level. We control directly for investment opportunities using two alternate proxies: sales growth, *SALES_GR*, or predicted Tobin's Q, *PTQ*. The additional control variables, measured as of the beginning of the year, include debt (*DEBT*), return on assets (*ROA*) and the natural log of assets (*LNASSETS*).[21] All regressions include industry and year fixed effects. Standard errors are clustered by year and industry and two-tailed p-values are reported.

< TABLE III >

Table III Panel A presents the results when *INV_OPP* is measured by *SALES_GR* on the left-side columns and by *PTQ* on the right-side columns. First consider the effects of growth opportunities on investment. The positive coefficient for *INV_OPP* is consistent with Tobin's Q theory of investment that firms increase capital expenditures when investment opportunities are high, and with evidence in Asker et al. (2015). The economic significance of investment opportunities on capital expenditures is large, consistent with growth opportunities as a key driver of investments. For example, a one standard deviation change in investment opportunities, as measured by *SALES_GR*, is associated with a change in investment, scaled by beginning of year investment, *INV*, of 0.028. This is 57% of the average level of *INV* for our sample of private firms.

Next, consider the effect of misvaluation, the primary focus of our paper. The coefficients on *PV* are positive and significant, measuring investment opportunities using either *SALES_GR* or *PTQ*. A one standard deviation increase in public firm misvaluation leads to a 4.4% increase in investment using *SALES_GR*, and 7.2% using *PTQ*. This implies that misvaluation has roughly 7.7% (18.4%) of the effect of investment opportunities on private firms' investment, when

[21] A potential concern induced by controlling for variables such as *ROA* and *ASSETS* is that they are likely to be correlated with growth opportunities. Since our interests include estimating whether the sensitivity of investment to growth opportunities varies with *PV* and comparing the sensitivity of investment to these variables with the sensitivity of investment to growth opportunities, these control variables may affect the interpretation of our results. In untabulated analyses, we verify that our inferences are unchanged when we remove these controls.

measuring investment opportunities using *SALES_GR (PTQ)*.

The positive relation is consistent with the shared-sentiment hypothesis, but not the economic competition hypothesis. This does not mean that economic competition effects are absent, just that sentiment-driven effects are stronger. While these results do not tell us which private-firm stakeholders are most affected, the results indicate that the shared-sentiment effect is broad and strong enough to encourage new investments.

Table III regressions are augmented with an industry investment opportunity variable *IND_INV_OPP* measured using industry sales growth (*IND_SG*) in the second column and industry Q (*IND_Q*) in the fourth column. The *PV* coefficients remain positive and statistically significant, consistent with misvaluation having incremental explanatory power for investment over both industry and firm specific growth opportunities. The *PV* coefficients are slightly smaller with the inclusion of industry growth opportunities, which may be attributable to the industry variables capturing some misvaluation effects so that misvaluation effects are underestimated. For example, sentiment about the industry may derive from stakeholders over-extrapolating industry growth, and industry Q, which is measured using stock prices, also reflects misvaluation.[22]

Next, we investigate possible interaction effects of misvaluation with growth opportunities by adding an interaction variable between *PV* and *INV_OPP* in Table III Panel B. We test whether firms with high growth opportunities may be more susceptible to misvaluation effects on investment. For example, high growth opportunity firms may be more able to increase investment because they can raise new financing more easily to exploit overvaluation. On the other hand, a rational manager of a firm with few or no growth opportunities may be more reluctant to invest

[22] A one standard deviation change in *PV* has a similar effect as a one standard deviation change in industry *SALES_GR*. Industry *Q*, however, has no significant effect on private firm investment. This difference with Foucault and Fresard (2014) suggest either that private firms are less responsive to industry growth opportunities than public firms, or that Foucault and Fresard’s industry Q effect is largely dominated by the misvaluation effect..

even when the firm is overvalued. Even though Table III Panel A shows that sentiment effects dominate economic competition effects, we do not make a specific directional prediction for the coefficient of *PV*INV_OPP* because the sensitivity of investment to shared sentiment versus economic competition may vary with growth opportunities.

Table III Panel B shows that the *PV* coefficients, our key interest, remain significantly positive, consistent with the shared sentiment hypothesis. The coefficients on *PV*INV_OPP* are also positive and significant, indicating that private firms are more sensitive to their investment opportunities when their public peers are more overvalued, and consistent with Baker and Wurgler (2007). A one standard deviation increase in *PV* increases firms' sensitivity to investment opportunities measured as *SALES_GR (PTQ),* by 5.0% (7.3%). The interaction variable remains positive and borderline significant (p-value 11%, two-tailed, in one specification; p-value 6.7% in the other) when industry growth opportunity is included in the regression.[23]

To summarize, we find consistent and statistically significant evidence of shared-sentiment effects of public-peer misvaluation on private firm investment. When overvaluation is high, firms invest significantly more, and this misvaluation-investment sensitivity generally increases with investment opportunities.

4.2 Cross-sectional Variation of the Investment-Misvaluation Relation

We examine four forms of potential cross-sectional variation in the investment-misvaluation relation in Table IV.[24] We examine whether investment sensitivity to misvaluation

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[23] For comparison with public firms, we replicate the Table III regressions on public firms using public firm's *Q* instead of predicted *PTQ* (results are not tabulated for brevity). We find that public firm investment also responds positively to industry misvaluation and the investment sensitivity is also higher when growth opportunities are higher. *PV* coefficients for public and private firm sample are similar when growth opportunities are measured using Q, and higher for public firms than private firms when growth opportunities are measured using sales growth.

[24] For brevity, in the remainder of the paper, we tabulate the results using only one investment growth opportunity measure. Following prior research (Asker, Farre-Mensa and Ljungqvist 2015 and Badertscher, Shroff, and White 2013), *SALES_GR* is the proxy for *INV_OPP*; the results for *PTQ* are quantitatively similar to those presented. We

varies with the variability in *PV* within the industry, the number of public firms in the industry, the degree of comovement in stock returns among public firms in the industry, and the size of the private firm. In each of the first three cases, we separate the sample into terciles by these conditioning variables and rerun the previous regressions for the top and bottom terciles. We explain the size subsamples later.

Table IV Panel A reports that investment responds significantly positively to misvaluation only for the tercile with the lowest standard deviation in *PV* in the industry. Private firm stakeholders are more likely to be affected by misvaluation that is more uniformly experienced by the relevant public firm stakeholders in the industry. The coefficient on *PV*INV_OPP* is significantly positive for the high standard deviation tercile, suggesting that when variability of sentiment is high, *PV* affects investment only when investment opportunities are high.

< TABLE IV >

The more public firms in the industry, the stronger the signal of misvaluation to private firms. Consistent with this conjecture, Table IV Panel B reports large and significant *PV* coefficient for the tercile with the largest number of firms, and small and marginally significant *PV* coefficient for the tercile with the fewest number of firms. Similarly, public firms with higher returns co-movement are more likely to convey stronger or more consistent sentiment to private firm stakeholders. Co-movement is estimated as the correlation in monthly stock returns for all public firms in the same industry and fiscal year. Table IV Panel C indicates a strong positive *PV* coefficient for the highest stock return correlation tercile (top tercile mean correlation is 0.28), and a positive but insignificant *PV* for the lowest tercile (mean correlation 0.14).

Finally, we examine how investment sensitivity to misvaluation varies with the size of

also do not tabulate the results after including *IND_INV_OPP* for the subsequent tables. Instead, we summarize the results of including industry growth opportunities in section 5.4.

private firms. Table I Panel B shows that private and public firms have distinct size distributions. Misvaluation effects, whether from shared-sentiment effects or from economic competition, are likely strongest for private firms that are more similar to public firms. The largest overlap in size distribution between public and private firms falls in the "middle market" size ranges. We therefore expect the largest misvaluation effects for the middle market group, and the few large private firms. We repeat our main tests separately for two subsamples; middle market firms and large firms (labeled "middle market" below), defined as firms with annual sales of at least $10M (as defined by the National Center for Middle Markets), and for the subsample of small firms, which are firms with less than $10M in annual sales.

Table IV Panel D indicates positive and significant *PV* coefficients for both middle market and small size groups, but the coefficient on the interaction variable *PV*INV_OPP* is large and significant only for the middle market group and not for the small group. The results are intuitive, consistent with larger misvaluation effects for the larger private firms closest in size to public firms.

4.3 Misvaluation Effects on Private Firm Financing and Investment Decisions

As previously discussed, private firm investment sensitivity to misvaluation may differ from public firms because private firms' limited access to public capital markets may constrain their ability to fund new investments in response to misvaluation. We conduct a path analysis, as employed in Bhattacharya, Ecker, Olsson and Schipper (2012), Landsman, Maydew and Thornock (2013), and Pevner, Xie, and Xin (2015) to examine investment response to misvaluation that involves external financing channels via new debt or new equity, or internal financing channels via using own funds. Path analysis is a method for testing the importance of different mediating variables, separating the association between two variables into a direct path between the two and an indirect path through the mediating variables in question (Baron and Kenny 1986; MacKinnon, Fairchild and Fritz 2007). In our situation, the two variables of interest are misvaluation and investment, and the mediating variables are the various forms of financing.

Before we consider the path analysis, we first examine how misvaluation affects private firm financing choice to raise external debt or external equity, or increase internal funds via an increase in retained earnings. Financing variables (change in debt, change in equity, or change in retained) are regressed separately on *PV* and controls, which include return on assets (*ROA*), debt (*DEBT*), and the natural log of assets (*LNASSETS*). Table V shows that misvaluation is associated with a significant increase in debt borrowing by private firms. A one standard deviation increase in *PV* is associated with a *CHG_DEBT* of 0.0048, 20% of the average private firm *CHG_DEBT*. On the other hand, the economic magnitude of the misvaluation effect on change in external equity is very small; note that most firm-years show no change in contributed equity capital in the sample. In other words, private firm borrowing is sensitive to misvaluation, but given the lack of easy access to the equity market, private firm new equity issuance is less responsive to misvaluation in absolute terms. There is also a statistically and economically significant positive relation between changes in retained earnings and *PV*. A one standard deviation increase in *PV* is associated with a *CHG_RE* of 0.0044, 19% of the average private firm *CHG_RE*. Thus, *PV* is associated with an increased availability of funds to finance investment, particularly via debt and retained earnings.

< TABLE V >

Turning to the path analysis, we estimate a structural equation model which includes the regression of investment on *PV* and the three financing paths, via debt, equity, and retained earnings, and controls, and the financing decision regressions of *CHG_Y* on *PV* and controls where *Y* is respectively change in debt, change in equity, or change in retained earnings:

$$INV = Intercept + bPV + b_{CHG\_DEBT}\,CHG\_DEBT + b_{CHG\_EQUITY}\,CHG\_EQUITY + b_{CHG\_RE}\,CHG\_RE$$

$$+ \; controls + error \qquad (2)$$

$$CHG\_Y = intercept + c_{CHG\_Y}\, PV + controls + error \qquad (3a,b,c)$$

where the controls of equation (2) are as in equation (1), and the controls in equations 3a, b, and c are as in the financing decision regressions in Table V. To aid in the interpretation of the path effects, key variables are standardized to mean zero and standard deviation one. The estimated values of $b_{CHG\_DEBT}*c_{CHG\_DEBT}$, $b_{CHG\_EQUITY}*c_{CHG\_EQUITY}$ and $b_{CHG\_RE}*c_{CHG\_RE}$ capture the effect of *PV* on investment via the respective financing channels of debt, equity, and internal profitability. The residual path contains only one path coefficient *b*, between *INV* and *PV*, and it captures the portion of new investment that is not explained by changes in debt, equity, or retained earnings.

< FIGURE 1>

Figure 1 summarizes the results. The percentages at the bottom of the Figure 1 table summarize the portion of the total investment response to misvaluation via each of these financing channels, and the residual portion unexplained by the three financing channels. The largest pathway, 60.5%, is via debt financing, and only 1.6% is via equity. These results are consistent with private firms using bank borrowing as the primary source of financing, and having limited access to equity markets. For the internal financing channels, 11.1% is via retained earnings, and the residual is 26.8%.[25]

Polk and Sapienza (2009) suggest that public firm managers may increase investment in response to misvaluation, even when no external capital is raised, because of catering pressure on the managers. Private firms may similarly cater to positive sentiment of current equity providers

[25] We conduct the same path analysis to examine the mechanisms linking *PV* to public firm investment. While both public and private firms respond to high *PV* with high investment, the paths linking the two are very different. For private firms, changes in debt are negatively related to *PV*. *CHG_EQUITY* accounts for 124% of the total effect, while *CHG_RE* and the direct path account for 13% and 25% respectively. These are partially offset by a -62% effect related to *CHG_DEBT*. Thus, the pecking order theory (Myers and Majluf, 1984) does not apply when there is misvaluation, and instead public firms take advantage of cheap equity to raise new financing when the firm is overvalued, consistent with the findings in Dong, Hirshleifer and Teoh (2012).

(outside blockholders and bank lenders) to sustain current valuations, but also to *potential* future equity investors in advance of an anticipated or hoped-for IPO. Cornelli, Goldreich and Ljungqvist (2006) provide evidence that investor sentiment affects IPO pricing. As discussed in Section 2, private firm managers may also increase investment without direct catering pressure; spillovers of positive sentiment to product and labor markets increase profitability (retained earnings), and thereby relax financing constraints. Overall, the evidence presented in this subsection suggests that both external financing through debt and internal financing play important roles in financing new investments by private firms when the public peers are overvalued.

4.4 Return to Investment of Misvaluation-Induced New Capital Expenditures

Next, we test whether the new investments are efficiently deployed by overvalued firms by examining future return on investments (*ROI)* of *PV*-related investments.[26] We separate investment into a misvaluation-related investment portion *INV_PV* and the remainder unexplained by *PV, INV_NON_PV*. We estimate *INV_PV* as the investment predicted from *PV* and *PV*INV_OPP* in equation (1) augmented with *PV*INV_OPP*. *ROI* is measured as operating income before depreciation divided by net fixed assets. We estimate the following regression relating future *ROI* (years *t+1* and *t+2*) to year *t* independent variables:

$$ROI = intercept + b1\ INV\_PV + b2\ INV\_NON\_PV + b2\ INV\_OPP + controls + error \quad (4)$$

The results are presented in Table VI. The future *ROI* of private firms increases with misvaluation-related investment. The coefficients on *INV_PV* in Panels A (one-year-ahead *ROI*) and B (two-year-ahead *ROI*) are both positive and highly significant ($p< 0.001$). For a private firm

[26] Since not all new investments are captured by the capital expenditures variable, we also examine future return on net operating assets and the results are qualitatively similar to return on investment.

with average investment opportunities, a one standard deviation change in *INV_PV* is associated with 19.8% increase in ROI_{t+1} compared to the median and 40.1% increase in ROI_{t+2}.[27]

< TABLE VI>

We present similar regression results for public firms for comparison. The differences are striking. Unlike private firms, the *INV_PV* coefficients in the regressions of public firm ROI_{t+1} are significantly negative, and in the regressions of $ROI_{t+2,}$ they are statistically insignificant. The differences between private and public firms for the coefficients on *INV_PV* are significant, with t-statistics of 3.19 in Panel A and 3.86 in Panel B. The incrementally higher returns for private firms on misvaluation-induced new investments suggest that private firms are less likely than public firms to suffer Jensen's agency costs of overvalued equity. Managerial agency problems are less severe in private firms. Furthermore, unlike public firms, private firms are constrained in their ability to invest and so underinvest in normal times; overvaluation facilitates additional efficient investments instead of wasteful spending.[28]

The higher returns to investment suggest that the positive sentiment fueling overvaluation also spills over to private firms to yield net positive real effects for the private firms, despite potential negative effects from public firms out-competing private firms (the economic competition hypothesis). The high sentiment in periods of overvaluation may spillover so that private firms also enjoy better terms from vendors/suppliers, cheaper and more productive employees, cheaper capital, and higher product prices, all of which relax financing constraints and boost profitability for the private firm. In such circumstances, rational managers would increase

[27] When we include the interaction of *PV* and *INV_OPP* in Table VI, we find no evidence that the interaction between *PV* and *INV_OPP* is significant.

[28] Increased productivity from relaxing financing constraints through banking deregulation has been reported for private firms (Krishnan, Nandy and Puri 2015).

investment even without catering pressure. They would, of course, increase investment if they share in the positive sentiment that boosts their confidence about firm growth opportunities. If that is the case, these positive outcomes would contrast with the negative consequences of managerial overconfidence for public firms (Malmendier and Tate 2005, 2008), but would be similar to the beneficial effects of misvaluation and overconfidence to encourage innovation by public firm managers documented by Dong, Hirshleifer, and Teoh (2017), and Hirshleifer, Low and Teoh (2012). In sum, whether through managers' confidence or other stakeholders' excitement, our results suggest that public firm overvaluation benefits private firms through shared-sentiment effects.

5. Alternative Misvaluation Measures and Robustness Analyses

Misvaluation measures are particularly challenging to estimate, and as with all empirical measures, are imperfect. While *PV* has been shown in prior literature to be an effective misvaluation measure relative to other measures (Appendix A), the measurement error remaining in *PV* may reduce test power or bias inferences. Test power is not a concern as we do find statistically significant relations between *PV* and private firm investment, financing, and future *ROI*. Biased inferences arising from insufficient control of growth opportunities may be a concern, even though our construction of *PV* goes farther than misvaluation measures in the prior literature (see Section 2) to control for growth opportunities. We address this concern in several ways below.

5.1 Instrumental Variables Using Mutual Fund Flows

We use mutual fund outflows from US equity funds as an instrument for misvaluation as suggested in the corporate finance literature.[29] High outflows pressure fund managers to sell stocks

[29] Mutual fund flow instruments for mispricing have been used in several recent papers in the corporate finance literature; see Coval and Stafford (2007), Edmans, Goldstein, and Jiang (2012), Hau and Lai (2013), Kadach (2015),

in their portfolios, creating temporary mispricing. We follow Edmans, Goldstein, and Jiang (2012) in using hypothetical trades that are in equal proportion to fund holdings prior to the outflows rather than the actual trades by managers in response to outflows, and in excluding sector-specific funds. These refinements ensure that the trades are unrelated to fund manager's private information about the underlying securities, and so are exogenous to growth expectations.

Following Edmans et al. (2012), we calculate outflow-related hypothetical sales for each individual public peer each year. We then average across the public peers for each industry-year to obtain an industry measure of flow-induced selling pressure, *MFFLOW*, where *MFFLOW* is a negative number to denote outflows. Larger *MFFLOW* reflects smaller outflows, corresponding to more positive misvaluation, thus we expect and find (see Table II, Panel B) a positive relation between *MFFLOW* and *PV*.

In the first stage of the two stage least squares instrumental variables design, we regress *PV* on the instrument *MFFLOW* and the same controls as in Equation (1). In the second stage, we regress investment or future ROI on predicted *PV* from stage 1. Results are reported in Table VII.

Table VII Panel A reports the first-stage regression where the dependent variable is *PV*. Staiger and Stock (1997) propose a test for the strength of an instrument under the null hypothesis wherein the coefficients for the instruments in the first stage are zero. The diagnostic results in Panel A show that we can reject this null comfortably, and the *MFFLOW* instrument clearly passes the threshold (partial F-statistics: 21.04 and 21.08), which mitigates concerns about a weak instrument bias.[30]

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and Eckbo, Makaew and Thorburn (2016). In untabulated analyses, we replicate the descriptive return tests in Coval and Stafford (2007) and find similar price reversion after extreme outflows at the industry level to validate that extreme outflows capture mispricing at the industry level.

[30] For brevity we report the first stage results only for Panel A of Table VII. Untabulated results indicate that *MFFLOW* does not suffer from a weak instrument bias in Panels B, C, and D.

<TABLE VII>

The results in Table VII for the stage 2 regression of investment on the instrumented *PV* variable in Panel A and for the same stage 2 regression but also including the interaction between the instrumented *PV* and growth opportunities are reported in Panel B. We continue to find a positive and significant coefficient on the instrumented *PV* variable when investment opportunities are measured using either *SALES_GR* or *PTQ*. Such results continue to support the shared-sentiment hypothesis.

Panels C and D report the regressions of future ROI on the instrumented *PV*, analogous to Table VI results for the uninstrumented *PV*. We find that instrumented *PV* is positively related to future ROI for private firms but not for public firms. The difference between the coefficients on instrumented *PV* for public and private firms is significant for two-year-ahead *ROI* but not for one-year-ahead *ROI*. Overall, the findings from Panels C and D provide consistent, albeit slightly weaker, evidence than the results from Table VI. In short, private firms appear to benefit from misvaluation-induced investment.

5.2 Growth-orthogonalized Misvaluation Measures

We implement an additional procedure that further purges expectations about growth opportunities from the *PV* and the mutual fund flow misvaluation measures. We use *PV_res*, calculated as the residuals in a regression of *PV* on sales growth (*SALES_GR*), predicted Tobin's Q (*PTQ*), and analyst long-term growth forecasts, averaged for public firms by industry-year. This is likely a conservative approach for estimating misvaluation because past evidence has shown that analysts' forecasts reflect sentiment. For example, Hribar and McInnis (2012) find that analysts' forecasts for hard-to-value firms are particularly optimistic during periods of high sentiment. Investors are also more likely to misvalue growth during periods of high growth or for firms with high growth. Therefore, some mispricing effects may be removed in the *PV_res* measure, handicapping the variable as an overvaluation proxy.

We use an analogous procedure to obtain *MFFLOW_res* by regressing *MFFLOW* on *SALES_GR*, *PTQ*, and analyst long-term growth forecasts, and obtaining the residuals. Recall that a justification for using *MFFLOW* as an instrument for *PV* is that it is unlikely to be related to information or growth expectations because it does not capture the active investment decisions of the fund manager or the individual stock investment decisions of the investor. Consistent with this, we find insignificant coefficients on all three growth proxies in our first stage. Nevertheless, to be conservative in our tests, we run the robustness analysis with *MFFLOW_res.*

Table VIII reports results analogous to Table III but using *PV_res* and *MFFLOW_res* as the main variables of interest. Results are similar to those reported in Table III. Specifically, we find positive and statistically significant coefficients on *PV_res* and *MFFLOW_res* in both panels. Thus, the inference that private firm investment is related to peer public firm overvaluation is robust and unlikely to be confounded by growth expectations in the misvaluation measures.

<TABLE VIII>

5.3 Robustness across Industries

We re-examine the robustness of the positive shared sentiment effect in Table III by removing two industries, “Construction and Construction Materials” and “Automobiles and Trucks”, where economic complementarities between public and private firms are most likely. In these industries, the private firms may be small suppliers to the public firms, and the positive spillover may come directly from increased demand for the private firm products by public firm customers rather than from sentiment spillovers. We do not have firm names in our private firm database so we are unable to check specifically for public firm customer-private firm supplier economic complementarities.

Results are untabulated for brevity. Comparing with Table III, we find very similar magnitudes and statistical significance for the *PV* coefficient in Panel A. The results are also very similar in Panel B which includes the interaction variable *PV*INV_OPP*. Overall, the results are consistent with those presented in Section 4, and suggest that contracting – public firms using private firms as direct suppliers – is not the main driving factor behind the positive sentiment spillovers to private firm investment.

5.4 Controlling for Industry Growth Expectations

Table III results show that the *PV* effect on investment is robust to including controls for industry investment opportunities (Foucault and Fresard 2014). In additional analyses, we examine robustness of results in Tables IV-VIII and Figure 1 to including industry investment opportunities. The results are generally similar with slightly smaller coefficient estimates and sometimes lower t-statistics.

When industry sales growth or industry Q are added to the regressions in Tables IV through VIII, we find the following: We find similar cross-sectional variation and significance levels in Table IV. For Table V and Figure 1, equity, debt, and retained earnings are all significantly positively related to *PV*, and the order of importance for the pathways remain the same (debt 63%, remainder 26%, retained earnings 7%, and equity 4%). For Table VI, future ROI is significantly positively (negatively) related to *INV_PV* for private (public) firms, where *INV_PV* is estimated from models including the *IND_INV_OPP* variable. The difference between the coefficient on *INV_PV* for private and public firms remains significant at the 1% level for both years t+1 and t+2. In Table VII, Panel B, the t-statistics for the coefficient on *Instrumented PV* is reduced to 1.59, p-value of 11%. In Table VIII, for which *PV* and *MFFLOW* are orthogonalized with an augmented set of growth opportunity variables that includes *IND_INV_OPP*, *PV_res* remains statistically significant in both panels. *MFFLOW_res* is significant in Panel A and *MVFLOW_res*INVOPP* is significant in Panel B. Overall, results are generally robust to including controls for *IND_INV_OPP*.

5.5 Undervaluation vs. Overvaluation

We examine whether there is an asymmetry in the effect for undervaluation (low *PV*) versus overvaluation (high *PV*). Given frictions to divestments, we might expect stronger effects for overvaluation. We sort the sample into terciles based on industry *PV*, and estimate equations (1) and (2), replicating Table III, for the top tercile (overvaluation) and bottom tercile (undervaluation) separately. We find that the positive relation between investment and *PV* is concentrated in the overvaluation subsample (positive significant coefficients, $p<0.01$), with an insignificant relation for the undervaluation subsample. Variation in the degree of overvaluation has a significant impact on investment, while variation in the degree of undervaluation does not. However for the undervaluation subsample we find a positive and significant coefficient on *PV*INV_OPP*, with $p<0.01$. Thus variation in the degree of undervaluation has a higher impact on the investment of firms with higher investment opportunities.

5.6 Reversals

Misvaluation, as opposed to efficient valuation, will eventually correct. When it does, we might expect misvaluation-driven investment to also reverse. We examine possible investment reversal by regressing *INV t+2* and *INV_t+3* on *PV* and the control variables from equation (1). It is not clear ex ante the correct horizon for the reversal effect, however we posit that one year would be too short – mispricing is likely to be somewhat persistent and/or firms may not react to reverse their investments that quickly. The results show weak evidence of a reversal at the t+2 horizon (coefficients on PV of -0.005 and -0.003, t-stats -1.46 and -1.96, for *INV_OPP = SALES_GR* and *PTQ*, respectively) and strong and significant evidence of a reversal at the t+3 horizon (coefficients on PV of -0.005 and -0.004, t-stats -2.18 and -2.06, respectively). These results are consistent with a decrease in investment corresponding to a correction of overvaluation.

6. Conclusion

Research on the drivers of the investment behavior of firms has devoted little attention to private firms, which comprise a significantly larger fraction of the economy than public firms in terms of assets invested, people employed, and revenues generated. We provide evidence that private firm investments are responsive to misvaluation of their public peers. Specifically, overvaluation of public peers is associated with higher new capital expenditures by private firms. We also find that the effect is stronger for industry-years where there are more likely to be public-to-private sentiment spillovers. Interestingly, the misvaluation-induced investments for private firms are more productive than the misvaluation-induced investments for public firms in generating incremental new net profits.

Collectively, our evidence of a positive investment-misvaluation relation is consistent with the predictions of the shared-sentiment hypothesis where public firm investor sentiments fueling the misvaluation spill over or are shared with private firm stakeholders. The resulting high sentiment encourages private firm managers to increase investment.

We also explore how private firms finance increased investment. The evidence that debt financing is used to fund misvaluation-induced investments of private firms is consistent with a situation where private firms' bank lenders adjust credit terms to private firms because the lenders share in the sentiment that is driving misvaluation in the public markets. The evidence that internal funds are used is consistent with a situation where private firm managers are rational but other stakeholders, such as suppliers or customers, are affected by same public market sentiment fueling the misvaluation, or where the private firm managers themselves are affected by the same public market sentiments fueling the misvaluation.

Finally, the evidence that misvaluation-induced investment is more productive for private firms than public firms in generating future earnings is consistent with private firms as more liquidity constrained and having initially increasing returns to scale. In that circumstance, in normal times, private firms are likely to invest in the increasing returns to scale region, and overvaluation permits them to invest more and achieve higher marginal return on investment. This provides an interesting contrast with studies that have documented economic costs associated with inefficient valuations. Here, overvaluation in the public markets has the beneficial effect of encouraging valuable investments by private firms. Our results suggest that a one standard deviation increase in misvaluation is associated with roughly a 25% increase in subsequent-years' return on investment for private firms.

Overall, our evidence suggests that misvaluation in public markets is associated with pervasive misvaluation effects in the private markets as well. This is surprising since private firms rely less on equity, a misvaluation-sensitive form of financing. The evidence emphasizes the importance of misperceptions by private firm stakeholders. These effects are potentially highly material because the private sector is substantially larger than the universe of publicly-traded firms. Our evidence suggests that policy prescriptions to motivate investment in the economy or to improve efficient investment need to consider how misvaluation affects the private firm sector.

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Appendix A. *PV* as a Measure of Misvaluation

The price to value ratio, *PV*, is defined as a firm's stock price over an estimate of the fundamental value of the stock based on the residual income model of Ohlson (1995). We follow Dong, Hirshleifer and Teoh (2012) for estimating *V* for each public peer. The *V* estimate incorporates both current book value, and analyst forecasts of future earnings. Thus, the denominator explicitly incorporates forecasts of future growth. While *V* is a noisy measure of fundamental value, it is unlikely to be as strongly affected by market misvaluation as market price itself, *P*. Because of this, the ratio *PV* serves as a measure of misvaluation, controlling for at least some measure of past performance through book value and for growth expectations through analyst forecasts.

The *PV* measure has been used as a measure of misvaluation in several studies, with prior research supporting the validity of *PV* as a misvaluation measure. *PV* has been shown to predict future returns, even after controlling for beta, size, book-to-market ratio, for individual stocks (Frankel and Lee, 1998) and for the Dow Jones 30 stock index (Lee, Myers, and Swaminathan, 1999), providing evidence that *PV* captures mispricing which later corrects. Kokkonen and Suominen (2015) show that the spread between high and low *PV* predicts returns for a long-short portfolio based on the *PV* misvaluation measure. Two studies specifically address whether the return predictability of *PV* is due to mispricing or omitted risk factors, providing evidence consistent with a mispricing explanation. Ali, Hwang, and Trombley (2003) find that future abnormal returns are concentrated around future earnings announcements, and that abnormal returns remain after controlling for an extensive list of risk measures. Doukas, Kim and Pantzalis (2010) confirm the abnormal return predictability documented in these other studies, and show that it is linked to arbitrage risk, further suggesting that the abnormal returns are related to mispricing rather than omitted risk factors. Finally, additional research suggests that *PV* is related to firm behavior, consistent with firms exploiting misvalued equity. Dong, Hirshleifer, Richardson, and Teoh (2006) find evidence that misvaluation, measured using *PV,* at least partially drives merger and acquisition behavior, particularly in the 1990-2000 period compared to the pre-1990 period, while Dong, Hirshleifer and Teoh (2012) find that equity issuance increases with *PV* for overvalued firms.

We make two modifications to the measure used in prior literature. First, the academic literature has sometimes used the inverse ratio, *V/P* measuring fundamental value to price. We use *PV* to allow a reader to more easily interpret larger values of PV as reflecting greater overvaluation, similar to Dong, Hirshleifer, Richardson, and Teoh (2006). Second, because we lack the market price and analyst forecast data to calculate *PV* for privately-held firms, we calculate industry *PV* as the average *PV* for all publicly-traded firms in the industry, with sufficient data. Prior literature has used firm-level *PV* as it has focused on public firms for which all necessary data is available. We describe this as "public peer misvaluation," to clarify that the *PV* measure is derived from peer (same-industry) firms which are publicly traded, rather than from the private firms themselves. This is similar to the approach used in Gompers, Kovner, Lerner and Scharfstein (2008), in which they relate venture capital investment in private firms to industry-level measures of public market valuations, such as industry-level weighted-average Tobin's Q.

Finally, while a theoretical value of *PV* greater than (less than) one reflects overvaluation (undervaluation), we do not calibrate the model to be one to represent fair valuation. The fundamental value model may be biased because of systematic mismeasurement of variables and upwardly biased analyst forecasts of earnings, leading a value other than one to represent fair valuation. We do not make statements about absolute "overvaluation" or "undervaluation" based on the level of *PV,* but rather focus on relatively higher or lower values of *PV*.

The primary weakness to using *PV* as a proxy for misvaluation lies in the possibility that analyst forecasts are related to misvaluation. If, for example, analysts are subject to the same biases that drive misvaluation or if their forecasts help to mislead the market and thus lead to misvaluation (e.g., see Hribar and McInnis 2012), a component of misvaluation will be captured in the denominator of the measure as well as the numerator. This would bias the *PV* measure towards one, and reduce the power to detect misvaluation-related effects.

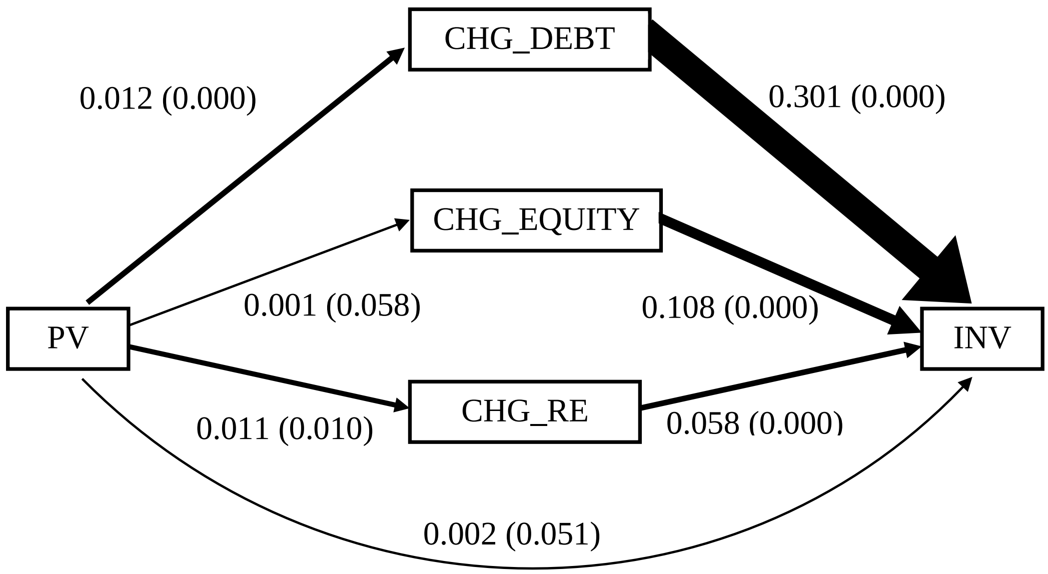
Finally, we note that *PV* may be mis-measured because of estimation errors for the cost-of-capital; *PV* is overestimated (underestimated) if the estimate of the cost-of-capital is too high (low). However, it is unlikely that cost-of-capital estimate fully explains our results. Previous studies report that the return predictive ability of the residual income value to price ratio is robust to the cost-of-capital model used (Frankel and Lee 1998; Lee, Myers, and Swaminathan 1999; D'Mello and Shroff 2000; Badertscher 2011). In addition, due to our use of industry *PV*, the mismeasurement would need to be systematic for the industry and for the private firm to induce a spurious positive relation between private firm investment and industry peer *PV*. Furthermore, our *ROI* tests in Section 4.4 find that private firms with high industry *PV* earn *higher* subsequent *ROI*, not lower as would be suggested from a too high estimation of the cost-of-capital. Finally, our results are robust to the mutual fund flow misvaluation instrument which is not subject to this issue (see Section 5.1), and find similar results.

The residual income model also assumes clean surplus, therefore mergers and acquisitions (M&A) can cause firms to violate this assumption. We follow the methodology in Hribar and Collins (2002) and replicate our tests excluding from our PV calculations firms that engaged in M&A where the M&A affects current sales by more than 20% of prior-year sales (Compustat variable AQS). The tenor of our results remain the same after excluding M&A firms.

Appendix B. Variable Definitions

Variable Name	Variable Definition
ASSETS	Total assets (Sageworks item totalassets).
CHG_DEBT	Annual increase in long-term and short-term debt (Sageworks item shortermdebt, seniordebt, subordinateddebt), scaled by beginning of the year assets.
CHG_EQUITY	Annual increase in stockholders equity minus increase in retained earnings plus dividends (Sageworks items totalstock, retainedearnings, dividends), scaled by beginning of the year assets
CHG_RE	Annual increase in retained earnings (Sageworks item retainedearnings), scaled by beginning of the year assets
DEBT	Debt is beginning-of-year long-term and short-term debt (Sageworks items shortermdebt, seniordebt, subordinateddebt), scaled by beginning-of-year total assets.
IND_Q	Industry Tobin's Q. Calculated as the annual mean of Tobin's Q for each Fama French 30 industry group.
IND_SG	Industry sales growth. Calculated as the annual mean of sales growth for each Fama French 30 industry group.
INV	Annual increase in gross fixed assets (Sageworks item grossfixedassets) scaled by beginning of the year assets.
INV_NON_PV	Investment that is not related to PV. Which is INV minus INV_PV, which represents the remainder of *INV* which is unexplained by *PV*
INV_PV	Investment related to PV which is the investment predicted by *PV* and *PV*INV_OPP* based upon the results of estimating equation (2).
LNASSETS	Natural logarithm of ASSETS (Sageworks item totalassets).
MFFLOW	Mutual fund outflows for each individual public peer each year is calculated following Edmans et al. (2012), and then averaged across the public peers for each industry-year to obtain industry *MFFLOW*. Note that it is a negative number since it is measuring outflows.
MFFLOW_res	Residuals from the regression of *MFFLOW* on sales growth (*SALES_GR*), predicted Tobin's Q (*PTQ*), and analyst long-term-growth forecasts, averaged for public firms by industry-year.
PTQ	Predicted Tobin's Q is computed as follows. Following Asker et al. (2015) and Campello and Graham (2013), we regress each public firm's Tobin's Q (Compustat items prcc_f×cshpri + pstkl + dltt + dlc – txditc divided by beginning-of-year total assets, at) on the firm's sales growth, return on assets, net income before extraordinary items, book debt, and year and industry fixed effects (using 3-digit NAICS industries). We then use the regression coefficients to generate predicted Q for each firm, both public and private ones.
PV	Price to value ratio is calculated annually for each Fama French 30 industry group. For each fiscal year, the price-to-value ratio is averaged for all firms within each industry group. The numerator of a firm's price-to-value ratio is the firm's market value at the end of the fiscal year. The denominator of the ratio is calculated as the firm's residual income value where abnormal earnings are estimated using analyst forecasts. See Dong, Hirshleifer and Teoh (2012) for details.
PV_res	Residuals from regression of *PV* on sales growth (*SALES_GR*), predicted Tobin's Q (*PTQ*), and analyst long-term-growth forecasts, averaged for public firms by industry-year.
ROA	Return on Assets (ROA) is operating income before depreciation (Sageworks equivalent, Sales – CostOfSales – Payroll – Rent – Advertising – Overhead + OtherOperatingIncome – OtherOperatingExpenses) scaled by beginning of the year total assets.
ROI	Return on Investment (ROI) is operating income before depreciation (Sageworks equivalent, Sales – CostOfSales – Payroll – Rent – Advertising – Overhead + OtherOperatingIncome – OtherOperatingExpenses) scaled by beginning of the year net fixed assets (Sageworks item netfixedassets).
SALES_GR	Annual percentage increase in sales, $Sales_{it}/Sales_{it-1}$ -1 (Sageworks item sales).

Figure 1. Path Analysis



		Coefficient	p-values
Calculation for combined path effects:	Total CHG_DEBT	0.004	0.000
	Total CHG_EQUITY	0.000	0.000
	Total CHG_RE	0.001	0.000
	Total	0.006	0.000
Percent of total effect through:	**% CHG_DEBT**	**60.52%**	
	% CHG_EQUITY	**1.59%**	
	% CHG_RE	**11.08%**	
	% Direct	**26.81%**	

The figure presents individual coefficient estimates from estimation of the structural equation model described in Equation 2 and 3a,b,c, p-values in parentheses. See Appendix B for variable definitions. The table below presents the calculation for total path effects and the percent of total effects through each of the four paths.

Table I. Sample Selection and Distribution

Panel A: Private firm sample selection process.

Private Firm Sample Selection (2001 - 2010)	
Initial Sample of U.S. Firms	439,517
Eliminate firms with missing financial data to compute necessary variables	(204,263)
Eliminate firms in Utilities, Finance, and Insurance industries	(9,287)
Eliminate observations that fail to satisfy basic accounting identities	(7,619)
Eliminate observations that are not based on Audited, Compiled, or Reviewed financial statements	(67,074)
Eliminate observations with annual sales less than $100,000 and total assets less than $500,000	(29,382)
Firm-year observations	121,892
Firms	51,191

Panel B: Size comparison of private and public firms.

	Private Firms		Public Firms		Difference in %
Sales Range	Firm-years	%	Firm-years	%	Public - Private
Small Firms					
sales < 10,000,000	73,163	60.02%	10,353	17.71%	-42.31%
Middle Market Firms					
10,000,000 ≤ sales < 50,000,000	39,658	32.54%	10,096	17.27%	-15.26%
50,000,000 ≤ sales < 100,000,000	5,494	4.51%	5,730	9.80%	5.30%
100,000,000 ≤ sales < 1,000,000,000	3,394	2.78%	18,638	31.89%	29.11%
Large Firms					
1,000,000,000 ≤ sales	183	0.15%	13,627	23.32%	23.17%
	121,892	100.00%	58,444	100.00%	

Table I: Sample Selection and Distribution *(continued)*

Panel C: Sample distribution by Fama-French industry of private and public firms.

Industry Category	Industry Code	Private		Public		Difference	
Food Products	1	4,711	3.9%	1,411	2.4%	1.5%	
Beer & Liquor	2	0	0.0%	267	0.5%	-0.5%	
Tobacco Products	3	17	0.0%	86	0.1%	-0.1%	
Recreation	4	4,303	3.5%	1,386	2.4%	1.2%	
Printing and Publishing	5	2,259	1.9%	612	1.0%	0.8%	
Consumer Goods	6	1,716	1.4%	847	1.4%	0.0%	
Apparel	7	379	0.3%	727	1.2%	-0.9%	
Healthcare, Pharmaceutical Products	8	2,152	1.8%	7,223	12.4%	-10.6%	**
Chemicals	9	1,026	0.8%	1,294	2.2%	-1.4%	
Textiles	10	283	0.2%	156	0.3%	0.0%	
Construction and Construction Materials	11	40,876	33.5%	1,721	2.9%	30.6%	***
Steel Works	12	2,923	2.4%	892	1.5%	0.9%	
Fabricated Products and Machinery	13	4,067	3.3%	2,101	3.6%	-0.3%	
Electrical Equipment	14	314	0.3%	1,050	1.8%	-1.5%	
Automobiles and Trucks	15	493	0.4%	886	1.5%	-1.1%	
Aircraft, ships, and railroad equipment	16	530	0.4%	419	0.7%	-0.3%	
Precious Metals and Industrial Metal Mining	17	749	0.6%	1,486	2.5%	-1.9%	
Coal	18	278	0.2%	184	0.3%	-0.1%	
Petroleum and Natural Gas	19	171	0.1%	3,897	6.7%	-6.5%	
Utilities	20	0	0.0%	0	0.0%	0.0%	
Communication	21	697	0.6%	2,668	4.6%	-4.0%	
Personal and Business Services	22	12,192	10.0%	8,851	15.1%	-5.1%	
Business Equipment	23	767	0.6%	7,954	13.6%	-13.0%	***
Business Supplies and Shipping Containers	24	2,726	2.2%	836	1.4%	0.8%	
Transportation	25	2,621	2.2%	3,901	6.7%	-4.5%	
Wholesale	26	17,275	14.2%	2,054	3.5%	10.7%	**
Retail	27	15,297	12.5%	2,757	4.7%	7.8%	*
Restaurants, Hotels, Motels	28	2,309	1.9%	987	1.7%	0.2%	
Banking, Insurance, Real Estate, Trading	29	0	0.0%	0	0.0%	0.0%	
Everything Else	30	761	0.6%	1,791	3.1%	-2.4%	
		121,892		58,444			

Table II: Descriptive Statistics and Correlations

Panel A: Descriptive Statistics.

	Private Sample					
Investment Spending	**Mean**	**Std. Dev**	**Q1**	**Median**	**Q3**	**Obs**
INV	0.049	0.134	0.000	0.015	0.059	121,892
Financing						
CHG_DEBT	0.024	0.168	-0.034	0.000	0.038	121,892
CHG_EQUITY	0.003	0.022	0.000	0.000	0.000	121,892
CHG_RE	0.023	0.162	0.000	0.000	0.040	121,892
Profitability						
ROI	0.001	0.886	-0.280	0.054	0.293	121,892
ROI_t+1	-0.006	0.863	-0.281	0.047	0.281	69,070
ROI_t+2	-0.010	0.845	-0.282	0.040	0.272	39,048
Misvaluation						
PV	1.978	0.401	1.743	1.966	2.461	121,892
Investment Opportunities						
SALES_GR	0.104	0.366	-0.074	0.048	0.197	121,892
PTQ	1.308	0.857	0.757	1.194	1.674	121,892
Industry Controls						
IND_SG	0.114	0.106	0.036	0.138	0.187	121,892
IND_Q	1.552	0.446	1.296	1.532	1.763	121,892
Firm Characteristics						
ROA	0.005	0.402	-0.176	0.041	0.197	121,892
DEBT	0.260	0.272	0.027	0.169	0.417	121,892
ASSETS	7.442	13.294	1.379	3.030	7.228	121,892

This table provides descriptive statistics for key variables. All variables are winsorized at the 1/99 percentiles. See Appendix B for variable definitions.

Table II: Descriptive Statistics and Correlations *(continued)*

Panel B: Pearson (top) and Spearman (bottom) Correlations.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	*INV*		**0.389**	**0.043**	**0.090**	**0.035**	**0.032**	**0.030**	**0.022**	**0.226**	**0.152**	**0.055**	**0.055**	**0.084**	**0.069**	**0.010**
2	*CHG_DEBT*	**0.237**		**0.048**	**-0.051**	**-0.012**	0.008	0.005	**0.030**	**0.134**	**0.125**	**0.057**	**0.044**	**-0.014**	**-0.055**	**0.036**
3	*CHG_EQUITY*	**0.022**	**0.045**		**-0.020**	-0.007	**-0.001**	-0.001	**0.019**	**0.049**	**0.026**	**-0.012**	-0.007	**-0.015**	**0.042**	**0.036**
4	*CHG_RE*	**0.109**	**-0.037**	**0.054**		**0.159**	**0.080**	**0.054**	**0.017**	**0.207**	**0.067**	**0.020**	**0.018**	**0.210**	**-0.039**	**0.018**
5	*ROI*	**0.081**	**-0.011**	**0.005**	**0.207**		**0.802**	**0.687**	**-0.029**	**0.119**	**0.105**	**-0.034**	**-0.032**	**0.781**	**-0.021**	**0.105**
6	*ROI_t+1*	**0.068**	**0.012**	**0.006**	**0.096**	**0.774**		**0.791**	**-0.027**	**0.074**	**0.074**	**-0.021**	**-0.026**	**0.644**	**-0.016**	**0.092**
7	*ROI_t+2*	**0.060**	**0.010**	**0.002**	**0.060**	**0.672**	**0.769**		**-0.025**	**0.066**	**0.066**	**0.008**	**-0.011**	**0.570**	**-0.016**	**0.076**
8	*PV*	**0.028**	**0.022**	**0.014**	**0.020**	**-0.020**	**-0.025**	**-0.038**		**0.043**	**0.126**	**0.110**	**0.449**	**-0.042**	0.001	**-0.020**
9	*SALES_GR*	**0.260**	**0.109**	**0.015**	**0.238**	**0.168**	**0.108**	**0.092**	**0.040**		**0.380**	**0.175**	**0.103**	**0.149**	**0.019**	**0.014**
10	*PTQ*	**0.148**	**0.075**	**0.006**	**0.080**	**0.142**	**0.100**	**0.091**	**0.142**	**0.384**		**0.211**	**0.277**	**0.131**	**0.151**	**0.017**
11	*IND_SQ*	**0.060**	**0.059**	**-0.012**	**0.022**	**-0.020**	-0.007	**0.023**	**0.042**	**0.225**	**0.248**		**0.544**	**-0.031**	**-0.012**	**-0.011**
12	*IND_Q*	**0.065**	**0.037**	**-0.005**	**0.024**	**-0.032**	**-0.025**	**-0.017**	**0.279**	**0.171**	**0.243**	**0.604**		**-0.041**	**0.012**	**-0.029**
13	*ROA*	**0.120**	-0.008	**0.000**	**0.217**	**0.929**	**0.731**	**0.642**	**-0.026**	**0.184**	**0.160**	**-0.016**	**-0.031**		**0.000**	**0.094**
14	*DEBT*	**0.077**	**-0.183**	**0.010**	**-0.016**	**-0.027**	**-0.018**	**-0.015**	-0.009	**0.007**	**0.083**	**-0.031**	**-0.013**	0.001		**0.055**
15	*ASSETS*	**0.014**	**0.052**	**0.038**	**0.076**	**0.162**	**0.141**	**0.127**	**-0.044**	**0.042**	**0.024**	**-0.026**	**-0.054**	**0.132**	**0.055**	

This table provides correlations among key variables. All variables are winsorized at the 1/99 percentiles. See Appendix B for variable definitions. Numbers in **bold** are statistically significant at the 10% level.

Table III: Variation in Investment and Investment Sensitivity with Respect to Misvaluation

Panel A: Variation in investment with respect to misvaluation.

	Dependent Variable = INV											
	INV_OPP = SALES_GR						INV_OPP = PTQ					
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.040	5.004	***	0.029	3.481	***	0.004	0.454		0.001	0.163	
PV	0.005	2.177	**	0.004	1.719	*	0.009	3.023	***	0.007	1.952	*
INV_OPP	0.077	23.491	***	0.076	24.111	***	0.023	12.971	***	0.022	12.319	***
IND_INV_OPP				0.014	4.531	***				0.004	0.990	
ROA	0.018	5.817	***	0.018	5.729	***	0.023	5.975	***	0.023	5.980	***
DEBT	0.033	7.256	***	0.033	7.366	***	0.024	7.344	***	0.024	7.461	***
LNASSETS	-0.001	-2.015	**	-0.001	-1.799	*	-0.001	-1.611		-0.001	-1.536	
R-squared	6.47%			6.53%			4.09%			4.10%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes			Yes			Yes		
No. of Observations	121,892			121,892			121,892			121,892		

Panel B: Variation in investment and investment sensitivity with respect to misvaluation.

	Dependent Variable = INV											
	INV_OPP = SALES_GR						INV_OPP = PTQ					
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.039	4.918	***	0.029	3.325	***	-0.009	-0.626		-0.010	-0.678	
PV	0.004	2.407	**	0.003	1.884	*	0.007	1.938	*	0.007	1.737	*
INV_OPP	0.084	6.379	***	0.085	6.513	***	0.045	1.172		0.010	1.167	
PV*INV_OPP	0.004	1.675	*	0.004	1.579		0.006	1.844	*	0.006	1.839	*
IND_INV_OPP				0.014	4.541	***				0.002	0.590	
ROA	0.018	5.806	***	0.018	5.718	***	0.023	5.795	***	0.023	5.793	***
DEBT	0.033	7.260	***	0.033	7.372	***	0.023	7.227	***	0.023	7.245	***
LNASSETS	-0.001	-2.013	**	-0.001	-1.795	*	-0.001	-1.591		-0.001	-1.567	
R-squared	6.47%			6.53%			3.99%			3.99%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes			Yes			Yes		
No. of Observations	121,892			121,892			121,892			121,892		

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed test). The model is estimated using ordinary least squares. Robust standard errors clustered by year and industry. See Appendix B for variable descriptions.

Table IV: Cross-sectional variation

Panel A: Sample Partition based on High and Low Variation of Industry PV.

	Dependent Variable = INV											
	High Variation of PV						**Low Variation of PV**					
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.073	5.883	***	0.073	5.900	***	0.016	1.250		0.014	1.159	
PV	0.006	1.353		0.006	1.376		0.008	1.745	*	0.009	2.158	**
INV_OPP	0.077	15.662	***	0.070	2.468	**	0.087	23.591	***	0.106	4.270	***
PV*INV_OPP				0.009	1.822	*				0.008	1.553	
ROA	0.013	4.984	***	0.013	5.014	***	0.007	2.766	***	0.007	2.788	***
DEBT	0.033	7.915	***	0.033	7.921	***	0.019	3.444	***	0.019	3.453	***
LNASSETS	0.001	1.128		0.001	1.123		0.000	0.472		0.000	0.477	
R-squared	6.33%			6.33%			5.71%			5.72%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes			Yes			Yes		
No. of Observations	36,431			36,431			38,140			38,140		

Panel B: Sample Partition based on the Number of Public Firms in the Industry.

	Dependent Variable = INV											
	High Public Presence						**Low Public Presence**					
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	-0.032	-2.861	***	-0.035	-3.351	***	0.104	3.628	***	0.109	3.810	***
PV	0.025	5.384	***	0.027	6.395	***	0.010	1.991	**	0.007	1.644	
INV_OPP	0.081	23.667	***	0.121	4.316	***	0.100	19.833	***	0.041	1.347	
PV*INV_OPP				0.016	2.331	**				0.030	1.399	
ROA	0.009	4.524	***	0.009	4.525	***	0.004	1.300		0.004	1.323	
DEBT	0.022	4.095	***	0.023	4.140	***	0.014	3.587	***	0.014	3.622	***
LNASSETS	0.001	1.346		0.001	1.373		0.001	0.715		0.001	0.671	
R-squared	6.34%			6.37%			6.62%			6.68%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes			Yes			Yes		
No. of Observations	36,749			36,749			37,761			37,761		

Panel C: Sample Partition based on the Correlation of Public Stock Returns.

	Dependent Variable = INV											
	High Stock Return Correlation						**Low Stock Return Correlation**					
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.049	3.112	***	0.050	3.239	***	0.042	2.137	**	0.039	2.055	**
PV	0.009	2.546	**	0.008	2.452	**	0.009	1.138		0.007	0.946	
INV_OPP	0.075	27.399	***	0.062	5.015	***	0.072	13.922	***	0.120	4.397	***
PV*INV_OPP				0.076	2.086	**				0.023	1.321	
ROA	0.009	3.783	***	0.009	3.757	***	0.030	7.335	***	0.030	7.339	***
DEBT	0.029	5.492	***	0.029	5.492	***	0.044	4.184	***	0.044	4.181	***
LNASSETS	-0.001	-1.622		-0.001	-1.627		-0.003	-2.254	**	-0.003	-2.258	**
R-squared	5.63%			5.63%			8.65%			8.68%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes			Yes			Yes		
No. of corrervations	42,551			42,551			43,666			43,666		

Panel D: Sample Partition based on the Size of the Private Firms.

	Dependent Variable = INV											
	Small Private Firms						Middle and Large Market Private Firms					
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.011	1.705	*	0.009	1.497		-0.011	-1.719	*	-0.010	-1.446	
PV	0.009	3.269	***	0.010	3.765	***	0.009	3.651	***	0.008	2.924	***
INV_OPP	0.083	23.664	***	0.102	6.731	***	0.069	17.318	***	0.061	3.455	***
PV*INV_OPP				0.004	1.347					0.014	1.749	*
ROA	0.032	7.353	***	0.032	7.354	***	0.024	4.538	***	0.024	4.549	***
DEBT	0.002	1.791	*	0.002	1.810	*	0.007	7.954	***	0.007	7.959	***
LNASSETS	0.008	2.583	***	0.008	2.506	**	0.012	5.584	***	0.012	5.608	***
R-squared	6.78%			6.79%			6.30%			6.30%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
Standard Errors Clustered by Year and Indust	Yes			Yes			Yes			Yes		
No. of Observations	73,163			73,163			48,729			48,729		

High (low) variation is determined by the top (bottom) tercile of the standard deviation of PV. High (low) public presence is determined by the top (bottom) tercile of the number of public firms in the industry. High (low) correlation of public stock returns is determined by top (bottom) tercile of the correlation of stock returns in each industry-year. Small (Middle and Large) Private Firms are those with annual sales of less than (at least) $10,000,000. ***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed test). The model is estimated using ordinary least squares. *INV_OPP* equals *SALES_GR*. Robust standard errors clustered by year and industry. See Appendix B for variable descriptions.

Table V: Variation in Debt, Equity, and Retained Earnings with Respect to Misvaluation

	Dependent Variable = CHG_DEBT			Dependent Variable = CHG_EQUITY			Dependent Variable = CHG_RE less DIV		
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	-0.001	-0.181		0.000	-0.208		0.002	0.199	
PV	0.012	4.005	***	0.001	1.912	*	0.009	1.760	*
INV_OPP	0.064	14.587	***	0.003	6.473	***	0.079	12.941	***
ROA	-0.016	-7.053	***	-0.001	-4.010	***	0.066	12.782	***
DEBT	-0.040	-5.654	***	0.003	8.206	***	-0.024	-10.376	***
LNASSETS	0.006	5.988	***	0.001	4.761	***	0.001	2.204	**
R-squared	1.13%			0.59%			6.76%		
Year and Industry Fixed Effects	Yes			Yes			Yes		
Standard Errors Clustered by Year and Indus	Yes			Yes			Yes		
No. of Observations	121,892			121,892			121,892		

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed test). The model is estimated using ordinary least squares. *INV_OPP* equals *SALES_GR*. Robust standard errors clustered by year and industry. See Appendix B for variable descriptions.

Table VI: Future Return on Investment

Panel A: Return on investment in year t+1.

	Dependent Variable = ROI_t+1								
	Private Firms			Public Firms					
	Coefficient	t-stat		Coefficient	t-stat		Diff in Coef.	t-stat	
Intercept	-0.104	-3.200	***	0.043	0.761		-0.147	-2.259	**
INV_PV	16.470	3.039	***	-0.875	-2.042	**	17.344	3.191	***
INV_NON_PV	0.056	4.531	***	0.029	2.183	**	0.028	1.535	
INV_OPP	-0.129	-5.685	***	-0.023	-1.742	*	-0.107	-4.057	***
ROI	0.802	54.859	***	0.702	69.081	***	0.101	5.647	***
DEBT	0.015	1.670	*	-0.038	-1.389		0.054	1.847	*
LNASSETS	0.005	2.360	**	0.032	12.081	***	-0.027	-7.807	***
R-squared	64.56%			51.15%					
Year and Industry Fixed Effects	Yes			Yes					
Standard Errors Clustered by Year and Industry	Yes			Yes					
No. of Observations	69,070			39,692					

Panel B: Return on investment in year t+2.

	Dependent Variable = ROI_t+2								
	Private Firms			Public Firms					
	Coefficient	t-stat		Coefficient	t-stat		Diff in Coef.	t-stat	
Intercept	-0.189	-5.143	***	0.054	0.775		-0.242	-3.097	***
INV_PV	30.484	3.803	***	-0.538	-1.061		31.022	3.862	***
INV_NON_PV	0.080	2.755	***	0.015	0.987		0.065	1.976	**
INV_OPP	-0.188	-5.951	***	-0.031	-0.739		-0.157	-2.976	***
ROI	0.684	32.252	***	0.562	39.723	***	0.121	4.758	***
DEBT	0.019	1.362		-0.096	-2.212	**	0.115	2.525	**
LNASSETS	0.005	0.999		0.043	10.129	***	-0.039	-6.107	***
R-squared	47.10%			34.28%					
Year and Industry Fixed Effects	Yes			Yes					
Standard Errors Clustered by Year and Industry	Yes			Yes					
No. of Observations	38,618			32,535					

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed test). The model is estimated using ordinary least squares. *INV_OPP* equals *SALES_GR*. Robust standard errors clustered by year and industry. See Appendix B for variable descriptions.

Table VII: Variation in Investment and Investment Sensitivity with Respect to Instrumented PV

Panel A: Variation in investment with respect to instrumented PV.

	Dependent Variable = INV											
	INV_OPP = SALES_GR						INV_OPP = PTQ					
	FIRST STAGE			SECOND STAGE			FIRST STAGE			SECOND STAGE		
	Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat		Coefficient	t-stat	
Intercept	2.817	485.94	***	-0.005	-0.34		2.811	432.10	***	-0.084	-5.28	***
Instrumented PV				0.005	1.97	**				0.038	5.70	***
MFFLOW	11.296	23.76	***				11.253	23.35	***			
INV_OPP	0.012	9.51	***	0.027	47.27	***	-0.009	-7.36	***	0.027	43.88	***
ROA	-0.040	-13.80	***	0.027	22.29	***	-0.008	-3.08	***	0.025	20.64	***
DEBT	0.005	1.18		0.034	18.44	***	-0.052	-13.97	***	0.022	12.14	***
ASSETS	-0.013	-13.13	***	-0.001	-2.22	**	-0.013	-16.11	***	-0.001	-1.18	
Weak Instrument tests:												
First Stage partial F Statistic	21.04						21.08					
p-value	<0.001						<0.001					
R-squared	27.90%			3.26%			27.88%			2.95%		
Year and Industry Fixed Effects	Yes			Yes			Yes			Yes		
No. of Observations	121,892			121,892			121,892			121,892		

Panel B: Variation in investment and investment sensitivity with respect to instrumented PV.

	SECOND STAGE: Dependent Variable = INV					
	INV_OPP = SALES_GR			INV_OPP = PTQ		
	Coefficient	t-stat		Coefficient	t-stat	
Intercept	-0.005	-0.03		-0.049	-3.27	***
Instrumented PV	0.014	2.27	**	0.021	3.38	***
INV_OPP	0.036	11.47	***	0.005	2.39	**
Instrumented PV *INV_OPP	0.004	2.89	***	0.011	12.48	***
ROA	0.027	12.30	***	0.025	10.72	***
DEBT	0.034	18.42	***	0.022	12.01	***
LNASSETS	-0.001	-2.24	**	-0.001	-1.35	
Weak Instrument tests:						
F Statistic	23.78					
p-value	<0.001					
R-squared	3.27%			3.08%		
Year and Industry Fixed Effects	Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes		
No. of Observations	121,892			121,892		

Panel C: Return on investment in year t+1 with instrumented PV.

SECOND STAGE: Dependent Variable = ROI_t+1									
	INV_OPP = SALES_GR								
	Private Firms			Public Firms					
	Coefficient	t-stat		Coefficient	t-stat		Diff in Coef.	t-stat	
Intercept	-0.078	-4.489	***	-0.115	-1.941	*	0.037	0.596	
Instrumented INV_PV	6.968	3.705	***	-0.311	-1.335		7.279	3.841	***
Instrumented INV_NON_PV	0.059	4.746	***	0.029	2.212	**	0.030	1.639	
INV_OPP	-0.080	-8.180	***	0.016	0.495		-0.096	-2.863	***
ROI	0.802	53.536	***	-0.040	-1.437		0.842	26.571	***
DEBT	0.008	0.739		0.032	11.904	***	-0.024	-2.214	**
ASSETS	0.006	2.970	***	-0.031	-1.060		0.038	1.274	
R-squared	64.48%			51.14%					
Year and Industry Fixed Effects	Yes			Yes					
Standard Errors Clustered by Year and Industry	Yes			Yes					
No. of Observations	69,070			39,692					

Panel D: Return on investment in year t+2 with instrumented PV.

SECOND STAGE: Dependent Variable = ROI_t+2									
	INV_OPP = SALES_GR								
	Private Firms			Public Firms					
	Coefficient	t-stat		Coefficient	t-stat		Diff in Coef.	t-stat	
Intercept	-0.144	-5.039	***	-0.144	-1.908	*	0.000	0.00	
Instrumented INV_PV	13.713	4.058	***	-0.637	-1.949	*	14.349	4.23	***
Instrumented INV_NON_PV	0.085	3.083	***	0.014	0.929		0.071	2.25	**
INV_OPP	-0.102	-6.873	***	0.000	0.010		-0.102	-2.49	**
ROI	0.685	31.971	***	-0.086	-2.069	**	0.771	16.52	***
DEBT	0.013	0.826		0.044	9.922	***	-0.030	-1.82	*
ASSETS	0.007	1.473		-0.032	-0.793		0.039	0.96	
R-squared	47.41%			34.32%					
Year and Industry Fixed Effects	Yes			Yes					
Standard Errors Clustered by Year and Industry	Yes			Yes					
No. of Observations	39,048			32,535					

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed test). The model is estimated using two stage least squares. *INV_OPP* equals *SALES_GR*. For brevity, the first stage results are only reported in Panel A. Robust standard errors clustered by year and industry. See Appendix B for variable descriptions.

Table VIII: Variation in Investment and Investment Sensitivity with Respect to Misvaluation and Mutual Fund Flow Driven Valuation Orthogonalized to Growth Expectations

Panel A: Variation in investment with respect to misvaluation and mutual fund flow valuation.

	Dependent Variable = INV					
	Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.049	6.675	***	0.042	19.841	***
PV_res	0.008	3.587	***			
MFFLOW_res				0.242	1.898	*
ROA	0.029	6.978	***	0.029	6.655	***
DEBT	0.037	8.039	***	0.034	7.306	***
LNASSETS	-0.001	-1.606		-0.002	-2.110	**
R-squared	2.42%			1.24%		
Year and Industry Fixed Effects	Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes		
No. of Observations	121,892			121,892		

Panel B: Variation in investment and investment sensitivity with respect to misvaluation.

	Dependent Variable = INV					
	Coefficient	t-stat		Coefficient	t-stat	
Intercept	0.050	6.710	***	0.034	32.664	***
PV_res	0.008	3.404	***			
MFFLOW_res				0.230	1.980	**
INV_OPP	0.077	24.006	***	0.079	24.541	***
PV_res*INV_OPP	0.001	1.055				
MFFLOW_res*INV_OPP				0.212	1.826	*
ROA	0.018	5.823	***	0.018	5.562	***
DEBT	0.033	7.251	***	0.032	7.188	***
LNASSETS	-0.001	-2.061	**	-0.002	-2.245	**
R-squared	6.49%			5.84%		
Year and Industry Fixed Effects	Yes			Yes		
Standard Errors Clustered by Year and Industry	Yes			Yes		
No. of Observations	121,892			121,892		

***, **, * denote significantly different from zero at the 1, 5, and 10 percent levels, respectively (two-tailed test). The model is estimated using ordinary least squares. Robust standard errors clustered by year and industry. See Appendix B for variable descriptions.