Investor Sentiment and Real Investment[Ψ]

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Abstract

We study how investor sentiment affects real investment. We find that both investment and external finance increase with sentiment. The relation between *q* and investment also increases with sentiment, while the relation between cash flow and investment declines with sentiment. These findings suggest that sentiment both creates and alleviates financial constraints. We further show that investment in low sentiment states leads to increases in operational efficiency, whereas investment in high sentiment states leads to declines in operational efficiency and lower stock returns. Taken in their entirety, the findings suggest that investor sentiment creates inefficiencies in the allocations of both financial and real resources.

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In this paper we study the effects of investor sentiment on real investment. We refer to investor sentiment as demand for securities that is not justified by fundamentals, and real investment as firm-level investment in real assets and research and development.[1] The notion of investor sentiment goes back to at least Keynes (1936) and is further developed in Black (1986), Delong, Shleifer, Summers, and Waldmann (1990), Shleifer and Summers (1990), and Baker and Wurgler (2006 and 2007). Delong et al. (1990) show that sentiment combined with arbitrage risk can create persistent mispricing. Baker and Wurgler (2006 and 2007), Lemmon and Portniaguina (2006), and Baker, Wurgler, and Yuan (2009) provide empirical evidence suggesting that sentiment creates mispricing.

There are at least four avenues through which investor sentiment can influence real investment. First, if managers share the same sentiment towards the prospects of their firms as investors do, then investment should be increasing in sentiment. Second, as Morck, Shleifer, and Vishny (1990) point out, managers may infer information from share prices. A price inflated with sentiment could therefore cause managers to infer high expected cash flow or low discount rates, both of which would prompt more investment. Third, Polk and Sapienza (2009) contend that catering to investor beliefs via investment may increase short-term firm value. Hence investment due to catering should be increasing in market sentiment. Fourth, Stein (1996) and Baker, Stein, and Wurgler (2003) contend that firms in need of external finance may forego investment if their securities are undervalued, so for this reason too both investment and external finance should be increasing in sentiment.

[1] Related studies define sentiment similarly. As examples, Shleifer and Summers (1990) refer to investor sentiment as demand changes for securities that "…seem to be a response to changes in expectation or sentiment that are not fully justified by information." Baker and Wurgler (2007) define investor sentiment as "…a belief about future cash flows and investment risks that is not justified by the facts at hand."

Our measure of investor sentiment is Baker and Wurgler's (2006) sentiment index, although we repeat our analyses with the Conference Board's Consumer Sentiment Index and obtain similar findings. The sentiment indices are both adjusted to be orthogonal to economic fluctuations; however we are mindful that even with these adjustments we still cannot completely rule out risk-based explanations for our findings. We use the sentiment indices to study the relation between sentiment and investment in a large sample of U.S. firms during the period 1962 through 2005. We find that both investment and external finance are increasing in sentiment. These relations persist in the presence of Tobin's *q* (*q*), so the effect of sentiment on investment appears to go beyond its effect on stock prices. This could be because sentiment influences managers more than investors, or because arbitrageurs partially offset the effect of sentiment on prices, but cannot do so with investment.

We study how sentiment affects the relations between *q* and investment and *q* and external finance. A literature initiated by Tobin (1969) shows that absent of any frictions marginal *q* should predict investment. A related literature that begins with Keynes (1936) relates mispricing, which is captured in *q,* to investment through external finance. Empirically differentiating between these two frameworks is difficult, because a positive relation between *q* and investment is consistent with both frameworks. We find that both the *q*-investment and *q*-external finance relations are increasing in sentiment, which suggests that Keynes's framework explains part of the *q*-investment relation.

Our paper tests whether the relation between investment and cash flow is affected by sentiment. Fazzari, Hubbard, and Petersen (1988) show that investment is increasing in cash flow and contend that this is evidence of financial constraints. We find that investment-sensitivity to cash flow is weaker in high sentiment states, and that low cash flow firms issue

more debt and equity in high sentiment states. Put together, these findings suggest that investment-sensitivity to cash flow decreases with sentiment, because the use of external finance by low cash flow firms increases sentiment.

In an effort to better understand the robustness of our findings, we study how investment efficiency varies across high and low sentiment states. In low sentiment states, more projects may be skipped due to financing constraints. If managers choose the most profitable projects first, then the average return on investment should be higher following investments made in low sentiment states. Moreover, firms may overinvest in high sentiment states, either because of catering, or because managers infer information from prices, or because managers are also infected with sentiment. Consistent with these arguments, we find that operational efficiency improves following investment made in low sentiment states, and worsens following investment made in high sentiment states.

We conclude our analyses by studying stock returns following investment and external finance. Prior studies have shown that both investment and external finance predict low stock returns.[2] If investment and external finance are influenced by mispricing resulting from investor sentiment, then these activities should predict especially low returns in high sentiment states. If fewer firms raise capital and invest in response to mispricing in low sentiment states, then investment and capital raising ought to tell us less about subsequent stock returns in low sentiment states. We find that stock returns resulting from both investment and external finance are decreasing in sentiment, which is consistent with the notion that both external finance and investment are influenced by mispricing.

[2] Titman, Wei, and Xie (2004) and Cooper, Gulen, and Schill (2008) show that investment predicts low stock returns. Loughran and Ritter (1995), Daniel and Titman (2006), and Pontiff and Woodgate (2008) show that share issuance predicts low stock returns. Spiess and Affleck-Graves (1999) and Billet et al. (2006) show that debt issuance predicts low stock returns. Bradshaw, Richardson, and Sloan (2006) show that both share and debt issuances predict low returns.

Our findings build on a growing literature that relates capital market imperfections to real investment. Baker, Stein, and Wurgler (2003), Gilchrist, Himmelberg, and Huberman (2005), and Polk and Sapienza (2009) relate various firm-level measures of mispricing to real investment. In contrast, we use an aggregate measure of investor sentiment and show that it predicts investment even after controlling for mispricing (as captured in *q*). Our use of an aggregate measure is important because Samuelson (1998), Shiller (2001), and Lamont and Stein (2006) posit that sentiment is mostly systematic, rather than firm-specific.[3] Moreover, Baker and Wurgler (2007) show that their sentiment index lines up well with stock market bubbles and crashes, and we are interested in testing whether these episodes affect real investment.

With respect to whether aggregate sentiment influences investment, Chirinko and Schaller (2001) show that the 1980s stock market boom in Japan led to high levels of investment. Their findings are interesting, but are centered on a single event. Lamont and Stein (2006) contend that if investment is more responsive to market prices than firm prices, then this is evidence of sentiment affecting managers. They find evidence of this effect with stock returns, but not with *q*, so their results are not fully conclusive. These papers provide a good foundation for studying the effects of aggregate sentiment on investment, and we build on their hypotheses and analyses.

The rest of this paper is organized as follows. Section 1 develops our hypotheses, discusses the related literature, and describes our sample and variables. Section 2 discusses our empirical findings. Section 3 concludes the paper.

[3] Lamont and Stein (2006) contend that this conjecture is supported by the findings in Campbell (1991) and Vuolteenaho (2002). Campbell (1991) shows that less than half of the variance in aggregate stock returns is due to changes in expected cash flow, leading to predictable reversal in the future. Vuolteenaho (2002) shows that most of the changes in firm-level returns are driven by cash flow news and are largely permanent.

1. Methods, Related Literature, and Sample

1.1. Regression Framework

Our regression framework follows that used in Fazzari, Hubbard, and Petersen (1988), Baker, Stein, and Wurgler (2003), McLean, Zhang, and Zhao (2009), and others. We estimate linear relations between investment (*I*) and lagged Tobin's *q*, cash flow (*CF*), and the Sentiment Index (*S*). Both *I* and *CF* are scaled by the lagged book value of assets (*A*) or an alternative measure of existing capital.

$$\frac{I_{i,t}}{A_{i,t-1}} = \alpha_i + \beta_1 q_{i,t-1} + \beta_2 \frac{CF_{i,t}}{A_{i,t-1}} + \beta_3 S_t + \varepsilon_{i,t} \qquad (1)$$

The variable α_i is a firm-fixed effect. The sentiment index is a time-series, so we do not include year fixed-effects. We also do not include industry fixed-effects, because time-invariant measures have no explanatory power when firm-fixed effects are included.[4] We estimate our standard errors by clustering on the firm, which is consistent with the recommendations in Petersen (2007). Our primary hypotheses are tested by estimating Equation 2, which is an augmented version of Equation 1, in that it includes two interaction terms:

$$\frac{I_{i,t}}{A_{i,t-1}} = \alpha_i + \beta_1 q_{i,t-1} + \beta_2 \frac{CF_{i,t}}{A_{i,t-1}} + \beta_3 q_{i,t-1} \times S_t + \beta_4 \frac{CF_{i,t}}{A_{i,t-1}} \times S_t + \beta_5 S_t + \varepsilon_{i,t} \qquad (2)$$

The sentiment coefficients (β_3 in Equation 1 and β_5 in Equation 2) test whether sentiment has a direct affect on investment, while controlling for *q* and cash flow. This is not our primary hypothesis, as one might expect sentiment to affect *q*, and *q* to affect investment. However if the sentiment coefficient is positive and significant in the presence of *q*, then it suggests that sentiment has a stronger impact on investment than on share prices.

[4] We repeated all of our tests with industry fixed-effects in place of firm fixed-effects and had similar findings.

As mentioned in the previous section, Tobin (1969) shows that marginal q should perfectly predict investment in an efficient market absent of any frictions. The idea here is that firms should invest until the marginal cost of an investment equals its benefit (marginal q = 1). Firms with higher marginal q will need to invest more to bring their marginal q down to 1. Papers that further develop this framework include Tobin (1969), von Furstenberg (1977), Hayashi (1982), Barro (1990), and McLean, Zhang, and Zhao (2009).

A related literature relates mispricing, which is captured in average q, to investment. The argument here is that mispricing changes the cost of equity capital, thereby affecting investment. This line of literature can be traced back to Keynes (1936) and includes papers by Fischer and Merton (1984), Morck, Shleifer, and Vishny (1990), Blanchard, Rhee, and Summers (1993), Stein (1996), and Baker, Stein and Wurgler (2003).

Empirically differentiating between these two frameworks is difficult; the relation between Tobin's q and investment could be explained by either framework. Our paper provides a relatively clean test of whether q predicts investment because of mispricing. If the relation between q and investment is unaffected by mispricing, then q should predict investment similarly in high and low sentiment states ($\beta_3 = 0$ in Equation 2). Alternatively, if the relation between q and investment is affected by mispricing, then q should be a stronger predictor of investment in high sentiment states ($\beta_3 > 0$ in Equation 2), and high q firms should also raise more external capital in high sentiment states.

The β_4 coefficient in Equation 2 tests whether investment-sensitivity to cash flow varies with investor sentiment. Fazzari, Hubbard, and Petersen (1988) argue that if investment is correlated with cash flow, then firms are financially constrained, as the relation suggests that investment is dependent on firms having sufficient internal cash flow. Fazzari et al's (1988)

argument has received a good deal of criticism. Poterba (1988) points out that if marginal q is measured with error, then the relation between cash flow and investment might be the result of cash flow measuring future investment opportunities. Kaplan and Zingales (1997 and 2000), Erickson and Whited (2000), Povel and Raith (2001), Gomes (2001), Almeida and Campello (2002), and Alti (2003) also provide criticism of Fazzari et al.'s interpretation of investment-sensitivity to cash flow.

If sentiment reduces the cost of external finance, then more firms should access external finance in high sentiment states. In this setting if investment sensitivity to cash flow measures financing constraints, then β_4 should be negative , or investment-sensitivity to cash flow should decline with sentiment, because firms can more easily raise capital and invest in high sentiment states. We further test how sentiment affects investment in our external finance regressions, which we describe below.

1.1.2. External Finance

The relation between sentiment and external finance can shed light on the relation between sentiment and investment. If sentiment predicts investment because of the arguments put forth in Keynes (1936), then external finance should be increasing in sentiment. To test this hypothesis we re-estimate Equations 1 and 2 with share issuance and debt issuance as our dependent variables. If firms are more likely to use external finance to fund their investment opportunities when sentiment is high, then the relation between q and external finance should be increasing in sentiment, or β_3 should be positive when we use external finance as the dependent variable in Equation 2. By the same token, if investment is less sensitive to cash flow in high sentiment states because low cash flow firms raise more external capital in these states, then β_4

should be negative when we use external finance measures as the dependent variables in Equation 2.

Poterba (1988) and subsequent studies point out that if proxies for marginal q do not sufficiently capture investment opportunities, then it could be that cash flow is correlated with investment not because of financial constraints, but rather because cash flow is correlated with future investment opportunities. One way to further explore the Poterba (1988) conjecture is to study the relation between cash flow and share issuance. A negative relation between share issuance and cash flow would be inconsistent with Poterba's (1988) argument that cash flows represent investment opportunities, as it does not seem plausible that firms would issue (repurchase) shares when their investment opportunities are weakest (strongest). Hence if β_2 is negative when we use share issuance as a dependent variable in either Equation 1 or 2, then this would appear to refute the Poterba's argument. With debt issuance, the prediction of β_2 is less clear, because if low cash flow firms are on average more financially constrained, then these firms may want to avoid debt, as they face a greater risk of bankruptcy.

1.2. Measuring Investor Sentiment

Our primary measure of investor sentiment is an index created by Baker and Wurgler (2006), who describe the index and its components in detail.[5] The sentiment index is based on the first principal component of six different investor sentiment proxies, each of which has been used as a measure of investor sentiment in previous studies. The principal component approach isolates the common variation in the indices, and excludes the idiosyncratic parts that are probably not related to sentiment. The six proxies are the closed-end fund discount, NYSE share

[5] We obtained the sentiment index data from Jeffrey Wurgler's website. We thank Jeffrey Wurgler for making the data available.

turnover, the number of initial public offerings, the average first day's return of initial public offerings, the equity share in new issues, and the premium in prices between dividend and non-dividend paying stocks.[6]

Baker and Wurgler (2006) construct a second version of the index, in which each of the sub-indices is orthogonalized to the business cycle before the principle component is isolated. We obtain similar results with both indices, and therefore only report results with the index that is constructed from the orthogonal indices. We also use a consumer confidence index as a second measure of investor sentiment. We discuss this second measure and our findings with it in Section 2.4 of the paper.

There is a good deal of empirical evidence showing that the Baker and Wurgler (2006) sentiment index is related to market mispricing. Baker and Wurgler (2006) show that when sentiment is high the subsequent returns on stocks that are difficult to arbitrage are low, and when sentiment is low the subsequent returns on these same stock are high. Baker and Wurgler (2007) report that contemporaneous stock market returns are positively correlated with their sentiment index, while subsequent market returns bear a negative relation with the index. Baker, Wurgler, and Yuan (2009) show that international versions of the sentiment index have similar effects on share prices in Canada, France, Japan, Germany, and the U.K. Lemmon and Ni (2009) show that the sentiment index is related to speculative demand for options. Livnat and Petrovits

[6] We do not believe that any of the six sub-indices bear mechanical relations to either the investment, or the external finance of the firms in our sample. With respect to the IPO measures, most of our tests require lagged values of assets or stock returns, so for this reason IPO firms should be excluded from our sample. As a robustness check, also excluded the first-year observation for each firm, repeated our analyses, and obtained the same results. With respect to the equity share in new issues, it is the *percentage* of total new issues (debt plus equity) that comes from equity. Kim and Weisbach (2007), and Hertzel and Li (2009) and McLean (2009) show that cash savings are the primary use of equity issuance proceeds, while McLean (2009) shows that debt issuance tend to be completely invested. Taken together, these findings suggest that investment might be declining in the equity share of new issues. With respect to sentiment and external finance, we do not test whether sentiment influences the choice of equity vs. debt, which is what the equity share in new issues captures, rather we test whether the levels of both equity and debt issuances among non-IPO firms are increasing with sentiment.

(2009) find that trading strategies based on accruals and earnings surprises can be enhanced with this sentiment index. Hribrar and Mcinnis (2009) find that analyst forecast error is increasing with the sentiment index, in that during periods of high sentiment analysts tend to be too optimistic regarding the earnings of small and young firms. In each of these papers the findings are consistent with the idea that overvaluation is increasing with the sentiment index. In this paper we build on these findings and test whether the sentiment index has an effect on real investment and external finance.

1.3. Sample and Variables

We start our sample with all of the firms in the Compustat database during the years 1962 through 2005.[7] We exclude financial firms with SIC codes between 6000 and 6999 and utility firms with SIC codes between 4900 and 4999. Like Baker et al. (2003) we also exclude firms that do not have positive book values of equity, and firms that have book value of assets that are less than $10 million. We winsorize each of the accounting variables at the top and bottom 1% to reduce the influence of outliers.

We conduct our analyses with three separate investment measures. The first measure is *Capex/PPE*, measured as capital expenditure scaled by lagged net property, plants and equipments. Our second measure is *Asset Growth*, measured as the yearly percentage change in total assets. Our third investment measure is *R&D/Assets*, which is research and development expenditures scaled by total assets. Yearly values for capital expenditures and R&D come from the statement of cash flow and income statement respectively, while total assets come from the firm's balance sheet. An important difference therefore between *Asset Growth* and these other

[7] We conducted the tests reported in this paper in the beginning and later halves of the sample period and had findings that were similar in both halves.

two measures is that *Asset Growth* includes investment resulting from mergers. Fama and French (2005) show that stock-financed mergers account for the majority of equity issuances, while Shleifer and Vishny (2003) contend that overvalued equity can explain merger activity. To the extent that Shleifer and Vishny's arguments are correct, we expect that *Asset Growth* should be strongly increasing in sentiment.

Most of our tests require measures of internally generated cash flow and Tobin's *q*. Cash flow is net income plus depreciation and amortization, all scaled by the beginning of the year's book value of assets. Tobin's *q* is estimated as the market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. Our measurement of *q* follows Baker et al. (2003) and Rauh (2006). We use the log of this *q* measure in our regression analyses. We also replace *q* with stock returns as a measure of investment opportunities.[8] We measure stock returns as buy and hold returns over the previous year.

We measure external financing with both share issues and debt issues. Our external finance measures are the same as those used in Baker, Stein and Wurgler (2003).[9] We measure share issues as the change in book equity, plus the change in deferred taxes, minus the change in retained earnings. Debt issues are measured as the change in assets, minus the change in book equity, minus the change in deferred taxes.

To examine whether sentiment affects investment efficiency, we study the relation between investment and subsequent operating performance. We use two measures of operating performance. Return-on-assets (ROA) is net income divided by total assets, while operating performance (OPA) is operating income divided by total assets. We use the averages of ROA

[8] Brainard and Tobin (1968), von Furstenberg (1977), Fazzari, Hubbard, and Petersen (1988), Blanchard, Rhee, and Summers (1993) and Rauh (2006)) use *q* to proxy for marginal *q*. Barro (1990) and Morck, Shleifer, and Vishny (1990) use stock returns to proxy for marginal *q*.

[9] We also used measures from the statement of cash flow for both share and debt issuances and obtained similar findings.

and OPA during the years t+1, t+2, and t+3. Table 1 provides descriptive statistics for the variables described in this Section.

2. Empirical Findings

In this Section we describe our main empirical findings. In Section 2.1 we report the findings from our univariate analyses. In Section 2.2 we discuss the findings from panel regressions, which measure the relation between sentiment and investment. In Section 2.3 the regressions discussed test how sentiment affects external finance. In Section 2.4 we test the robustness of our findings by replacing the Baker and Wurgler (2006) sentiment index with the Conference Board's Consumer Sentiment Index. In Sections 2.5 we compare the effects of investment on operational efficiency in low and high sentiment states. In Section 2.6 we test whether sentiment influences the relations between investment and stock returns and external finance and stock returns.

2.1. Univariate Analyses

Table 2 reports the findings from our univariate tests. To conduct our univariate analyses we sort the years in our sample into sentiment terciles. We then compare average values of the investment and external financing variables across the sentiment terciles. The findings show that all three of the investment measures are monotonically increasing in sentiment. Capital expenditure increases by 31%, from 0.288 to 0.378 between the low and high sentiment states. The effects are even greater with asset growth and R&D. Between the low to high sentiment states R&D increases 109%, from 0.035 to 0.073 while asset growth increases 36%, from 0.128 to 0.174. Each of these differences is statistically significant at the 1% level.

Table 2 further shows that sentiment has strong effects on external finance. Share issuance increases 310% (from 0.022 to 0.090) while debt issuance 27% (from 0.068 to 0.086) between the low and high sentiment states. These findings suggest that the increase in investment in high sentiment states is in large part financed by an increase in external finance. This is consistent with the idea that sentiment influences investment because it causes mispricing which in turn influences the cost of external finance.

2.2. Regression Analyses: Sentiment and Investment

In this Section of the paper we measure the effects of sentiment on investment via panel regressions. We begin our analyses by estimating univariate regressions, in which sentiment is the only independent variable, along with firm-fixed effects. We then estimate Equations 1 and 2. In these regressions capital expenditure (Table 3), asset growth (Table 4), and R&D (Table 5) are the dependent variables. As discussed in Section 1.1 we use both q and stock returns as proxies for marginal q. The findings are similar with each measure, so we focus our discussion on the results with q. As we mention in Section 1, we cluster our standard errors on the firm.

2.2.1. Capital Expenditure

Table 3 reports the results for capital expenditure. In the regression reported in the first column, sentiment is the only independent variable and its coefficient is 0.020 (t-statistic = 18.13). This shows that if sentiment increases by one standard deviation (1 as shown in Table 1), then capital expenditure increases by 6%.[10] Sentiment loses its significance in the second regression, which includes q and cash flow; however sentiment becomes significant again in the

[10] The average firm fixed-effect is 0.338, and the mean value of sentiment is zero. 6% is therefore the percentage change in capital expenditure (from 0.338 to 0.358) when sentiment increases by one standard deviation.

third regression, which includes *q*, cash flow, and the interaction terms. Sentiment is significant in all of the regressions that have stock returns instead of *q*. Hence sentiment appears to influence investment beyond the extent to which it affects share prices (as captured in *q* and stock returns). As discussed in the Introduction, this could be because sentiment influences managers more than investors, or because arbitrageurs partially offset the effect of sentiment on prices, but cannot do so with investment.

In each of the regressions the *q* coefficients are positive and significant. This is consistent with prior studies that have found that capital expenditure is increasing in *q* (e.g. Fazzari, Hubbard, and Petersen (1988) and Baker, Stein, and Wurgler (2003)). The interaction between sentiment and *q* is positive, showing that for a given level of *q,* investment is greater in high sentiment states than in low sentiment states. The results in Baker and Wurgler (2006 and 2007) suggest that a firm is more likely to be overvalued in high sentiment states and undervalued in low sentiment states. Our findings along with theirs suggest that mispricing plays a role in the relation between *q* and investment, which is consistent with Keynes's (1936) framework.

To get an idea of the economic significance of the results, consider that the interaction coefficient is 0.046 (t-statistic = 15.45), while the *q* coefficient in the same regression is 0.246 (t-statistic = 60.06). The overall *q* coefficient is the sum of the *q* coefficient and the *q*-sentiment interaction coefficient multiplied by the level of sentiment at that time (in Equation 2 this is $\beta_1 + \beta_3 * Sentiment_t$). Table 2 shows that sentiment has a mean value of -1.016 in the low sentiment state and 1.174 in the high sentiment state. Hence the overall *q* coefficient is 0.199 in the low sentiment state and 0.300 in the high sentiment state, or 51% higher.

In all of the regressions the cash flow coefficients are positive and significant. Fazzari, Hubbard, and Petersen (1988) interpret this relation as evidence of financial constraints, in that firms invest less when they generate fewer cash flows internally. In Fazzari et al.'s framework if external finance is costless, then the relation between investment and cash flow would not exist, as firms would be able to fund all positive net present value investments, regardless of internal cash flow. If sentiment lowers the cost of external capital, then the relation between capital expenditure and cash flow should be decreasing in sentiment. This is what we find, as the interaction between sentiment and cash flow is negative. In the third column, the cash flow-sentiment interaction coefficient is -0.180 (t-statistic = 10.85), while the cash flow coefficient in the same regression is 0.445 (t-statistic = 26.25). Hence the overall cash flow coefficient is 0.627 in the low sentiment state and 0.234 in the high sentiment state, less than half as large. This result is consistent with the idea that positive sentiment alleviates financing constraints by making external finance less costly, and that negative sentiment increases financial constraints by making external finance more costly.

2.2.2. Asset Growth

Table 4 reports the findings with respect to asset growth. As mentioned previously, asset growth captures investment resulting from mergers, whereas capital expenditure do not. Fama and French (2005) show that more than half of all share issuances are in the form of stock-financed mergers. Shleifer and Vishny (2003) contend that merger activity is largely the result of firms using overvalued equity to buy other firms; if sentiment creates overvalued share prices in some firms, then it should lead to more stock-financed merger activity, which would result in more asset growth.

The sentiment coefficient in the first regression is 0.020 (t-statistic = 17.53), showing that a one standard deviation increase in sentiment leads to an increase of 13% in asset growth.[11] The effects here are more than twice as large as with capital expenditure. The effect of sentiment on asset growth is also robust to the inclusion of *q* and cash flow, both of which have positive relations with asset growth.

Like with capital expenditure, *q* more strongly predicts asset growth in high sentiment states. In the third column the *q*-interaction coefficient is 0.054, while the *q* coefficient in the same regression is 0.217. The combined *q* coefficient (in Equation 2 this is $\beta_1 + \beta_3 * Sentiment_t$) is therefore 73% higher, in the high sentiment states (0.280) as compared to the low sentiment states (0.162). The stock return interaction in the fifth column shows that the combined stock return coefficient is 81% higher in the high sentiment state. The results here suggest that part of the relation between *q* and investment can be explained by mispricing effects, in that sentiment can either make external capital either costly or cheap, and this affects the firm's willingness to raise capital and invest.

If sentiment makes external finance less costly, then firms should be less dependent on internal cash flow in high sentiment states. In the third column the cash flow-interaction coefficient is -0.204, while the cash flow coefficient in the same regression is 0.997. The combined cash flow coefficient (in Equation 2 this is $\beta_2 + \beta_4 * Sentiment_t$) is therefore 37% lower, in high sentiment states as compared to low sentiment states. These findings suggest that sentiment relaxes financial constraints, as firms are apparently less dependent on internal funds for investment. Similar results are obtained in the stock return regressions. The results support the idea that sentiment makes financing less costly, thereby encouraging investment.

[11] This average firm fixed-effect in this regression is 0.150. 13% is the percentage change (from 0.150 to 0.170) in asset growth when sentiment increases by one standard deviation.

2.2.3. Research and Development

Brown, Fazzari, and Petersen (2008) and Hall and Lerner (2009) contend that R&D spending is on average financially constrained and dependent on external finance, particularly equity finance. If sentiment affects the cost of equity finance, then sentiment should be a significant determinant of R&D spending. The first column of Table 5 confirms this conjecture. The sentiment coefficient is 0.003 (t-statistic = 12.28). This shows that a one standard deviation increase in sentiment leads to an increase of 4.6% in R&D.[12] Like with capital expenditure and asset growth the effect of sentiment on R&D remains significant after controlling for *q* and cash flow, showing that the effect of sentiment on investment goes beyond sentiment's effect on share prices.

The relation between *q* and R&D is positive, suggesting that R&D spending creates growth options that are reflected in prices. In the regression reported in the third column the *q*-sentiment interaction coefficient is positive. As in the previous two tables the findings here suggests that the cost of external capital is lower in high sentiment states, so firms are more able to raise capital to finance their investing activities in high sentiment states.

Table 5 shows that unlike with capital expenditure and asset growth, the relation between R&D and cash flow is negative. A potential explanation for this relation is that high R&D firms are typically young and unprofitable, so their R&D spending is largely financed by equity financing (see Brown, Fazzari, and Petersen (2009)). In the third and fifth regressions the cash flow-sentiment interaction coefficients are negative, showing that the R&D investments of low cash flow firms are greater in high sentiment states. This is again consistent with the notion that

[12]The average firm fixed effect is 0.065. 4.6% is the percentage change in R&D (from 0.065 to 0.068) when sentiment increases by one standard deviation.

positive sentiment makes external finance less costly, while negative sentiment makes external finance more costly.

2.3. External Finance

The findings in tables 3, 4, and 5 show that investment is increasing in investor sentiment. The results also show that the relation between *q* and investment is increasing in sentiment, while the relation between cash flow and investment is decreasing in sentiment. We contend that these results are largely explained by sentiment lowering the cost of external finance, thereby making investment more feasible. In this Section of the paper we test for this sentiment-external finance relation by measuring the effects of sentiment on external finance in panel regressions. In these regressions share issuance (Table 6) and debt issuance (Table 7) are the dependent variables. As with investment, we begin our analyses be estimating univariate regressions, in which sentiment is the only independent variable along with firm dummies. We then estimate Equations 1 and 2 using share issuance and debt issuance as the independent variables.

2.3.1. Share Issuance

Table 6 reports the findings for share issuance. In the first regression the sentiment coefficient is 0.014 (t-statistic = 23.26), showing that a one standard deviation increase in sentiment leads to a 20% increase in share issuance. This relation is robust to the inclusion of cash flow and *q*, although the sentiment coefficient shrinks to 0.003 (t-statistic = 5.94) when these variables are included. If *q* is replaced with stock return, then the sentiment coefficient is 0.009 (t-statistic = 15.40).

In the second regression we see that *q* has a positive relation with share issuance, while cash flow has a negative relation with share issuance. All else equal high *q* firms with low cash flow are more likely to be in need of external finance, so the findings here are consistent with the idea that firms issue shares to overcome financing constraints. As discussed in the previous sections, Poterba (1988) and subsequent papers have been critical of the notion that investment is sensitive to cash flow because of financial constraints. These papers contend that cash flow itself is most likely a noisy measure of marginal *q*, and this is why it predicts investment in the presence of average *q*, which may also be an imperfect measure of marginal *q*. Yet here we see that cash flow is negatively correlated with share issuance. We would expect such a relation if low cash flow firms were financially constrained, as Fazzari et al. (1988) claim, but we would not expect this relation if cash flow proxies for marginal *q*, as in Poterba's (1988) framework, becuase it seems implausible that firms would issue the most shares when their investment opportunities are weakest.

The *q*-sentiment interaction is positive, while the cash flow-sentiment interaction coefficient is negative, showing that firms with high *q* and low cash flow issue more equity overall and especially in high sentiment states, but not as much in low sentiment states. This again is consistent with the idea that financially constrained managers are less willing to issue undervalued shares (in low sentiment states) and more willing to issue shares that may be overvalued (in high sentiment states). These results suggest that high *q* firm low cash flow firms invest more (less) in high (low) sentiment states because these same firms raise more (less) external capital in high sentiment states

2.3.2. Debt Issuance

The findings with debt issuance are reported in Table 7 and are similar to those reported with share issuance. Sentiment strongly predicts debt issuance; in the first regression, the coefficient shows that a one standard deviation increase in sentiment leads to a 12% increase in debt issuance. Although lower than the increase with share issuance (20%), this still represents a significant increase in the issuance of debt. When *q* and cash flow are included, the sentiment coefficient becomes insignificant; however the sentiment-interaction terms are both significant. If *q* is replaced with stock return, then sentiment regains its significance.

The *q* and stock return coefficients are positive in each of the regressions, suggesting that firms with more valuable investment opportunities issue more debt. The *q* and stock return interaction coefficients are both positive and significant, showing that firms with high *q* and high past stock returns are more likely to issue debt in high sentiment states. These results suggest that high *q* firms invest more in high sentiment states because these same firms raise more external capital in high sentiment states.

The cash flow coefficient is positive in each of the regressions, showing that firms are more likely to issue debt when their cash flow is above average. This finding is sensible, as lenders should be more willing to provide capital when firms are in good financial condition, and firms would not want to be saddled with debt payments when they are in weak financial condition. In the third and fifth columns the sentiment-cash flow interactions are negative, showing that cash flow is less a factor in determining whether a firm issues debt in high sentiment states and more a factor in low sentiment states. These interactions suggest that lenders are more willing to lend to unprofitable firms in high sentiment states, and that firms are more confident in their ability to repay debt in high sentiment states.

2.4. Robustness: Consumer Confidence as a Measure of Investor Sentiment

In this section we attempt to replicate our findings with an alternative measure of investor sentiment, which is The Conference Board's Consumer Confidence Index. We have monthly values of this index beginning in 1977 through 2009, so we conduct this part of our analyses during this time period. The index is based on a questionnaire that is sent to 5,000 different households in the United States, and asks participants questions about their outlook on the economy.

The use of consumer confidence indices as sentiment indicators is supported by the findings in related studies. Acemoglu and Scott, (1994), Carroll, Fuhrer, and Wilcox (1994), Bram and Ludvigson (1998), Ludvigson (2004) show that consumers sentiment indices predict household consumption. Fisher and Statman (2002), Lemmon and Portnaiguina (2006), and Doukas, Antoniou, and Subrahmanyam (2009) use consumer confidence indices as measures of investor sentiment, and relate the indices to security mispricing.

In order to purge the index of sentiment that is explained by economic conditions, we regress this monthly index on six macroeconomic indicators: growth in industrial production, real growth in durable consumption, non-durable consumption, services consumption, growth in employment, and an NBER recession indicator. Our choice of macroeconomic variables follows Baker and Wurgler (2006), who orthogonalize the six sub-indices of their sentiment index with these variables. We use the yearly averages of the residuals from this regression to create a yearly consumer confidence index (CCI). The correlation between this index and the Baker and Wurgler (2006) index is 0.27.

2.4.1. Consumer Confidence, Investment, and External Finance

Table 8 reports the results from regressions that estimate Equation 2 and use the CCI as the measure of investor sentiment. For the sake of brevity, we combine our three investment measures into one aggregate measure, and do the same for our two external finance measures, although we obtain similar results if we use non-aggregated measures. Our aggregate investment measure is the sum of asset growth and R&D spending, while our aggregate external finance measure is the sum of share issuance and debt issuance. We report our investment results in Panel A and our external finance results in Panel B.

The findings in both panels show that our results in the previous tables are robust to an alternative measure of investor sentiment. In Panel A we see that sentiment by itself predicts increased investment in five of our six regressions, so as in the previous tables sentiment appears to affect investment in ways that go beyond its affect on share prices. Both the *q* and stock return interactions are positive and significant, showing that share prices are stronger predictors of investment in high sentiment states and weaker predictors in low sentiment states. Both of our cash flow interactions are negative, showing that cash flow is a less robust predictor of investment in high sentiment states. The results here are consistent with those in the previous tables, and support the idea that investment is increasing in sentiment.

In Panel B, we see that sentiment predicts external finance even after controlling for share prices, as the sentiment coefficient is again significant in five of the six regressions. Both the *q* and stock return interactions are positive and significant, showing that firms with high stock prices are more likely to issue shares in high sentiment states, and less likely to do so in low sentiment states. This is consistent with the idea that firms issue securities in response to overvaluation, and that overvaluation is more prevalent in high sentiment states.

Like in the previous tables, the cash flow interactions are negative and significant in all of the regressions in Panel B, showing that low cash firms raise more capital in high sentiment states as compared to low sentiment states. As we explain in the previous sections, this could explain why investment is less sensitive to cash flow in high sentiment states; low cash flow firms are more likely to issue shares and invest in high sentiment states, so cash flow is therefore not as necessary for investment.

2.5. Sentiment and Operating Performance

In this section we study whether investment efficiency is affected by sentiment. If low sentiment leads to underinvestment, and managers invest in the most valuable projects first, then investment in low sentiment states should lead to improved operational efficiency. Moreover, if sentiment leads to overinvestment, then operating performance should worsen following investment made in high sentiment states. To test for these effects we estimate the following regression equation:

$$\frac{\sum_{t=1}^{3} \frac{CF_{i,t+1}}{A_{i,t}}}{3} = \alpha_i + \beta_1 \frac{I_{i,t}}{A_{i,t-1}} + \beta_2 S_t + \beta_3 \frac{I_{i,t}}{A_{i,t-1}} \times S_t + \varepsilon_{i,t} \qquad (3)$$

The dependent variable is the average return-on-assets (ROA) over the three years subsequent to the year in which the investment is made (the firm must have ROA in year t+1 to be included). On the right

-hand side a firm-fixed effect is included, along with current year's sentiment, the firm's investment in the current year, and an interaction between investment and sentiment. The regression tests whether future operating performance is increasing in investment, and whether this effect differs across sentiment states. We also estimate Equation 3 with operating income

scaled by assets (OPA) in place of ROA. Our choice of operational efficiency measures follows Loughran and Ritter (1997). We also scaled our measures by sales instead of assets and obtained similar findings, so we only report the findings with measures scaled by assets. As done in the previous tables we cluster our standard errors on the firm.

2.5.1. Sentiment and Operating Performance: Results

Columns 1 through 3 of Table 8 report the results for ROA, while columns 4 through 6 report the results for OPA. Both of the regressions show that subsequent operating performance increases with capital expenditure and asset growth. R&D has no affect on subsequent ROA, but predicts lower OPA. In all of the regressions subsequent operating performance is declining in sentiment, suggesting that sentiment may be in part caused by high profits that subsequently revert.

The interactions in all of the equations show that investment from high sentiment states predicts worse operating performance, while investment made in low sentiment state results in improved operating performance. As shown in Table 2, the mean sentiment value in the low sentiment state is -1.016, while in the high sentiment state it is 1.174. Each of the interaction terms in Table 8 is negative, so when multiplied with the sentiment values the results predict higher operating performance following investment in low sentiment states, and lower operating performance following investment made in high sentiment states.

To appreciate the magnitude of the results, consider the coefficients from the asset growth regression in the second column. The asset growth coefficient is 0.006 (t-statistic = 6.22), showing that if a firm's asset growth is above average, then its subsequent operating performance also tends to be above average. The asset growth-sentiment interaction coefficient

is -0.008 (t-statistic = 7.00). The combined asset growth coefficient is therefore equal to -0.003 in the high sentiment state, and 0.014 in the low sentiment states.

2.6. Sentiment and Stock Returns

There is a good deal of evidence showing that both investment and external finance predict low stock returns.[13] Here we tests whether these effects vary across different sentiment states. We test for this effect by estimating the following regression equation:

$$R_{\text{i,t to t+1}} = \alpha_i + \beta_1 \frac{I_{i,t}}{A_{i,t-1}} + \beta_2 \frac{I_{i,t}}{A_{i,t-1}} \times S_t + \beta_3 S_t + \varepsilon_{i,t} \qquad (4)$$

The dependent variable is the firm's buy and hold return over the subsequent year. The predictive variables include firm-fixed effects, investment (or external finance), sentiment, and an interaction between investment and sentiment. The β_1 coefficient in Equation 4 can be negative if firms invest more when discount rates are lower, or if firms invest in response to mispricing; by itself the β_1 coefficient does not allow us to differentiate between these two effects. However the β_2 and β_3 coefficients do provide tests of the mispricing hypothesis. If mispricing varies with sentiment, then the sentiment coefficient (β_3) should be negative. If firms invest more when overvalued, and invest less when undervalued, then the investment-sentiment interaction (β_2) should be negative.[14]

[13] See for example Titman, Wei, and Xie (2004), Cooper, Guylen, and Schill (2008) for investment and Loughran and Ritter (1995), Daniel and Titman (2006), Pontiff and Woodgate (2008) and Bradshaw, Richardson, and Sloan (2006) for external finance.

[14] We also estimated Equation 2 with *future* stock returns in place of q. This follows Baker, Stein, and Wurgler (2003) who use this framework to test whether managers, who expect low subsequent returns, invest more. We find this effect in our sample, in that firms with lower subsequent returns have higher investment, and we also finding that this effect is increasing in sentiment.

2.6.1. Sentiment and Stock Returns: Results

The findings are reported in Table 9. The results show that both asset growth and capital expenditure predict low stock returns, which is consistent with the results in Titman, Wei, and Xie (2004) and Cooper, Guylen, and Schill (2008). The results also show that R&D predicts higher returns, which is consistent with the findings in Eberhart, Maxwell, and Siddique (2004). Share issuance predicts low returns, which is consistent with Loughran and Ritter (1995), Daniel and Titman (2006), and Pontiff and Woodgate (2008). Debt issuance also predicts low returns, which is consistent with Spiess and Affleck-Graves (1999) and Billet et al. (2001). Cooper et al. (2008) and Bradshaw, Richardson, and Sloan (2006) also show that both share and debt issuance predict low returns.

All of the interaction terms are negative, showing that both investment and external finance in high sentiment states portend lower stock returns. The differences between high and low sentiment states are economically significant as well. As an example, the overall asset growth coefficient is equal to -0.129 in the low sentiment state and -0.234 in the high sentiment state. With R&D, the overall coefficient is positive in low sentiment states and negative in high sentiment states. The results here are consistent with the idea that firms raise more capital and invest more when their expected returns are lower, and that such market timing activities are increasing in sentiment.

3. Conclusion

Investor sentiment has a statistically robust and economically meaningful impact on both real investment and external finance. Capital expenditure, R&D, and total asset growth all increase significantly with sentiment, as do both share and debt issuance. The relation between *q*

and investment is increasing in sentiment, while the relation between cash flow and investment is declining with sentiment. These findings are broadly consistent with the idea sentiment lowers the cost of external finance, thereby reducing financial constraint and increasing investment.

We find that operational efficiency declines with investment made in high sentiment states, but increases with investment made in low sentiment states. This is consistent with the idea that financing is constrained in low sentiment states, so only the most valuable projects are undertaken, and the average investment therefore has a higher return. This is also consistent with the idea that firms overinvest in high sentiment states, either because of catering, or from managers inferring information from prices, or because managers are also infected with sentiment.

Stock-return predictability resulting from both investment and external financing strengthens with sentiment. This is consistent with the notion that capital raising and investment are influenced by mispricing resulting from sentiment, so these activities predict especially low returns in high sentiment states, in which overvaluation is greater. Moreover, if in low sentiment states fewer firms invest in response to mispricing, then issuance and investment ought to tell us less about subsequent stock returns, so our findings are also consistent with this argument.

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Table 1: Sample Descriptive Statistics

This table reports summary statistics for the primary variables used in this study. SENT is the sentiment index from Baker and Wurgler (2006). The sentiment index is based on the first principal component of six sentiment variables, each adjusted so as to be orthogonal to the business cycle. CAPEX is capital expenditure scaled by lagged property, plant, and equipment. R&D is research and development expenditure scaled by lagged assets. Asset Growth is the yearly percentage change in total assets. CF is net income plus depreciation and amortization, scaled by lagged assets. Tobin's *q* (*q*) is measured as the log of market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. Stock returns (Ret(t-1)) are lagged 12-month buy and hold stock return. Share Issuance is the change in book equity minus the change in retained earnings. Debt Issuance is the change in assets minus the change in book equity.

Statistics	*Mean*	*Std. Dev.*	*25th%ile*	*Median*	*75th%ile*	*N*
SENT	0	1	-0.583	-0.044	0.605	44
CAPEX	0.346	0.395	0.131	0.226	0.398	144,063
Asset Growth	0.158	0.377	-0.015	0.081	0.215	147,059
R&D	0.067	0.099	0.005	0.028	0.088	76,259
CF	0.075	0.15	0.039	0.095	0.148	146,281
q	0.364	0.539	-0.017	0.244	0.640	147,059
Ret(t-1)	0.182	0.623	-0.203	0.074	0.403	117,568
Share Issuance	0.076	0.242	0	0.008	0.041	140,600
Debt Issuance	0.079	0.226	-0.024	0.031	0.118	141,989

Table 2: Investment and External Finance across Sentiment Terciles

This table reports average levels of investment and external finance across sentiment terciles. "High-Low" is the difference in average variable values between the high (top tercile) and low (bottom tercile) sentiment years. SENT is the sentiment index from Baker and Wurgler (2006). CAPEX is capital expenditure scaled by lagged property, plant, and equipment. R&D is research and development expenditure scaled by lagged assets. Asset Growth is the yearly percentage change in total assets. Share Issuance is change in book equity minus the change in retained earnings. Debt Issuance is change in assets minus the change in book equity. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

SENT Tercile	SENT	CAPEX	Asset Growth	R&D	Share Issuance	Debt Issuance
Low	-1.016	0.288	0.128	0.035	0.022	0.068
2	-0.001	0.331	0.147	0.070	0.077	0.074
High	1.174	0.378	0.174	0.073	0.090	0.086
High - Low	2.190	0.090***	0.046***	0.038***	0.068***	0.018***
T-statistic		(29.90)	(16.26)	(37.86)	(38.85)	(10.62)

Table 3: Investor Sentiment and Capital Expenditures

This table reports estimates of Equations 1 and 2 in which yearly capital expenditure scaled by lagged property, plant, and equipment is the dependent variable. Cash Flow is net income plus depreciation and amortization, all scaled by lagged total assets. *q*(t-1) is the log of Tobin's *q* from the previous year. Tobin's *q* is measured as the market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. SENT is the sentiment index from Baker and Wurgler (2006). Ret(t-1) is lagged 12-month buy and hold returns. All regressions include firm fixed-effects. Standard errors are clustered at the firm-level. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	1	2	3	4	5
SENT	0.020***	-0.001	0.004**	0.010***	0.018***
	(18.13)	(0.56)	(2.51)	(9.38)	(8.87)
q(t-1)		0.266***	0.246***		
		(62.57)	(60.06)		
Cash Flow		0.374***	0.445***	0.466***	0.519***
		(22.12)	(26.25)	(25.51)	(28.56)
SENT*q(t-1)			0.046***		
			(15.45)		
SENT*Cash flow			-0.180***		-0.161***
			(10.85)		(8.98)
Ret(t-1)				0.089***	0.080***
				(39.14)	(37.37)
SENT*Ret(t-1)					0.027***
					(11.64)
# of Observations	135,119	134,873	134,873	108,142	108,142
# of Firms	14,231	14,220	14,220	11,276	11,276
R-squared	0.00	0.11	0.12	0.07	0.08

Table 4: Investor Sentiment and Asset Growth

This table reports estimates of Equations 1 and 2 in which the yearly percentage change in total assets is the dependent variable. Cash Flow is net income plus depreciation and amortization, all scaled by lagged total assets. *q*(t-1) is the log of Tobin's *q* from the previous year. Tobin's *q* is measured as the market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. SENT is the sentiment index from Baker and Wurgler (2006). Ret(t-1) is lagged 12-month buy and hold returns. All regressions include firm-fixed effects. Standard errors are clustered on the firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	1	2	3	4	5
SENT	0.020***	0.002*	0.007***	0.011***	0.021***
	(17.53)	(1.82)	(3.72)	(11.02)	(9.08)
q(t-1)		0.241***	0.217***		
		(54.61)	(52.19)		
Cash Flow		0.915***	0.997***	1.017***	1.085***
		(45.75)	(50.40)	(45.42)	(50.17)
SENT*q(t-1)			0.054***		
			(17.74)		
SENT*Cash Flow			-0.204***		-0.208***
			(10.84)		(9.58)
Ret(t-1)				0.083***	0.071***
				(34.16)	(32.67)
SENT*Ret(t-1)					0.037***
					(14.23)
# of Observations	137,925	137,224	137,224	109,874	109,874
# of Firms	14,341	14,319	14,319	11,346	11,346
R-squared	0.00	0.17	0.17	0.14	0.15

Table 5: Investor Sentiment and R&D Expenditures

This table reports estimates of Equations 1 and 2 in which research and development expenditure scaled by lagged assets is the dependent variable. Cash Flow is net income plus depreciation and amortization, all scaled by lagged total assets. *q*(t-1) is the log of Tobin's *q* from the previous year. Tobin's *q* is measured as the market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. SENT is the sentiment index from Baker and Wurgler (2006). Ret(t-1) is lagged 12-month buy and hold returns. All regressions include firm-fixed effects. Standard errors are clustered on the firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	1	2	3	4	5
SENT	0.003***	0.000*	0.001***	0.002***	0.004***
	(12.28)	(1.91)	(2.82)	(8.53)	(7.97)
q(t-1)		0.027***	0.024***		
		(28.76)	(26.73)		
Cash Flow		-0.075***	-0.065***	-0.056***	-0.045***
		(16.37)	(13.86)	(10.83)	(8.76)
SENT*q(t-1)			0.004***		
			(7.16)		
SENT*Cash Flow			-0.023***		-0.030***
			(6.70)		(7.12)
Ret(t-1)				0.007***	0.006***
				(17.07)	(16.15)
SENT*Ret(t-1)					0.003***
					(5.62)
# of Observations	71,083	70,900	70,900	60,130	60,130
# of Firms	8,552	8,546	8,546	7,196	7,196
R-squared	0.00	0.07	0.08	0.03	0.04

Table 6: Investor Sentiment and Share Issuance

This table reports estimates of Equations 1 and 2 in which share issuance is the dependent variable. Share issuance is measured as the change in book equity minus the change in retained earnings. Cash Flow is net income plus depreciation and amortization, all scaled by lagged assets. *q*(t-1) is the log of Tobin's *q* from the previous year. Tobin's *q* is measured as the market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. SENT is the sentiment index from Baker and Wurgler (2006). Ret(t-1) is lagged 12-month buy and hold returns. All regressions include firm-fixed effects. Standard errors are clustered on the firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	1	2	3	4	5
SENT	0.014***	0.003***	0.006***	0.009***	0.014***
	(23.26)	(5.94)	(4.81)	(15.40)	(8.93)
q(t-1)		0.131***	0.114***		
		(43.49)	(40.53)		
Cash Flow		-0.091***	-0.037***	-0.051***	-0.011
		(6.70)	(2.75)	(3.43)	(0.73)
SENT*q(t-1)			0.039***		
			(18.65)		
SENT*Cash Flow			-0.135***		-0.122***
			(10.81)		(8.36)
Ret(t-1)				0.047***	0.040***
				(28.61)	(27.36)
SENT*Ret(t-1)					0.023***
					(13.58)
# of Observations	131,991	131,400	131,400	104,796	104,796
# of Firms	14,142	14,123	14,123	11,175	11,175
R-squared	0.00	0.06	0.07	0.03	0.04

Table 7: Investor Sentiment and Debt Issuance

This table reports estimates of Equations 1 and 2 in which debt issuance is the dependent variable. Debt issuance is measured as the change in assets minus the change in book equity. Cash Flow is net income plus depreciation and amortization, all scaled by lagged total assets. *q*(t-1) is the log of Tobin's *q* from the previous year. Tobin's *q* is measured as the market value of equity, minus the book value equity, plus the book value of assets, all scaled by the book value of assets. SENT is the sentiment index from Baker and Wurgler (2006). Ret(t-1) is lagged 12-month buy and hold returns. All regressions include firm-fixed effects. Standard errors are clustered on the firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	1	2	3	4	5
SENT	0.009***	0.001	0.002	0.005***	0.007***
	(12.98)	(1.09)	(1.64)	(6.59)	(6.26)
q(t-1)		0.101***	0.095***		
		(44.26)	(42.04)		
Cash Flow		0.103***	0.122***	0.129***	0.150***
		(9.80)	(11.35)	(11.00)	(12.61)
SENT*q(t-1)			0.013***		
			(8.52)		
SENT*Cash Flow			-0.046***		-0.061***
			(5.07)		(5.94)
Ret(t-1)				0.034***	0.030***
				(24.32)	(22.64)
SENT*Ret(t-1)					0.011***
					(7.51)
# of Observations	133,267	132,631	132,631	105,771	105,771
# of Firms	14,254	14,232	14,232	11,257	11,257
R-squared	0.00	0.04	0.04	0.02	0.02

Table 8: The Consumer Confidence Index, Investment, and External Financing

This table provides regression estimates of Equation (2) with an alternative sentiment index – the Consumer Confidence Index from the Conference Board. We orthogonalize the consumer confidence index to six different macroeconomic variables. The macroeconomic variables include growth in industry production, real growth in durable consumption, non-durable consumption, service consumption, growth in employment, and NBER recession indicators. CCI is the residual from the regressions of the Conference Board index on these macroeconomic variables. In Panel A the dependent variable is total investment, which is measured as the sum of asset growth and R&D. In Panel B the dependent variable is total external finance, which is the sum of share issuance and debt issuance. The independent variables are as defined in the previous tables. All regressions include firm fixed-effects. Standard errors are estimated by clustering on firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Panel A: Total Investment

	1	2	3	4	5
CCI	0.109***	0.025***	-0.006	0.080***	0.095***
	(12.17)	(3.82)	(0.73)	(11.29)	(8.81)
q(t-1)		0.304***	0.289***		
		(50.43)	(49.56)		
Cash Flow		0.749***	0.795***	0.883***	0.927***
		(31.40)	(33.11)	(31.67)	(34.02)
CCI*q(t-1)			0.164***		
			(9.13)		
CCI*Cash Flow			-0.509***		-0.580***
			(6.09)		(5.82)
Ret(t-1)				0.096***	0.089***
				(31.45)	(31.60)
CCI*Ret(t-1)					0.148***
					(9.32)
# of Observations	131,372	123,959	123,959	99,306	99,306
# of Firms	15,291	14,561	14,561	11,370	11,370
R-squared	0.00	0.14	0.15	0.11	0.12

Table 8 (Continued)

Panel B: External Finance

	1	2	3	4	5
CCI	0.079***	0.029***	0.005	0.077***	0.086***
	(11.57)	(4.73)	(0.62)	(11.74)	(9.21)
q(t-1)		0.264***	0.253***		
		(51.23)	(50.01)		
Cash Flow		-0.086***	-0.051**	-0.010	0.023
		(4.07)	(2.41)	(0.40)	(0.97)
CCI*q(t-1)			0.122***		
			(7.94)		
CCI*Cash Flow			-0.371***		-0.427***
			(5.23)		(5.05)
Ret(t-1)				0.086***	0.081***
				(31.60)	(31.62)
CCI*Ret(t-1)					0.121***
					(8.60)
# of Observations	118,832	118,238	118,238	94,335	94,335
# of Firms	14,362	14,336	14,336	11,183	11,183
R-squared	0.00	0.07	0.08	0.03	0.04

Table 9: Investor Sentiment, Investment, and Subsequent Operating Performance

This table reports regression results of the firm's operating performance following investment made in different sentiment states. The dependent variable in regressions 1-3 is ROAf3yrs, which is the average ROA over year t+1, t+2, t+3 (the firm must have ROA in year t+1 to be included). ROA is measured as net income scaled by book value of assets. The dependent variable in regressions 4-6 is OPAf3yrs, which is the average OPA over year t+1, t+2 and t+3 (the firm must have OPA in year t+1 to be included). OPA is measured as operating income before depreciation, amortization, and taxes plus interest income scaled by book value of assets. SENT is the sentiment index from Baker and Wurgler (2006). Capex is capital expenditure scaled by lagged property, plant, and equipment. R&D is research and development expenditure scaled by lagged assets. Asset Growth is yearly percentage change in total assets. All regressions include firm fixed-effects. Standard errors are clustered on year and firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	1	2	3	4	5	6
	ROAf3yrs	ROAf3yrs	ROAf3yrs	OPAf3yrs	OPAf3yrs	OPAf3yrs
SENT	-0.006***	-0.007***	-0.008***	-0.007***	-0.010***	-0.008***
	(14.31)	(23.13)	(15.69)	(19.88)	(18.76)	(25.76)
Capex	0.003***			0.008***		
	(2.77)			(7.89)		
SENT*Capex	-0.008***			-0.004***		
	(7.15)			(3.97)		
Asset Growth		0.006***				0.012***
		(6.22)				(14.95)
SENT*Asset Growth		-0.008***				-0.004***
		(7.00)				(5.11)
R&D			-0.030*		-0.020	
			(1.66)		(1.28)	
SENT*R&D			-0.045***		-0.014*	
			(4.52)		(1.71)	
# of Observations	125,282	127,810	66,086	125,024	65,922	127,383
# of Firms	12,950	13,043	7,868	12,935	7,860	13,025
R-squared	0.01	0.01	0.01	0.01	0.02	0.02

Table 10: Investor Sentiment, Investment, External Finance, and Future Stock Returns

This table reports results from regressions in which the dependent variable is 12-month buy and hold returns over he subsequent year. SENT is the sentiment index from Baker and Wurgler (2006). Capex is capital expenditure scaled by lagged property, plant, and equipment. R&D is research and development expenditure scaled by lagged assets. Asset Growth is yearly percentage change in total assets. Share Issuances is the change in book equity minus the change in retained earnings; Debt Issuance is the change in assets minus the change in book equity. All regressions include firm fixed-effects. Standard errors are measured by clustering on the firm. Robust t-statistics are reported in the parentheses. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

	Ret(t+1)	Ret(t+1)	Ret(t+1)	Ret(t+1)	Ret(t+1)
SENT	-0.051***	-0.027***	-0.040***	-0.053***	-0.056***
	(18.29)	(6.60)	(11.65)	(21.32)	(21.99)
Capex			-0.151***		
			(15.48)		
SENT*Capex			-0.060***		
			(6.68)		
Asset Growth	-0.200***				
	(19.06)				
SENT*Asset Growth	-0.047***				
	(3.70)				
R&D		0.563***			
		(4.28)			
SENT*R&D		-0.670***			
		(9.82)			
Share Issues				-0.283***	
				(13.48)	
SENT*Share				-0.097***	
				(4.91)	
Debt Issues					-0.205***
					(15.62)
SENT*Debt					-0.068***
					(3.44)
# of Observations	121,412	66,018	119,124	115,902	117,027
# of Firms	12,494	7,860	12,404	12,320	12,414
R-squared	0.01	0.01	0.01	0.01	0.01