Abnormal Investment and Time-Varying Monitoring*

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Abstract

Recent studies show that during periods of increased uncertainty, economic agents that monitor firm activity (analysts, fund managers, media, etc.) expend greater effort. In this study, we examine whether firms' abnormal investment activity changes in periods of uncertainty and if this change is related to time-varying monitoring. Focusing on recessions, when uncertainty is high, we find that firms not only reduce overinvestment but also reduce *underinvestment*. The change is economically large and is 13% of average investment. Using various measures of governance including financial reporting quality, conservatism, the presence of activist investors, and managerial entrenchment, we show that stronger governance and monitoring are associated with a greater reduction in abnormal investment. These measures also have a greater effect on abnormal investment during recessions as compared to other times. These findings are consistent with time-varying benefits to monitoring and highlight when governance matters most. This paper adds to the nascent literature on time-varying monitoring and indicates researchers should account for the strong relationship between business cycles and abnormal investment activity.

Keywords: Recessions, Overinvestment, Underinvestment, Financial reporting quality, Accounting conservatism, Shareholder monitoring, Managerial entrenchment, Bad times
JEL: M41, D81, G10, G30, G31, G32

*We would like to thank Karthik Balakrishnan, Asaf Bernstein, Don Bowen, Conrad Ciccotello, Alan Crane, Andrew Detzel, Beatriz García Osma, Gilles Hilary, Shane Johnson, Christopher Mace, Katie Moon, Christoph Schiller, Michael Wittry, participants at the 2023 Financial Management Association European Conference, the 2023 Finance and Accounting Annual Research Symposium, the 2023 European Financial Management Association Conference, the 2021 New Zealand Finance Meeting, the 2021 Financial Management Association Conference, the 37th International Conference of the French Finance Association, the 2021 Colorado/Texas Research Idea Conference, the 2nd Boca Corporate Finance and Governance Conference, the 16th Conference on Asia-Pacific Financial Markets, the 2021 World Finance Conference, the 7th International Corporate Governance Society Conference, and seminar participants at the University of Oklahoma, Virginia Tech, Ohio University, Bentley University, James Madison University, Florida International University, Northern Illinois University, and University of Denver for their helpful comments and suggestions. Shahram Amini (shahram.amini@du.edu, 303-871-2703) is with the Daniels College of Business, Finance Department, University of Denver. Andrew MacKinlay (acmackin@vt.edu, 540-231-9355) is with the Pamplin College of Business, Finance Department, Virginia Tech. Brian R. Rountree (rountree@rice.edu, 713-348-5328) is with the Jones Graduate School of Business, Accounting Department, Rice University. James P. Weston (westonj@rice.edu, 713-348-4480) is with the Jones Graduate School of Business, Finance Department, Rice University. Corresponding author: Brian Rountree.

September 18, 2023

1. Introduction

Recessions are characterized by a decline in investment, rising unemployment, and generally bad economic news that correspond with a sharp increase in uncertainty. While investment levels decline, there is also evidence that external monitoring increases during downturns, which could, on the margin, improve investment efficiency.[1] For example, Kacperczyk et al. (2016) note that during recessions information becomes more valuable, which leads to time-varying attention and monitoring. Similarly, firms closer to default during a recession are more likely to attract monitoring to perform costly state-verification as in Townsend (1979). On the flip side, expansions may raise the incidence of rent extraction, hubris, and empire building as in Jensen (1986). Overall, there are good theoretical reasons to believe that the value of information production and returns to monitoring have strong cyclical components.

Using a variety of models meant to calibrate normal investment levels, we find that both over- and *under*investment are reduced in the aftermath of recessions. Specifically, we document that firms that invest more than expected cut new investment by 16% (roughly $356M on average) during bad times, while firms that invest less than expected *increase* new investment by 11% (roughly $229M on average). The combined average effect on abnormal investment is 13% or roughly $281M on average. We observe these shifts across capital expenditures, acquisitions, and R&D expenses for both over- and underinvesting firms.

While the results on overinvestment are expected, comprehending how a firm that is underinvesting prior to a recession manages to return to more normal levels of investment following a recession is less obvious. Underinvestment is typically associated with financial constraints that tend to worsen during recessionary periods, making the results even more surprising. However, our

[1] See Bloom (2014) for a synthesis of the literature on uncertainty and the business cycle. Loh and Stulz (2018) and Amiram et al. (2018) document an increased reliance on analysts during bad times; Glode (2011) shows that mutual fund managers will increase their effort to realize good performance during bad times when investors' marginal utility of consumption is high; Kacperczyk et al. (2016) predict and find that economic agents value information more during bad times; Bonsall et al. (2020) find that the higher demand for financial information during periods of increased uncertainty leads to greater monitoring by the media, which in turn leads to improved investor transparency and less information asymmetry. Bernstein et al. (2019) survey private equity investors and find that they interact more with portfolio companies during the 2008 financial crisis.

investment model includes various controls, such as firm size, leverage, cash holdings, and firm age to incorporate differences in financial constraints (see Kaplan and Zingales, 1997; Whited and Wu, 2006; Hadlock and Pierce, 2010). Thus, our results reflect changes in investment behavior after accounting for the effects of financial constraints on expected investment. Furthermore, the existing literature shows that many firms are compelled to innovate in order to survive recessions. For instance, Banker et al. (2020) conclude that firms use recessions as an opportunity to innovate while still maintaining spending on critical activities like R&D and advertising, which yield future benefits. Our results are consistent with similar innovative behaviors for the sub-sample of firms that underinvest prior to a recession but return to more normal investing levels after the recession.

Having documented business cycle shifts in abnormal investment, we next turn to the mechanisms that might be driving this cyclicality. We test the role that governance plays in explaining cross-sectional variation in changes in abnormal investment. Previous studies show that effective corporate governance limits the degree of over- and underinvestment on average, which raises the question of how governance and investment activity interact during bad times. On the one hand, better-governed firms may be less likely to make abnormally high or low investment decisions in general (Richardson, 2006; Biddle et al., 2009; García-Lara et al., 2016), which would mean relatively poorly governed firms make investment corrections during recessionary periods. On the other hand, given time-varying demands for monitoring, adjustments to abnormal investment may be at least partially the response from effective governance. That means suboptimal behavior is more likely to be identified in recessions and corrected, but this is conditional on having the proper governance in place.[2]

The governance attributes we investigate in this paper include the presence of an activist shareholder (Richardson, 2006), managerial entrenchment (Bebchuk et al., 2009), financial reporting

[2]Bernanke and Gertler (1989), building on Townsend (1979), study business cycle variation in agency costs. Their focus is on external financing frictions for new capital related to borrowers' net worth. Instead, we focus on the effects of increased monitoring on investment policy, which we argue would lessen managerial discretion in downturns. Relatedly, Philippon (2006) suggests that managers need to move quickly when times are good and product demand is high; shareholders, therefore, give management more discretion and less scrutiny in good times, consistent with time-varying benefits to monitoring.

quality (Biddle and Hilary, 2006; Biddle et al., 2009), and conservatism (García-Lara et al., 2016; Balakrishnan et al., 2016; Bushman et al., 2011; Francis and Martin, 2010). Across all these measures, we find that good governance matters more during recessions. In some cases, the measure *only* matters during recessionary periods. Both findings are consistent with the notion of a time-varying marginal benefit to monitoring.

In particular, we find that firms with the recent addition of an activist investor and those with lower managerial entrenchment experience a greater reduction in abnormal investment during recessionary periods, whereas there is either no relation (entrenchment) or a positive relation (activist investor) to abnormal investment during non-recessionary periods. Better financial reporting quality, measured following Dechow and Dichev (2002), is associated with less abnormal investment (consistent with Biddle et al., 2009). The reduction, however, is accentuated during recessions. Finally, conservatism also attenuates abnormal investment during recessionary periods. To summarize, the relationship between attributes measuring good governance and abnormal investment becomes stronger during recessions, which is consistent with the notion that heightened uncertainty during recessions leads to greater monitoring and, as a result, corrections in investment behavior.

Our primary measure of abnormal investment, derived from Richardson (2006) and Stoughton et al. (2017), is similar to the models used in Biddle and Hilary (2006), Biddle et al. (2009), and García-Lara et al. (2016) but incorporates more control variables. More specifically, we estimate residuals from a regression forecast of new investment, using a panel of a firm's past investment, and a large set of control variables including cash holdings, growth opportunities, leverage, firm size, recent annual return performance, and firm age. Following the literature, we call the estimated residuals "abnormal investment" in a statistical sense because deviations from our prediction suggest that investment is out of line relative to both other firms and past investment. This approach offers certain advantages and also has its limitations. The main advantage is its simplicity since this measure represents abnormal investment relative to an in-sample statistical benchmark. Of course, the disadvantage is that residuals could measure investment that, while statistically abnormal, is perfectly efficient. Further, our fixed-effects model precludes us from measuring time-invariant

systematic under- or overinvestment at an industry level. Both of these problems attenuate the precision of our measure. However, we consider this tradeoff worthwhile as our focus is on the business cycle frequency and we view our measure as a noisy instrument for systemic under- and overinvestment. A final caveat is that we investigate the behavior of firms that survive recessions. A subset of firms, especially those that have routinely underinvested because of financial constraints, do not survive recessions and thus our results do not generalize to this particular group of firms.

Our results do not depend critically on any specific measure of abnormal investment. We employ alternative measures of abnormal investment and conduct a battery of robustness tests with the main findings remaining unaffected. First, we use different proxies for growth opportunities based on sales and market-to-book ratios following Biddle et al. (2009) and García-Lara et al. (2016), along with only using measures of growth opportunities without the additional controls in our investment model, consistent with the Q-theory of investment. We further allow for differential effects by industry or business cycle, perform rolling out-of-sample tests, and use various firm, industry, and geographic fixed effects.[3] Additionally, we analyze the impact of sector-specific downturns alongside the National Bureau of Economic Research (NBER) recessions and obtain similar results. Moreover, our findings are insensitive to the precise timing and magnitude of our recession thresholds and do not depend on any single downturn. None of these exercises alter our core conclusions.

It is important to note that our results do not reflect simple mean reversion in firm-level investment policy. Independent of business cycles, a firm that abnormally invests too much one year might simply cut investment in the next year. If this reversion coincides with business cycles, it could lead to spurious results. To rule out this argument, we first construct placebo business cycles by simulating recessionary and expansionary periods and find no time-series patterns that resemble our evidence around actual business cycles. Second, we include multiple lags of the estimated investment residuals into our main specifications to control for any firm-level mean reversion. Our results persist. Third, if a small subset of firms exhibits extreme investment volatility and

[3]We prefer industry fixed effects as it allows for firms to be persistent over- or underinvestors, which is swept out with firm fixed effects. Nevertheless, our results remain statistically significant if we control for this heterogeneity.

strong mean reversion, their behavior might skew our estimates. As a robustness check, we scale our abnormal investment measures by the standard deviation of each firm's investment and find consistent results.

Our study makes several contributions. First, we link firm-level *abnormal* investment to business cycle variation in investment levels. Second, our work expands our understanding of investment under uncertainty (Guiso and Parigi, 1999; Bloom, 2009; Julio and Yook, 2012; Dangl and Wu, 2016; Gulen and Ion, 2016). While past studies generally document a reduction in firm-level investment during recessionary times, we show that abnormal over- and underinvestment both decrease during bad times. To our knowledge, this is the first study to calibrate the positive effect of economic downturns at the firm level by testing the deviation from expectations, rather than just the levels of new investment.

Our study also relates to the financial reporting and broader corporate governance literature. Prior studies document a positive impact of superior corporate governance on different aspects of firm performance, including firm value, profitability, investment, and stock returns. Our paper documents another positive impact of better financial reporting and corporate governance: investment policy may actually improve on the margin during times of uncertainty due to superior reporting and governance. Furthermore, our results provide additional evidence of the time-varying nature of monitoring and illustrate when governance attributes are most valuable.

The remainder of the paper proceeds as follows. Section 2 discusses related literature and lays out the key predictions that we test. Section 3 explains the research design and Section 4 describes the sample selection, construction of different abnormal investment proxies, and summary statistics. Section 5 presents the results on abnormal investment and economic downturns. Section 6 presents the findings on how governance mechanisms affect investment policy. Section 7 offers a battery of robustness tests while Section 8 concludes.

2. Related Literature and Predictions

Economists as far back as Marx (1867), Mitchell (1913), and Schumpeter (1942) suggest that downturns reflect the "creative destruction" of older and less profitable technologies, sectors, or firms that are shuttered and replaced by new investments and productive growth. While it is nearly folk wisdom that bad investments swell in expansions and get winnowed out in recessions, there is little theoretical or empirical justification for the basic idea in either Keynesian or real business cycle models.

This study speaks to the type of creative destruction that operates within firms over time. Rather than focus on whether cycles arise from large-scale technology shocks, we focus on firm-level changes on the intensive margin. Examples include when firms innovate, update production processes, cut costs, refine pricing strategies, and so on. Under the uncertainty and economic pressure of a downturn, firms may tilt new investments towards new, more productive outlets. Indeed, these micro-level transformations are discussed by Schumpeter (1942) as the "constant dynamics of innovation" that arise from competitive pressure. Consistent with this notion of creative destruction, Banker et al. (2020) find that firms experiencing a decline of sales during a recession actually improve operating margins more than firms that experience sales increases during recessions, as well as relative to firms experiencing sales declines outside of recessions. The heightened uncertainty during economic downturns provides firms with both the incentive and opportunity to innovate, leading to operational efficiencies. Whether this innovation extends to changes in investment decisions is the subject of our study.

Beyond the typical macro factors that drive aggregate cycles, theory also predicts deviations from optimal investment based on agency, moral hazard, and asymmetric information. For example, managers may waste free cash flow on negative NPV projects to build empires or consume perquisites (Jensen, 1986; Blanchard et al., 1994). Firms may also overinvest if their managers exhibit behavioral biases like overconfidence or optimism (Malmendier and Tate, 2005, 2008). On the other hand, costly external finance may lead to suboptimal underinvestment through asymmetric information (Myers and Majluf, 1984; Greenwald et al., 1984) and moral hazard (Jensen and Meckling, 1976;

Grossman and Hart, 1983; Stulz, 1990; Hart and Moore, 1995). Similarly, managers may underinvest because of risk-averse labor market concerns (Fama, 1980; Holmström and Ricart i Costa, 1986; Dewatripont et al., 1999).

Corporate finance frictions also likely change dynamically over the business cycle. Free cash flow is higher in expansions, allowing managers to overinvest (Jensen, 1986). As external financing becomes more costly in downturns, underinvestment among constrained firms rises (Bernstein et al., 2019). In addition, debt overhang problems, which increase as equity values decline, may rise in recessions. Asset fire sales during downturns can further exacerbate debt overhang effects (Shleifer and Vishny, 1992). Executive compensation policy may also drive firms to sacrifice optimal long-run investment policy to maximize short-term incentives within the current part of the business cycle (Bolton et al., 2006; Laux, 2012).

We expect the impact of these frictions to change in downturns as predicted by costly state verification models. As far back as Townsend (1979), contract theory suggests that investor monitoring increases with the proximity to default, as costly monitoring is often suboptimal for debt contracts in good standing. This basic idea maps naturally into business cycles. If firms destroy wealth by over- or underinvesting, they are more likely to escape detection when times are good. When state-contingent payments disappear—which is more likely in a recession—then the marginal value of monitoring is high and economic agents invest in costly state verification.

The recent literature documents results that are consistent with a more general increase in the marginal value of monitoring outside of debt contracts during periods of high uncertainty as in recessions. Glode (2011) provides a model explaining how it can be rational to invest in actively managed funds that have been shown to simultaneously underperform unconditionally but perform abnormally well during poor economic times. He notes that fund managers of actively managed funds increase their effort during periods in which "investors' marginal utility of consumption is high" (i.e., in bad states of the economy) (Glode, 2011, p.547). Kacperczyk et al. (2016) model mutual fund managers' attention allocation decisions across the business cycle illustrating that skilled managers rationally allocate more effort during bad economic times because information is

more valuable. Bonsall et al. (2020) document an expanded role of media coverage during periods of high uncertainty that reduces information asymmetry and improves investor informedness. Similarly, Loh and Stulz (2018) and Amiram et al. (2018) find that investors' increased demand for information during periods of high uncertainty leads to greater effort by analysts. Bernstein et al. (2019) find that private equity investors spend more time consulting with managers at portfolio firms during the 2008 financial crisis in an effort to help them survive and provide evidence that firms with private equity investors perform better during the crisis relative to a matched control sample without private equity investors.

In summary, previous studies have found that mutual fund managers, private equity investors, analysts, debt holders, and the media all increase monitoring during bad economic states, which means managers are subject to greater scrutiny. We expect this greater scrutiny to lead to adjustments to abnormal investing behaviors of firm managers, including both over- and underinvestment.

We extend our analysis by examining the relationship between corporate governance attributes and abnormal investment across the business cycle. The literature on the role of financial accounting information in shaping investment decisions has expanded significantly since the call for more research on the governance role of accounting in Bushman and Smith (2011). Roychowdhury et al. (2019) provide a recent summary of the relationship between financial reporting and corporate investment. We build on this literature by examining the role of four governance attributes that have been shown to have a relationship with investment: activist investors (Richardson, 2006); managerial entrenchment (Bebchuk et al., 2009); financial reporting quality (Biddle and Hilary, 2006; Biddle et al., 2009); and conservatism (García-Lara et al., 2016; Balakrishnan et al., 2016; Bushman et al., 2011; Francis and Martin, 2010).[4]

Although we predict there will be greater monitoring by economic agents during recessionary periods, it is unclear what relationship the governance attributes will have with investment across the

[4]Berger et al. (2022) find evidence that is consistent with improvements in internal managerial reporting quality being responsible for improved investment efficiency as opposed to necessarily external financial reporting quality. The study capitalizes on the requirement for cross-listed firms to comply with the Sarbanes-Oxley Act's required internal control assessments, which is a shift in monitoring in its own right. We cannot assess this attribute in our analysis of investment and the business cycle since the time period in their study has only one recessionary period.

business cycle. On the one hand, there is evidence consistent with better-governed firms experiencing less abnormal investment in general (Richardson, 2006; Biddle et al., 2009; García-Lara et al., 2016; Francis and Martin, 2010, among others). Furthermore, Balakrishnan et al. (2016) find that more conservative firms are less likely to experience decreases in investment during the financial crisis along with smaller declines in raising debt and stock performance. Given this evidence, it is reasonable to predict that better-governed firms generally have less abnormal investment, leading to fewer corrections during recessionary periods. On the other hand, if the marginal utility of monitoring is higher during recessions, then better-governed firms may be more likely to correct abnormal investment in downturns. With time-varying monitoring, investment behavior can deviate from predicted levels during good times, which is then corrected during bad times when economic agents are more attentive. However, for this to happen firms must have the governance attributes in place to properly monitor investment behavior during bad times. Ultimately, this is an empirical question and the primary focus of our study.

3. Research Design

3.1. Abnormal Investment

Our primary measure of abnormal investment is based on Richardson (2006) and extended by Stoughton et al. (2017). We first estimate the expected new investment level using the following regression:

$$\begin{aligned} I_{i,j,t} = {} & \beta_1 V/P_{i,j,t-1} + \beta_2 Leverage_{i,j,t-1} + \beta_3 Cash_{i,j,t-1} + \beta_4 Size_{i,j,t-1} + \beta_5 Return_{i,j,t-1} \\ & + \beta_6 Age_{i,j,t-1} + \beta_7 I_{i,j,t-1} + \theta_j + \lambda_t + \varepsilon_{i,j,t}, \end{aligned} \tag{1}$$

for firm i in industry j in year t. The dependent variable, new investment, consists of capital expenditures plus research and development (R&D) expenses plus acquisitions minus sale of property, plant, and equipment (PP&E) minus amortization and depreciation, all scaled by lagged

total assets.[5] V/P measures firm growth opportunities, where V represents the value of assets in place divided by the market value of equity, P. The value of assets in place comes from a residual income model of assets described in Ohlson (1995) and Richardson (2006). Our results hold if we use the firm's market-to-book ratio (a common proxy for Tobin's Q) or recent sales growth as the measure of growth opportunities (Biddle et al., 2009; García-Lara et al., 2016). *Leverage* is the sum of the book value of short-term and long-term debt divided by the sum of the book value of total debt and the book value of equity. $Cash$ is the balance of cash and short-term investments scaled by lagged total assets. $Size$ is the natural logarithm of total assets. *Return* is the stock return measured as the change in market capitalization of the firm over the previous year, and *Age* is the natural logarithm of one plus the number of years the firm has been listed in the Compustat database. Many of these control variables have been used to create measures of financial constraints (see Kaplan and Zingales, 1997; Whited and Wu, 2006; Hadlock and Pierce, 2010). Rather than using an index measure of financial constraints, we opt to include the underlying variables in an unconstrained manner. This choice is motivated by Farre-Mensa and Ljungqvist (2016) who illustrate that none of the widely adopted index measures of financial constraints effectively capture financial constraints.[6] We use the Fama-French 48 industry classification (Fama and French, 1997). We include industry fixed effects, θ_j, to control for unobserved industry differences and year fixed effects, λ_t, to control for any time trends and to remove common macroeconomic shocks from our estimates. All ratio variables are winsorized at the 1% and 99% tails. Finally, the reported standard errors are robust to heteroskedasticity and are clustered by firm and year to account for within-firm and within-year serial correlation.

Following Richardson (2006) and Stoughton et al. (2017), we use the estimated residuals from equation (1) to measure unexpected investment. Because the expected value of residuals is zero i.e., $E(\varepsilon_{i,j,t}) = 0$, the absolute values of the residuals represent a deviation from the expected investment level or abnormal investment. Therefore, we classify firms with positive residuals in a

[5]We set missing values of sale of PP&E, R&D, and acquisitions to zero.

[6]In Section 7, we discuss that the results are not sensitive to the inclusion of the control variables or to the chosen proxy for growth opportunities.

given year as overinvesting firms and firms with negative residuals in a given year as underinvesting firms. Mathematically, the abnormal investment proxy (AI), overinvestment proxy (OI), and underinvestment proxy (UI) for firm i in industry j at time t are defined, respectively, as:

$$AI_{i,j,t} = |\widehat{\varepsilon}_{i,j,t}| = |I_{i,j,t} - \widehat{I}_{i,j,t}| \tag{2}$$

$$OI_{i,j,t} = |\widehat{\varepsilon}_{i,j,t}| = |I_{i,j,t} - \widehat{I}_{i,j,t}| \qquad \text{if} \quad I_{i,j,t} > \widehat{I}_{i,j,t} \tag{3}$$

$$UI_{i,j,t} = |\widehat{\varepsilon}_{i,j,t}| = |I_{i,j,t} - \widehat{I}_{i,j,t}| \qquad \text{if} \quad I_{i,j,t} < \widehat{I}_{i,j,t}, \tag{4}$$

where higher values of these proxies, AI, OI, and UI imply a greater degree of abnormal investment (in either direction), overinvestment, or underinvestment, respectively. Several recent studies use a similar approach to measure firm-level expected investment and examine its association with product market competition (Stoughton et al., 2017), analysts' capital expenditure forecasts (Choi et al., 2020), managers' forecast accuracy (Goodman et al., 2014), institutional investors' monitoring (Ward et al., 2020), accounting conservatism (García-Lara et al., 2016), financial reporting quality (Biddle et al., 2009), director connections (Hann et al., 2019), corporate social responsibility (Benlemlih and Bitar, 2018), changes in generally accepted accounting principles (Shroff, 2017), and analysts' coverage (Brogaard et al., 2016).

The disadvantage of using the residuals from equation (1) as a measure of abnormal investment is that, while statistically abnormal, the investment may actually be perfectly efficient. Further, our fixed-effects model precludes us from measuring time-invariant systematic under- or overinvestment at an industry level. Both of these problems attenuate the precision of our measure. However, we view this as a worthwhile tradeoff since our focus is on the business cycle frequency and we view our measure as a noisy instrument for under- and overinvestment, which biases against finding systematic results. In addition, in Section 7 we conduct a battery of robustness tests in an attempt to rule out alternative interpretations of our findings.

3.2. Abnormal Investment over the Business Cycle

After calculating abnormal investment, we investigate how it varies over the business cycle with a particular focus on bad times when there is an increase in demand for monitoring as previously discussed. We focus on recessions as our definition of bad times as they are likely exogenous to firms' financial policy decisions. We follow prior studies (e.g., Loh and Stulz, 2018) and define recession years as any year with at least three months that are in an NBER-defined recession. The post-1972 recession periods (when our data begin) are December 1973 to March 1975, January 1980 to July 1980, July 1981 to November 1982, June 1990 to March 1991, March 2001 to December 2001, and December 2007 to June 2009.[7] As a robustness check, in Section 7 we change the three-month threshold to one, two, or six months.

To formally investigate the relationship between abnormal investment and business cycles, we estimate the following regression:

$$y_{i,j,t} = \beta_1 Bad\ Times_{t-1} + \beta_2 Controls_{i,j,t-1} + \theta_j + \varepsilon_{i,j,t}, \tag{5}$$

where y is the proxy for overinvestment (OI), underinvestment (UI), or abnormal investment (AI), as defined in equations (2) to (4). $Bad\ Times$ is an indicator variable that equals one if year $t-1$ has at least three months that are in an NBER recession period as described above. $Controls$ is a vector of firm characteristics. Following Stoughton et al. (2017), we control for Age, $Size$, $Cash$, $Leverage$, $Tangibility$ (ratio of net PP&E to total assets), and $Market\text{-}to\text{-}Book$ (total book value of assets plus the market value of common equity minus the book value of common equity and deferred taxes, all divided by total book assets). We also control for return on assets (ROA), defined as pretax income plus interest expense divided by lagged total assets. These variables are likely to explain variation in investment activity as they capture differences in growth opportunities, age, scale, ability to borrow, and capital to spend. To control for unobservable heterogeneity, we also include industry fixed effects (θ_j) using the Fama-French 48 industry classification. Since our main variable of interest

[7] See https://www.nber.org/cycles.html for a complete list of recessionary periods.

(*Bad Times*) is a time-series variable, we cluster standard errors by year in addition to by firm. Based on our main prediction, we expect β_1 to be negative across all three measures of abnormal investment.

3.3. Governance and Investment

Our next step is to investigate the relationship between various corporate governance attributes and abnormal investment as a potential mechanism through which recessions affect firms' investment behavior. To do so, we estimate the following regression:

$$\begin{aligned} y_{i,j,t} = {} & \beta_1 Bad\ Times_{t-1} + \beta_2 Gov_{t-1} + \beta_3 Bad\ Times_{t-1} \times Gov_{t-1} \\ & + \beta_4 Controls_{i,j,t-1} + \theta_j + \varepsilon_{i,j,t}, \end{aligned} \tag{6}$$

where all the variables are defined as in equation (5) except for Gov_{t-1}, which represents four different governance attributes that have been shown to be associated with investment in the prior literature. Following Richardson (2006), we use both the presence of activist investors and a governance index capturing the degree of managerial entrenchment from Bebchuk et al. (2009).[8] We identify activist investors by collecting data on Schedule 13D filings with the U.S. Securities and Exchange Commission (SEC). Based on SEC regulations, active, beneficiary investors who intend to exert control over the company and who own more than 5% of a voting class of a company's equity are required to file a Schedule 13D with the SEC within 10 days of the transaction. We create an indicator variable, 13*D Indicator* that takes the value of one if a firm has at least one 13D filing in a year, and zero otherwise.

We measure the degree of managerial entrenchment using the *E-Index* from the Institutional Shareholder Service (ISS) RiskMetrics database (Bebchuk et al., 2009). The entrenchment index is based on six provisions in the corporate charter. Two are anti-takeover provisions and four are

[8]Richardson (2006) uses a principal components analysis methodology developed in Larcker et al. (2007) to reduce 39 governance-related attributes down to 14 governance factors that are then correlated with known characteristics to enhance the interpretation of his results. Three factors end up being associated with overinvestment: one related to activist investors and two related to anti-takeover provisions. We elect to use actual observed values of these characteristics that are common in the literature instead of using the Larcker et al. (2007) methodology.

provisions designed to curb shareholder rights. The index is constructed by assigning a score of one for each provision. Therefore, the index ranges from a feasible low of zero to a high of six; a high score is associated with weak shareholder rights. For the years in which the ISS database does not report the scores, we follow Bebchuk et al. (2009) and use the index from the latest available year. The filing and entrenchment data span from 1995 through 2017.

Our final two governance attributes are financial reporting quality (*FRQ*) and conservatism (*CONS*). We follow Francis et al. (2005), Biddle et al. (2009) and García-Lara et al. (2016) in constructing *FRQ*, which is based on the measure from Dechow and Dichev (2002). Specifically, we estimate the Dechow and Dichev model cross-sectionally for each of the Fama-French 48 industries with at least 20 observations. *FRQ* is defined as the standard deviation of firm-specific residuals from the Dechow and Dichev model over the years $t-5$ to $t-1$. We multiply the resulting standard deviation by negative one so that *FRQ* is increasing in financial reporting quality.

We follow García-Lara et al. (2016) in constructing *CONS*, which is based on the firm-specific adaptation of the Basu (1997) model developed in Khan and Watts (2009) that is a linear combination of size, leverage, and the market-to-book ratio. The model estimates the timeliness of earnings to good news (G-Score) and the incremental timeliness to bad news (C-Score) annually on a firm-specific basis. We add G-Score and C-Score values each year to obtain the total timeliness of loss recognition, decile rank this measure annually, and take the three-year average over the years t, $t-1$, and $t-2$ to create *CONS*. Ettredge et al. (2012) and Jayaraman (2012) find that the Khan and Watts (2009) measure captures variation in conservatism.[9]

4. Sample and Descriptive Statistics

Our primary sample includes U.S. firms listed on NYSE, AMEX, or NASDAQ with CRSP share codes of 10 and 11, which are covered by CRSP and Compustat between 1972 and 2017. We exclude firms with missing or negative total assets and exclude utilities (SIC codes 4900–4949) and

[9]We follow the exact methodology from García-Lara et al. (2016), Appendix B, in constructing *CONS*.

financials (SIC codes 6000–6999).[10] Recessions are based on the NBER dates.

We report the regression estimates for equation (1) in Table 1. The results are largely consistent with prior studies (Richardson, 2006; Stoughton et al., 2017).[11] Focusing on Column 4, which includes both industry and year fixed effects, the negative coefficient for V/P implies that firms with higher growth opportunities have higher investment. The negative coefficient for *Leverage* and the positive coefficients for $Cash$ and $Size$ suggest that larger firms with lower financial constraints also have higher investments. The negative coefficient for *Age* implies that firms that are later in their life cycle have lower investments. The results also show that firms with good past stock performance and higher prior investment tend to have higher future investment than their industry peers.

4.1. Descriptive Statistics

Table 2 reports the summary statistics for the variables used throughout this paper. We find that the average new investment across all firm-years is 7.1% of lagged assets. The average firm in our sample has assets worth about $2.169 billion (in 2010 dollars), a leverage ratio of 32.8%, and is about 16.36 years old. Cash accounts for 16.3% of lagged assets. The abnormal investment measure can be calculated for 145,868 observations, of which 60,104 observations are in the overinvesting sample (i.e., have positive residuals based on the estimation in Table 1) and 85,764 observations are in the underinvesting sample. Average abnormal investment, overinvestment, and underinvestment are 6.2%, 7.5%, and 5.3% of lagged assets, respectively. These percentages are about the same magnitude as the average new investment. About 21.3% of the observations in our sample are in bad years when we use the three-month threshold to identify bad times. The governance characteristics indicate 20.8% of the sample have a recent activist investor (13*D Indicator*), while the entrenchment index (*E-Index*), financial reporting quality (*FRQ*), and conservatism (*CONS*) all have values consistent with prior research. Overall, we observe large cross-sectional differences in investment,

[10] Because some companies change their fiscal year end date in the middle of the calendar year, there is more than one annual record for the accounting data in these cases. We select the last annual record in a given calendar year.

[11] Throughout all our analyses, we multiply *Investment* by 100 for ease of readability and reducing the number of zeros reported after the decimal point for many of the coefficients. This accounts for the coefficient magnitude differences relative to Richardson (2006) and Stoughton et al. (2017).

our abnormal investment proxies, governance attributes, and firm characteristics.

Table 3 splits firms into three groups based on terciles of estimated investment residuals from equation (1). We label firms with the largest positive residuals "Overinvestors" (the highest tercile), firms with the most negative residuals "Underinvestors" (the lowest tercile), and the remaining firms in the middle tercile, which have residuals closest to zero, are labeled "Normal Investors." Panel A of Table 3 provides summary statistics for each group of firms. On average, firms that fall into the normal-investors classification are larger, older, and have higher annual cash flows, lower market-to-book, lower sales growth, and higher ROA (profitability). Over- and underinvestors are similar in terms of average size, age, and ROA although overinvestors have higher leverage and lower cash holdings.

In terms of governance attributes, underinvestors attract more attention from activist investors (13*D Indicator*), whereas there is not much difference across any of the investment categories for *E-Index*. Consistent with Biddle et al. (2009) and García-Lara et al. (2016), over- and underinvestors have worse financial reporting quality (*FRQ*), whereas conservatism deciles (*CONS*) seem to be more evenly spread.

Given the investment residuals are calculated each year, a question is how frequently firms move between the three investor categories. We present the average transition matrix for firms over the sample in Panel B of Table 3. On average, firms are most likely to remain in the same category as the prior year, with the likelihood of remaining an over- or underinvestor being about 42% and remaining a normal investor being about 47%. Interestingly, the average overinvestor is more likely to switch to being an underinvestor in the next year (33.49%) than to become a normal investor (24.43%). This is consistent with the model and empirical results in Bachmann and Bayer (2014) who find that investment lumpiness is a critical aspect to observed cyclicality patterns of dispersion in investment activities.

5. Bad Times and Abnormal Investment

In this section, we test the hypothesis that firms move toward their expected investment levels in recessions (i.e., reduce abnormal investment). Using our measure of abnormal investment, we present both simple univariate results and multivariate regression tests. In Section 6, we explore the relationship between abnormal investment and governance attributes over the business cycle.

5.1. Univariate Analysis

We begin by showing the association between bad times and abnormal investment graphically. Using the tercile classifications, Figure 1, Panels A and B combine all the recessionary periods and present shifts in over/underinvestment (Panel A) and changes in new investment (Panel B) in event time where $t = 0$ represents the recessionary period. Overinvestors and underinvestors are classified in the year before the recession ($t = -1$) and are followed over the subsequent years. For recessions that span multiple years, we collapse the period into a single recession year $t = 0$.

We find that the gap between the normal and abnormal investing groups shrinks as the economy contracts. This is true if considering the investment residuals (Panel A) or the investment level directly (Panel B). The gap continues to tighten in the year after a recession. The change in investment residuals comes from changing investment behavior for both over- and underinvesting firms. On average, overinvestors decrease their investment, and underinvestors *increase* their investment in absolute terms, and not just compared to their expected level. The fact that similar patterns appear in both panels shows that the results are not just an artifact of changes in expected investment levels over the business cycle.

5.2. Multivariate Analysis

Table 4 presents the results from estimating equation (5) for overinvestment (Columns 1 and 2), underinvestment (Columns 3 and 4), and for abnormal investment (Columns 5 and 6). The coefficient for the *Bad Times* indicator in Column 1 is negative and statistically significant at the 1% level. The result in Column 2 equates to roughly a 16% reduction in annual overinvestment for the average firm in our sample. In effect, following bad times the average overinvesting firm

eliminates about $356 million in new investments (in 2010 dollars).[12] We also find that more growth opportunities (higher market-to-book) and more cash holdings are associated with more overinvestment. Larger firms and firms with lower leverage, fewer tangible assets, and higher ROA are associated with less overinvestment.

In Columns 3 and 4, we focus on the firms that we classify as underinvesting, relative to their predicted level. To provide a consistent interpretation of the coefficients across Table 4, we take the absolute value of the investment residuals. So for this sample, a larger positive value indicates more underinvestment. Again, we estimate a negative and statistically significant coefficient for *Bad Times*, indicating that economic hardship mitigates underinvestment. Following bad times the average underinvesting firm reduces annual underinvestment roughly by 11% (using the estimate from Column 4). Put differently, the average underinvesting firm increases its investment by about $229 million (in 2010 dollars) relative to its behavior in years without a recent bad economic shock.[13]

In Columns 5 and 6, we test the relation between bad times and abnormal investment for the full sample of firms. Here the dependent variable *AI* is the absolute value of the investment residual, so the interpretation remains the same. A negative value indicates less deviation from expected investment, regardless of whether the firm underinvests or overinvests. In both columns, the coefficient on the proxy for bad times is statistically significant at the 1% level. This result, paired with the results of Columns 1 through 4, suggests that abnormal investment is reduced following bad times. This reduction is economically significant as well. In the year after a recession, the average firm makes about a 13% shift towards expected investment (using the estimate from Column 6). This change equates to $281 million in 2010 dollars.[14] As both types of firms adjust, this is not necessarily a unilateral decrease in investment, but rather a shift in investment activity across both overinvesting and underinvesting firms.

[12]The calculation for the average firm is $0.01230/0.075(= 16.4\%) \times \$2169.132$ million $\approx \$356$ million.
[13]The calculation is $0.00559/0.053(= 10.5\%) \times \$2169.132$ million $\approx \$229$ million.
[14]The calculation is $0.00804/0.062(= 13.0\%) \times \$2169.132$ million $\approx \$281$ million.

5.3. Investment Constituents

The estimates in Table 4 show that firms on average reduce abnormal investment during bad times; overinvesting firms reduce their investment and underinvesting firms increase their investment on a relative basis, bringing it closer to expected levels. To shed more light on exactly how the composition of investment changes, we break apart investment into its major constituents: capital expenditures, R&D, acquisitions, and sale of PP&E. We then compute the average of each investment component for the years around recessions for both overinvesting and underinvesting firms. Here we reclassify firms each year by their investment residuals rather than holding the classification fixed over the recession period.

Panel A in Figure 2 shows the mix of average investment for overinvestors. As these firms enter a recessionary period, they cut their capital expenditures, R&D, and acquisitions spending and slightly increase the sale of PP&E. The largest drop is in acquisitions. In the year before the recession, overinvesting firms spend about 4% (as a percentage of assets) on acquisitions but decrease it to 1.2% in the recession year, for a total decline of 2.8%. Acquisitions increase slightly in the first and second year after the recession period but stay well below pre-recession levels. This decline is consistent with Bhagwat et al. (2016) who find that increases in macro-level uncertainty decrease M&A activity. The second largest drop is in capital expenditures. Overinvesting firms invest about 10.5% in physical capital in the year before the recession but cut their spending by almost 1.9% in the recession year. Capital expenditures continue to drop one year after the recession and then stabilize. Innovation activities appear to be less affected by economic hardship. Overinvestors decrease their R&D spending from 6.5% in the year before the recession to 5.6% in the recession year, less than a 1% decline.

Panel B of Figure 2 focuses on the underinvesting firms. These firms *increase* their spending on all of the major components of investment going into a recessionary period. Physical capital spending increases by 1.1% from the pre-recession year to the recession year. R&D activities increase by 0.3% during the recession and continue to increase over the subsequent years. Interestingly, acquisition activities also gather steam as the economy goes through bad times. Underinvesting firms spend 1.3%

on acquisitions compared to 0.5% in the year prior to the recession.[15] Overall, the decomposition of investment in both Panels A and B shows that the change in investment is not homogeneous across different components as firms enter into a recessionary period. Overinvestors cut their total investment as acquisitions and capital expenditures experience the sharpest drop. Underinvestors scale up their total investment with physical capital and acquisitions enjoying the largest boost. To the best of our knowledge, we are the first to document the increases in the different components of total investment for underinvesting firms during recessions. Having established changes in investment policy during bad times, the next section examines the role governance attributes play in the shifting nature of abnormal investment over the business cycle.

6. Governance and Abnormal Investment

We first investigate how the presence of activist investors affects the relationship between bad times and abnormal investment. We use the presence (indicator variable) and number of 13D filings in a given year as indicative of shareholder activism.[16] In untabulated analyses, we find that both the presence and number of 13D filings increase during recessionary periods even after controlling for return on assets, market-to-book ratio, leverage, cash, size, tangibility, and age. Specifically, being in a recession year is associated with a 4.1% increase in the likelihood that a given firm has a current 13D filing or a 4.8% increase in the number of filings.

The results from estimating equation (6) with activist investors are in included in Table 5 Columns 1 and 2. The key variable of interest is 13*D Indicator*, which is an indicator that takes a value of one if the firm at time $t-1$ was the subject of a 13D filing and zero otherwise. The positive estimates for the 13*D Indicator* coefficients imply that the firms that are subject to 13D filings generally have more abnormal investment during non-bad times. However, following bad times, as a result of more intense monitoring, these firms move even further towards expected investment levels

[15] As an anecdotal example, a medical company called Natus Medical Incorporated is classified as an underinvestor in 2007 in our sample. During the 2008–2009 financial crisis, the company acquired NeuroCom International firm in 2008 in an $18 million deal to expand its footprint in a different specialty.

[16] In untabulated analyses, we also include the presence of 13G filers with no change to inferences. However, 13D filers are more traditionally viewed as activist investors and thus we use the more strict definition here.

relative to firms without activist investors. The amount of change for monitored firms is about 21.7% of the average abnormal investment level of firms in our sample (using the estimates from Column 2).[17] This correction is about 60% larger than for firms without a recent filing. As we only have filing data for 1995 through 2017, we cannot speak definitively to the role of shareholder monitoring across all the business cycles in our full sample. Nevertheless, these findings point to a monitoring channel in which firms with more shareholder activism react more strongly to recessions.

Another possible mechanism is the role of internal governance and the degree of managerial entrenchment. Ultimately, the responsiveness of management to changing economic conditions will be determined, in part, by their job security. If management is sufficiently entrenched that their jobs are not at risk, the disciplinary threat of increased scrutiny during an economic downturn will lack teeth. Alternatively, if the change in investment behavior is not related to this channel, we would not expect significant differences in investment behavior along the entrenchment dimension.

Columns 3 and 4 of Table 5 report the results of this exercise. We still find that the *Bad Times* indicator reduces abnormal investment for the high-entrenchment firms (*Bad Times* < 0). However, the effect is more pronounced for low-entrenchment firms. In Column 4, we document a negative and significant coefficient estimate on the interaction term (*Bad Times* $\times$ *Low Entrenchment*). This effect is despite the fact that firms with low entrenchment do not have higher abnormal investment than other firms during good times (*Low Entrenchment*). Similar to the shareholder activism results, this implies that firms with less entrenchment and better corporate governance react more aggressively to recessions and change their investment policy more sharply consistent with the notion of time-varying utility of monitoring.

Both financial reporting quality and conservatism have been shown to reduce the likelihood of over- and underinvestment (Biddle et al., 2009; García-Lara et al., 2016). In Table 6, we examine how these governance attributes influence the relationship between abnormal investment and bad times. Consistent with the results in Biddle et al. (2009) and García-Lara et al. (2016), financial reporting quality exhibits a negative relationship to abnormal investment in general (Column 1).

[17] The calculation is $(0.00826 + 0.00518)/0.062 = 21.7\%$.

The effect of *FRQ* in Column 2 on abnormal investment is even stronger during bad times with the incremental coefficient being about twice as large as the slope of *FRQ* during regular economic times. The effect is both statistically and economically significant as a one standard deviation improvement in *FRQ* during bad times is associated with a reduction equal to 5.4% of average abnormal investment levels.[18]

The last results in Table 6 (Columns 3 and 4) examine the relationship between conservatism (*CONS*) and abnormal investment across the business cycle after controlling for *FRQ* and the other determinants of investment. The results in Column 3 reveal a negative and significant relationship between *CONS* and abnormal investment in general, consistent with the findings in García-Lara et al. (2016) who document that greater conservatism leads to less underinvestment. However, once we include an interaction between *CONS* and the *Bad Times* indicator, there is no longer a statistically significant relationship between conservatism and abnormal investment in non-bad times. In Column 4, the interaction of *Bad Times* and *CONS* is negative and statistically significant, with a similar economic magnitude as *FRQ*. For example, a one standard deviation shift in *CONS* represents a 4.7% reduction relative to average abnormal investment during bad times.[19] In our specifications, it is important to note that we include the interaction term *Bad Times* $\times$ *FRQ*, so these effects are distinct from that of financial reporting quality alone. Overall, the results are consistent with more conservative firms monitoring their abnormal investment more during bad economic times.

7. Robustness Tests

In this section, we consider a battery of alternative tests based on changes to our definition of recessions and alternative estimation techniques for our measures of abnormal investment.

7.1. Placebo Recessions

One potential concern with our measure of abnormal investment is that the residuals from our panel regression model may exhibit simple mean reversion. For example, some firms might

[18]The calculation is $(0.01858 + 0.03959) \times 0.058/0.062 = 5.4\%$.
[19]The calculation is $(0.0004 + .00062) \times 2.834/0.062 = 4.7\%$.

underinvest one year and then revert to more typical investment for reasons unrelated to the macroeconomy or business cycle. Such a statistical behavior would present as abnormal over- or underinvestment for firms with more investment volatility. Fortunately, this concern is testable. While regression residuals may mean revert at the firm level, our hypothesis is that there are systematic differences over the business cycle.

To determine whether our results reflect spurious mean reversion, we perform a set of tests based on simulated "placebo" recessions. We take every year that is not classified as *Bad Times* and calculate median over- and underinvestment for the two-year window around these dates. We repeat this exercise for every year to create 32 placebo recessions. We then average these placebo recessions and plot the average sample overinvestment and underinvestment in event time. If our results were driven by general mean reversion in our abnormal investment measure, we would expect to see similar patterns to Figure 1. Figure 3 presents the average over/underinvestment patterns across actual recessionary periods in Panel A along with the results of our placebo recessions in Panel B. The Panel A results are consistent with the graphs in Figure 1 with overinvestors (underinvestors) experiencing declines (increases) in abnormal investment during the recessionary period ($t = 0$) and the year following ($t = 1$). In contrast, in Panel B placebo recessions we do not find evidence of mean reversion, and in fact, do not find any clear time-series statistical patterns around non-business cycle events. These results are inconsistent with residual mean reversion driving our main results.[20]

7.2. Alternative Measures of Bad Times

While we consider our definition of "bad times" as reasonable, we also conduct robustness tests to determine whether our main results are sensitive to changes in our recession thresholds. In Table 7, we report results based on defining bad times as years with a minimum of one, two, or six-month recession periods and reestimate equation (5). The results are insensitive to the change of recession thresholds: overinvestment, underinvestment, and general abnormal investment all decline

[20]In Section 7.3, we discuss two additional exercises to rule out mean reversion arguments. These tests include scaling the abnormal investment measures by firm-level investment volatility and augmenting our main specifications with lagged residuals.

during recessions. The estimates are similar in economic magnitude to our main specifications in Table 4, and all estimates remain statistically significant. In untabulated analysis, we confirm that the governance results in Tables 5 and 6 remain similar with these alternative recession thresholds.

In addition to macro-level recessions dated by NBER, we also use industry production data released by the Bureau of Economic Analysis (BEA) to define industry-level "bad times" based on industry-level GDP growth. Specifically, each year we classify an *Industry Downturn* as the industries in the bottom tercile by GDP growth.[21] In untabulated results, we consider whether firms facing an industry downturn adjust their investment policy. We find that for all three measures of abnormal investment, firms experiencing a recent downturn move toward their expected investment. In the case of overinvestment and abnormal investment, the results are statistically significant at the 5% level but are insignificant for underinvestment. In general, the findings are consistent with the NBER macro-level recessions used elsewhere in the paper.[22] Whether a firm is facing an industry-specific or economy-wide downturn, it appears to spur changes in investment policy.

7.3. Alternative Measures of Abnormal Investment

Another concern may be our measure of abnormal investment based on Richardson (2006) and Stoughton et al. (2017). In Table 8, we present results based on two alternative specifications to estimate abnormal investment. Specifically, instead of using the residuals of equation (1), we use residuals from the following model:

$$I_{i,j,t} = \beta_1 Growth\ Opportunities\ Proxy_{i,j,t-1} + \theta_{j,t} + \varepsilon_{i,j,t}, \tag{7}$$

where *Growth Opportunities Proxy* is either the firm's sales growth (following Biddle et al., 2009; García-Lara et al., 2016) or its lagged market-to-book ratio.[23] Sales growth is defined as the

[21]The industry GDP growth maps to the Fama-French 17 industry classification, although we continue to use the Fama-French 48 industry classification for our fixed effects. We get similar results if we define *Industry Downturn* as being the bottom quartile or bottom decile of industries in a given year.

[22]We also find that the *Industry Downturn* coefficients remain statistically significant for overinvestment and abnormal investment when including our *Bad Times* control. These results suggest that the changes in investment policy are not limited to industry downturns that coincide with macroeconomic downturns.

[23]We also require at least 20 observations for each industry-year, following Biddle et al. (2009).

percentage change in sales from year $t-2$ to year $t-1$. Our main results hold. Economic downturns mitigate overinvestment, underinvestment, and abnormal investment in general.

Using the alternative measure estimated using sales growth, we repeat our analysis of the different governance measures from Section 6. Specifically, we repeat Columns 2 and 4 from Tables 5 and 6 but use the alternative measure of abnormal investment as the dependent variable. The results are presented in Appendix Table A1. All the interaction terms between bad times and different governance measures remain negative and statistically significant.

Overall, our estimates of statistically abnormal investment are not sensitive to our specific econometric model. Nonetheless, in Appendix Table A2, we present a final set of alternative specification tests for equation (5). First, when constructing our investment measures using equation (1), we simply let all the coefficient estimates differ in expansions and contractions, in case the relation between firm variables and investment behavior depends on economic conditions. We also let the coefficients vary by Fama-French 48 industry classifications in case the relationships differ meaningfully by industry. Alternatively, we allow all our coefficient estimates from equation (1) to change with each business cycle.[24] As a separate approach, we conduct our residual estimates on a rolling basis using a ten-year window. In this case, our residuals begin in 1981, so there are fewer observations. Our results remain similar.

Next, we include up to three lags of past investment residuals as additional controls in our test of equation (5). These lags control for any firm-level mean reversion in residuals that may coincide with bad times. Here, we find that past abnormal investment is typically positively correlated with current abnormal investment, which is inconsistent with a mean reversion argument. More importantly, the effect of bad times on firm investment policy remains quantitatively similar to our main specifications. It is also possible that mean reversion is more prevalent in firms with more volatile investments. To make sure the measures are not just capturing differences in investment volatility, we scale all of our residuals by the standard deviation of each firm's investment, and

[24] Specifically, we split our sample into six cycles: 1972 to 1976, 1977 to 1983, 1984 to 1992, 1993 to 2002, 2003 to 2010, and 2011 to 2017.

our results hold. Finally, to further mitigate concerns that some omitted firm heterogeneity, such as higher investment volatility, is driving the results, we repeat our procedure but use firm-fixed effects instead of industry-fixed effects. The estimates of equation (5) remain highly statistically significant. They are somewhat smaller in economic magnitude, which does suggest that some firms persistently over- or underinvest. The recurring theme here is that model misspecification is unlikely to be driving the association between large realizations of unexpected investment and future changes in investment and value.

8. Conclusion

In this paper, we find that both over and *under*investment decreases during recessions, consistent with the time-varying marginal utility of monitoring. We further show that governance attributes generally associated with better investment outcomes have heightened importance during bad times. Specifically, firms with better financial reporting quality, less managerial entrenchment, recent activist investor activity, and higher accounting conservatism all have greater decreases in abnormal investment activity during recessions. By showing how the effect of governance on investment activity varies over time, this paper clarifies when governance is most valuable. It also identifies important variations in investment behavior over the business cycle that should be controlled for when investigating firm investment activity.

Overall, our results are consistent with new investment spending guiding firms toward more efficient resource allocation when times are bad. These findings are consistent with Schumpter's notion of creative destruction on the intensive margin, where business cycles serve the beneficial role of winnowing bad investments and directing capital to more economically viable projects. Furthermore, our study provides results that suggest time-varying benefits to monitoring play a role in this creative destruction.

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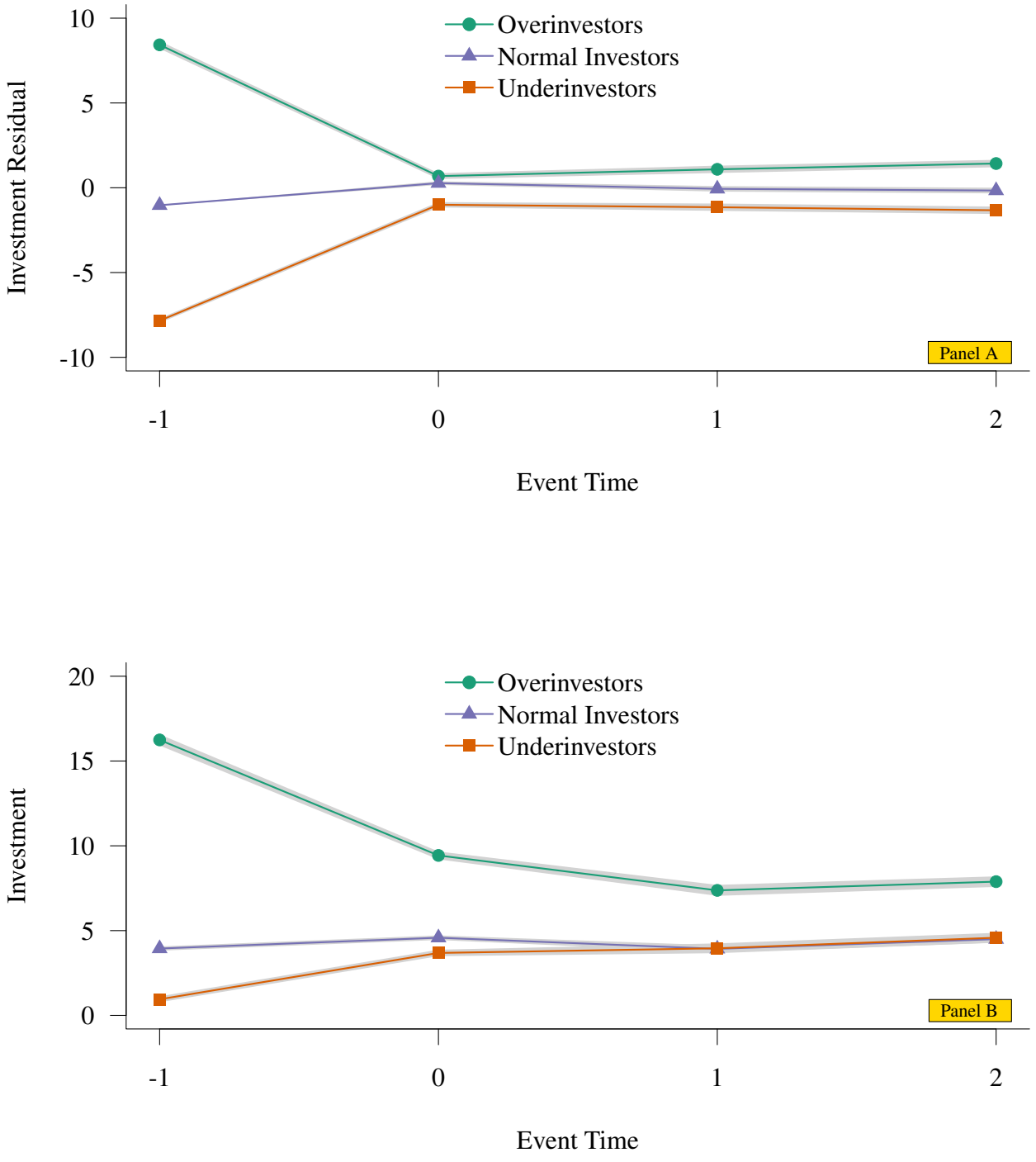

Figure 1: Investment over Time

This figure splits firms into three groups: overinvestors (the highest tercile by abnormal investment residuals), normal investors (the middle tercile by abnormal investment residuals), and underinvestors (the lowest tercile by abnormal investment residuals). Panel A plots the average *abnormal* investment residual for each group over event time. Panel B plots the average *new* investment for each group over event time. Recession years correspond to $t = 0$ in event time. The terciles are formed at event time $t = -1$ (the year before the recession). Shaded areas correspond to the 95% confidence intervals.

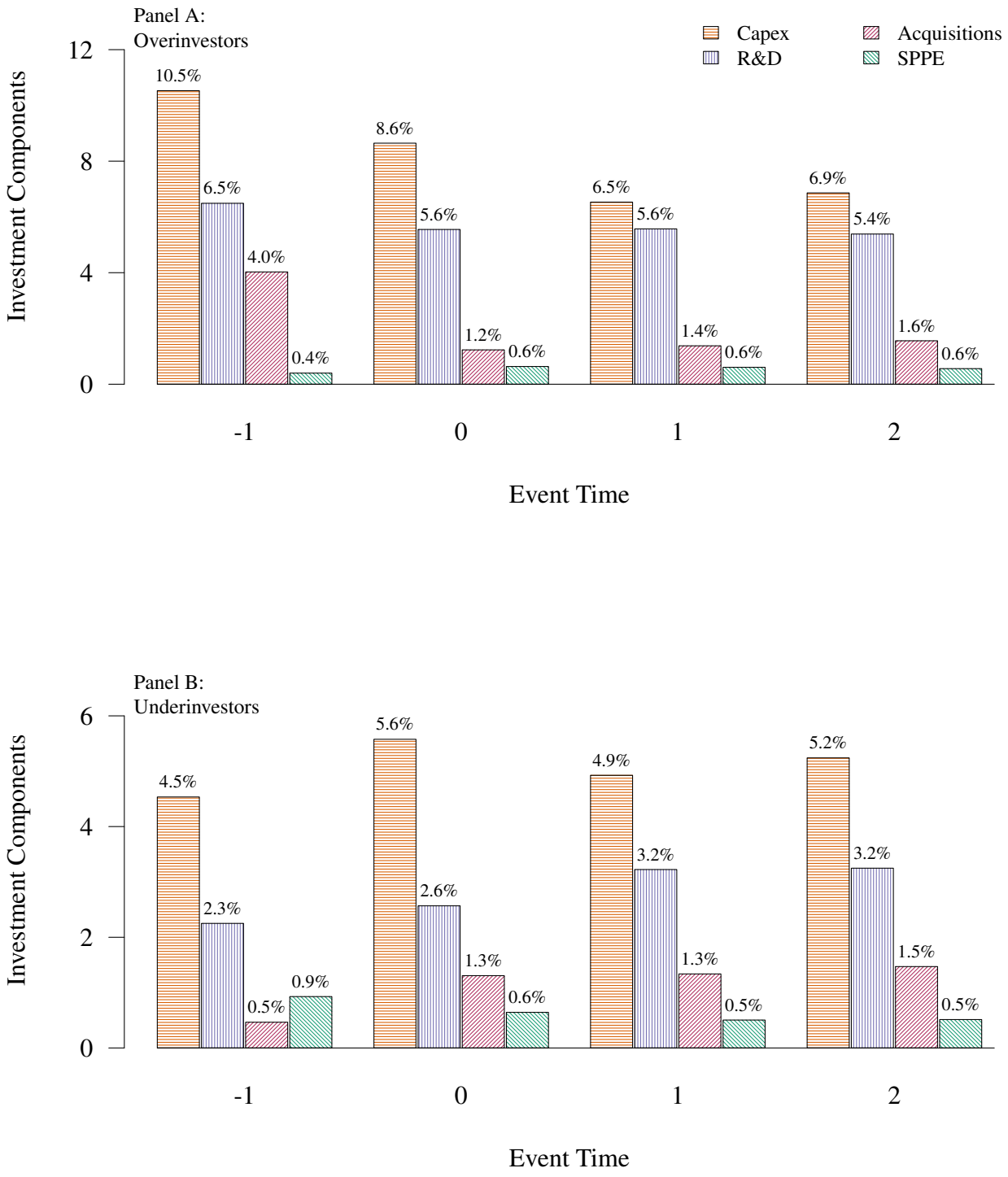

Figure 2: Investment Decomposition

This figure decomposes firms' average investment into four categories: capital expenditures (Capex); research and development expenses (R&D); acquisitions; and sales of property, plant, and equipment (SPPE). Panel A plots the mix of average investment for overinvestors (the highest tercile by abnormal investment residual), and Panel B plots the mix of average investment for underinvestors (the lowest tercile by abnormal investment residual). Recession years correspond to $t = 0$ in event time.

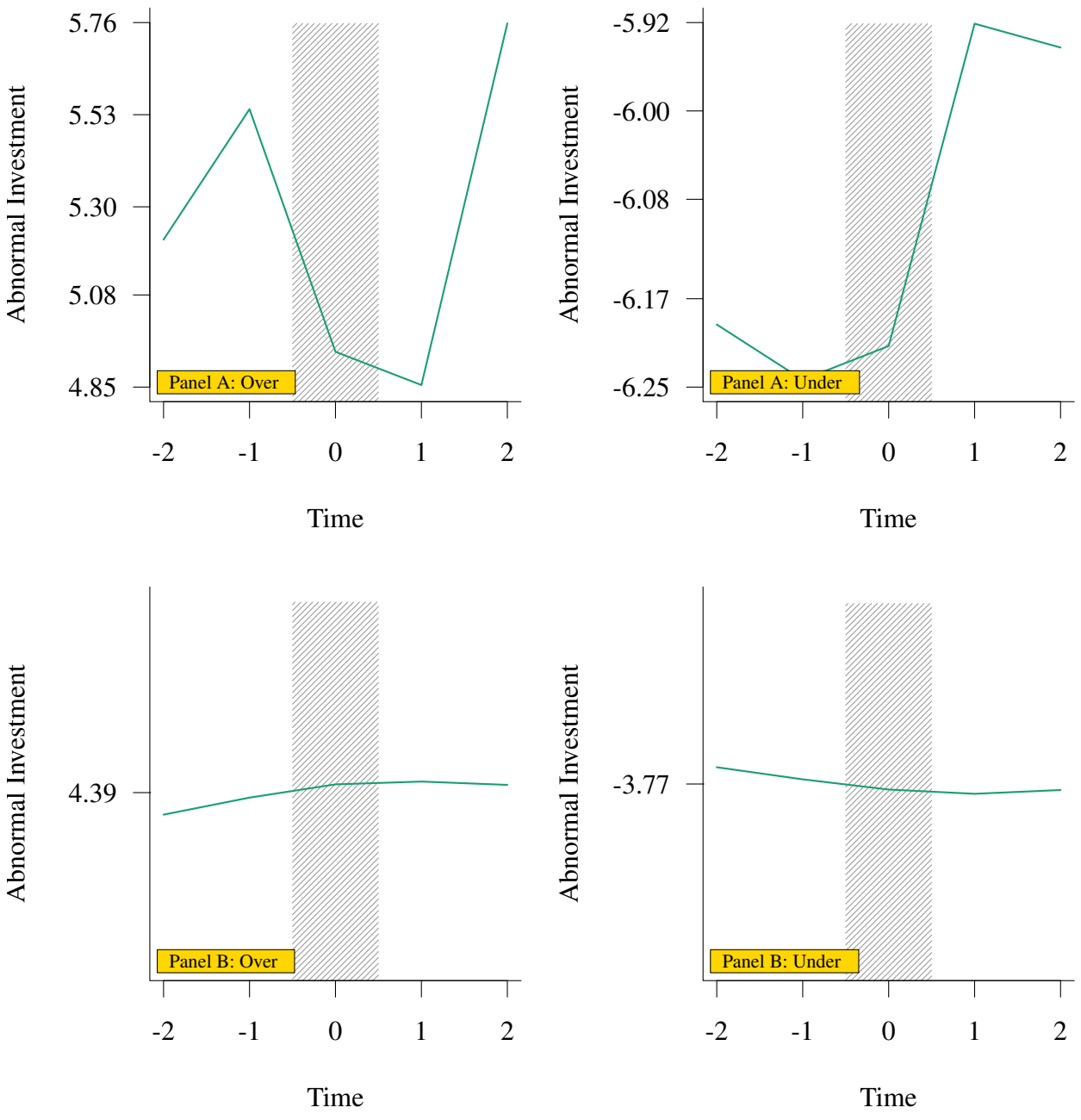

Figure 3: Real and Simulated Abnormal Investment over Time

Panel A of this figure plots the average overinvestment and underinvestment level (abnormal investment) across all NBER recession periods (shaded area). Firms in the highest tercile by abnormal investment residual are classified as overinvestors and firms in the lowest tercile by abnormal investment residual are classified as underinvestors. Panel B of this figure plots the average overinvestment (left figure) and average underinvestment level (right figure) around 32 simulated recessionary periods (shaded area).

Table 1: Predicted Investment Regression

This table reports the results of regressions of corporate new investment on a set of control variables. The sample includes U.S. firms listed on NYSE, AMEX, or NASDAQ with CRSP share codes of 10 and 11, which are covered by CRSP and Compustat between 1972 and 2017. Utilities, financials, and firms for which total assets are either missing or negative are excluded. *New Investment* is scaled by 100. All control variables are lagged and all the ratios have been winsorized at the 1% and 99% of their empirical distribution. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	New Investment			
	(1)	(2)	(3)	(4)
V/P	−0.681***	−0.903***	−0.612***	−0.810***
	(0.093)	(0.070)	(0.091)	(0.063)
Leverage	−2.271***	−2.283***	−2.317***	−2.289***
	(0.208)	(0.198)	(0.182)	(0.177)
Cash	14.821***	15.333***	12.870***	13.372***
	(0.679)	(0.656)	(0.530)	(0.512)
Size	0.050	0.103***	0.113***	0.176***
	(0.040)	(0.036)	(0.041)	(0.036)
Return	0.948***	0.899***	0.941***	0.894***
	(0.103)	(0.088)	(0.101)	(0.083)
Age	0.028	0.066	−0.206**	−0.162**
	(0.093)	(0.087)	(0.087)	(0.079)
Prior Investment	0.497***	0.495***	0.460***	0.457***
	(0.010)	(0.010)	(0.009)	(0.009)
Industry Fixed Effects	No	No	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes
Adjusted R^2	0.434	0.438	0.451	0.456
Observations	145,868	145,868	140,773	140,773

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 2: Summary Statistics for the Aggregate Sample

The sample includes U.S. firms listed on NYSE, AMEX, or NASDAQ with CRSP share codes of 10 and 11, which are covered by CRSP and Compustat between 1972 and 2017. Utilities, financials, and firms for which total assets are either missing or negative are excluded. Number of observations (N), mean, median, first quartile (Q1), third quartile (Q3), and standard deviations (Std. Dev.) are reported. All the ratios have been winsorized at the 1% and 99% of their empirical distribution. See Section 3 for detailed definitions and the construction of the variables.

	Observations	Mean	Median	Q1	Q3	Std. Dev.
Investment Model Variables:						
New Investment	145,868	0.071	0.038	−0.000	0.108	0.127
V/P	145,868	0.762	0.591	0.298	1.046	0.834
Leverage	145,868	0.328	0.290	0.069	0.494	0.302
Cash	145,868	0.163	0.078	0.027	0.217	0.202
Age (Unlogged)	145,868	16.360	13.000	7.000	23.000	12.569
Size	145,868	4.871	4.688	3.320	6.285	2.134
Return	145,868	0.256	0.063	−0.236	0.442	0.894
Unexpected Investment Proxies:						
Abnormal Investment	145,868	0.062	0.038	0.017	0.077	0.073
Overinvestment	60,104	0.075	0.040	0.016	0.095	0.092
Underinvestment	85,764	0.053	0.036	0.018	0.069	0.054
Bad Times Proxies:						
Recession (1m)	145,868	0.252	0.000	0.000	1.000	0.434
Recession (2m)	145,868	0.232	0.000	0.000	0.000	0.422
Recession (3m)	145,868	0.213	0.000	0.000	0.000	0.410
Recession (6m)	145,868	0.170	0.000	0.000	0.000	0.376
Other Characteristics:						
Total Assets (Adjusted)	145,868	2169.132	185.507	49.191	797.503	14022.221
Market-to-Book	140,917	1.944	1.308	0.973	2.017	2.442
Cash Flow	145,801	0.042	0.097	0.030	0.152	0.236
Sales Growth	143,545	0.261	0.098	−0.014	0.244	1.203
ROA	145,838	0.034	0.090	0.002	0.164	0.342
Tangibility	145,763	0.293	0.240	0.114	0.418	0.224
Governance Attributes:						
13D Indicator	34,982	0.208	0.000	0.000	0.000	0.406
Num. of 13D Filings	34,982	0.536	0.000	0.000	0.000	1.438
E-Index	29,387	2.565	3.000	2.000	4.000	1.408
FRQ	83,335	−0.062	−0.044	−0.081	−0.023	0.058
CONS	95,184	5.334	5.000	3.000	8.000	2.834

Table 3: Summary Statistics for Overinvestors, Underinvestors, and Normal Investors

This table reports summary statistics of the characteristics of overinvesting, underinvesting, and normal investing firms. Dividing the abnormal investment residuals into terciles, *Overinvestors* are those in the highest tercile of investment residuals (largest positive residuals). *Underinvestors* are those in the lowest tercile of investment residuals (most negative residuals). *Normal Investors* are those in the middle tercile (closest to expected investment). Panel A reports the number of observations, mean, and median of the firm variables for each group. Panel B reports the transition matrix for the three groups. All the ratios have been winsorized at the 1% and 99% of their empirical distribution. See Section 3 for detailed definitions and the construction of the variables.

Panel A: Summary Statistics:

	Overinvestors		Underinvestors		Normal Investors	
	Mean	Median	Mean	Median	Mean	Median
V/P	0.710	0.533	0.633	0.528	0.941	0.727
Leverage	0.322	0.279	0.302	0.237	0.361	0.335
Cash	0.174	0.079	0.205	0.123	0.109	0.055
Age (Unlogged)	15.533	12.000	14.943	11.000	18.604	15.000
Size	4.733	4.552	4.626	4.477	5.255	5.041
Return	0.273	0.083	0.319	0.054	0.176	0.052
Tangibility	0.307	0.251	0.283	0.221	0.288	0.245
ROA	0.011	0.098	0.013	0.075	0.078	0.095
Market-to-Book	2.167	1.439	2.089	1.348	1.575	1.169
Cash Flow	0.026	0.104	0.022	0.087	0.076	0.099
Sales Growth	0.287	0.112	0.328	0.102	0.169	0.082
13D Indicator	0.205	0.000	0.216	0.000	0.201	0.000
Num. of 13D Filings	0.502	0.000	0.575	0.000	0.524	0.000
E-Index	2.593	3.000	2.528	3.000	2.574	3.000
FRQ	−0.065	−0.045	−0.067	−0.047	−0.055	−0.039
CONS	5.196	5.000	5.484	5.000	5.341	5.000
Observations	48,622		48,623		48,623	

Panel B: Transition Matrix:

	Current Category		
Prior Category	Overinvestors	Underinvestors	Normal Investors
Overinvestors	42.08	33.49	24.43
Underinvestors	26.74	42.65	30.60
Normal Investors	30.74	22.15	47.11

Table 4: Overinvestment, Underinvestment, and Abnormal Investment in Bad Times

This table reports the results of regressions of abnormal investment on the *Bad Times* indicator and a set of control variables. *Overinvestment* is the absolute value of the firm's deviation from its predicted investment for firms with higher than expected investment. *Underinvestment* is the absolute value of the firm's deviation from its predicted investment for firms with lower than expected investment. *Abnormal Investment* is the absolute value of the firm's deviation from its predicted investment for all firms. All three investment variables are scaled by 100. *Bad Times* is an indicator for the prior calendar year having a recession for at least three months. All control variables are lagged and all ratios have been winsorized at the 1% and 99% of their empirical distribution. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Overinvestment		Underinvestment		Abnormal Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
Bad Times (3m)	−1.549***	−1.230***	−0.570***	−0.559***	−0.935***	−0.804***
	(0.339)	(0.273)	(0.207)	(0.181)	(0.244)	(0.210)
Market-to-Book		0.285***		0.106***		0.187***
		(0.034)		(0.018)		(0.020)
Leverage		0.272*		1.125***		0.856***
		(0.165)		(0.141)		(0.120)
Cash		9.326***		5.125***		6.633***
		(0.388)		(0.316)		(0.287)
Size		−0.380***		−0.235***		−0.282***
		(0.037)		(0.022)		(0.023)
Tangibility		0.948***		2.034***		1.896***
		(0.330)		(0.304)		(0.261)
Age		−0.497***		−0.616***		−0.606***
		(0.084)		(0.062)		(0.056)
ROA		−2.152***		−2.504***		−2.631***
		(0.152)		(0.192)		(0.134)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.085	0.166	0.062	0.156	0.071	0.150
Observations	56,329	56,329	79,619	79,619	135,948	135,948

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 5: Investment and Shareholder Monitoring

This table considers the interaction between shareholder monitoring, managerial entrenchment, and abnormal investment. *Abnormal Investment* is the absolute value of the firm's deviation from its predicted investment for all firms, scaled by 100. *Bad Times* is an indicator for the prior calendar year having a recession for at least three months. *13D Indicator* is an indicator for whether the firm is the subject of a 13D filing in the previous year. *Low Entrenchment* is an indicator for whether the firm is below median for the entrenchment index. All other control variables are lagged and all ratios have been winsorized at the 1% and 99% of their empirical distribution. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Abnormal Investment			
	(1)	(2)	(3)	(4)
Bad Times (3m)	−0.949***	−0.826***	−0.875***	−0.489**
	(0.242)	(0.218)	(0.201)	(0.243)
13D Indicator	0.334**	0.404**		
	(0.159)	(0.176)		
Bad Times × 13D Indicator		−0.518**		
		(0.204)		
Low Entrenchment			−0.139	−0.066
			(0.144)	(0.143)
Bad Times × Low Entrenchment				−0.585***
				(0.154)
Market-to-Book	0.175***	0.175***	0.170*	0.169*
	(0.043)	(0.043)	(0.092)	(0.092)
Leverage	0.804***	0.807***	0.490*	0.482*
	(0.212)	(0.212)	(0.268)	(0.267)
Cash	5.272***	5.274***	4.771***	4.770***
	(0.290)	(0.290)	(0.542)	(0.544)
Size	−0.316***	−0.316***	−0.436***	−0.437***
	(0.031)	(0.031)	(0.056)	(0.056)
Tangibility	1.490***	1.489***	0.359	0.354
	(0.341)	(0.340)	(0.525)	(0.525)
Age	−0.602***	−0.602***	−0.196	−0.196
	(0.091)	(0.091)	(0.132)	(0.132)
ROA	−2.355***	−2.353***	0.013	0.010
	(0.201)	(0.201)	(0.621)	(0.622)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.116	0.116	0.073	0.074
Observations	33,287	33,287	12,589	12,589

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 6: Investment and Accounting Quality

This table considers the interaction between accounting quality and abnormal investment. *Abnormal Investment* is the absolute value of the firm's deviation from its predicted investment for all firms, scaled by 100. *Bad Times* is an indicator for the prior calendar year having a recession for at least three months. *FRQ* is the accounting quality measure from Dechow and Dichev (2002). *CONS* is the accounting conservatism measure from García-Lara et al. (2016). All other control variables are lagged and all ratios have been winsorized at the 1% and 99% of their empirical distribution. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Abnormal Investment			
	(1)	(2)	(3)	(4)
Bad Times (3m)	−1.011***	−1.011***	−1.033***	−1.027***
	(0.228)	(0.224)	(0.200)	(0.199)
FRQ	−2.617***	−1.858**	−0.499	−0.420
	(0.748)	(0.825)	(1.062)	(1.063)
Bad Times × FRQ		−3.959***	−4.584***	−5.049***
		(0.919)	(1.584)	(1.709)
CONS			−0.052**	−0.040
			(0.025)	(0.026)
Bad Times × CONS				−0.062**
				(0.031)
Market-to-Book	0.166***	0.166***	0.262***	0.262***
	(0.027)	(0.027)	(0.034)	(0.034)
Leverage	0.603***	0.602***	0.605**	0.600**
	(0.142)	(0.141)	(0.304)	(0.303)
Cash	5.455***	5.459***	4.988***	4.983***
	(0.250)	(0.250)	(0.332)	(0.333)
Size	−0.301***	−0.302***	−0.300***	−0.295***
	(0.024)	(0.024)	(0.046)	(0.047)
Tangibility	1.281***	1.281***	0.657**	0.659**
	(0.247)	(0.246)	(0.294)	(0.294)
Age	−0.519***	−0.518***	−0.519***	−0.522***
	(0.063)	(0.063)	(0.075)	(0.075)
ROA	−2.574***	−2.579***	−1.207***	−1.206***
	(0.161)	(0.161)	(0.246)	(0.247)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.126	0.126	0.083	0.083
Observations	79,258	79,258	48,822	48,822

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 7: Overinvestment, Underinvestment, and Abnormal Investment in Bad Times—Alternative Thresholds

This table reports the results of regressions of abnormal investment on different measures of bad times and a set of control variables. *Overinvestment* is the absolute value of the firm's deviation from its predicted investment for firms with higher than expected investment. *Underinvestment* is the absolute value of the firm's deviation from its predicted investment for firms with lower than expected investment. *Abnormal Investment* is the absolute value of the firm's deviation from its predicted investment for all firms. All three investment variables are scaled by 100. *Bad Times* is an indicator for the prior calendar year having a recession for at least one, two, or six months. All other control variables are the same as in Table 4. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Overinvestment			Underinvestment			Abnormal Investment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bad Times (1m)	−1.122***			−0.473**			−0.704***		
	(0.332)			(0.215)			(0.259)		
Bad Times (2m)		−1.373***			−0.646***			−0.913***	
		(0.277)			(0.181)			(0.212)	
Bad Times (6m)			−1.032***			−0.346**			−0.592***
			(0.280)			(0.173)			(0.206)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.166	0.167	0.165	0.156	0.157	0.155	0.150	0.151	0.149
Observations	56,329	56,329	56,329	79,619	79,619	79,619	135,948	135,948	135,948

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table 8: Overinvestment, Underinvestment, and Abnormal Investment in Bad Times—Alternative Specifications

This table reports the results of regressions of abnormal investment on the *Bad Times* indicator and a set of control variables, using alternative models to predict abnormal investment. Here *Overinvestment*, *Underinvestment*, and *Abnormal Investment* is defined based on a model using *Sales Growth* as the growth opportunities proxy (Columns 1–3) or *Market-to-Book* as the growth opportunities proxy (Columns 4–6). All three investment variables are scaled by 100. *Bad Times* is an indicator for the prior calendar year having a recession for at least three months. All other control variables are the same as in Table 4. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Sales Growth			Market-to-Book		
	Overinv.	Underinv.	Abnormal Inv.	Overinv.	Underinv.	Abnormal Inv.
	(1)	(2)	(3)	(4)	(5)	(6)
Bad Times (3m)	−1.145***	−1.025***	−0.975***	−1.283***	−0.904***	−1.003***
	(0.328)	(0.298)	(0.293)	(0.343)	(0.283)	(0.297)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.198	0.265	0.194	0.195	0.282	0.202
Observations	49,717	79,950	129,667	52,168	79,597	131,765

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Appendix

A. Additional Robustness Tests

Table A1: Investment and Governance Attributes, Alternative Specification

This table considers the interaction between shareholder monitoring, managerial entrenchment, accounting quality, and abnormal investment. *Abnormal Investment (Sales Growth)* is the absolute value of the firm's deviation from its predicted investment for all firms using sales growth as in Biddle et al. (2009), scaled by 100. *Bad Times* is an indicator for the prior calendar year having a recession for at least three months. *13D Indicator* is an indicator for whether the firm was the subject of a 13D filing in the previous year. *Low Entrenchment* is an indicator for whether the firm was below median for the entrenchment index. *FRQ* is the accounting quality measure from Dechow and Dichev (2002). *CONS* is the accounting conservatism measure from García-Lara et al. (2016). All other control variables are lagged and all ratios have been winsorized at the 1% and 99% of their empirical distribution. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Abnormal Investment (Sales Growth)			
	(1)	(2)	(3)	(4)
Bad Times (3m)	−0.766***	−0.724**	−1.209***	−1.220***
	(0.273)	(0.341)	(0.346)	(0.275)
13D Indicator	0.351*			
	(0.193)			
Bad Times × 13D Indicator	−0.501*			
	(0.296)			
Low Entrenchment		0.167		
		(0.154)		
Bad Times × Low Entrenchment		−0.327*		
		(0.194)		
FRQ			−3.079***	−1.949*
			(0.866)	(1.092)
Bad Times × FRQ			−2.971**	−4.234***
			(1.446)	(1.431)
CONS				0.045*
				(0.024)
Bad Times × CONS				−0.111***
				(0.017)
Other Controls	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.188	0.191	0.198	0.168
Observations	31,792	11,919	78,373	48,243

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Table A2: Overinvestment, Underinvestment, and Abnormal Investment in Bad Times: Additional Robustness Tests

This table reports the results of regressions of abnormal investment on the *Bad Times* indicator and a set of control variables. *Overinvestment* is the absolute value of the firm's deviation from its predicted investment for firms with higher than expected investment. *Underinvestment* is the absolute value of the firm's deviation from its predicted investment for firms with lower than expected investment. *Abnormal Investment* is the absolute value of the firm's deviation from its predicted investment for all firms. All three investment variables are scaled by 100. Here, we reestimate the residuals that form the abnormal investment measures following Column 4 of Table 1 but allow for: the control variables to have differential effects in bad times (Panel A), the control variables to have differential effects by industry (Panel B), or the control variables to have differential effects for each business cycle (Panel C). In Panel D, the residuals are estimated using a 10-year rolling window approach. In Panel E, we include the estimated investment residuals from the prior three years as additional controls. In Panel F, the investment measures are scaled by the firm-specific investment volatility. In Panel G, the residuals are estimated using firm fixed effects instead of industry fixed effects. *Other Controls* include the same control variables as in Table 4. Standard errors are clustered by firm and year. See Section 3 for detailed definitions and the construction of the variables.

	Overinvestment		Underinvestment		Abnormal Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Bad Times Interaction Residuals:						
Bad Times (3m)	−1.530***	−1.228***	−0.605***	−0.585***	−0.946***	−0.815***
	(0.347)	(0.276)	(0.204)	(0.180)	(0.246)	(0.212)
Adjusted R^2	0.085	0.165	0.063	0.157	0.071	0.150
Observations	56,298	56,298	79,650	79,650	135,948	135,948
Panel B: Industry Interaction Residuals:						
Bad Times (3m)	−1.307***	−1.070***	−0.517***	−0.481***	−0.816***	−0.701***
	(0.279)	(0.232)	(0.172)	(0.144)	(0.200)	(0.170)
Adjusted R^2	0.056	0.119	0.123	0.207	0.073	0.136
Observations	58,832	58,832	77,116	77,116	135,948	135,948
Panels A & B:						
Other Controls	No	Yes	No	Yes	No	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

(*Continued*)

Table A2: Overinvestment, Underinvestment, and Abnormal Investment in Bad Times: Additional Robustness Tests—*Continued*

	Overinvestment		Underinvestment		Abnormal Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Business Cycle Interaction Residuals:						
Bad Times (3m)	−1.412***	−1.184***	−0.617***	−0.557***	−0.922***	−0.792***
	(0.306)	(0.257)	(0.236)	(0.202)	(0.250)	(0.215)
Adjusted R^2	0.071	0.148	0.069	0.168	0.067	0.144
Observations	58,756	58,756	77,192	77,192	135,948	135,948
Panel D: Rolling-Window Residuals:						
Bad Times (3m)	−1.849***	−1.464***	−0.517***	−0.538***	−1.045***	−0.927***
	(0.276)	(0.223)	(0.182)	(0.164)	(0.176)	(0.153)
Adjusted R^2	0.081	0.163	0.061	.147	0.069	0.146
Observations	47,394	47,394	67,952	67,952	115,346	115,346
Panel E: Including Lagged Residuals:						
Bad Times (3m)	−1.613***	−1.360***	−0.597***	−0.598***	−0.992***	−0.885***
	(0.310)	(0.250)	(0.158)	(0.150)	(0.209)	(0.189)
$\widehat{\varepsilon}_{i,j,t-1}$	0.078***	0.060***	0.179***	0.206***	0.146***	0.160***
	(0.010)	(0.008)	(0.007)	(0.006)	(0.006)	(0.005)
$\widehat{\varepsilon}_{i,j,t-2}$	0.073***	0.060***	−0.009*	0.012**	0.044***	0.053***
	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)
$\widehat{\varepsilon}_{i,j,t-3}$	0.066***	0.057***	−0.047***	−0.033***	0.018***	0.024***
	(0.007)	(0.006)	(0.005)	(0.005)	(0.005)	(0.004)
Adjusted R^2	0.094	0.160	0.167	0.270	0.103	0.176
Observations	40,225	40,225	56,894	56,894	97,119	97,119
Panels C, D & E:						
Other Controls	No	Yes	No	Yes	No	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

(*Continued*)

Table A2: Overinvestment, Underinvestment, and Abnormal Investment in Bad Times: Additional Robustness Tests—*Continued*

	Overinvestment		Underinvestment		Abnormal Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel F: Scaled by Volatility Residuals:						
Bad Times (3m)	−0.756***	−0.652***	−0.670***	−0.506*	−0.714***	−0.543**
	(0.174)	(0.167)	(0.248)	(0.299)	(0.196)	(0.221)
Adjusted R^2	0.009	0.019	0.015	0.064	0.009	0.042
Observations	56,273	56,273	79,495	79,495	135,768	135,768
Other Controls	No	Yes	No	Yes	No	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel G: Within-Firm Residuals:						
Bad Times (3m)	−0.644***	−0.576***	−0.452***	−0.479***	−0.538***	−0.514***
	(0.156)	(0.160)	(0.143)	(0.143)	(0.144)	(0.147)
Adjusted R^2	0.377	0.389	0.474	0.504	0.330	0.344
Observations	58,960	58,960	76,816	76,816	139,231	139,231
Other Controls	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01