Aggregate Investment and Investor Sentiment

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Using bottom-up information from corporate financial statements, we examine the relation between aggregate investment, future equity returns, and investor sentiment. Consistent with the business cycle literature, corporate investments peak during periods of positive sentiment, yet these periods are followed by lower equity returns. This pattern exists in most developed countries and survives controls for discount rates, equity flows, valuation multiples, operating accruals, and other investor sentiment measures. Higher aggregate investments also precede greater earnings disappointments, lower short-window earnings announcement returns, and lower macroeconomic growth. We conclude aggregate corporate investment is an alternative, and possibly sharper, measure of market-wide investor sentiment. (*JEL* G12, G14, G15, G31)

The ebbs and flows of capital markets have long fascinated scientists. Some of the earliest studies tried to identify periodic cyclical patterns (e.g., Juglar 1862 and Kitchin 1923). We know now that markets do not move with such rigid periodicity. Nevertheless, the fact remains that financial markets are unsettlingly volatile, with periods of rapid expansion ("booms") as well as painful contraction ("busts"). The reasons for these sharp fluctuations, and the extent to which they are an endogenous feature of capitalism, continue to elicit debate.

In this study, we examine the empirical relation between aggregate corporate investments and business cycles. Beginning with Tugan-Baranovsky (1894) and Schumpeter (1934, 1939), a long line of economists have speculated that the level of aggregate corporate investment could be a function of the stage/phase of the business cycle.[1] According to these theories, periods with

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[1] We use the term "cycle" loosely to describe market-wide fluctuations in economic activity, without implying rigid periodicity. The possibility of episodic over- and underinvestment is featured in Keynes (1936), Shiller

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high growth expectations and easy access to capital (economic "booms") are more likely to be accompanied by aggregate overinvestment. Conversely, periods of economic contractions during which firms face more stringent financing constraints (economic "busts") are more likely to be associated with aggregate underinvestment. A key prediction of these theories is that stock market peaks (troughs) will coincide with higher (lower) levels of aggregate investment, even though the ex post returns to these investments may prove lower (higher) than expected.[2]

The first part of our study focuses on documenting the empirical relation between aggregate investments and future market-wide stock returns. Multiple theories predict the existence of a negative association—that is, higher investments should portend lower future stock market returns. However, prior findings on this important prediction of asset pricing theory are surprisingly limited and indeed quite mixed (Cochrane 1991; Lamont 2000; Hirshleifer, Hou, and Teoh 2009).[3]

We use a new bottom-up measure of aggregate investments based on corporate balance sheets to reexamine this long-hypothesized relation in the literature. To compute aggregate investments, we extract new operating investments made by each publicly traded firm from its financial statements (based on changes in "net operating assets" plus "capitalized R&D expense," divided by average total assets) and aggregate over all firms. Our primary set of tests focuses on annual aggregate investment in the United States over the period 1962–2009. Figure 1A depicts the annual aggregate investment for year t ($INVEST_t$), and Figure 1B depicts the average annual aggregate investment for the past two years ($INVEST_{t,t-1}$). It is clear from these graphs that this measure of aggregate investment exhibits substantial time-series fluctuation. Interestingly, what NBER defines as recession months (shaded in gray) often appear to be preceded by an upward spike in annual aggregate investments.

(2006), and Krugman (2009). Business cycles also feature prominently in the writings of Austrian economists (e.g., Mises 1912; Hayek 1929) who warned that the over- and underinvestment problem would be exacerbated by monetary policies that distort market-based interest rates.

2 These theories need not impute irrational behavior on the part of corporate managers. Aggregate investments could negatively predict future stock returns as a rational outcome, because aggregate investments reflect lower expected returns (Cochrane 1991; Carlson, Fisher, and Giammarino 2006; Lyandres, Sun, and Zhang 2008). Periods of overinvestment can also occur if rational managers have relative wealth concerns that are accentuated in certain states of the world (e.g., DeMarzo, Kaniel, and Kremer 2007; Pintus and Wen 2008). Finally, rational managers may "cater" to the fluctuating whims of capricious investors, supplying new equity (and investing more) during periods of high investor sentiment. We discuss these possibilities below.

3 Only three prior studies we are aware of provide some evidence on the time-series association between aggregate investments and future market returns. First, Cochrane (1991) constructs an aggregate investment/capital ratio using macroeconomic data from CITIBASE and reports a weak negative relationship, which is subsumed when he controls for dividend yield (see Table III, Panel B, of his study). Second, Lamont (2000) documents a much stronger negative relation between managers' expected investments and future market returns, but this finding is based on data from a discontinued survey by the U.S. Department of Commerce rather than actual investments. Finally, Hirshleifer, Hou, and Teoh (2009) report a positive, not negative, relation between operating accruals (a component of corporate investments) and future aggregate stock returns.

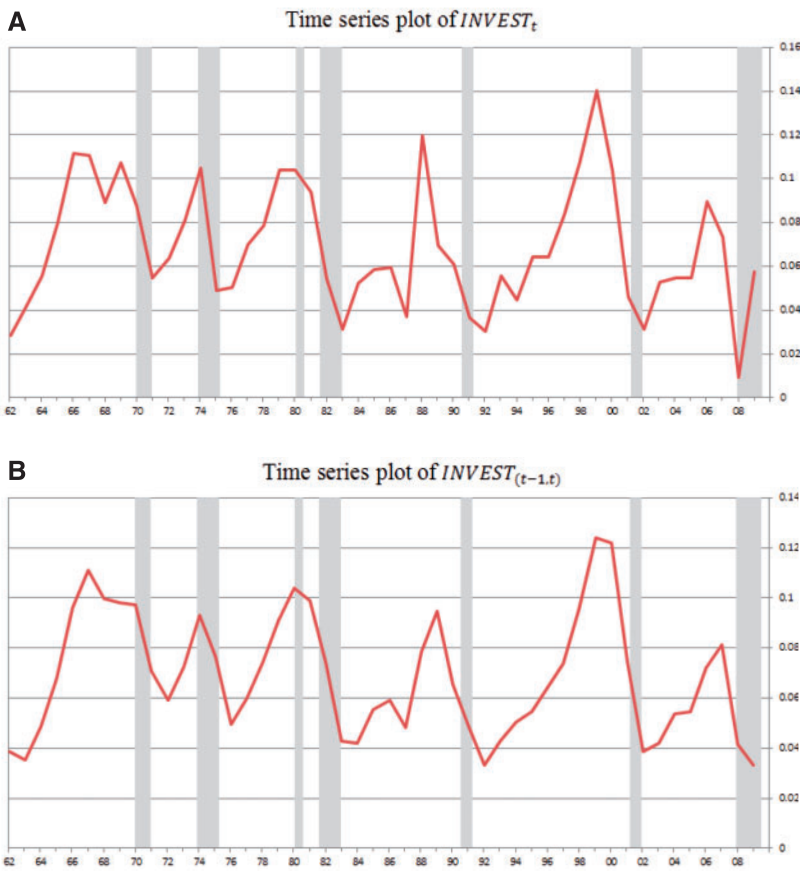


Figure 1
Aggregate corporate investment, 1962–2009
These figures present aggregate corporate investment from 1962 to 2009. NBER recession months are shaded in gray. Only firms with December fiscal year-ends are included. Aggregate corporate investment is the weighted-sum of firm-level investments in fiscal year t, aggregated to the market level using year-end market capitalizations as weights. Firm-level investment is the change in each firm's net operating assets (NOA) plus unamortized R&D expenditures, scaled by average total assets. We capitalize and amortize annual R&D expenditures (Compustat XRD) using industry-based amortization rates (see Lev and Sougiannis (1996)). Figure 1A depicts the annual aggregate investment for year t ($\boldsymbol{INVEST_t}$), and Figure 1B depicts the average annual aggregate investment for the past two years ($\boldsymbol{INVEST_{t,t-1}}$).

Our first key result is that this new measure of aggregate investment is strongly predictive of future market-wide stock returns. Contrary to the results in Cochrane (1991), the predictive power of this aggregate investment measure is little affected by the inclusion of the dividend yield (the dividend-to-price ratio, D/P). In fact, the predictive power of aggregate investment for future returns is robust to the inclusion of multiple valuation ratios (earnings-to-price ratio, E/P; book-to-market ratio, B/M; and D/P), as well as time-varying discount-rate proxies (*Term*, the difference between ten- and one-year Treasury constant maturity rates; *Def*, the difference between Moody's BAA yield and AAA yield; and *Tbill*, the thirty-day Treasury bill rate), equity inflows (Baker and Wurgler 2000; Dichev 2007), and operating accruals (Hirshleifer, Hou, and Teoh 2009). After controlling for these variables, a one-standard-deviation increase in $INVEST_{t,t-1}$ is associated with a decrease of 7.1% in real annual returns in years $t+1$ and $t+2$. For reference, the average annual real return over this period is 6.8%, with a standard error of 17.8%, so these results are economically significant.

Expanding the analysis to international markets, we find that this negative relation is evident in thirteen out of fourteen developed markets. Reconciling our results with Hirshleifer, Hou, and Teoh (2009), we show that despite the positive association between operating accruals and future returns reported in their study, aggregate investment (measured as changes in total net operating assets) is in fact negatively correlated with future stock returns in most countries. Finally, we go beyond Lamont (2000) by showing that the negative pattern holds for actual, not simply planned, investments. In short, our study provides the clearest evidence yet that aggregate investment peaks (troughs) in advance of weaker (stronger) stock market performance.

Having established the robustness of this empirical phenomenon, we next conduct a series of tests designed to discriminate between alternative explanations for its existence. In keeping with the spirit of the business cycle literature, we entertain the possibility that stock markets could be affected by investor sentiment, or noise trading, defined as market-wide "optimism" (or "pessimism") not justified by existing fundamentals. Broadly speaking, existing models of managerial investment decision making in the presence of market noise can be grouped into two camps, with each camp having two sub-branches (see Appendix A).

Group 1: Non-sentiment-based. The first group of models attributes the negative investment-return association to time-varying discount rates and either assumes that stock prices are efficient (1A: the "standard asset pricing" explanation) or that market mispricings are irrelevant to investment decisions (1B: the "market as sideshow" explanation). In these models, corporate managers behave rationally, and investor sentiment is irrelevant, either because market prices are efficient (Cochrane 1991; Carlson, Fisher, and Giammarino 2006; Lyandres, Sun, and Zhang 2008) or because managers who optimize long-term firm value rationally ignore any short-term sentiment-induced mispricings (e.g., Stein 1996, the long-horizon case). A common element in all these models is that even if markets are buffeted by waves of investor sentiment, it is effectively a "side show" (Morck, Shleifer, and Vishny 1990). We refer to this first category as the "non-sentiment-based" group.

Group 2: Sentiment-based. The second group of models admits the possibility that investor sentiment could influence real managerial decisions. This influence occurs either because managers rationally exploit market misvaluations

(2A: the "managerial catering" hypothesis) or because they are themselves caught up in the market euphoria (2B: the "expectation bias" hypothesis). In the managerial catering models, financial markets are affected by time-varying sentiment, and corporate managers rationally "cater" to noise traders (e.g., time their stock issuances to take advantage of the lower-than-rational cost of capital).[4] In the expectation bias setting, managers make more (fewer) capital investments during high- (low-) sentiment periods because they also overestimate (underestimate) the present value of expected future cash flows. Aggregate investments negatively predict future market returns because managers, like investors, are too optimistic (too pessimistic) during high- (low-) sentiment periods. Collectively, we refer to this second category as the "sentiment-based" group.

It is difficult to distinguish between Group 1 and Group 2 explanations by studying the empirical relation between aggregate investments and future returns in isolation. In fact, Cochrane (1991), Lamont (2000), and Hirshleifer, Hou, and Teoh (2009) all note that their findings could be due to rational anticipation of time-varying expected returns. In particular, after documenting a strongly negative relation between managers' planned investments and subsequent market returns, Lamont (2000, 2722) writes: "I am unable to make any strong statement about mispricing or rationality. All the evidence is consistent with rational asset pricing."

The approach we take in this study is to focus on two additional types of ancillary evidence: (i) the contemporaneous association between aggregate investments and investor sentiment (the "investment-sentiment" link) and (ii) the ability of aggregate investments to forecast future cash-flow "shocks," such as innovations in macroeconomic indicators and gross domestic product (GDP) growth, as well as measures of firm-level earnings disappointments, such as analyst forecast revisions and short-window market returns around future earnings announcements (the "investment/future cash-flow" link).

An empirical link between aggregate investment and investor sentiment (the "investment-sentiment" link) is important in distinguishing Group 1 models from those in Group 2. If market sentiment is unrelated to managerial investment decisions, as suggested by the Group 1 models, we would not find an association between aggregate investments and various measures of investor sentiment.[5] Conversely, a positive relation between total investments and investor sentiment is an integral part of the story for the Group 2 models.

[4] See, for example, Stein (1996), the short-horizon case), Baker and Wurgler (2000, 2002), Baker, Stein, and Wurgler (2003), Polk and Sapienza (2004), and Morck, Shleifer, and Vishny (1990). A direct implication of these models is that corporate investments will increase when firms are more overvalued. This might happen via a financing channel—that is, managers would issue more equity shares during "hot markets" (Baker and Wurgler 2000; McLean and Zhao Forthcoming; Campello and Graham 2012; Chirinko and Schaller 2001) or more directly due to a firm mispricing channel (Polk and Sapienza (2004), 2009).

[5] It is always possible that our investor sentiment measures are picking up yet another unidentified fundamental risk factor. We reduce this risk by orthogonalizing all our proxies for investor sentiment by known fundamental factors.

If managerial investment decisions are influenced by investor sentiment, we should observe a positive contemporaneous relation even after controlling for other known determinants of corporate investments.

An empirical link between aggregate investments and future cash flows (the "investment/future cash-flow" link) is also important in separating out Group 1 explanations from Group 2. If time-varying discount rate is the primary channel through which aggregate investment predicts future returns, aggregate investments should not predict future "shocks" in cash flows. Conversely, if aggregate investments predict future returns largely because the former captures some sort of investor sentiment, or market mispricing, then periods of higher (lower) aggregate investment should precede periods with lower (higher) innovations in the cash-flow series. We measure these shocks at both the macroeconomic level (using GDP growth and various macroeconomic indicators) and the firm level (using analyst forecast errors, managerial forecast errors, and short-window earnings announcement returns). We also evaluate the extent to which these ex post shocks (or "forecast errors") can account for the ex ante predictive power of aggregate investments for future stock returns.[6]

Our results from both sets of tests are broadly consistent with the Group 2 models. First, we find that aggregate corporate investment in the United States peaks during periods of positive investor sentiment (measured multiple ways). As a group, corporate managers make more investments in operating assets when investors are more optimistic. This finding holds whether investor sentiment is gauged through a survey of household beliefs (Lemmon and Portniaguina 2006; Ho and Hung 2009), inferred from investors' equity market fund flows (Dichev 2007), or measured using a composite sentiment index (Baker and Wurgler 2006; hereafter, the BW index). It is also robust to a host of control variables: market-level profitability (aggregateROA_t), current and past market returns (R_t^M,R_{t-1}^M), lagged aggregate investments ($INVEST_{t-1}$), lagged valuation (B/M_{t-1}), as well as standard discount-rate proxies ($Term_{t-1}$, Def_{t-1}, $Tbill_{t-1}$). In short, we show that investor sentiment is positively correlated with aggregate investments.

We find that this investment-sentiment relation holds in international markets as well. In a recent study, Baker, Wurgler, and Yuan (BWY; 2012) construct sentiment indices for five other developed countries (Canada, Japan, Germany, France, and the United Kingdom).[7] Using the BWY sentiment indices, we examine the contemporaneous association between sentiment

[6] Two related studies also investigate the link between market-wide sentiment and future cash-flow realizations. Hribar and McInnis (2012) report on analyst forecast revisions after high- and low-sentiment periods as measured by the Baker and Wurgler (2006) sentiment index and find a cross-sectional effect but not a mean effect. Greenwood and Shleifer (2013) examine the relation between investor expectations (as measured by six surveys) and "expected returns," based on aggregate data on dividends, consumption, and market valuations. Neither study examines the role of aggregate investments. We discuss other differences with Hribar and McInnis (2012) in more detail later.

[7] Like Baker and Wurgler (2006), BWY find that when investor sentiment is high, future returns are low in relatively difficult-to-arbitrage and difficult-to-value stocks.

and aggregate investments in each country. Our results show that the positive contemporaneous relation between the sentiment factor and aggregate investments exists in all five countries, significantly so in four out of five cases. In short, our findings indicate that the amount of aggregate investment in these countries exhibits a strong positive co-movement with global investor sentiment.

Our tests of the link between aggregate investments and future cash flows lend further support to the Group 2 models. Our results show consistently that corporate investments are negatively associated with subsequent realizations of firm-level cash flows and macroeconomic growth measures. Specifically, we find that higher levels of corporate investment precede greater earnings disappointments (in terms of earnings shortfalls, relative to analyst forecasts as well as managerial forecasts) and lower short-window earnings announcement returns.[8] After controlling for discount-rate proxies, market-valuation multiples, and operating accruals, a one-standard-deviation increase in $INVEST_{t,t-1}$ is associated with a decrease of 0.12% in the average three-day earnings announcement returns over the next eight quarterly earnings releases.

A similar "investment/future cash-flow" pattern is observed at the macroeconomic level. Higher aggregate investments precede decreases in reported GDP, as well as decreases in the monthly Chicago Federal Reserve National Activity Index (CFNAI).[9] After controlling for lagged GDP growth, stock returns, and industrial production, a one-standard-deviation increase in $INVEST_{t,t-1}$ is associated with a decrease of 0.34% in average annual GDP growth in years $t+1$ and $t+2$. With similar controls, a one-standard-deviation increase in $INVEST_{t,t-1}$ is associated with a decrease of 0.13 in average CFNAI in years $t+1$ and $t+2$.[10]

Finally, we find the predictive power of aggregative investment for stock returns becomes insignificant once we control for ex post errors in (i) expected

[8] Hribar and McInnis (2012) report that when investor sentiment is high, analyst forecasts are relatively more optimistic for "uncertain" or "difficult-to-value" firms. Their findings differ from ours in three important aspects. First, Hribar and McInnis do not study the effect of aggregate investments on analyst forecast errors (their sentiment measure is from Baker and Wurgler 2006). Second, their finding is on the relative sensitivity of stocks to market sentiment in the cross-section (i.e., it is a test of "sentiment seesaw" effect). They find no evidence of a mean effect—that is, that market-wide sentiment is related to analysts' forecast errors in aggregate. In untabulated results, we find a similar null result using the BW sentiment measure. However, using aggregate investments as a sentiment proxy, we do find a reliable relation between market-wide sentiment and future analyst forecast errors. Third, we go beyond their tests by reporting market-wide earnings disappointments relative to managerial guidance, as well as lower short-window earnings announcement returns after high-investment periods.

[9] Introduced by Stock and Watson (1999), the CFNAI is the first principal component of eighty-five indicators of economic growth drawn from four broad categories of the economy: employment; production and income; personal consumption and housing; and sales, orders, and inventories. This index closely tracks periods of economic expansions and contractions, with lower values of the CFNAI indicating a higher likelihood that a recession is occurring. In our tests, current-period CFNAI and GDP growth rate are used as proxies for market expectation of future macroeconomic growth.

[10] For reference, the mean annual GDP growth over our sample is 3%, with a standard error of 2.5%; the mean annual CFNAI measure is 0.03, with a standard error of 0.77.

corporate profits (i.e., the ex post errors in analysts' long-term earnings forecasts) and (ii) macroeconomic growth indicators (i.e., GDP growth). In other words, aggregate investment no longer has explanatory power for future market returns once future realizations of the forecast error in these expected fundamentals are accounted for. Collectively, these findings point to ex post forecast errors as a key channel through which aggregate investment is able to predict future market returns.

In sum, our results strongly suggest that the predictive power of aggregate investments for future returns is not due solely to time-varying discount rates. We show that aggregate investments co-vary positively with multiple other investor-sentiment measures. Moreover, we find that aggregate investments predict future cash-flow disappointments in a manner consistent with the expectation bias hypothesis (Group 2B models). Thus, while our findings are broadly consistent with the literature on managerial "catering," they seem to go beyond the Group 2A models and point to the possibility that corporate managers are influenced by the same waves of optimism (or pessimism) as other investors.

Our study fits into a growing body of literature that examines the effect of investor sentiment on real economic decisions. Prior studies have documented the influence that investor preferences can have on a host of firms' decisions: to issue equity versus debt, to pay dividends, to make investments, to merge with or acquire other firms, and even to set a range for their nominal share prices.[11] Our findings add to this literature in a number of distinct ways: (i) we show that higher aggregate investment not only forecasts lower stock returns but also lower corporate earnings; (ii) the negative relation between investments and future returns is robust to the inclusion of multiple discount-rate proxies (Treasury bond yield, term structure spread, and default spread) as well as other control variables (dividend yield, book-to-market ratio, earnings-to-price ratio, operating accruals, and equity issuance); (iii) a similar pattern exists in most international markets; and (iv) the predictive power of aggregate investment for future returns is subsumed after controlling for subsequent news about aggregate fundamentals. These results are broadly consistent with Group 2 models in general, and Group 2B (expectation bias) in particular.

Our results also shed light on another curious gap in the investor sentiment literature—the fact that sentiment measures seem to have little predictive power for aggregate market returns. A natural prediction of the noise trader models is that returns should be lower following high-sentiment periods. However, a careful reading of the evidence shows that the best-known sentiment measures (e.g., the BW index) actually have little or no ability to predict

[11] A nonexhaustive set of studies that explore these issues includes: Morck, Shleifer, and Vishny (1990), Baker and Wurgler (2000, 2002, 2004), Baker, Stein, and Wurgler (2003), Chirinko and Schaller (2001), Gilchrist, Himmelberg, and Huberman (2005), Lamont and Stein (2006), Polk and Sapienza (2004, 2009), and Campello and Graham (2012).

market-wide stock returns. While many studies document a cross-sectional effect—that is, sentiment has a stronger effect on smaller, hard-to-value, and difficult-to-arbitrage firms (the "sentiment seesaw")[12]—evidence for a first-order prediction of behavioral theory, that market-wide sentiment should predict aggregate stock returns, is weak.[13]

We show that: (i) aggregate investment is positively correlated with investor sentiment, but (ii) it has much stronger predictive power for market returns than other sentiment measures. In fact, during our sample period, the BW composite index predicts U.S. market-wide returns in the wrong direction (see Table 2, Panel B). The other two sentiment measures in our paper (consumer confidence and equity inflows) are negatively correlated with future returns on a univariate basis, but neither sentiment measure survives our controls for discount rates and market valuation. In contrast, the inclusion of multiple control variables, including the other three sentiment measures, fails to eliminate the predictive power of aggregate investment for future returns.

Based on these findings, we conclude that aggregate corporate investment is likely to be an even better ex ante measure of market-wide mispricing than the existing measures of investor sentiment. At a minimum, it augments the existing variables. We think this might be due to the fact that corporate investments tend to be a late-stage indicator of market sentiment—that is, corporations tend to have the lowest investments at the bottom of the business cycle and generally do not ratchet up their investments until late in a recovery cycle. This explanation is consistent with the early macroeconomic theories on the formation of business cycles.

1. Data and Sample

We obtain annual U.S. financial statement data from the Compustat Xpressfeed database over the period 1962–2009. We exclude firms with SIC codes between 6000 and 6999 (financial companies) because the demarcation between operating and financing activities is not clear for these firms. To ensure that annual reports are all available at the same point in time, we restrict the analysis to firms with fiscal years ending in December.[14]

[12] Ample evidence exists on the cross-sectional effect of sentiment on returns—for example: Lee, Shleifer, and Thaler (1991), Baker and Wurgler (2006, 2007), Kumar and Lee (2006), Baker, Wurgler, and Yuan (2012), and Ben-Raphael, Kandel, and Wohl (2012).

[13] The seminal work by Baker and Wurgler (2006) does not report this result. Baker and Wurgler (2007), which summarizes the sentiment literature, offers a suggestive graph (Figure 6) showing one-month-ahead market return for months that are in the most extreme of the sentiment index as identified by an in-sample fit, with no formal statistical tests. A more recent study by Baker, Wurgler, and Yuan (2012) finds that the global component of an international sentiment index does in fact negatively predict country-level market returns.

[14] See Kothari, Lewellen, and Warner (2006). In addition, similar to Dechow, Richardson, and Sloan (2008), we require availability of Compustat data items CHE, AT, DLTT, SALE, IVAO, and LT in both the current and previous years and Compustat data item IB in the current year to keep a firm-year in the sample. If Compustat data item DLC is missing, we set this item to zero.

We use annual stock market returns (including dividends) covering the period through July 2011. The annual real stock market return for year t (R_t^M) is computed by compounding monthly Center for Research in Security Prices (CRSP) value-weighted index returns from July in year t to June in year $t+1$ (real returns are calculated using the Consumer Price Index). The July-to-June return accumulation period ensures that firms' financial statement data are all publicly available prior to the realization of future stock returns.

Appendix B summarizes the variables used in this study. Our annual aggregate investment variable is the value-weighted cross-sectional average of annual firm-level investment. Specifically, the time series of aggregate investment, $INVEST_t$, is computed by value-weighting annual firm-level investment ($INVEST_{i,t}$), using the market capitalization of firm i as of the end of year t as the weight.[15]

Our measure of firm-level investment ($INVEST_{i,t}$) is the change in net operating assets of the firm, adjusted for research and development (R&D) costs. To obtain a more comprehensive measure of firm investments, we capitalize each firm's annual R&D expense and amortize it using the industry coefficients estimated by Lev and Sougiannis (1996). We then compute earnings adjusted for the R&D capitalization as actual reported earnings plus the expensed R&D outlay minus the R&D amortization.[16] Both $ROA_{i,t}$ and $INVEST_{i,t}$ are scaled by average total assets, including the unamortized portion of R&D. Specifically, we compute:

$$INVEST_{i,t} = \frac{\Delta NOA_{i,t} + R\&D_{i,t}}{\frac{1}{2}*(TA_{i,t-1} + R\&DC_{i,t-1} + TA_{i,t} + R\&DC_{i,t})} \tag{1}$$

$$ROA_{i,t} = \frac{NI_{i,t} + R\&D_{i,t} - RA_{i,t}}{\frac{1}{2}*(TA_{i,t-1} + R\&DC_{i,t-1} + TA_{i,t} + R\&DC_{i,t})} \tag{2}$$

where $\Delta NOA_{i,t}$ is the change in non-cash assets minus the change in non-debt liabilities; non-cash assets is calculated as total assets minus cash and short-term investments; non-debt liabilities is calculated as total liabilities plus minority interest less debt (this definition of $\Delta NOA_{i,t}$ follows Dechow, Richardson, and Sloan (2008)).[17] In Equations (1) and (2), $TA_{i,t}$ is total assets, $NI_{i,t}$ is net income, $R\&D_{i,t}$ is R&D expenditure, $RA_{i,t}$is R&D amortization, and $R\&DC_{i,t}$ is R&D capital, defined as the unamortized portion of the historical R&D expenditures as in Lev and Sougiannis (1996).

[15] This methodology is similar to that used in prior research for computing the time series of aggregate accounting-based variables (e.g., Hirshleifer, Hou, and Teoh 2009; Kang, Liu, and Qi 2010; Guo and Jiang 2010).

[16] Our main results are unchanged if we do not capitalize R&D expense.

[17] For the non-U.S. sample, if a firm reports its financial information in year $t-1$ in a different currency denomination compared with year t, we use the Compustat Global Currency table to convert the year $t-1$ data into the year t currency denomination.

We also compute a number of other aggregate variables based on firm-level data. All accounting variables for year t are based on numbers reported as of the end of fiscal year t, aggregated using market capitalization at the end of year t as the weight. $OpAcc_t$ is aggregate operating accruals, computed following Hirshleifer, Hou, and Teoh (2009), except average total assets rather than lagged total assets is used in the denominator. $FROA_{t+1}$ is aggregate forecasted year $t+1$ return on assets (ROA) computed using analysts' earnings per share (EPS) forecasts as of December in year t. $FLTG_{t+1}$ is aggregated forecasted long-term earnings growth computed using analysts' long-term growth (LTG) forecasts as of December in year t. $MFROA_{t+1}$ is the forecast of year $t+1$ aggregate ROA computed using managers' EPS forecasts in the first quarter of fiscal year $t+1$. E/P_t is the aggregate earnings-to-price ratio as of fiscal year-end. B/M_t is the aggregate book-to-market ratio as of fiscal year-end. D/P_t is the aggregate dividend-to-price ratio for the CRSP value-weighted index (total dividends accrued to the index from July in year t to June in year $t+1$ divided by the index level at the end of June in year $t+1$).

Several variables measure market-wide conditions and interest rates. $Term_t$ is the difference between ten- and one-year Treasury constant maturity rates as of the beginning of July in year $t+1$. Def_t is the difference between Moody's BAA bond yield and AAA bond yield as of the beginning of July in year $t+1$. $Tbill_t$ is the thirty-day Treasury bill rate as of the beginning of July in year $t+1$. $CFNAI_t$ is the average value of the monthly CFNAI from July in year t to June in year $t+1$. The CFNAI is a comprehensive measure of monthly macroeconomic growth and is available starting in 1967. $INDPROD_t$ is growth in industrial production over the period from July in year t to June in year $t+1$. $GDPGR_t$ is the annual growth rate of real GDP over the period from July in year t to June in year $t+1$.

We employ three measures of investor sentiment. The first is the average value of the Index of Consumer Confidence collected by the Conference Board in year t ($ConsConf_t$). The second ($InFlow_t$) is the aggregate net capital inflow from investors into listed stocks in year t, computed at the firm level and aggregated to the market level using market capitalization at the end of year t as the weight. The third ($SentIndex_t$) is the BW composite investor sentiment index. All three measures are orthogonalized with respect to a set of macroeconomic indicators following Baker and Wurgler (2006).

Finally, in our ancillary tests, we rely on two additional variables. EAR_{t+1} is the value-weighted average earnings announcement return in year $t+1$, computed as follows. For each firm-year, we compute the average cumulative stock return over trading days $[-1,+1]$ surrounding each of the firm's quarterly earnings announcement dates occurring between July in year $t+1$ and June in year $t+2$. This variable is then aggregated to the market level using market capitalization at the end of year t as the weight. HML_t is the compounded annual return on the equal-weighted HML (High book-to-market Minus Low book-to-market) portfolio over the period from July in year t to June in year

$t+1$. HML portfolio returns and returns on the CRSP value-weighted market index are obtained from the website of Kenneth French.

2. Empirical Results

2.1 Descriptive statistics

Table 1 reports descriptive statistics for the time series of annual variables used in this study. In the 1962–2009 period, the mean annual real stock market return in the United States (R^M) is 6.8%, mean aggregate return on assets (*ROA*) is 8.1%, mean aggregate investment (*INVEST*) is 0.069, and the mean annual growth in GDP (*GDPGR*) is 3%.

Figure 1 plots the time series of aggregate investment in the United States during 1962–2009, with National Bureau of Economic Research (NBER) recession months shaded in gray. Figure 1A depicts aggregate corporate investment for each year ($INVEST_t$), defined as the weighted sum of net operating assets for fiscal year t; Figure 1B shows the results for $INVEST_{(t-1,t)}$, the average aggregate investment over the past two years (the arithmetic mean of $INVEST_{t-1}$ and $INVEST_t$).

Both graphs show that aggregate investment exhibits substantial fluctuation over time. Interestingly, peaks in aggregate investment tend to precede NBER recessionary periods. Although the pattern is not exact, many periods of high aggregate investment (such as 1969, 1974, 1980, 1989, and 1999) were followed shortly by recessions. In recent years, after the collapse of the dot-com bubble, aggregate investment fell to low levels in 2001, only to creep back up to a local high around 2007, just prior to the 2008 financial crisis. Figure 1B shows that using aggregate investment over the past two years, rather than from the most recent year, produces similar patterns.

2.2 Predicting returns on the aggregate stock market

We begin by examining whether aggregate investment forecasts future aggregate returns. Prior studies of the relation between aggregate investments and future stock returns are typically motivated by the observation that investments should increase when discount rates are lower (e.g., Cochrane 1991). However, empirical evidence on the ability of aggregate investment to negatively forecast aggregate returns is surprisingly limited. First, using macroeconomic data to measure investments, Cochrane (1991) reports a weak negative relationship, which is subsumed when he controls for dividend yield.[18] Second, Lamont (2000) documents a much stronger negative relation between managers' expected investments and future market returns, but this finding is based on data from a discontinued survey by the U.S. Department of Commerce rather than actual investments. Finally, Hirshleifer, Hou, and Teoh (2009) report

[18] See Table III, Panel B, in Cochrane (1991).

Table 1
Summary statistics

Variable	Mean	Std Dev	Q1	Median	Q3	ρ
INVEST	0.069	0.028	0.051	0.062	0.089	0.46
ROA	0.081	0.014	0.070	0.082	0.091	0.72
OpAcc	−0.046	0.011	−0.051	−0.046	−0.040	0.35
FROA	0.084	0.01	0.079	0.083	0.092	0.54
FLTG	0.123	0.02	0.106	0.121	0.131	0.83
MFROA	0.076	0.014	0.069	0.074	0.078	−0.39
ConsConf	0.964	0.231	0.80	0.983	1.06	0.63
InFlow	−0.003	0.074	−0.033	−0.010	0.004	0.50
SentIndex	0.02	1.055	−0.58	−0.101	0.73	0.67
E/P	0.138	0.06	0.097	0.113	0.176	0.83
B/M	0.622	0.238	0.445	0.529	0.8	0.91
D/P	0.029	0.011	0.021	0.03	0.037	0.89
Term	0.009	0.011	0.001	0.007	0.017	0.48
Def	0.01	0.004	0.007	0.009	0.013	0.68
Tbill	0.004	0.002	0.003	0.004	0.005	0.71
ESHARE	0.181	0.090	0.117	0.157	0.221	0.68
R^M	0.068	0.178	−0.024	0.073	0.172	−0.05
CFNAI	0.003	0.77	−0.46	0.13	0.495	0.18
INDPROD	0.028	0.052	0.009	0.031	0.059	0.05
GDPGR	0.03	0.025	0.018	0.031	0.044	0.20
EAR	0.0019	0.0042	−0.001	0.003	0.005	−0.06
HML	0.071	0.138	−0.027	0.073	0.146	−0.06

This table presents summary statistics for the market aggregate measures used in the study. Sample period is 1962–2009 unless otherwise noted. Only December fiscal year-end firms are included in the sample. All accounting variables for year t are based on numbers reported as of the end of fiscal year t, aggregated using market capitalization at the end of year t as weights. *INVEST* is aggregate investment, *ROA* is aggregate ROA, and *OpAcc* is aggregate operating accruals. *FROA* is aggregate forecasted year $t+1$ ROA computed using analysts' EPS forecasts as of December of year t. *FLTG* is aggregated forecasted long-term earnings growth computed using analysts' LTG forecasts as of December of year t. *MFROA* is aggregate forecasted year $t+1$ ROA computed using managers' first-quarter EPS forecasts (1996–2009). *ConsConf* is consumer confidence (1967–2009). *InFlow* is net capital inflows from investors into listed stocks. *SentIndex* is the Baker and Wurgler (2006) composite sentiment index (1965–2009). E/P is the aggregate earnings-to-price ratio as of fiscal year-end. B/M is the aggregate book-to-market ratio as of fiscal year-end. D/P is the aggregate dividend-to-price ratio for the CRSP value-weighted index. *Term* is the difference between ten- and one-year Treasury constant maturity rates as of the beginning of July in year t. *Def* is the difference between Moody's BAA yield and AAA yield as of beginning of July in year t. *Tbill* is the thirty-day Treasury bill rate as of the beginning of July in year t. *ESHARE* is the equity share in total new equity and debt issues for year t. The following variables are all measured from July of year t to June of year $t+1$: R^M is the annual real return on the CRSP value-weighted index (1962–2011); *CFNAI* is the average value of the monthly Chicago Federal National Activity Index; *INDPROD* is growth in industrial production; *GDPGR* is the annual growth rate of real GDP; *EAR* is the aggregate average earnings announcement return (1971–2010); *HML* is the compounded annual return to the high book-to-market minus low book-to-market (HML) equal-weighted portfolio (from the website of Kenneth French). ρ is the variable's first-order autocorrelation. All variables are for the United States. See Appendix B for further details on the construction of each variable.

a positive, not negative, relation between operating accruals (a component of corporate investments) and future aggregate stock returns.

We extend these analyses by: (i) including controls for a number of discount-rate (expected return) proxies and market-valuation multiples; (ii) exploring a broader set of reasons for this empirical association, including investor sentiment; (iii) documenting a relation between aggregate investment and market returns in international markets; and (iv) showing that the predictive power of aggregate investment for future returns is subsumed after controlling for subsequent news about aggregate fundamentals.

Table 2 presents predictive regressions of market returns on lagged aggregate investment and control variables in the United States. In Panel A, the dependent variable is R^M_{t+1}, the annual real return on the value-weighted market index in year $t+1$. The first two rows show that in a univariate setting, aggregate investment negatively forecasts stock market returns over the following two years. Specifically, the first row shows that $INVEST_{t-1}$ negatively forecasts R^M_{t+1} (t-statistic -3.21), while the second row shows that $INVEST_t$ negatively forecasts R^M_{t+1} (t-statistic -1.81).[19] These results indicate that the consequences of aggregate investment are long-term, playing out over a horizon beyond the immediately following year.

In rows four and five we add control variables suggested by prior literature, including time-varying discount-rate proxies and valuation ratios.[20] Specifically, we control for the term structure of interest rates, the default rate, the Treasury bill rate, the aggregate earnings-to-price ratio, the aggregate book-to-market ratio, the aggregate dividend-to-price ratio, aggregate operating accruals (*OpAcc*), and the equity share in total new equity and debt issues (*ESHARE*). We find that $INVEST_{t-1}$ continues to negatively and significantly predict aggregate returns after including these controls. This suggests that the predictive power of aggregate investment for future market returns is unlikely to be driven by variables that have been proposed by prior research, including discount-rate proxies and market-valuation multiples.

The remaining rows of Panel A consider the predictive power of extant investor sentiment proxies for future returns. We find evidence that some sentiment proxies negatively forecast aggregate returns. Specifically, in a univariate setting, *ConsConf* and *Inflow* are negatively and significantly related to future market returns. *SentIndex* actually loads positively, although it is not statistically significant. After including various control variables, aggregate investment continues to predict market returns, but the other investor sentiment variables do not.

Because the relation between aggregate investments and subsequent market returns appears to extend beyond one year, we also report results for

19 Following recent literature on predicting aggregate returns, we report t-statistics based on Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors (e.g., Lettau and Ludvigson 2001; Rangvid 2006; Guo and Savickas 2008). Since the number of observations in most regressions is 48, we follow the literature in setting the number of lags to three. Predictive regression results may be spurious if the independent variable is highly persistent (Stambaugh 1999). However, the autocorrelation of $INVEST_t$ is only 0.46, and the autocorrelation of $INVEST_{(t-1,t)}$ is 0.66. In each case, a Dickey-Fuller test rejects the presence of a unit root.

20 Fama and French (1988), Kothari and Shanken (1997), and Lewellen (2004) nominate the dividend-to-price ratio as a predictor of market returns. Campbell and Vuolteenaho (2004) and Campbell, Polk, and Vuolteenaho (2010) suggest the slope of the yield curve, and Keim and Stambaugh (1986) and Fama and French (1989) nominate the default spread. Kothari and Shanken (1997), Pontiff and Schall (1998), and Lewellen (2004) report that the aggregate book-to-market ratio positively forecasts stock market returns. Fama and Schwert (1977) and Ang and Bekaert (2007) find that the short-term interest rate negatively forecasts aggregate returns. Baker and Wurgler (2000) show that when investor sentiment is high, firms increase the equity share in total new (equity + debt) issues, and that such periods are followed by lower market returns. Finally, Hirshleifer, Hou, and Teoh (2009) find that aggregate accruals positively predict aggregate returns and suggest that aggregate accruals might be a discount-rate proxy.

Table 2
Predicting aggregate returns

$Sent_t$ Measure	Intercept	$INVEST_{t-1}$	$INVEST_t$	$Sent_t$	$Term_t$	Def_t	$Tbill_t$	E/P_t	B/M_t	D/P_t	$OpAcc_t$	$ESHARE_t$	Adj. R^2
Panel A: Dependent variable is $\mathbf{R^M_{t+1}}$													
	0.22	−2.19											10.41%
	(4.47)	**(−3.21)**											
	0.16		−1.20										2.01%
	(3.02)		**(−1.81)**										
	0.23	−2.09	−0.19										8.49%
	(3.74)	**(−3.27)**	(−0.27)										
	0.01	−2.69	0.67		6.13	3.35	23.95						17.31%
	(0.08)	**(−4.53)**	(0.55)		**(2.01)**	(0.41)	**(2.20)**						
	0.01	−2.67	1.01		9.61	0.93	28.52	0.01	−0.42	6.94	1.19	0.31	13.94%
	(0.28)	**(−3.78)**	(0.77)		**(1.98)**	(0.07)	(1.49)	(0.01)	(−1.01)	(0.87)	(0.63)	(0.77)	
ConsConf	0.06			−0.21									2.71%
	(2.60)			**(−1.81)**									
	0.11	−3.51	−0.17	0.35	10.62	5.42	38.1	1.33	−0.70	5.56	2.69	0.49	17.70%
	(0.43)	**(−3.54)**	(−0.13)	**(2.09)**	**(2.17)**	(0.42)	**(2.08)**	(0.69)	(−1.29)	(0.65)	(1.08)	(1.21)	
InFlow	0.07			−0.51									2.39%
	(2.91)			**(−2.31)**									
	−0.02	−2.56	0.99	−0.18	9.05	3.14	28.4	0.49	−0.49	6.55	1.23	0.29	10.86%
	(−0.08)	**(−3.67)**	(0.65)	(−0.36)	**(1.97)**	(0.24)	(1.35)	(0.25)	(−1.05)	(0.65)	(0.60)	(0.67)	
SentIndex	0.07			0.03									-0.01%
	(2.77)			(0.94)									
	0.10	−2.64	0.55	0.05	7.36	−0.75	13.3	1.23	−0.54	7.16	1.95	0.21	14.54%
	(0.44)	**(−2.78)**	(0.40)	(1.50)	**(1.73)**	(−0.05)	(0.75)	(0.55)	(−1.01)	(0.88)	(0.64)	(0.58)	

(continued)

Table 2
Continued

Panel B: Dependent variable is $\mathbf{R}^{\mathbf{M}}_{(t+1,t+2)}$

Sent Measure	*Intercept*	$INVEST_{(t-1,t)}$	$Sent_t$	$Term_t$	Def_t	$Tbill_t$	E/P_t	B/M_t	D/P_t	$OpAcc_t$	$ESHARE_t$	*Adj.* R^2
	0.21	−2.09										15.98%
	(4.23)	**(−3.02)**										
	0.09	−2.603		2.39	1.72	24.94						30.51%
	(1.48)	**(−5.04)**		(1.24)	(0.33)	**(3.19)**						
	0.11	−2.70		5.00	4.92	37.60	1.33	−0.69	3.47	0.70	0.30	34.76%
	(0.96)	**(−3.66)**		**(1.68)**	(1.25)	**(2.89)**	(1.57)	**(−3.13)**	(0.93)	(0.71)	(0.95)	
ConsConf	0.07		−0.2									6.21%
	(2.97)		**(−2.00)**									
	0.11	−4.28	0.23	5.74	8.43	44.29	2.43	**−0.92**	1.90	−0.35	0.39	42.59%
	(1.23)	**(−6.22)**	(1.66)	**(2.09)**	(1.58)	**(3.63)**	**(2.36)**	**(−3.19)**	(0.49)	(−0.32)	(1.61)	
InFlow	0.07		−0.55									7.35%
	(3.06)		**(−3.50)**									
	0.05	−2.60	−0.18	4.88	4.98	38.4	1.69	−0.72	2.19	−0.56	0.31	33.15%
	(0.47)	**(−3.44)**	(−0.81)	(1.91)	(0.96)	**(3.11)**	(1.61)	**(−3.15)**	(0.52)	(0.54)	(1.0)	
SentIndex	0.06		0.03									5.29%
	(2.92)		**(2.02)**									
	0.16	−3.46	0.05	2.45	2.27	18.95	2.67	−0.83	3.87	−0.57	0.17	44.45%
	(1.41)	**(−4.57)**	**(2.24)**	(1.07)	(0.33)	(1.36)	**(2.27)**	**(−3.40)**	(1.14)	(−0.40)	(0.62)	

The table presents time-series regressions of future aggregate U.S. stock market returns on aggregate investment and other predictors from 1962 to 2009 of the form:

$$Ret^M_{t+1} = \beta_0 + \beta_1 INVEST_{t-1} + \beta_2 INVEST_t + \beta_3 INVEST_{(t-1,t)} + \beta_4 Sent_t + \beta_5 Term_t + \beta_6 Def_t + \beta_7 TBill_t + \beta_8 E/P_t + \beta_9 B/M_t + \beta_{10} D/P_t + \beta_{11} OpAcc_t + \beta_{12} ESHARE_t + \varepsilon_{t+1}$$

where the dependent variable in Panel A is R^M_{t+1}, the annual return on the CRSP value-weighted index from July of year $t+1$ to June of year $t+2$. The dependent variable in Panel B is $R^M_{(t+1,t+2)}$, which denotes the arithmetic average of R^M_{t+1} and R^M_{t+2}. $INVEST_t$ is aggregate investment in year t. $INVEST_{(t-1,t)}$ is the arithmetic average of $INVEST_t$ and $INVEST_{t-1}$. $Sent_t$ is one of three investor sentiment proxies: consumer confidence ($ConsConf_t$), investors' net capital inflows into listed stocks in year t ($InFlow_t$), or the Baker and Wurgler (2006) composite investor sentiment index ($SentIndex_t$). $Term_t$ is the difference between ten- and one-year Treasury constant maturity rates as of the beginning of July in year $t+1$. Def_t is the difference between Moody's BAA yield and AAA yield as of the beginning of July in year $t+1$. $TBill_t$ is the thirty-day Treasury bill rate as of the beginning of July in year $t+1$. E/P_t (B/M_t) is the aggregate earnings-to-price (book-to-market) ratio as of the end of fiscal year t. D/P_t is the dividend-to-price ratio for the CRSP value-weighted index as of the beginning of July in year $t+1$. $OpAcc_t$ is aggregate operating accruals in year t. $ESHARE_t$ is the equity share in total new equity and debt issues. Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported.

$INVEST_{(t-1,t)}$, calculated as the arithmetic average of $INVEST_{t-1}$ and $INVEST_t$. As expected, Panel B shows that $INVEST_{(t-1,t)}$ is a strong negative predictor of $R^M_{(t+1,t+2)}$, where $R^M_{(t+1,t+2)}$ is calculated as the arithmetic average of R^M_{t+1} and R^M_{t+2}. The predictive power of $INVEST_{(t-1,t)}$ for future equity returns is robust to controlling for time-varying discount-rate proxies, valuation ratios, and extant investor-sentiment proxies. Moreover, the economic magnitude of the effect is substantial: a one-standard-deviation increase in $INVEST_{(t-1,t)}$ is associated with a 7.1% decrease in annual real returns over the following two years. For reference, annual real returns average 6.8%, with a standard error of 17.8%. Thus, the effect is highly significant in economic terms.

2.3 Predicting returns on the aggregate stock market: International evidence

We next examine the predictive power of aggregate investment for future market returns in international markets. Table 3 shows that higher aggregate investment is followed by lower aggregate stock market returns in most developed countries. To construct this table, we run a separate time-series regression for each country of its aggregate stock market returns (averaged over years $t+1$ and $t+2$) on its aggregate investment (averaged over years t and $t-1$). We also control for aggregate valuation ratios and operating accruals. Interest rate–related variables are not included because the data are not available for all countries over the time period we study.

In twelve of the thirteen countries, the coefficient on aggregate investment is negative. In eight of these countries, the coefficient is statistically significant. Specifically, we find that aggregate investment is a significant negative predictor of aggregate returns in Canada, the United Kingdom, Belgium, Germany, France, Netherlands, Italy, and Switzerland. We also highlight that despite the positive association between operating accruals and future returns documented in the United States by Hirshleifer, Hou, and Teoh (2009), aggregate operating accruals are in fact negatively correlated with future stock returns in most countries. Finally, the last row of Table 3 presents the results of a pooled regression that shows, not surprisingly, that aggregate investment exhibits a strong negative relation to future aggregate returns across the entire non-U.S. sample.

In sum, Table 3 shows that aggregate investment is a leading indicator of subsequent aggregate stock returns across many markets. These results extend Cochrane (1991), Lamont (2000), and Hirshleifer, Hou, and Teoh (2009) by showing that actual (not simply planned) aggregate investment negatively predicts aggregate stock returns in most major economies. Combined with the evidence in Table 2, our results provide the clearest evidence yet that aggregate investment peaks (troughs) in advance of weaker (stronger) stock market performance.

Table 3
International evidence: Predicting aggregate returns

	Country	*Intercept*	$INVEST^{Ctry}_{(t-1,t)}$	E/P^{Ctry}_t	B/M^{Ctry}_t	D/P^{Ctry}_t	$OpAcc^{Ctry}_t$	*Adj.* R^2
Coefficient	Canada	−0.088	−0.59	1.47	0.25	−4.06	−0.89	39.03%
t-statistic		(−0.55)	**(−1.94)**	(1.65)	(1.08)	(−1.42)	(−1.24)	
Coefficient	United Kingdom	−0.24	−1.17	−2.33	0.70	4.85	−4.38	64.67%
t-statistic		(−1.34)	**(−2.38)**	(−1.43)	**(1.73)**	(0.99)	**(−2.07)**	
Coefficient	Belgium	−0.26	−2.58	3.3	0.56	−12.3	−3.34	63.78%
t-statistic		(−0.99)	**(−2.28)**	**(2.88)**	**(2.40)**	(−1.64)	(−1.51)	
Coefficient	Germany	0.47	−3.27	−0.31	0.21	−5.32	1.75	33.56%
t-statistic		(1.43)	**(−2.37)**	(−0.27)	(0.42)	(−0.45)	(0.93)	
Coefficient	France	0.11	−2.15	1.45	0.90	−20.87	−2.72	49.6%
$t-$statistic		(0.29)	**(−2.68)**	(0.79)	**(2.52)**	**(−2.81)**	(−0.53)	
Coefficient	Hong Kong	−0.54	0.86	−0.23	0.88	1.19	−0.46	48.11%
t-statistic		**(−2.87)**	(1.41)	(−0.12)	**(2.44)**	(0.42)	(−0.62)	
Coefficient	Netherlands	0.11	−1.73	1.98	0.06	−2.34	0.89	20.84%
t-statistic		(0.58)	**(−3.18)**	(0.59)	(0.06)	(−0.23)	(0.46)	
Coefficient	Italy	0.18	−2.60	1.07	0.09	−9.2	−2.09	60.48%
t-statistic		**(1.99)**	**(−4.47)**	(0.85)	(0.66)	**(−3.32)**	**(−3.44)**	
Coefficient	Australia	−0.64	−0.48	−1.57	0.37	14.2	−1.73	45.25%
t-statistic		**(−3.33)**	(−1.25)	**(−2.33)**	**(2.87)**	**(3.46)**	(−1.01)	
Coefficient	Switzerland	0.15	−3.34	6.02	−0.25	−9.11	0.68	48.20%
t-statistic		(0.63)	**(−2.71)**	(1.36)	(−0.26)	**(−1.94)**	(0.25)	
Coefficient	Sweden	−0.19	−0.96	2.76	0.41	−4.22	−1.43	47.0%
t-statistic		(−0.59)	(−1.01)	**(3.85)**	**(2.69)**	(−1.60)	(−0.54)	
Coefficient	Singapore	−0.30	−0.02	0.88	0.44	1.35	0.39	5.41%
$t-$statistic		**(−2.32)**	(−0.02)	(0.34)	**(3.60)**	(0.33)	(0.21)	
Coefficient	Japan	−0.09	−2.61	2.50	0.07	−6.93	−1.06	-0.15%
t-statistic		(−0.42)	(−1.54)	(0.95)	(0.13)	(−0.46)	(−0.49)	
Coefficient	Pooled	−0.015	−0.94	0.41	0.22	0.06	−0.32	20.07%
t-statistic		(−0.18)	**(−2.58)**	(0.79)	**(2.40)**	(0.03)	(−0.78)	

The table presents time-series regressions of future aggregate stock market returns in each country on aggregate investment and control variables from 1992 to 2009:

$$R^{M,Ctry}_{(t+1,t+2)} = \beta_0 + \beta_1 INVEST^{Ctry}_{(t-1,t)} + \beta_2 E/P^{Ctry}_t + \beta_3 B/M^{Ctry}_t + \beta_4 D/P^{Ctry}_t + \beta_5 OpAcc^{Ctry}_t + \varepsilon_{(t+1,t+2)}$$

where the dependent variable is the average annual aggregate stock market return in the country in years $t+1$ and $t+2$. $INVEST^{Ctry}_{(t-1,t)}$ is the arithmetic average of $INVEST^{Ctry}_{t-1}$ and $INVEST^{Ctry}_t$, where $INVEST^{Ctry}_t$ is aggregate investment in country $Ctry$ in fiscal year t, computed by value-weighting firm-level investment for all nonfinancial firms within that country. E/P^{Ctry}_t, B/M^{Ctry}_t, D/P^{Ctry}_t, and $OpAcc^{Ctry}_t$ denote the aggregate earnings-to-price ratio, book-to-market ratio, dividend-to-price ratio, and operating accruals for country $Ctry$ in fiscal year$t$. Aggregate stock market returns for each country are obtained from MSCI Barra. Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported. T-statistics for the pooled regression are computed using two-way clustered standard errors, clustering on both year and country.

2.4 Investor sentiment and aggregate investment

Having established that aggregate investment negatively forecasts aggregate returns, we next conduct a series of tests to discriminate between alternative explanations for this relation. Specifically, in this section we examine whether aggregate investment is contemporaneously associated with investor sentiment (the "investment-sentiment" link). Under rational investment models (i.e., Group 1 models), markets are efficient and corporate managers rationally ignore investor sentiment. Thus, under Group 1 models, there is no correlation between aggregate investment and investor sentiment. On the other hand, under Group 2 models, corporate investments are associated with investor sentiment either because managers rationally exploit investor sentiment or because managers themselves are caught up in market euphoria. Thus, Group 2 models suggest a positive link between investor sentiment and aggregate investment.

Table 4 presents a series of regressions of aggregate investment on potential explanatory variables, including investor sentiment and various controls nominated by prior literature. To focus on changes in annual aggregate investment, we include a lagged dependent variable ($INVEST_{t-1}$). The control variables are designed to capture macroeconomic conditions, discount rates, and expected returns. Specifically, we control for aggregate profitability, aggregate book-to-market, contemporaneous and lagged stock market returns, the term structure of interest rates, the default rate (i.e., the difference between Moody's BAA bond yield and AAA bond yield), and the Treasury bill rate.

Results in the first three rows show that current profitability (ROA_t) is strongly positively associated with increases in aggregative investment ($INVEST_t$). The last three rows show that firms make fewer investments when the term structure is more flat ($TERM_{t-1}$). In general, corporate investments are also higher during periods of higher returns (R_t^M). All these findings seem intuitive: firms invest more heavily when corporate profits are high, overall market returns are positive, and long-term rates are low relative to current rates. These findings are consistent with Barro (1990), Morck, Shleifer, and Vishny (1990), and Blanchard, Rhee, and Summers (1993). Most of the other control variables are not significant.

The most salient result from Table 4 is the consistently positive coefficient on all three measures of investor sentiment. In each of the six models, the investor sentiment variable is reliably positive. Aggregate investment is more likely to increase during periods of high consumer confidence, high net inflows into equity markets, and high sentiment as measured by the BW index. In fact, investors' net inflows into equity markets (*InFlow*) is the single most important explanatory variable for changes in aggregate investment (*INVEST*). These findings are new to the literature and seem strikingly robust even in the presence of multiple control variables nominated by prior studies.

We further test the investment-sentiment link around the world using international investor-sentiment data constructed by Baker, Wurgler, and Yuan

Table 4
Factors associated with aggregate investment

	Intercept	$ConsConf_t$	$InFlow_t$	$SentIndex_t$	ROA_t	R_t^M	R_{t-1}^M	$INVEST_{t-1}$	B/M_{t-1}	$Term_{t-1}$	Def_{t-1}	$Tbill_{t-1}$	*Adj.* R^2
Coefficient	−0.01	0.07			0.90	0.02	0.00	0.09	0.004				38.21%
t-statistic	(−0.50)	**(2.74)**			**(3.81)**	(0.91)	(0.08)	(0.47)	(0.24)				
Coefficient	−0.03		0.24		1.12	0.01	−0.01	0.15	0.004				47.54%
t-statistic	**(−2.48)**		**(6.55)**		**(5.94)**	(0.80)	(−0.86)	(1.49)	(0.34)				
Coefficient	−0.03			0.006	1.04	0.03	−0.00	0.28	−0.01				34.91%
t-statistic	(−1.42)			**(2.45)**	**(5.01)**	(1.18)	(−0.22)	**(1.76)**	(−0.73)				
Coefficient	0.06	0.05			0.29	0.03	−0.01	0.02	0.02	−1.17	−1.18	−1.71	41.69%
t-statistic	(1.39)	**(1.98)**			(0.72)	(1.43)	(−0.60)	(0.10)	(0.85)	**(−2.22)**	(−1.38)	(−0.83)	
Coefficient	0.04		0.23		0.53	0.02	−0.02	0.01	0.01	−1.19	−0.44	−0.97	52.04%
t-statistic	(0.98)		**(6.27)**		**(1.78)**	(1.10)	(−1.22)	(0.01)	(0.60)	**(−2.13)**	(−0.53)	(−0.46)	
Coefficient	0.07			0.006	0.27	0.04	−0.02	0.14	0.03	−1.49	−2.06	−3.99	43.37%
t−statistic	**(1.76)**			**(2.31)**	(0.75)	**(1.91)**	(−0.89)	(0.80)	(1.15)	**(−2.64)**	**(−1.93)**	**(−1.69)**	

The table presents time-series regressions of aggregate investment ($INVEST_t$) on factors expected to be associated with aggregate investment. The regressions take the form:

$$INVEST_t = \beta_0 + \beta_1 SENTIMENT_t + \beta_2 ROA_t + \beta_3 R_t^M + \beta_4 R_{t-1}^M + \beta_5 INVEST_{t-1} + \beta_6 B/M_{t-1} + \beta_7 Term_{t-1} + \beta_8 Def_{t-1} + \beta_9 Tbill_{t-1} + \varepsilon_t$$

where $SENTIMENT_t$ is one of three investor sentiment proxies: consumer confidence ($ConsConf_t$), investors' net capital inflows into listed stocks in year t ($InFlow_t$), or the Baker and Wurgler (2006) composite investor sentiment index ($SentIndex_t$). ROA_t is aggregate ROA in year t, R_t^M is the annual real return on the CRSP value-weighted index from July of year t to June of year $t+1$, B/M_{t-1} is aggregate book-to-market as of the end of year $t-1$, $Term_{t-1}$ is the difference between ten- and one-year Treasury constant maturity rates as of the beginning of July in year t, Def_{t-1} is the difference between Moody's BAA yield and AAA yield as of the beginning of July in year t, and $Tbill_{t-1}$ is the thirty-day Treasury bill rate as of the beginning of July in year t. Bold denotes statistical significance at the 10% level or higher based on Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors.

(2012). Specifically, BWY compute annual investor sentiment for the United States, Canada, the United Kingdom, Germany, France, and Japan. They further decompose the six total sentiment indices into a single "global" index and six "local" indices. They find that total sentiment, particularly the global component of total sentiment, is a contrarian predictor of country-level market returns.

Table 5 tests the relation between aggregate investment and investor sentiment in each of the countries. The test period is limited to the fourteen years for which we have overlapping observations for aggregate investment and international sentiment (1992–2005). Despite the potentially limited power of these tests, we find a positive relation between country-level aggregate investment and total country-level sentiment in all five foreign markets, significantly so in four of the five countries (the United Kingdom, Germany, France, and Japan). The relation between aggregate investment and the global component of sentiment is particularly strong and remains positive in all five countries after including multiple control variables (such as country-level ROA, current and lagged market returns, lagged *INVEST*, and lagged book-to-market). The pooled tests show that a one-standard-deviation increase in global sentiment index is associated with a 2.62% increase in global aggregate investments in the same year, after controlling for other factors. For reference, the mean annual aggregate investment across the five foreign countries is 0.07, with a standard error of 6.17%.

In short, we find consistent evidence of an investment-sentiment link: aggregate corporate investment tends to increase during periods of buoyant investor sentiment. This holds not only in the United States, but also in other major foreign markets. These results provide initial evidence against Group 1 models, in which investor sentiment is irrelevant to investment decisions. Instead, they favor the Group 2 models, in which a positive investment-sentiment relation is an integral theme.

2.5 Aggregate investment and earnings forecast errors

We further conduct a series of tests designed to investigate whether aggregate investment forecasts future cash-flow "shocks." If the time-varying discount rate is the primary channel through which aggregate investment predicts future returns (i.e., Group 1 models), aggregate investments should not predict future "shocks" in cash flows.[21] Conversely, if aggregate investments predict future returns largely because the former captures some sort of investor sentiment, or market mispricing, then periods of higher (lower) aggregate investment should precede periods with lower (higher) innovations in the cash-flow series. Thus, we test for an empirical "investment/future cash-flow"

[21] In the standard Campbell (1991) framework, both cash-flow and discount-rate shocks are random (i.e., cannot be forecasted in advance). Our evidence that the market is "surprised" by future earnings and macroeconomic growth realizations that can be forecasted is inconsistent with the notion that these events are truly "news."

Table 5
International evidence: Aggregate investment and investor sentiment

Country	*Intercept*	$SEN_t^{Total,Ctry}$	$SEN_t^{Local,Ctry}$	SEN_t^{GLB}	ROA_t^{Ctry}	$R_t^{M,Ctry}$	$R_{t-1}^{M,Ctry}$	$INVEST_{t-1}^{Ctry}$	B/M_{t-1}^{Ctry}	*Adj.* R^2
Canada	0.10	–0.01								–7.85%
	(3.42)	(–0.37)								
	0.10		–0.06							18.91%
	(4.47)		**(–2.40)**							
	0.10			0.05						19.04%
	(6.84)			**(2.79)**						
UK	0.06	0.03								27.95%
	(4.77)	**(2.57)**								
	0.06		0.018							0.67%
	(3.65)		(1.13)							
	0.07			0.03						39.23%
	(6.43)			**(2.99)**						
Germany	0.07	0.04								66.98%
	(8.68)	**(5.75)**								
	0.07		0.026							21.40%
	(5.08)		**(2.83)**							
	0.07			0.04						64.64%
	(7.31)			**(4.51)**						
France	0.08	0.03								9.79%
	(4.62)	**(2.09)**								
	0.07		–0.01							–4.3%
	(3.41)		(–0.76)							
	0.07			0.04						49.25%
	(6.74)			**(4.65)**						
Japan	0.04	0.01								21.85%
	(8.09)	**(1.79)**								
	0.05		0.01							18.63%
	(7.50)		**(1.67)**							
	0.04			0.005						–3.93%
	(5.26)			(1.32)						

(*continued*)

Table 5
Continued

Country	*Intercept*	$SEN_t^{Total,Ctry}$	$SEN_t^{Local,Ctry}$	SEN_t^{GLB}	ROA_t^{Ctry}	$R_t^{M,Ctry}$	$R_{t-1}^{M,Ctry}$	$INVEST_{t-1}^{Ctry}$	B/M_{t-1}^{Ctry}	*Adj.* R^2
Pooled	0.07	0.02								11.56%
	(6.89)	**(3.24)**								
	0.09	0.01			0.18	0.02	0.11	0.14	–0.06	24.94%
	(4.72)	(1.29)			(0.50)	(0.33)	(1.45)	(1.18)	(–1.30)	
	0.07		0.00							–1.46%
	(7.07)		(0.06)							
	0.05		–0.01		0.35	0.03	0.12	0.25	–0.05	23.54%
	(3.08)		(–0.61)		(1.40)	(0.45)	(1.62)	**(1.94)**	(–0.93)	
	0.07			0.03						28.59%
	(7.82)			**(3.00)**						
	0.05			0.02	0.27	–0.0	0.09	0.09	–0.02	35.04%
	(1.57)			**(2.10)**	(1.04)	(–0.06)	(0.47)	(0.50)	(–0.54)	

The table examines the relation between aggregate investment and investor sentiment across developed markets. The Baker et al (2012) investor sentiment data is used. Regressions cover the period 1992–2005 and are of the form:

$$INVEST_t^{Ctry} = \beta_0 + \beta_1 SENTIMENT^{Ctry} + \beta_2 ROA_t^{Ctry} + \beta_3 R_t^{M,Ctry} + \beta_4 R_{t-1}^{M,Ctry} + \beta_5 INVEST_{t-1}^{Ctry} + \beta_6 B/M_{t-1}^{Ctry} + \varepsilon_t$$

where $INVEST_t^{Ctry}$ is aggregate investment in country $Ctry$ in fiscal year t, computed by value-weighting firm-level investment for all non-financial firms within that country. $SENTIMENT$ is either $SEN_t^{Total,Ctry}$, total sentiment for country $Ctry$ in fiscal year t, $SEN_t^{Local,Ctry}$, local sentiment for country $Ctry$ in fiscal year t, or SEN_t^{GLB}, global sentiment for fiscal year t. Sentiment variables are obtained from the website of Yuan Yu (see Baker, Wurgler, and Yuan (2012) for details). ROA_t^{Ctry} is aggregate return on assets in country $Ctry$ in year t. $R_t^{M,Ctry}$ denotes the aggregate market return in country $Ctry$ in year t. B/M_{t-1}^{Ctry} denotes the aggregate book-to-market ratio in country $Ctry$ in year t. Aggregate stock market returns for each country are obtained from MSCI Barra. Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported. T-statistics for the pooled regression are computed using two-way clustered standard errors, clustering on both year and country.

Table 6
Aggregate investment and earnings forecasts

$VARIABLE_{t+1}$		Intercept	$INVEST_t$	$VARIABLE_t$	Adj. R^2
Panel A: One-year-ahead analyst forecasts (1981–2009)					
$FROA_{t+1}$	Coefficient	0.037	0.06	0.51	36.20%
	t-statistic	**(6.15)**	**(2.16)**	**(6.02)**	
$Error_{t+1}$	Coefficient	0.01	0.04	0.20	–2.82%
	t-statistic	(1.13)	(0.47)	(0.90)	
Panel B: Long-term analyst forecasts (1981–2009)					
$FLTG_{t+1}$	Coefficient	0.01	0.25	0.82	85.20%
	t-statistic	(0.69)	**(3.01)**	**(10.74)**	
$LTError_{t+1}$	Coefficient	–0.03	0.42	0.74	81.06%
	$t-$statistic	**(–3.70)**	**(3.30)**	**(9.02)**	
Panel C: One-year-ahead manager forecasts (1996–2009)					
$MFROA_{t+1}$	Coefficient	0.1	0.17	**–0.45**	21.63%
	$t-$statistic	**(5.34)**	**(2.51)**	**(–2.12)**	
$MFError_{t+1}$	Coefficient	–0.01	0.36	0.36	0.23%
	t-statistic	**(–1.69)**	(1.64)	**(3.95)**	

The table reports time-series regressions involving aggregate investment and analysts' aggregate forecasts. The regressions take the form:

$$VARIABLE_{t+1} = \beta_0 + \beta_1 INVEST_t + \beta_2 VARIABLE_t + \varepsilon_{t+1}$$

$FROA_{t+1}$ is the forecast of year $t+1$ aggregate ROA computed using analyst forecasts available as of the end of December in year t. $Error_{t+1}$ is the value-weighted difference between the forecasted ROA ($FROA_{t+1}$) and the actual realized ROA for year $t+1$. $FLTG_{t+1}$ is the forecast of aggregate long-term earnings growth using analyst forecasts available as of the end of December in year t. $LTError_{t+1}$ is the value-weighted difference between the forecasted long-term earnings ($FLTG_{t+1}$) and the actual realized long-term ROA (computed as the arithmetic average of actual ROA in years t+2 and t+3). $MFROA_{t+1}$ is the forecast of year $t+1$ aggregate ROA computed using managers' EPS forecasts in the first quarter of the fiscal year $t+1$. $MFError_{t+1}$ is the value-weighted difference between managers' forecasts of year $t+1$ ROA and actual realized ROA in year $t+1$. All variables involving analyst forecasts cover the period 1981–2009. All variables involving managerial forecasts cover the period 1996–2009. Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported.

link, using both firm-level news (analyst and managerial earnings forecast errors and short-window earnings announcement returns) and macroeconomic news (GDP growth and CFNAI).

We begin by examining whether aggregate investment is associated with errors in expectations about future earnings (Table 6). To construct this table, we compute forecasted aggregate one-year-ahead ROA ($FROA_{t+1}$) and forecasted long-term earnings growth ($FLTG_{t+1}$) using median analyst consensus forecasts as of the end of December in year t. For each firm, analysts in the I/B/E/S database make a forecast of the expected average growth rate for the next five years. We aggregate these firm-level forecasts in computing the market-level variable *FLTG*. Note that this variable is available as of the end of December in year t (in other words, it is available as of the fiscal year end of year t for the firms in our sample).

We also collected the managerial guidance for firms' year $t+1$ EPS from the first quarter of fiscal year $t+1$. We use the managerial forecasts issued in quarter 1 (Q1) of year $t+1$, rather than those from quarter 4 (Q4) of year t, because managerial forecast data are sparse and many more firms issue guidance in the first quarter of the current year. Because we do not compute year $t+1$ returns until July 1, these forecasts are still publicly available well before the return accumulation period. When a firm issues a range of estimated earnings rather than a point estimate, we take the midpoint of the range as our forecast (e.g., Bergman and Roychowdhury 2008). We then compute each firm's managerial forecasted ROA ($MFROA_{t+1}$) and aggregate to the market level in the usual manner. The forecast error is computed by comparing the forecasted earnings to future realized earnings.

Panel A of Table 6 reports the relation between aggregate investment and analysts' forecasts of one-year-ahead earnings ($FROA_{t+1}$). We find that higher aggregate investment is associated with more optimistic ex ante expectations of one-year-ahead corporate profits (t-statistic 2.16). In other words, corporate managers make more investments when analysts are forecasting higher one-year-ahead earnings. Results in the second row show that aggregate investment does not predict errors in the forecasts of one-year-ahead earnings (t-statistic 0.47). Taken together, these findings indicate that while higher investment is associated with rosier ex ante expectations of profits, on average these forecasts are unbiased, at least for expected earnings over the next year.

Panel B focuses on longer-term corporate earnings. In the first row, we document the relation between $INVEST_t$ and $FLTG_{t+1}$. These results show that higher aggregate investment is associated with more-optimistic expectations of long-term earnings (t-statistic 3.01). Moreover, results in the second row show that aggregate investment positively predicts forecast errors in long-term earnings (t-statistic 3.30). In other words, during high-investment periods, the long-term (five-year) earnings forecasts of the analysts are too high relative to actual realized earnings in the future.

Panel C examines one-year-ahead manager forecasts of earnings. These results show that corporate managers also tend to forecast higher earnings during high-investment periods. In addition, the results in Row 2 of this panel show that these earnings are, on average, too high. The coefficient on *MFError* is large and positive, although it just fails to achieve statistical significance (t-statistic 1.64). Note that because managerial forecast data are available for only fourteen years (1996–2009), the power of the managerial forecast test is much lower than the power of the analyst forecasts.

Overall, these results indicate that periods of higher aggregate investment are accompanied by more optimistic ex ante expectations of corporate profits (the coefficient on $INVEST_t$ is reliably positive for $FROA_{t+1}$, $FLTG_{t+1}$, and $MFROA_{t+1}$). Moreover, ex post realizations of these earnings generally fail to live up to the expectations. This is seen in the positive coefficient on $INVEST_t$ for each of the three error variables ($Error_{t+1}$, $LTError_{t+1}$, and $MFError_{t+1}$). In the case of $LTError_{t+1}$, higher investment reliably forecasts positive ex post errors in long-term analyst earnings expectations.

2.6 Predicting earnings announcement returns and the value premium

We conduct two additional tests of the biased-expectation hypothesis. In the first test, we examine the average short-window (three-day) returns around the release of subsequent quarterly earnings news. If investors do not anticipate the decline in aggregate profitability following periods of higher aggregate investment, they will be disappointed by the lower earnings that are subsequently announced. By focusing on short-window returns, we isolate the "news" associated with future earnings news releases and minimize the likelihood that these returns are due to some sort of misspecification in the model for expected returns.

Panel A of Table 7 presents predictive regressions of earnings announcement returns on lagged aggregate investment and other control variables. To construct this table, we compute the time series of average short-window earnings announcement returns by value-weighting firm-level returns for earnings announcements occurring in the annual return window. The first row shows that aggregate investment negatively predicts average short-window earnings announcement returns in a univariate setting (t-statistic -2.01), and the second row shows that the predictive power of aggregate investment continues to hold after controlling for discount-rate proxies and market-valuation multiples (t-statistic -2.65). After controlling for discount-rate proxies, market-valuation multiples, and operating accruals, a one-standard-deviation increase in $INVEST_{t,t-1}$ is associated with a decrease of 0.12% in the average three-day earnings announcement returns over the next eight quarterly earnings releases. For reference, the unconditional average of the three-day returns over earnings announcements is 0.19%, with a standard error of 0.42%. To the extent that short-window earnings announcement returns capture investor "surprise" associated with future earnings releases, these results suggest that investors are not fully anticipating the lower earnings that are announced after periods of higher aggregate investment.

We also examine whether aggregate investment is related to future realizations of the value premium. The value premium measures the return to a portfolio that is long value (high book-to-market) stocks and short growth (low book-to-market) stocks. Prior research suggests that the prices of growth stocks reflect naive expectations about future growth (e.g., Lakonishok, Shleifer, and Vishny 1994; Dechow and Sloan 1997). If periods of higher aggregate investment are associated with excessive optimism about future growth, we would expect growth stocks, in particular, to perform poorly in the subsequent period.

Panel B of Table 7 presents predictive regressions of the value premium on lagged aggregate investment and control variables. The first row shows that aggregate investment positively predicts the value premium in a univariate setting (t-statistic 2.38). The second row shows that the predictive power of aggregate investment for the value premium continues to hold after controlling for discount-rate proxies and market-valuation multiples (t-statistic 3.17).

Table 7
Predicting earnings announcement returns and the value premium

	Intercept	$INVEST_{(t-1,t)}$	$Term_t$	Def_t	$Tbill_t$	E/P_t	B/M_t	D/P_t	$OpAcc_t$	$ESHARE_t$	Adj. R^2
Panel A: Predicting earnings announcement returns											
Coefficient	0.01	–0.04									6.46%
t-statistic	**(2.67)**	**(–2.01)**									
Coefficient	0.01	–0.05	0.18	–0.11	0.97	0.06	–0.03	0.00	0.03	0.01	23.78%
t-statistic	**(4.18)**	**(–2.65)**	**(3.31)**	(–0.71)	**(2.67)**	**(2.24)**	**(–3.55)**	(0.08)	(0.85)	**(2.31)**	
Panel B: Predicting the value premium											
Coefficient	–0.01	1.15									7.24%
t-statistic	(–0.29)	**(2.38)**									
Coefficient	–0.04	1.96	4.24	–5.84	11.15	–0.75	0.21	–2.71	0.95	0.24	8.97%
t-statistic	(–0.37)	**(3.17)**	**(2.39)**	**(–1.94)**	(1.27)	(–1.25)	(1.25)	(–0.78)	(1.36)	(1.03)	

The table presents time-series regressions of the form:

$$DepVar_{(t+1,t+2)} = \beta_0 + \beta_1 INVEST_{(t-1,t)} + \beta_2 Term_t + \beta_3 Def_t + \beta_4 TBill_t + \beta_5 E/P_t + \beta_6 B/M_t + \beta_7 D/P_t + \beta_8 OpAcc_t + \beta_9 ESHARE_t + \varepsilon_{(t+1,t+2)}$$

In Panel A, the dependent variable is $EAR_{(t+1,t+2)}$; that is, the arithmetic average of EAR_{t+1} and EAR_{t+2}, where EAR_{t+1} denotes average earnings announcement returns aggregated to the market level in year $t+1$. In Panel B, the dependent variable is $HML_{(t+1,t+2)}$; that is, the arithmetic average of HML_{t+1} and HML_{t+2}, where HML_{t+1} denotes the annual return to the equal-weighted HML portfolio from July of year $t+1$ to June of year $t+2$. Monthly returns on the *HML* portfolio are obtained from the website of Kenneth French. $INVEST_{(t-1,t)}$ is the arithmetic average of $INVEST_t$ and $INVEST_{t-1}$. $Term_t$ is the difference between ten- and one-year Treasury constant maturity rates as of the beginning of July in year $t+1$. Def_t is the difference between Moody's BAA yield and AAA yield as of the beginning of July in year $t+1$. $TBill_t$ is the thirty-day Treasury bill rate as of the beginning of July in year $t+1$. E/P_t (B/M_t) is the aggregate earnings-to-price (book-to-market) ratio as of the end of fiscal year t. D/P_t is the dividend-to-price ratio for the CRSP value-weighted index as of the beginning of July in year $t+1$. $OpAcc_t$ is aggregate operating accruals in year t. $ESHARE_t$ is the equity share in total new equity and debt issues. Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported.

Untabulated results show that the widening of the value premium following higher aggregate investment is driven by the particularly poor returns on growth stocks. Consistent with our hypothesis, periods of higher aggregate investment are associated with an apparent overvaluation of growth stocks. In the following two years, this temporary dislocation in the value premium corrects itself, and growth stocks perform particularly poorly. Once again, this evidence suggests that periods of higher aggregate investment are associated with excessively optimistic earnings and growth expectations, leading to a subsequent correction.

2.7 Predicting future macroeconomic growth

We next test the "investment/future cash-flow" relation at the macro level using two broad measures of macroeconomic growth: growth in GDP and the CFNAI. Introduced by Stock and Watson (1999), the CFNAI is the first principal component of eighty-five indicators of economic growth drawn from four broad categories of the economy: employment; production and income; personal consumption and housing; and sales, orders, and inventories. This index closely tracks periods of economic expansions and contractions and is used as an indicator of business-cycle turning points. Lower values of the CFNAI indicate a higher likelihood that a recession is occurring.

Table 8 presents predictive regressions of future macroeconomic growth on aggregate investment and variables suggested by prior literature to be predictors of macroeconomic activity (e.g., Fama 1981). The second row of Panel A shows that aggregate investment negatively predicts the CFNAI after including controls (t-statistic -1.98), while the second row of Panel B shows that aggregate investment negatively predicts GDP growth (t-statistic -1.97). In economic terms, a one-standard-deviation increase in aggregate investment is associated with 0.34% lower annual GDP growth and a decrease of 0.13 in annual CFNAI in the following two years. For reference, the mean annual GDP growth over our sample is 3%, with a standard error of 2.5%; the mean annual CFNAI measure is 0, with a standard error of 0.77.

In sum, we find that the "investment/future cash-flow" pattern is also observed at the macro level. Specifically, we find that periods of higher aggregate investment are followed by generally deteriorating macroeconomic conditions (lower GDP growth) as well as a higher likelihood of recession (lower CFNAI). These results are consistent with the long tradition in macroeconomic theories in which investment decisions play a key role in the formation of business cycles (e.g., Tugan-Baranovsky 1894; Kitchin 1923; and Schumpeter 1934, 1939).

2.8 Subsuming the predictive power of aggregate investment

Finally, we conduct a further test to better understand the relation between aggregate investments and future aggregate returns. If the predictive power of aggregate investment for future stock market returns arises from excessive optimism or pessimism about future fundamentals (as hypothesized under

Table 8
Predicting macroeconomic growth

Panel A: Predicting $CFNAI_{(t+1,t+2)}$

	Intercept	$INVEST_{(t-1,t)}$	$CFNAI_t$	R_t^M	$INDPROD_t$	*Adj.* R^2
Coefficient	0.40	–5.83	0.09			4.12%
t-statistic	**(1.94)**	**(–2.03)**	(1.03)			
Coefficient	0.24	–5.91	0.05	0.94	2.48	7.01%
t-statistic	**(1.40)**	**(–1.98)**	(0.17)	**(2.73)**	(0.54)	

Panel B: Predicting $GDPGR_{(t+1,t+2)}$

	Intercept	$INVEST_{(t-1,t)}$	$GDPGR_t$	R_t^M	$INDPROD_t$	*Adj.* R^2
Coefficient	0.04	–0.15	0.05			4.69%
t-statistic	**(4.98)**	**(–2.05)**	**(1.68)**			
Coefficient	0.04	–0.14	0.06	0.04	–0.05	7.64%
t-statistic	**(4.81)**	**(–1.97)**	(0.29)	**(2.76)**	(–0.60)	

The table presents time-series regressions of future CFNAI and GDP growth on aggregate investment and other variables using all available data. The regressions take the form

$$GROWTH_{(t+1,t+2)} = \beta_0 + \beta_1 INVEST_{(t-1,t)} + \beta_2 GROWTH_t + \beta_3 R_t^M + \beta_4 INDPROD_t + \varepsilon_{(t+1,t+2)}$$

where the dependent variable, $GROWTH_{(t+1,t+2)}$ is either $CFNAI_{(t+1,t+2)}$ (i.e., the arithmetic average of $CFNAI_{t+1}$ and $CFNAI_{t+2}$) or $GDPGR_{(t+1,t+2)}$ (i.e., the arithmetic average of $GDPGR_{t+1}$ and $GDPGR_{t+2}$). The explanatory variable, $INVEST_{(t-1,t)}$, is the arithmetic average of $INVEST_t$ and $INVEST_{t-1}$. $GROWTH_t$ varies with the dependent variable and is either $CFNAI_t$, or $GDPGR_t$, each measured from July in year t to June in year $t+1$. R_t^M is the annual return on the CRSP value-weighted index from July in year t to June in year $t+1$. $INDPROD_t$ is growth in industrial production from July in year t to June in year $t+1$. Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported.

Group 2 models), then the predictive power of aggregate investment should be subsumed after controlling for news about subsequent fundamentals. In other words, if aggregate investment forecasts returns because it is a leading indicator of forecast errors, then its predictive power for future returns should disappear once we control for the ex post forecast errors. In this section, we test whether aggregate investment continues to predict stock market returns after controlling for ex post errors in analyst forecasts of corporate profits and macroeconomic growth.

Table 9 presents regressions of aggregate returns on lagged aggregate investment ($INVEST_{(t-1,t)}$) and ex post errors in earnings forecasts and ex post macroeconomic growth. The dependent variable is $R^M_{(t+1,t+2)}$. The last two rows show that, after controlling for ex post forecast errors in long-term earnings estimates and macroeconomic growth, the predictive power of $INVEST_{(t-1,t)}$ for stock returns becomes insignificant. These results tie in neatly with findings in the preceding three sections.

To recap, the preceding sections show that higher investment is followed by larger ex post errors in long-term earnings and macroeconomic growth forecasts. In this section, we show that the predictive power of investment for market returns disappears after controlling for ex post errors in long-term earnings and macroeconomic growth. Collectively, these results are consistent with the view that overinvestment relating to errors in expectations about future

Table 9
Subsuming the predictive power of aggregate investment

	Intercept	$INVEST_{(t-1,t)}$	$GDPGR_{(t+1,t+2)}$	$Error_{t+1}$	$LTError_{t+1}$	*Adj.* R^2
Coefficient	0.21	–2.09				15.98%
t-statistic	**(4.23)**	**(–3.02)**				
Coefficient	0.12	–1.77	2.01			27.21%
t-statistic	**(2.73)**	**(–2.56)**	**(2.40)**			
Coefficient	0.27	–3.24		2.64		30.93%
t-statistic	**(5.17)**	**(–4.08)**		(1.28)		
Coefficient	0.23	–2.17			–0.89	28.09%
t-statistic	**(3.10)**	**(–1.93)**			(–1.02)	
Coefficient	0.07	–1.58	3.88		–0.85	54.15%
t-statistic	(0.97)	(–1.33)	**(4.87)**		(–0.85)	
Coefficient	0.08	–1.72	3.64	1.43	–0.99	53.62%
t-statistic	(0.96)	(–1.38)	**(4.17)**	(0.92)	(–1.05)	

The table presents time-series regressions of aggregate U.S. stock market returns on aggregate investment, gross domestic product (GDP) growth, and analysts' forecast errors. The regressions take the form

$$R^M_{(t+1,t+2)} = \beta_0 + \beta_1 INVEST_{(t-1,t)} + \beta_2 GDPGR_{(t+1,t+2)} + \beta_3 Error_{t+1} + \beta_4 LTError_{t+1} + \varepsilon_{t+1}$$

where the dependent variable is $R^M_{(t+1,t+2)}$, the arithmetic average of R^M_{t+1} and R^M_{t+2}. $INVEST_{(t-1,t)}$ is the arithmetic average of $INVEST_{t-1}$ and $INVEST_t$. $GDPGR_{(t+1,t+2)}$ is the arithmetic average of $GDPGR_{t+1}$ and $GDPGR_{t+2}$. $Error_{t+1}$ is the value-weighted difference between the forecasted return on assets (ROA) ($FROA_{t+1}$) and the actual realized ROA for year $t+1$. $LTError_{t+1}$ is the value-weighted difference between the forecasted long-term earnings ($FLTG_{t+1}$) and the actual realized long-term ROA (computed as the arithmetic average of actual ROA in years $t+2$ and $t+3$). Bold denotes statistical significance at the 10% level or better. Newey-West heteroscedasticity- and autocorrelation-consistent (HAC) standard errors are reported.

fundamentals is a key driver of the predictive power of aggregate investment for market returns.

3. Conclusion

Using investment information gleaned from corporate financial statements, we examine the relation between investor sentiment and aggregate corporate investments. Our analyses are focused on answering three main questions left open by the prior literature. First, does aggregate investment negatively predict aggregate equity market returns, after controlling for various discount-rate proxies and market-valuation metrics? Second, is aggregate corporate investment associated with common measures of investor sentiment? And finally, assuming aggregate investment is negatively correlated with subsequent market returns, what might be the reason for this empirical phenomenon?

Our analyses resulted in a number of findings consistent with the view that aggregate corporate investments are affected by, and indeed mirror, waves of investor optimism and pessimism. First, we find that periods of higher corporate investment are followed by lower aggregate stock returns, particularly for growth stocks. We show that the ability of aggregate investment to predict aggregate stock returns is robust after controlling for various market-valuation multiples, as well as proxies for interest rates, term structure, default risk, and other market conditions. Moreover, these patterns are prevalent in other countries, as we show using international data from thirteen other major economies.

We then conduct a series of tests to better understand the cause of the negative relation between current aggregate investment and future aggregate stock returns. Existing models on the potential impact of sentiment on real economic decisions fall into two main camps (see Appendix A). Models in Group 1 (the "non-sentiment-based" group) argue that a negative relation between investment and future returns can be attributable solely to time-varying discount rates, and investor sentiment is irrelevant. Models in Group 2 (the "sentiment-based" group) argue that for various reasons, investor sentiment will influence investment decisions. This influence occurs either because managers rationally exploit market misvaluations (2A: the "catering" hypothesis), or because they are themselves caught up in the market euphoria (2B: the "expectation bias" hypothesis).

The approach we take is to focus on two additional types of ancillary evidence: (i) the contemporaneous association between aggregate investments and investor sentiment (the "investment-sentiment" link), and (ii) the ability of aggregate investments to forecast future cash-flow "shocks," such as innovations in macroeconomic indicators and GDP growth, as well as measures of surprises in firm-level earnings, such as analyst forecast errors, managerial forecast errors, and short-window market returns around future earnings announcements (the "investment/future cash-flow" link).

The "investment-sentiment" link is important in distinguishing Group 1 models from those in Group 2. If market sentiment is irrelevant to managerial investment decisions, as suggested by the Group 1 models, we should not expect to find an association between aggregate investments and measures of investor sentiment. Conversely, a positive relation between total investments and investor sentiment is an integral part of the story for the Group 2 models.

The "investment/future cash-flow" link is also important in separating out Group 1 explanations from Group 2. If time-varying discount rate is the primary channel through which aggregate investments predict future returns, aggregate investments should not predict future "shocks" in cash flows. Conversely, if aggregate investments predict future returns largely because the former captures some sort of investor sentiment, or market mispricing, then periods of higher (lower) aggregate investment should precede periods with lower (higher) innovations in the cash-flow series. We measure these shocks at both the macroeconomic level (using GDP growth and various macroeconomic indicators) and the firm level (using analyst forecast errors, managerial forecast errors, and short-window earnings announcement returns).

Overall, our findings support the Group 2 models. Specifically, we find that higher levels of corporate investment also precede lower corporate profitability, greater earnings disappointments, lower short-window earnings announcement returns, and lower macroeconomic growth. Furthermore, the predictive power of aggregative investment for returns becomes insignificant after accounting for ex post forecast errors in (i) long-term growth in corporate profits and (ii) macroeconomic growth indicators.

These findings suggest that a key reason why aggregate investments predict stock returns is that these investments reflect excessive optimism (pessimism) in cash-flow expectations. This excessive optimism (pessimism) is particularly evident in the case of GDP growth and firm-level analyst long-term earnings forecasts. The forecasts of GDP growth and long-term earnings growth are consistently too high (low) after high- (low-) investment periods. Errors in managerial earnings guidance reflect a similar pattern, although the results are not statistically significant ($t-$statistic 1.64), perhaps due to a shorter sample period (only fourteen years of managerial forecast data are available). Prior studies have provided significant evidence that corporate managers "cater" to the sentiment of noise traders. Our evidence shows these investments also reflect a collective bias in expectation with respect to future fundamentals.

Note that our results do not require individual managers to be wildly irrational. As Hassan and Mertens (2010) observed, if individual managerial forecasts contain a small but common error, the resource misallocation that results in the aggregate can be substantial, even if individual forecasts are "nearly rational." It is also possible that managers are themselves not overtly biased, but their investment decisions appear biased collectively because they are influenced by pressures exerted by market participants who can vote their sentiment through stock prices (Morck, Shleifer, and Vishny 1990).

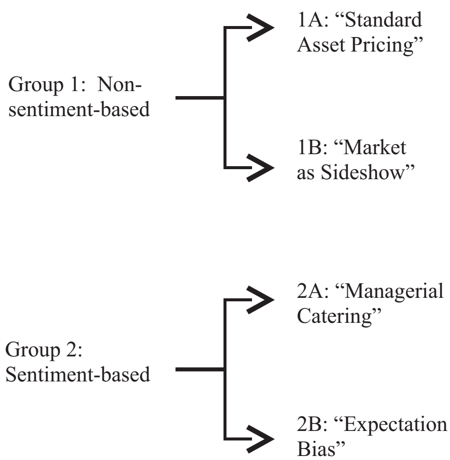
Our findings also help to shed light on another curious gap in the investor sentiment literature—the fact that sentiment measures seem to have little predictive power for aggregate market returns. A natural prediction of the noise trader models is that returns should be lower following high-sentiment periods. However, while many studies document a cross-sectional effect—that is, sentiment has a stronger effect on smaller, hard-to-value, and difficult-to-arbitrage firms (the "sentiment seesaw")—evidence for a first-order prediction of behavioral theory (that market-wide sentiment should predict aggregate stock returns) is weak.

We show that (i) aggregate investment is positively correlated with investor sentiment, but (ii) it has much stronger predictive power for market-wide returns than do other sentiment measures. As Baker, Wurgler, and Yuan (2012) observed, market-wide sentiment is intrinsically difficult to measure with precision. In their words: "If there [were] an unambiguous, real-time measure, even the mediocre investor would be able to recalibrate himself and in the process, reduce or eliminate the information content in the measure" (272). Our evidence suggests that this new bottom-up measure of aggregate investment is likely to be a better indicator than existing sentiment measures of market-wide mispricing. As a minimum, it seems to augment the existing variables.

Overall, our findings fit well with the business cycle literature. In the wake of the recent financial crisis, a number of economists have contended that aggregate-level inefficiencies played a role in driving these outcomes (e.g., Akerlof and Shiller 2009; Krugman 2009). To the extent that they point to biased expectations about fundamentals as an explanation for episodic periods of overinvestment, our findings seem to support this point of view. At the minimum, these findings highlight the need for further research into the exact nature and cause of the common errors that seem to affect both investors and corporate managers.

Appendix A. Managerial Decision Making when Markets are Noisy

The following chart summarizes existing models of managerial decision making in the presence of market noise. Broadly speaking, these theories can be grouped into two camps, with each camp having two sub-branches.



Group 1: Non-sentiment-based. Models in this group attribute the negative investment-return association to time-varying discount rates, and either assume that the stock prices are efficient (1A: the "standard asset pricing" explanation) or that market mispricings are irrelevant to investment decisions (1B: the "market as sideshow" explanation). In these models, corporate managers behave rationally, and investor sentiment is irrelevant, either because prices are efficient (Cochrane 1991; Carlson, Fisher, and Giammarino 2006; Lyandres, Sun, and Zhang 2008) or because managers who optimize long-term firm value rationally ignore any short-term sentiment-related fluctuations (Stein 1996, the long-horizon case).

Group 2: Sentiment-based. Models in this group admit the possibility that investor sentiment could influence real managerial decisions. This influence occurs either because managers rationally exploit market misvaluations (2A: the "managerial catering" hypothesis) or because they are themselves caught up in the market euphoria (2B: the "expectation bias" hypothesis). The managerial catering explanation is rooted in the notion that rational managers with finite planning horizons care about temporary price dislocations (Stein 1996, the short-horizon case). The expectation bias explanation hypothesizes that aggregate investment decisions could be influenced by the same waves of sentiment that afflict market participants.

Appendix B. Variable Descriptions

Variables cover the time period 1962 to 2009 unless otherwise noted.

$INVEST_t$: Aggregate corporate investment, defined as the weighted-sum of firm-level investments in fiscal year t, aggregated to the market level using year-end market capitalizations as weights. Firm-level investment is the change in each firm's net operating assets (NOA) scaled by average total assets. NOA is defined as in Dechow, Richardson, and Sloan (2008): total assets (Compustat AT) less cash and short-term investments (Compustat CHE) minus non-debt liabilities; where non-debt liabilities equals total liabilities (Compustat LT) plus minority interest (MIB) less debt (Compustat DLTT plus Compustat DLC).[22] In addition, we also capitalize and amortize annual R&D expenditures (Compustat XRD) using industry-based amortization rates (see Lev and Sougiannis 1996). To reduce the influence of outliers, firm-level investment is winsorized at the 1% level every year.

ROA_t: Aggregate ROA as reported in fiscal year t, computed at the firm level and aggregated to the market level using market capitalization at the end of year t as the weight. Firm-level ROA is net income (Compustat IB) plus R&D expenditure (XRD) minus amortized R&D, scaled by average total assets, including the unamortized portion of R&D. R&D is amortized using the industry coefficients estimated by Lev and Sougiannis (1996).

$OpAcc_t$: Aggregate operating accruals, computed at the firm level and aggregated to the market level using market capitalization at the end of year t as the weight. Firm-level operating accruals is the change in noncash current assets (Compustat ACT minus CHE) minus the change in current liabilities (LCT), excluding the change in short-term debt (DLC) and the change in taxes payable (TXP) minus depreciation and amortization expense (DP), scaled by average total assets.

$FROA_{t+1}$: The forecast of year $t+1$ aggregate ROA computed using analyst forecasts available as of the end of December in year t. For each stock, the median forecast of year $t+1$ ROA is computed by multiplying the median year $t+1$ EPS forecast by shares outstanding, scaled by total assets as of the end of year t. This is aggregated to the market level using market capitalization as of the end of year t as the weight. This variable covers the period 1981 to 2009. Analyst forecast data is obtained from the I/B/E/S database.

$FLTG_{t+1}$: Analysts' aggregated forecast of long-term earnings growth computed using analyst forecasts available as of the end of December in year t. Firm-level long-term earnings growth forecasts are obtained from the I/B/E/S database and are aggregated to the market level using market capitalization as of the end of year t as the weight. This variable covers the period 1981 to 2009. Analyst forecast data is obtained from the I/B/E/S database.

$MFROA_{t+1}$: The forecast of year $t+1$ aggregate ROA computed using managers' EPS forecasts issued in the first quarter of year $t+1$. For each stock, managers' forecasted year $t+1$ ROA is computed by multiplying the earliest forecast of year $t+1$ EPS available in the first quarter of year $t+1$ by shares outstanding, scaled by average total assets in year $t+1$. This is aggregated to the market level using market capitalization as of the end of year t as the weight. This variable covers the period 1996 to 2009. Managerial forecast data is obtained from First Call.

E/P_t: The aggregate earnings-to-price ratio, computed at the firm level and aggregated to the market level using market capitalization at the end of year t as the weight. Firm-level earnings-to-price is computed as operating income after depreciation (OIADP) scaled by market capitalization at fiscal year-end.

B/M_t: The aggregate book-to-market ratio, computed at the firm level and aggregated to the market level using market capitalization at the end of year t as the weight. Firm-level book-to-market is book equity divided by market capitalization at fiscal year-end. Book equity is

[22] We use the Compustat Xpressfeed database. The definition of total liabilities in the Compustat Xpressfeed database excludes minority interest, while the definition of total liabilities in the Compustat Legacy database includes minority interest. To retain consistency with Dechow, Richardson, and Sloan (2008), we add minority interest (MIB) to total liabilities (LT) in the calculation of non-debt liabilities.

stockholder's equity (Compustat SEQ), plus balance sheet deferred tax and investment tax credit (TXDITC, if available), minus the book value of preferred stock (liquidating value [PSTKL] if available, or else redemption value [PSTKRV] if available, or else carrying value [PSTK]).

D/P_t: The dividend-to-price ratio for the CRSP value-weighted index as of the beginning of July in year $t+1$. This equals total dividends accrued to the index from July in year t to June in year $t+1$ divided by the index level at the end of June in year $t+1$.

R_t^M: The annual real return on the CRSP value-weighted index (including dividends) from July of year t to June of year $t+1$ (1962–2011). Real returns are created using the Consumer Price Index.

$Term_t$: The difference between ten- and one-year Treasury constant maturity rates as of the beginning of July in year $t+1$. Data is obtained from the St. Louis Federal Reserve Economic Database.

DEF_t: The default rate, calculated as the difference between the Moody's BAA bond yield and AAA bond yield as of the beginning of July in year $t+1$. Data is obtained from the St. Louis Federal Reserve Economic Database.

$TBILL_t$: The thirty-day Treasury bill rate as of the beginning of July in year $t+1$, obtained from the St. Louis Federal Reserve Economic Database.

$ConsConf_t$: The average value of the Conference Board's Index of Consumer Confidence over year t, scaled by 100 and orthogonalized with respect to a set of macroeconomic indicators following Baker and Wurgler (2006, 2007). Specifically, this variable is the residual from a regression of the annual average Index of Consumer Confidence on annual growth in industrial production; growth in durable, nondurable, and services consumption; growth in employment; and an NBER recession indicator. The data covers the period 1967–2009.

$InFlow_t$: Aggregate net capital inflows from investors into listed stocks in year t, computed at the firm level and aggregated to the market level using market capitalization at the end of year t as the weight. Firm-level net capital inflow is the sum of the monthly net capital inflows in year t, scaled by average total assets in year t. This variable is orthogonalized with respect to a set of macroeconomic indicators following Baker and Wurgler (2006, 2007). Specifically, we take the residual from a regression of annual aggregate net capital inflows on annual growth in industrial production; growth in durable, nondurable, and services consumption; growth in employment; and an NBER recession indicator. The monthly net capital inflow from investors to firm $i$in month $m$is computed following Dichev (2007) as:

$$InFlow_{i,m} = -1^* \left(\mathrm{MV}^*_{\mathrm{i,m-1}}\left(1+\mathrm{r_{i,m}}\right) - \mathrm{MV_{i,m}}\right)$$

where $\mathrm{MV_{i,m}}$ is the market capitalization of firm i at the end of month m, and $\mathrm{r_{i,m}}$ is the stock return of firm i in month m (including dividends).

$SentIndex_t$: The Baker and Wurgler (2006) composite investor sentiment index, obtained from Jeffrey Wurgler's website and orthogonalized with respect to macroeconomic variables. The data covers the period 1965–2009.

$CFNAI_t$: The average value of the monthly CFNAI (Chicago Federal Reserve National Activity Index) from July in year t to June in year $t+1$. The CFNAI is a comprehensive measure of macroeconomic growth and is available starting 1967. For details, see www.chicagofed.org/webpages/publications/cfnai.

$INDPROD_t$: Growth in industrial production in year t over the period from July in year t to June in year $t+1$. Data is obtained from the St. Louis Federal Reserve Economic Database.

$ESHARE_t$: The equity share in total new equity and debt issues as in Baker and Wurgler (2000) for year t, obtained from Jeffrey Wurgler's website (1962–2007) and based on data from the Federal Reserve (2008–2009).

$GDPGR_t$:Growth in real GDP over the period from July in year t to June in year $t+1$. Data is obtained from the St. Louis Federal Reserve Economic Database.

EAR_{t+1}: The value-weighted average earnings announcement return in year $t+1$, computed as follows. For each firm-year, the average cumulative stock return over trading days [−1,+1] surrounding each of the firm's quarterly earnings announcement dates occurring between July in year $t+1$ and June in year $t+2$ is computed. This is then aggregated to the market level using market capitalization at the end of year t as the weight. We gather quarterly earnings announcement dates from Compustat, which are available starting 1971.

HML_t : The compounded annual return on the equal-weighted HML (High book-to-market Minus Low book-to-market) portfolio over the period from July in year t to June in year $t+1$. Portfolio returns are obtained from the website of Kenneth French.

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