THE ACCRUAL ANOMALY:
EXPLORING THE OPTIMAL INVESTMENT HYPOTHESIS

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ABSTRACT

Interpreting accruals as working capital investment, we hypothesize that firms rationally adjust their investment to respond to discount rate changes. Consistent with the optimal investment hypothesis, we document that (i) the predictive power of accruals for future stock returns increases with the covariations of accruals with past and current stock returns, and (ii) adding investment-based factors into standard factor regressions substantially reduces the magnitude of the accrual anomaly. High accrual firms also have similar corporate governance and entrenchment indexes as low accrual firms. This evidence suggests that the accrual anomaly is more likely to be driven by optimal investment than by investor overreaction to excessive growth or over-investment.

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1 Introduction

In a path-breaking work, Sloan (1996) documents that firms with high accruals earn abnormally low returns on average than firms with low accruals. He interprets the evidence as investors overestimating the persistence of the accrual component of earnings when forming earnings expectations. These investors are systematically surprised later on when realized earnings of high accrual firms fall short of prior expectations and those of low accrual firms exceed prior expectations.

Sloan's (1996) influential work has spurred the development of a large body of empirical literature. One strand of the literature follows Sloan in linking accruals to earnings persistence and security mispricing. For example, Xie (2001) shows that the relation between total accruals and average returns is largely due to discretionary accruals. Richardson, Sloan, Soliman, and Tuna (2005) develop a comprehensive balance sheet categorization of accruals and show that less reliable accruals lead to lower earnings persistence and abnormally low average returns.

Another strand of the literature links accruals to growth attributes. Thomas and Zhang (2002) report that the negative accrual-return relation is mainly due to inventory changes, and interpret this evidence as investors not recognizing the temporary nature of growth. Fairfield, Whisenant, and Yohn (2003) find that accruals and long-term net operating assets growth both predict stock returns negatively, and argue that the market equivalently overvalues these two components of growth in net operating assets. Hirshleifer, Hou, Teoh, and Zhang (2004) document that net operating assets scaled by total assets predicts long-run returns negatively, and argue that investors fail to discount for the unsustainability of earnings growth.

A commonality across most, if not all, existing explanations for the accrual anomaly relies on some form of investor irrationality. In contrast, we propose and test an optimal investment hypothesis of the accrual anomaly that is potentially consistent with rationality. Interpreting accruals as working capital investment, we hypothesize that firms optimally adjust capital investment in response to discount rate changes, as predicted by the neoclassical q-theory of investment (e.g.,

Hayashi 1982). When the discount rate falls, more investment projects become profitable and accruals increase accordingly. At the same time, current returns should increase because stock prices increase due to lower discount rates. But future returns should decrease because lower discount rates mean low expected returns going forward.

Thus, if capital investment optimally adjusts to discount rate changes, accruals should be positively related to current returns and negatively related to future returns. To the extent that investment adjusts with time lags—investment projects take multiple periods to complete, accruals also should be positively correlated to past returns. Because discount rate changes affect past, current, and future returns simultaneously, the magnitude of the accrual anomaly in the cross section should be positively related to the correlation between accruals and current and past returns.

Our empirical tests confirm these predictions. While replicating previous findings that accruals are negatively related to future returns, we show that accruals also are positively related to past and current returns. In cross-sectional regressions, the magnitude of the predictive relations of accruals for future returns increases with the correlation between accruals and past and current returns. We document these results using as accrual measures Sloan's (1996) total accruals, Xie's (2001) discretionary accruals, as well as Hirshleifer, Hou, Teoh, and Zhang's (2004) net operating assets.

More important, the optimal investment hypothesis suggests that controlling for capital investment should go a long way towards in reducing the magnitude of the accrual anomaly. We test this prediction using both the calendar-time factor regressions à la Fama and French (1993) and the characteristic-matching technique à la Sloan (1996). We find that adding investment-based common factors into standard factor models such as the CAPM and the Fama-French three-factor model reduces the total accrual anomaly by on average 46%, the discretionary accrual anomaly by 50%, and the net operating assets anomaly by 82%. And relative to the magnitude of abnormal performance measured as the average size-adjusted abnormal returns as in Sloan, matching on investment-to-assets in addition to size reduces on average the total accrual anomaly by around 50% and 35% in the first and the second post-formation years, respectively. Matching further on investment-to-assets

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reduces the magnitude of the discretionary accrual anomaly by 32% in the first post-formation year and by 41% in the second post-formation year. Doing so also reduces the magnitude of the net operating assets anomaly by 59% in the first post-formation year and by 46% in the second.

Although our evidence is consistent with the optimal investment hypothesis, it is also possible to put forward a mispricing story. For example, investors are likely to overreact to past good news reflected in strong past growth (and investment) only to be systematically surprised later on, giving rise to subsequent reversals in stock prices (e.g., Fairfield, Whisenant, and Yohn 2003; Titman, Wei, and Xie 2004). To distinguish our optimal investment hypothesis from this excessive growth story, we examine the variation in the accrual anomaly across subsamples split on proxies for firms' vulnerability to over-investment or excess growth.

We use two such proxies including Gompers, Ishii, and Metrick's (2003) corporate governance index and Bebchuk, Cohen, and Ferrell's (2005) entrenchment index. Both indexes have been used extensively in the literature to quantify the degree of investor protection. Under the over-investment hypothesis, the negative relation between accruals and future returns should be more pronounced among firms with weaker corporate governance. Presumably, these firms are more vulnerable to over-investment by empire-building managers. We find that the accrual anomaly does not display much systematic variation across governance indexes. More important, the governance structure of firms in the highest accruals decile is indistinguishable from the governance structure of firms in the lowest accruals decile. Our evidence casts doubt on the over-investment hypothesis.

Our story proceeds as follows. Section 2 discusses theoretical motivation for the optimal investment hypothesis and related empirical literature. Section 3 describes our data. We present our main empirical findings in Section 4. Section 5 presents some tests that aim to distinguish our optimal investment hypothesis from the over-investment hypothesis. Finally, Section 6 concludes.

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2 Theoretical Motivation

We interpret accruals as investment in working capital. Doing so opens the door for a rational explanation for the accrual anomaly: Firms rationally adjust their investment levels in response to changes in the discount rate. When the discount rate falls, more investment projects become profitable, giving rise to higher investment and thus accruals. The discount rate can vary across firms due to firm-specific loadings on macroeconomic risk factors.

Our explanation of the accrual anomaly is built on the negative relation between investment and the discount rate. In the language of Brealey, Myers, and Allen (2006), capital investment increases with the net present values, or NPVs, of new projects. These NPVs are inversely related to the costs of capital or expected returns of the new projects, given their expected cash flows. High costs of capital mean low NPVs, which in turn mean low investment. And low costs of capital mean high NPVs, which in turn mean high investment. More important, the average costs of capital for firms that take many new projects are reduced by the low costs of capital of the new projects. But the average costs of capital for firms that do not take many new projects remain relatively high.

This prediction on the negative expected return-investment relation is common across investment-based asset pricing models. Cochrane (1991) is among the first to establish this relation in the neoclassical q-theory framework. In Cochrane's model, firms invest more when their marginal q (the net present value of future cash flows generated from one additional unit of capital) is high. Given expected cash flows, low costs of capital give rise to high values of marginal q and high investment, and high costs of capital give rise to low values of marginal q and low investment. Consistent with this prediction, Cochrane documents that the aggregate investment-to-assets ratio strongly predicts future stock market returns with a negative slope coefficient.

In the real options models of Berk, Green, and Naik (1999) and Carlson, Fisher, and Giammarino (2004), growth options are riskier than assets in place. Capital investment transforms riskier growth options into less risky assets in place in firm value, thereby reducing risk and expected returns.

Zhang (2005) embeds the standard q-theory model into a full-fledged industry equilibrium model and uses it to study the driving forces behind the value premium. Optimal investment means that marginal cost of investment (an increasing function of investment) equals marginal q, which is basically the market-to-book ratio. Thus, growth firms with high market-to-book should invest more and earn low average returns, whereas value firms with low market-to-book should invest less and earn high average returns. Zhang also relates the magnitude of the value premium to capital adjustment technology and time-varying price of risk. The structural tests conducted by Liu, Whited, and Zhang (2007) show that the q-theory model empirically captures the average-return variations across portfolios sorted on investment and on size and book-to-market.

Capital obtained from raising equity is likely to be invested. Based on this observation, Carlson, Fisher, and Giammarino (2006) and Li, Livdan, and Zhang (2007) argue that SEO firms must earn lower expected returns than nonissuers with similar characteristics. Intuitively, firms' uses of funds must add up to the sources of funds, meaning that issuers are more likely to invest more and earn lower average returns than matching nonissuers. Motivated by these two papers, Lyandres, Sun, and Zhang (2007) document that adding the investment factor into standard factor regressions substantially reduces the magnitude of the long-term underperformance following seasoned equity offerings, initial public offerings, and convertible debt issues.

Several other papers also explore the effects of the negative expected return-investment relation in driving asset pricing anomalies. Anderson and Garcia-Feijóo (2006) document that investment growth classifies firms into size and book-to-market portfolios. Xing (2006) shows that an investment growth factor helps explain the value effect. Cooper, Gulen, and Schill (2007) document that the annual asset growth rate is an important determinant in the cross section of returns, but interprets the evidence as investor overreaction. Cooper et al. show that the explanatory power of asset growth in cross-sectional regressions survives an array of controls including accruals.

Most important, compared to the value, equity issuance, and other related anomalies, the accrual anomaly offers an arguably better setting to test the optimal investment hypothesis. The

reason is that accruals represent a direct form of investment. It has long been recognized in the accounting literature that accruals vary systematically with a firm's business stage (see, for example, the textbook treatment in Stickney, Brown, and Wahlen 2003). Recent evidence in the accounting literature also shows that accruals capture fundamental investment in working capital and that investment rather than earnings information in accruals seems to drive the accrual anomaly (e.g., Bushman, Smith, and Zhang 2006; Zhang 2007). In particular, Zhang documents that accruals covary with employee growth, external financing, and other growth aspects of corporate growth, and that the covariation between accruals and other growth attributes explains the magnitude of the accrual anomaly in a cross-sectional setting. Thus, it is only natural to apply the insights from the emerging body of theoretical literature in investment-based asset pricing in the context of the accrual anomaly. Our work makes the first step in this direction.

3 Data

We obtain accruals and other accounting data from the COMPUSTAT Annual Industrial, Full Coverage, and Research files. Stock return data are from CRSP monthly return files for NYSE, AMEX, and NASDAQ firms. Starting with the universe of publicly traded firms, we exclude utility (SIC code between 4900 and 4999) and financial firms (SIC code between 6000 and 6999). These two industries are highly regulated in our sample and thus have accruals that are significantly different from those in other industries. We also exclude firms with negative book values of equity. And only firms with ordinary common equity are included in the tests, meaning that we exclude ADRs, REITs, and units of beneficial interest. The final sample spans 36 years from 1970 to 2005 and includes 127,103 firm-year observations with non-missing accruals and future stock return data.

We consider three accrual measures. Following Sloan (1996), we measure total accruals as changes in non-cash working capital minus depreciation expense scaled by average total assets (TA), where non-cash working capital is the change in non-cash current assets minus the change in current

liabilities less short-term debt and taxes payable. Specifically, total accruals (ACC) are defined as:

$$ACC \equiv (\triangle CA - \triangle CASH) - (\triangle CL - \triangle STD - \triangle TP) - DEP \tag{1}$$

where $\triangle CA$ is the change in current assets (COMPUSTAT annual item 4), $\triangle CASH$ is the change in cash or cash equivalents (item 1), $\triangle CL$ is the change in current liabilities (item 5), $\triangle STD$ is the change in debt included in current liabilities (item 34), $\triangle TP$ is the change in income taxes payable (item 71), and DEP is depreciation and amortization expense (item 14).

We also use discretionary accruals ($DACC$). Xie (2001) finds that the accrual anomaly that Sloan (1996) documents is largely due to discretionary accruals. We measure discretionary accruals using Dechow, Sloan, and Sweeney's (1995) modification of the Jones (1991) model as follows:

$$ACC_t/TA_{t-1} = \alpha_1 \, 1/TA_{t-1} + \alpha_2 \, (\triangle REV_t - \triangle REC_t)/TA_{t-1} + \alpha_3 \, PP\&E_t/TA_{t-1} + e_t \tag{2}$$

where $\triangle REV_t$ is the change in sales in year t (COMPUSTAT annual item 12), $\triangle REC_t$ is the net receivables in year t less net receivables in year $t-1$ and $PP\&E_t$ is the gross property, plant, and equipment in year t (item 7). Following Dechow et al., we estimate regression (2) in the cross section for each two-digit SIC code and year combination, formed separately for NYSE/AMEX firms and for NASDAQ firms. The discretionary accrual scaled by average total assets is defined as the residual from equation (2), e_t, and the fitted component is the non-discretionary accrual.

The third accrual measure that we use is Hirshleifer, Hou, Teoh, and Zhang's (2004) measure of net operating assets. Hirshleifer et al. find that net operating assets scaled by lagged total assets is a strong negative predictor of stock returns. Scaled net operating assets (NOA) are defined as:

$$NOA_t \equiv \frac{\text{Operating Assets}(OA_t) - \text{Operating Liabilities}(OL_t)}{\text{Lagged Total Assets}}$$

where OA_t is total assets (COMPUSTAT annual item 6) minus cash and short-term investment (item 1). OL_t is total assets $-STD_t - LTD_t - MI_t - PS_t - CE_t$, where STD_t is debt included in current liabilities (item 34), LTD_t is long-term debt (item 9), MI_t is minority interests (item 38),

PS_t is preferred stocks (item 130), and CE_t is common equity (item 60).

We use NOA in our tests because it is closely related to the comprehensive measure of accruals used by Richardson, Sloan, Soliman, and Tuna (2005). Richardson et al. develop a balance sheet categorization of accruals and rate each category based on the reliability of the underlying accruals. The authors argue that less reliable accruals lead to lower earnings persistence and that investors do not fully anticipate the lower earnings persistence, leading to significant mispricing.

Table 1 reports descriptive statistics. To alleviate the effects of outliers, we winsorize all variables at 1% and 99%. Panel A shows that, consistent with Sloan (1996), total accruals tend to be negative with a mean of -0.016. By construction, the mean of discretionary accruals is close to zero. The net operating assets have a mean of 0.748 and a standard deviation of 0.36. From Panel B, all three accrual measures are positively correlated. For example, total accruals have Spearman correlations of 0.66 and 0.28 with discretionary accruals and NOA, respectively. And the correlation is 0.27 between discretionary accruals and NOA. All these correlations are significantly different from zero.

All accrual measures are positively correlated with investment-to-assets, measured as the annual change in gross property, plant, and equipment (COMPUSTAT annual item 7) plus the annual change in inventories (item 3) divided by the lagged book value of assets (item 6). We use changes in property, plant, and equipment to capture investment in long-lived assets for operations over many years such as buildings, machinery, furniture, and other equipment. And we use changes in inventories to capture investment in short-lived assets within a normal operating cycle such as merchandise, raw materials, supplies, and work in progress. Our main purpose is to choose a measure accepted in the literature as capturing fundamental investment and to examine whether this investment variable helps explain the accrual anomaly. As expected, the Spearman correlations of investment-to-assets with $ACC, DACC$, and NOA are 0.23, 0.21, and 0.51, respectively, all of which are significantly different from zero, but are far less than 1.

4   Main Results

We present our main results on testing the optimal investment hypothesis. We proceed in four steps. First, we explore the effects of past and current returns on the magnitude of the accrual anomaly in Section 4.1. Second, in Section 4.2, we use the standard calendar-time factor regression approach à la Fama and French (1993, 1996) to quantify the effects of investment in driving the accrual anomaly. Third, in Section 4.3, we calculate characteristic-adjusted abnormal returns using the event-time regression approach of Sloan (1996). Finally, in Section 4.4, we examine how investment and profitability vary across extreme accrual portfolios.

4.1   Past/Current Returns and the Accrual Anomaly

Changes in the discount rate should affect the investment level, current stock returns, and expected stock returns simultaneously. Consequently, accruals should be positively related to current stock returns and negatively related to future stock returns if investment adjusts instantly in response to changes in the discount rate. To the extent that investment adjusts with a lag, accruals should also be positively related to past stock returns. We study these testable implications in this subsection.

The Lead-Lag Relations between Accruals and Stock Returns

We use the Fama and French (1993) portfolio approach. Specifically, we sort stocks in June of each year t into ten accrual portfolios and calculate average future stock returns from July of year t to June of year $t+1$ (RET_{t+1}), where the accruals are measured at the fiscal year-end of year $t-1$.

The last column in each panel of Table 2 reports the accrual anomaly. Most of the literature on the accrual anomaly reports equal-weighted portfolio returns. From Panel A, average equal-weighted RET_{t+1} decreases from 18.7% per annum for the low-ACC decile to 9.8% for the high-ACC decile. The low-minus-high ACC portfolio earns an average return of 8.9% per annum (t-statistic $= 5.92$). From Panel B, a spread in average equal-weighted return of 9.0% per annum appears across the two extreme discretionary accrual deciles. The corresponding average return spread is higher across the NOA deciles. From Panel C, the average equal-weighted return decreases from

20.6% per annum for the low-NOA decile to 5.9% for the high-NOA decile. The low-minus-high NOA portfolio earns an average return of 14.6% (t-statistic = 4.81). This evidence is consistent with previous studies by Sloan (1996), Xie (2001), and Hirshleifer, Hou, Teoh, and Zhang (2004).

Using value-weighted returns does not materially affect the magnitude of the relations of average returns with total accruals and discretionary accruals. The low-minus-high ACC portfolio earns a value-weighted average return of 7.3% per annum (t-statistic = 3.02), and the low-minus-high $DACC$ portfolio earns a value-weighted average return of 7.6% per annum (t-statistic = 3.98). However, using value-weighted returns dramatically reduces the average return of the low-minus-high NOA portfolio to 6.9% per annum (t-statistic = 1.91). The reason is that the highest NOA decile has an equal-weighted average return of 5.9% per annum, which is much lower than that of 13.4% for the ninth NOA-decile. But the big gap is largely absent when we use value-weighted returns.

More important, unlike the decreasing relation with future returns, accruals exhibit increasing relations with past and current stock returns. We associate accruals measured at the fiscal year-end of year $t-1$ (or equivalently, at the beginning of year t) to the annual stock returns from the beginning to the end of fiscal year $t-1$, which we call current stock returns (RET_t). To allow for investment lags, we also associate accruals at the fiscal year-end of year $t-1$ to the annual returns from the beginning to the end of fiscal year $t-2$, which we call past stock returns (RET_{t-1}). We again use both equal-weighted and value-weighted returns.

Panel A of Table 2 shows that, as total accruals increase from decile one to ten, the equal-weighted RET_t increases from 6.5% to 34.7% per annum, and the equal-weighted RET_{t-1} increases from 3.7% to 42.8%. The return spreads of -39% and -28% are highly significant (t-statistics = -11.42 and -10.65, respectively). Panel B shows that a somewhat weaker pattern is present across the $DACC$ deciles. The equal-weighted RET_t and RET_{t-1} spreads across the two extreme $DACC$ deciles are 7.4% and 24.3% per annum (t-statistics = -1.98 and -12.45), respectively. From Panel C, the average equal-weighted RET_t and RET_{t-1} spreads across the two extreme NOA deciles are -18% and -34.4% per annum (t-statistics = -6.41 and -11.11), respectively. Using value-weighted

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returns yields similar, but quantitatively weaker results. In all, the evidence on the positive relations of accruals with past and current returns is consistent with our optimal investment hypothesis.

Conditional Analysis of the Accrual Anomaly

The optimal investment hypothesis suggests that the magnitude of the accrual anomaly should vary cross-sectionally, depending on the correlation between accruals and current and past stock returns. In industries in which accruals exhibit strong positive relations with past and current stock returns, accruals are more likely to capture information about changes in the discount rate and thus should have stronger predictive power for future stock returns. In industries in which accruals are not correlated with past and current stock returns, we should not expect to find such predictive power.

To test this implication, we first estimate the sensitivity of accruals to changes in the discount rate for each two-digit SIC industry based on the most recent three years of data (years $t-2, t-1$, and t). Specifically, we estimate the three-year rolling panel regression:

$$ACC_{j\tau}[DACC_{j\tau}, NOA_{j\tau}] = \alpha_{0t} + \alpha_{1t} RET_{j\tau} + \alpha_{2t} RET_{j\tau-1} + \epsilon_{jt} \tag{3}$$

where $\tau = t-2, t-1$, and t and $ACC_{j\tau}[DACC_{j\tau}, NOA_{j\tau}]$ denotes total accruals, discretionary accruals, or net operating assets at year τ for firm j in a given two-digit SIC industry. The sensitivity of accruals to changes in the discount rate is defined as $S_t \equiv \alpha_{1t} + \alpha_{2t}$. A higher S_t indicates that accruals are more positively correlated to past and current stock returns, meaning that accruals contain more information on changes in the discount rate.

In untabulated results, we find that manufacturing (SIC codes between 2000 and 3999) and wholesales and retail (SIC codes between 5000 and 5999) industries have high accrual-discount-rate sensitivities. Agriculture and mining (SIC codes between 0100 and 1999) and service (SIC codes between 7000 and 8999) industries have low sensitivities. The evidence suggests that the information content of accruals depends on a firm's business model, as suggested by Zhang (2007).

After estimating the accrual-discount-rate sensitivities for all the industries each year, we assign

the sensitivity of a given two-digit SIC industry to all the firms within that industry. We estimate the sensitivities at the industry portfolio level because firm-level estimates tend to be less precise. The idea is similar to that of Fama and French (1992), who estimate firm-level market betas as betas of corresponding portfolios sorted on pre-ranking betas and market equity.

To examine how the magnitude of the accrual anomaly varies with the accrual-discount-rate sensitivity, we perform the following annual Fama-MacBeth (1973) cross-sectional regression:

$$ACC_t[DACC_t, NOA_t] = \beta_0 + \beta_1 \, RET_{t+1} + \beta_2 \, S_t + \beta_3 \, (S_t \times RET_{t+1}) + e_t \tag{4}$$

The optimal-investment hypothesis predicts a stronger correlation between accruals and future returns when accruals covary more with past and current returns. Because accruals and future returns are negatively correlated, our hypothesis predicts a negative slope on the interaction term.

The evidence is consistent with our hypothesis. Panel A of Table 3 shows that, when we use total accruals as the dependent variable, the interaction term has a negative coefficient of -0.111 (t-statistic $= -2.78$). Using discretionary accruals increases the magnitude of the negative coefficient to -0.186, but decreases that of the t-statistic to -1.65. And when we use net operating assets as the dependent variable, the interaction term has a negative coefficient of -0.107 (t-statistic $= -2.58$). The evidence suggests that the predictive power of accruals for future returns increases with the sensitivity of accruals to changes in the discount rate.

4.2 Calendar-Time Factor Regressions

The optimal investment hypothesis suggests that the accrual anomaly reflects the negative relation between investment and the discount rate. Controlling for investment should therefore reduce the magnitude of the accrual anomaly. We test this implication using the standard factor regression approach à la Fama and French (1993, 1996).

Testing Portfolios

In June of each year t, we sort stocks into ten deciles based on the accruals at the fiscal year-end of year $t-1$, and form the zero-investment portfolio long in the low-accrual portfolio and short in the high-accrual portfolio. Both equal-weighted and value-weighted monthly returns on the zero-investment portfolio are calculated from July of year t to June of year $t+1$. We regress the portfolio returns on the market factor and on the Fama and French (1993) three factors to measure abnormal returns as the intercepts (alphas) from these factor regressions. To evaluate the explanatory power of investment in driving the accrual anomaly, we augment these standard factor models with an investment-based common factor. We quantify the explanatory power of investment using the percentage reduction in the magnitude of the alphas induced by the investment factor.

Investment-Based Common Factors

We do a double sort on size and investment-to-assets. In June of each year t from 1970 to 2005, all NYSE stocks on CRSP are sorted on market equity (price times shares). We use the median NYSE size to split NYSE, AMEX, and NASDAQ stocks into two groups. We also break NYSE, AMEX, and NASDAQ stocks into three investment-to-assets groups based on the breakpoints for the low 30%, middle 40%, and high 30% of the ranked values for stocks traded on all three exchanges. Six portfolios are formed from the intersections of the two size and the three investment-to-assets groups. Monthly returns on the six portfolios are calculated from July of year t to June of $t+1$, and the portfolios are rebalanced in June of $t+1$.

The investment-based factors are designed to mimic the common variations in returns related to capital investment. Corresponding to the weighting scheme in the dependent low-minus-high accrual portfolio returns, we both equal-weight and value-weight the six portfolio returns. INV_{vw} is the difference between the simple average of the value-weighted returns on the two low investment-to-assets portfolios and the simple average of the value-weighted returns on the two high investment-to-assets portfolios. And INV_{ew} is the difference between the simple average of the equal-weighted

returns on the two low investment-to-assets portfolios and the simple average of the equal-weighted returns on the two high investment-to-assets portfolios.

Table 4 reports descriptive statistics for the value-weighted investment factor, INV_{vw}, and the equal-weighted investment factor, INV_{ew}. Both factors are profitable. The average INV_{vw} return is 0.60% per month (t-statistic = 5.89) and the average INV_{ew} return is 0.77% (t-statistic = 8.04). Other common factors such as the market factor MKT, the size factor SMB, the value factor HML, and the momentum factor WML cannot explain the average returns of the investment factors.[1] Regressing the investment factors on these common factors leaves significant and positive alphas unexplained. Specifically, the Fama-French alpha of INV_{vw} is 0.66% per month (t-statistic = 7.05), and that of INV_{ew} is 0.81% (t-statistic = 9.25). And the R^2s from these factor regressions are relatively low, with the highest being 33%. Finally, INV_{vw} and INV_{ew} are negatively correlated with MKT and SMB, but are positively correlated with HML and WML. Overall, the evidence suggests that the investment-based common factors capture average return variations that are not subsumed by the other well-known factors commonly used in empirical finance.

Regression Results

Table 5 reports the factor regressions estimated with Ordinary Least Squares. Using Weighted Least Squares regressions yields quantitative similar results (untabulated). We find that adding the investment factors can explain on average 46% of the total accrual anomaly, 50% of the discretionary accrual anomaly, and 82% of the net operating assets anomaly.[2]

Specifically, from Panel A of Table 5, the equal-weighted CAPM alpha of the low-minus-high ACC portfolio is 0.74% per month (t-statistic = 5.42). Adding the equal-weighted investment factor into the factor regression reduces the alpha by 34% to 0.49%, albeit still significant (t-statistic = 3.25). Further, the value-weighted CAPM alpha of the zero-cost ACC portfolio equals 0.78% per month (t-statistic = 3.39). Adding the value-weighted investment factor into the regression reduces

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[1] The data for the Fama-French (1993) factors and the momentum factor are from Kenneth French's Web site.

[2] For example, 46% is the average of the four numbers reported in the column denoted $\triangle\alpha/\alpha$ in Panel A of Table 5.

the alpha by 69% to an insignificant level of 0.24% (t-statistic = 1.04). Using the Fama-French (1993) three-factor model as the benchmark to measure the alphas yields quantitatively similar results, but the percentage reductions in the alphas are somewhat lower. Most important, the zero-cost accrual portfolio has significant positive loadings on the investment factors in all specifications.

The results for the discretionary accrual portfolios are largely similar to those for the total accrual portfolios. For example, from Panel B of Table 5, the equal-weighted CAPM alpha of the zero-cost $DACC$ portfolio is 0.64% per month (t-statistic = 5.80). Adding the equal-weighted investment factor reduces the alpha by 34% to 0.42% (t-statistic = 3.46). The value-weighted CAPM alpha of the zero-cost $DACC$ portfolio is 0.63% per month (t-statistic = 3.05). Adding the value-weighted investment factor reduces the alpha by 71% to 0.18% (t-statistic = 0.86). And the zero-cost $DACC$ portfolio has significant positive loadings on the investment factors in all specifications.

Capital investment plays a more important role in driving the NOA anomaly. From Panel C of Table 5, the equal-weighted CAPM alpha of the zero-cost NOA portfolio is 1.34% per month (t-statistic = 7.21). Adding the equal-weighted investment factor reduces the alpha by 91% to 0.13% per month (t-statistic = 0.78). The value-weighted CAPM alpha for the portfolio is 0.84% per month (t-statistic = 3.79). Adding the value-weighted investment factor reduces the alpha by 88% to 0.10% (t-statistic = 0.47). Most important, the zero-cost NOA portfolio has positive and highly significant loadings on the investment factors in all specifications.

4.3 Characteristic-Adjusted Abnormal Returns

Instead of the Fama-French (1993) calendar-time factor regressions, the accrual anomaly literature has traditionally used the characteristics matching technique to measure the magnitude of abnormal returns (e.g., Sloan 1996, Table 6). In this subsection, we aim to quantify the explanatory power of investment in driving the accrual anomaly using this technique. The basic results are similar to those from the factor regressions.

We largely follow Sloan (1996, Table 6) in our empirical practice. Specifically, in June of each

year t, we assign firms into ten deciles based on the magnitude of accruals at the fiscal year-end of year $t-1$. The return cumulation for years $t+1, t+2$, and $t+3$ begins from July of year t to June of year $t+1$, July of year $t+1$ to June of year $t+2$, and July of year $t+2$ to June of year $t+3$, respectively. We compute the size-adjusted abnormal returns by calculating the buy-and-hold returns for each firm and then subtracting the return on a size matched portfolio of firms. The size portfolios are based on market equity deciles of NYSE, AMEX, and NASDAQ firms with breakpoints of NYSE and AMEX firms.

The size-and-investment-adjusted abnormal returns are computed by calculating the buy-and-hold returns for each firm and then subtracting the return on a size-and-investment-matched portfolio of firms. The size and investment portfolios are based on a sequential sort on size and investment-to-assets (independent sorts lead to some portfolios with too few firms). Starting from the ten size deciles used for size-adjusted returns, we further split each size decile on investment-to-assets using breakpoints on NYSE, AMEX, and NASDAQ firms. Most important, the relative magnitudes of the average abnormal returns with and without matching on investment-to-assets provide a quantitative measure of the explanatory power of investment as a driver of the accrual anomaly.

Table 6 presents the detailed results. In the top half of the table, we equal-weight a given accrual portfolio and its corresponding matching portfolios for all the firms in that portfolio. From Panel A, the zero-cost low-minus-high total accrual portfolio earns an average equal-weighted size-adjusted abnormal returns of 7.31%, 4.50%, and 4.11% per annum in the first, second, and third post-formation years, respectively. All of these average abnormal returns are significantly different from zero at the one percent significance level. Matching on investment-to-assets in addition to size reduces these average abnormal returns to 3.70%, 2.58%, and 3.10% per annum, which represent reductions of 49%, 43%, and 25% from their respective size-adjusted levels. Further, the average abnormal return after adjusting for investment is significant only at the five percent level in the first and third years, and is insignificant in the second year.

In the bottom half of Table 6, we value-weight a given accrual portfolio and its corresponding

matching portfolios for all the firms in that portfolio. Panel A shows that the average value-weighted size-adjusted abnormal return for the low-minus-high total accrual portfolio is 7.30% per annum (t-statistic = 4.22) in the first post-formation year, and 5.37% (t-statistic = 3.03) in the second post-formation year. The abnormal performance is insignificant in in year $t + 3$. Matching further on investment-to-assets reduces the abnormal performance to 3.34% per annum (t-statistic = 1.83) in year $t + 1$ and to 3.85% (t-statistic = 2.34) in year $t + 2$. The implied reductions amount to 54% and 28% of the size-adjusted levels.

Panel B of Table 6 reports largely similar results for portfolios sorted on discretionary accruals. The percentage reductions in the abnormal performance induced by matching further on investment-to-assets are somewhat lower in the first post-formation year, but are higher in the following year. For example, the average equal-weighted size-adjusted abnormal return is 8.43% per annum (t-statistic = 7.43) and 4.23% (t-statistic = 4.20) in years $t + 1$ and $t + 2$. Additional matching on investment-to-assets reduces these abnormal returns by 40% and 46% to 5.31% and 2.30% per annum, albeit still significant with t-statistics of 4.22 and 2.39, respectively.

Investment also plays an important role in driving the NOA anomaly. From Panel C of Table 6, the average equal-weighted size-adjusted abnormal return for the low-minus-high NOA portfolio is 14.36%, 8.21%, and 4.74% per annum (t-statistics = 4.23, 2.56, and 1.87) in years $t + 1, t + 2$, and $t + 3$, respectively. Additional matching on investment-to-assets reduces these average abnormal returns by 62%, 63%, and 65% to 5.53%, 3.04%, and 1.66% per annum (t-statistics = 2.53, 1.36, and 0.92), respectively. Value-weighting returns yields largely similar results. The value-weighted size-adjusted abnormal performance only shows up in the first two post-formation years, 9.15% and 6.51% per annum (t-statistics = 2.64 and 2.20), respectively. Matching further on investment-to-assets reduces these average abnormal returns to 4.05% per annum (t-statistic = 1.34) in year $t + 1$ and 4.60% (t-statistic = 1.85) in year $t + 2$.

4.4   Why Can Capital Investment Help Explain the Accrual Anomaly?

To understand the sources of the explanatory power of investment in driving the accrual anomaly, we study the investment and profitability behavior for high and low accrual firms. Table 1 shows that the correlations of accruals with earnings and investment are similar in magnitude (Pearson 0.21, Spearman 0.23). We now show that the investment-to-assets spread between the high and low accrual firms is much larger than the corresponding profitability spread. This evidence means that the accrual anomaly is more likely to be driven by investment-to-assets rather than by profitability.

Methodology

We use the standard event study framework à la Fama and French (1995). Specifically, we examine event-time evolution of median investment-to-assets and median return-on-assets for extreme accrual deciles. In June of each year t, we assign stocks into ten accruals deciles based on the magnitude of the accruals at the fiscal year-end in year $t - 1$. The median investment-to-assets or return-on-assets ratios for the two extreme accrual deciles are calculated for $t + i, i = -3, \ldots 3$. We then average the median investment-to-assets and the median return-on-assets of each accrual portfolio for event-year $t+i$ across portfolio formation year t. As noted, we measure investment-to-assets as the sum of the annual change in gross property, plant, and equipment (COMPUSTAT annual item 7) and the annual change in inventories (item 3) divided by the lagged total assets (item 6). And we measure return-on-assets as earnings (income before extraordinary items, item 18) divided by the lagged total assets (item 6). Using the same denominator in calculating investment-to-assets and return-on-assets facilitates the interpretation of their relative magnitude.

Investment-to-Assets

Panel A of Figure 1 shows that, the decile with the highest total accruals has higher investment-to-assets for one year before and one year after the portfolio formation. In particular, at year zero (portfolio formation), the high total accrual decile has an investment-to-assets of 0.27 per annum, whereas the low total accrual decile has an investment-to-assets of 0.10. From Panel B, the two

extreme deciles based on discretionary accruals display a similar investment pattern. Panel C shows that the extreme NOA deciles display a more dramatic pattern in investment. At year zero, the high NOA decile has an investment-to-assets of 0.49, whereas the low NOA decile has an investment-to-assets of 0.05. Although a large portion of the investment-to-assets spread converges for one year before and one year after the year zero, the spread remains positive for all the seven years around the portfolio formation. Because the low-minus-high investment factors earn significant positive average returns (0.60% per month for the value-weighted factor and 0.77% for the equal-weighted factor), the investment-to-assets spreads across extreme accrual portfolios help explain the accrual anomaly.

Panels A to C of Figure 1 document an interesting pattern of asymmetry: Firms with high total accruals, discretionary accruals, and net operating assets all display upward spikes in investment-to-assets at the portfolio formation. But firms with low total accruals, discretionary accruals, and net operating assets do not display symmetric downward spikes in investment-to-assets. We interpret this evidence as suggesting the empirical relevance of costly reversibility, meaning that it is more costly for firms to downsize than to expand the scale of productive assets. Specifically, firms in the lowest deciles of total accruals and discretionary accruals have a median rate of capital depreciation around 10% per annum. And firms in the lowest NOA decile have a median rate of depreciation around 5%. Firms pay low costs of adjustment when their rates of investment are high than their rates of depreciation. But firms pay high costs of adjustment when their rates of investment are lower than their rates of depreciation, meaning their scale of production is decreasing.[3]

Return-on-Assets

Figure 1 also examines the return-on-assets of extreme accrual portfolios for seven years around the portfolio formation. This step is important. As noted in Section 2, the negative relation between investment-to-assets and average returns is conditional on profitability. High investment can be induced by not only low costs of capital but also high profitability. More important, more

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[3]Costly reversibility has received much attention in the investment literature (e.g, Abel and Eberly 1994). Zhang (2005) and Cooper (2006) explore the effects of costly reversibility in the cross-section of returns.

profitable firms earn higher average returns than less profitable firms (e.g., Fama and French 2006). The investment spreads between high and low accrual portfolios go the right way in explaining the accrual anomaly, but the profitability spreads can potentially go the wrong way. Indeed, we find that high accrual firms are more profitable than low accrual firms. More important, however, the return-on-assets spreads are much smaller than their corresponding investment-to-assets spreads, meaning that the investment spreads play a quantitatively dominant role in driving the accrual anomaly.

Panels D to F of Figure 1 report the details. The spread in return-on-assets between the two extreme total accrual deciles is 0.09 per annum, which is only 56% of the corresponding spread in investment-to-assets (0.17). Further, the return-on-assets spread between the two extreme deciles sorted on discretionary accruals is even smaller at 0.05 per annum, which amounts to 36% of the corresponding investment-to-assets spread (0.14). Finally, the return-on-assets spread between the two extreme NOA deciles is slightly less than 0.09 per annum, which is less than 20% of the corresponding investment-to-assets spread (0.44).

5 Optimal Investment vs. Over-investment: The Effects of Corporate Governance

Although our results so far support the optimal investment hypothesis, the results are also largely consistent with an over-investment hypothesis (e.g., Titman, Wei, and Xie 2004; Cooper, Gulen, and Schill 2007). The difference is that while we argue that optimal investment drives the negative relation between investment and expected returns, Titman et al. and Cooper et al. argue that investor underreaction to over-investment by empire-building managers drives the negative relation between investment and average abnormal returns. More important, the over-investment hypothesis is also related to Fairfield, Whisenant, and Yohn's (2003) hypothesis for the accrual anomaly. Fairfield et al. argue that investors do not understand the implications of growth in net operating assets for future profitability, thereby overpricing firms with high accruals and underpricing firms with low accruals. In this section, we present some tests that aim to distinguish our

optimal investment hypothesis from the over-investment hypothesis.

Our tests are built on the following simple idea. Under the over-investment hypothesis, the negative investment-return relation should be stronger among firms that are more vulnerable to over-investment by empire-building managers. To operationalize this idea, we split the sample into two based on ex-ante measures of vulnerability to empire-building. We then perform Fama-MacBeth (1973) cross-sectional regressions of future stock returns on accrual measures and compare the magnitudes of the coefficients across the two subsamples. As an alternative, we also directly compare measures of vulnerability to empire-building across low and high accrual firms.

Motivated by recent corporate governance literature, we measure a firm's vulnerability to empire-building using the corporate governance index of Gompers, Ishii, and Metrick (2003). Democratic firms with strong shareholder rights (low values of the governance index) should be less vulnerable to over-investment than dictatorial firms with weak shareholder rights (high values of the governance index). Indeed, Gompers et al. show that firms with stronger shareholder rights have lower capital expenditures and make fewer corporate acquisitions than firms with weaker shareholder rights. Under the over-investment hypothesis, firms with strong shareholder rights should display weaker investment-return relation than firms with weak shareholder rights.

Several papers have recently cast doubt on the governance index of Gompers, Ishii, and Metrick (2003). Bebchuk, Cohen, and Ferrell (2005) show that an entrenchment index based on six out of 24 IRRC provisions fully drives the negative relation between the governance index and stock returns (see also Bebchuk and Cohen 2005). The relation between the entrenchment index and future stock returns is robust during the 1990–2003 period. In contrast, Core, Guay, and Rusticus (2005) show that the correlation between the governance index and future returns exhibit a reversal from 2000 to 2003 following Gompers et al.'s sample period from 1990 to 1999.

Further, the entrenchment index seems a more precise measure of vulnerability to empire-building than the governance index. Among the six provisions included in the entrenchment index are four provisions that directly limit the power of a majority of shareholders, provisions including

staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, and supermajority requirements for charter amendments. The other two provisions reduce the likelihood of a hostile takeover (poison pills and golden parachutes).

We take the intersection of our sample with the sample of Gompers, Ishii, and Metrick (2003) from Andrew Metrick's Web site. Because of data restrictions, the sample is from 1990 to 2005. This intersection has between 748 and 1,5223 firms each year with an average of 1,071 firms. We define the democratic sample with the governance index less than or equal to nine (the median) and the dictatorial sample with the governance index greater than or equal to ten. We also take the intersection of our sample with the sample of Bebchuk, Cohen, and Ferrell (2005) from Lucian Bebchuk's Web site. This intersection has between 660 and 1,312 firms each year from 1990 to 2004 with an average of 932 firms. We define the low-entrenchment sample with the entrenchment index less than or equal to two (the median) and the high-entrenchment sample with the index greater than or equal to three.

Table 7 reports Fama-MacBeth (1973) cross-sectional regressions of future returns on accruals using the samples partitioned by Gompers, Ishii, and Metrick's (2003) corporate governance index (G-index) and by Bebchuk, Cohen, and Ferrell's (2005) entrenchment index (E-index). Under the over-investment hypothesis, we expect to see a stronger negative relation between accruals and future returns in the weak-governance sample. The evidence is not affirmative. Only when we use total accruals and G-index, do we observe a negative coefficient of accruals with a higher magnitude in the weak-governance sample than that in the strong-governance sample, -0.49 versus -0.30 in univariate regressions. However, when we use the E-index to split the sample, the result is reversed, -0.26 versus -0.44 (Panel A). Using discretionary accruals and net operating assets generate negative coefficients of accruals with largely similar magnitudes across the subsamples partitioned by corporate governance. The exception is that, from Panel B, the magnitude of the slope for discretionary accruals in the high-entrenchment sample is smaller than that in the low-entrenchment sample, -0.095 (t-statistic $= -1.28$) versus -0.342 (t-statistic $= -4.81$). Adding size and book-to-market in the regressions does not affect the basic results. Overall, the evidence

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casts doubt on the over-investment hypothesis.

As an alternative test, we also directly examine the variation of corporate governance across the accrual portfolios. Under the over-investment hypothesis, we should expect to see that high accrual firms should be more vulnerable to empire-building, and should thus have weaker shareholder rights (higher G-index) and higher degrees of entrenchment (higher E-index) than low accrual firms.

The evidence again fails to support the over-investment hypothesis. Table 8 shows that high accrual firms and low accrual firms have on average similar median governance and entrenchment indexes. For example, the median G-index of the top ACC decile is 8.50, which is even lower than that of the bottom ACC decile of 8.67. The Z-statistic of -3.07 of the Wilcoxon matched-pairs test means that the distribution of the high-ACC firms is more skewed to the left than the distribution of the low-ACC firms. Using E-index yields similar results, but the difference in distribution is insignificant. If anything, the evidence suggests that firms with high accruals have similar governance as or even more democratic governance than firms with low accruals. Untabulated results show that the mean governance and entrenchment indexes are also similar across the extreme accrual deciles. The evidence is largely similar across portfolios sorted on discretionary accruals. For net operating assets, high investment firms indeed have higher G- and E-index than low investment firms. The difference in E-index is significant, but the difference in G-index is not. Overall, the cross-sectional variation in corporate governance index across extreme accrual portfolios fails to support the over-investment or excess growth hypothesis.

6 Conclusion

Investment is an important driver of the accrual anomaly. Treating accruals as working capital investment, we hypothesize that firms rationally adjust their investment levels in response to changes in the discount rate. Consistent with this optimal investment hypothesis, we report three main findings. First, the predictive power of accruals for future stock returns increases with the covariations of accruals with past and current stock returns. Second, adding investment-based factors into

standard factor regressions and using investment-to-assets as an extra matching characteristic in calculating abnormal returns substantially reduce the accrual anomaly. Finally, high accrual firms have similar governance and entrenchment indexes as low accrual firms, inconsistent with the view that the accrual anomaly is driven by investor overreaction to excessive growth or over-investment.

Although our tests on the mispricing argument are helpful, we recognize that mispricing could take a variety of forms and definitively distinguishing rational from irrational explanations of the accrual anomaly is perhaps impossible. In particular, we interpret the investment factors as common factors of stock returns. While Fama and French (1993, 1996) pursue a more aggressively interpretation on their similarly constructed SMB and HML factors as risk factors motivated from ICAPM or APT, we do not take a stance on the risk interpretation. However, we do emphasize that, unlike size and book-to-market, investment-to-assets does not involve the market value of equity, at least directly, and is thus less likely to be affected by mispricing.

It is tempting to interpret the investment factors as risk factors. Future work can link the investment factors to macroeconomic fluctuations empirically as in, for example, Liew and Vassalou (2000). We can also study the covariations of the cash flows of the investment factors to aggregate cash flows, perhaps along the lines of Bansal, Dittmar, and Lundblad (2005).

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Table 1 : Descriptive Statistics (January 1970–December 2005)

This table presents the summary statistics of total accruals (Sloan 1996), discretionary accruals (Dechow, Sloan, and Sweeney 1995), net operating assets (Hirshleifer, Hou, Teoh, and Zhang 2004), earnings, cash flows, market equity (ME), book-to-market equity (BE/ME), and investment-to-assets (I/A). Panel A reports the mean, standard deviation (Std), min, 25% percentile, median, 75% percentile, and max for these variables. Panel B reports their cross correlations. Total accruals, denoted ACC, are measured as the change in non-cash current assets (COMPUSTAT annual item 4 minus item 1), less the change in current liabilities (exclusive of short-term debt and taxes payable) (item 5 minus items 34 and 71), less depreciation expense (item 14), all divided by average total assets (the sum of item 6 and lagged item 6 divided by two). Discretionary accruals, denoted $DACC$, are measured as the residuals from the estimation of Dechow et al.'s modification of the original Jones (1991) model cross-sectionally for each SIC code and year combination. Following Hirshleifer et al., we measure net operating assets, denoted NOA, as operating assets minus operating liabilities, both divided by lagged total assets. Operating assets are total assets minus cash and short-term investment (item 1), and operating liabilities are total assets less debt included in current liabilities (item 34), less long term debt (item 9), less minority interests (item 38), less preferred stocks (item 130), less common equity (item 60). Cash flows are measured as the difference between earnings, defined as income before extraordinary items (item 18), and total accruals. Both earnings and cash flows are scaled by average total assets (item 6). ME (in millions of dollars) is the share price at the end of June in year t times the number of share outstanding. The book value (BE) is defined as the stockholders' equity (item 216), minus preferred stock, plus balance sheet deferred taxes and investment tax credit (item 35) if available, minus post-retirement benefit asset (item 330) if available. If stockholder's equity value if missing, we use common equity (item 60) plus preferred stock par value (item 130). We measure preferred stock as preferred stock liquidating value (item 10) or preferred stock redemption value (item 56) or preferred stock par value (item 130) in that order of availability. If these variable are missing, we use book assets (item 6) minus liabilities (item 181). BE/ME is calculated by using the book value and market value at the end of the fiscal year. Investment-to-assets is defined as the annual change in gross property, plant, and equipment (item 7) plus the annual change in inventories (item 3) divided by the lagged book value of assets (item 6).

Panel A: Descriptive statistics							
Variables	Mean	Std	Min	25%	Median	75%	Max
ACC	−0.016	0.10	−0.50	−0.07	−0.02	0.03	0.50
$DACC$	0.008	0.14	−1.62	−0.04	0.00	0.05	2.32
NOA	0.748	0.36	−0.45	0.60	0.74	0.87	8.61
Cash flows	0.093	0.18	−1.42	0.04	0.12	0.19	0.53
Earnings	0.077	0.17	−1.62	0.04	0.10	0.16	0.47
ME	1247.8	8536.3	0.01	21.3	86.6	421.6	463699.8
BE/ME	1.399	5.43	0.00	0.36	0.66	1.17	154.14
I/A	0.145	0.20	0.00	0.04	0.09	0.17	3.55

Panel B: Cross correlations (Pearson/Spearman correlations above/below the diagonal)							
	ACC	$DACC$	NOA	Cash flows	Earnings	ME	BE/ME	I/A
ACC	1	0.58	0.27	−0.34	0.21	−0.04	−0.04	0.21
$DACC$	0.66	1	0.19	−0.34	0.09	0.00	−0.01	0.15
NOA	0.28	0.27	1	−0.05	0.16	−0.02	−0.01	0.63
Cash flows	−0.42	−0.23	0.01	1	0.84	0.09	0.00	−0.09
Earnings	0.23	0.09	0.17	0.71	1	0.07	−0.02	0.03
ME	−0.10	−0.02	−0.05	0.32	0.27	1	−0.03	−0.02
BE/ME	−0.03	0.02	0.09	−0.12	−0.20	−0.40	1	−0.02
I/A	0.23	0.21	0.51	−0.00	0.19	0.01	−0.10	1

Table 2 : The Lead-Lag Relations between Accruals and Stock Returns (January 1970–December 2005)

This table reports the portfolio averages of accruals, the annual returns from July of year t to June of year $t+1$ (RET_{t+1}), the annual returns for fiscal year t (RET_t), and the annual returns for fiscal year $t-1$ (RET_{t-1}). Panel A reports these averages for ten portfolios sorted on Sloan's (1996) total accrual measure, Panel B does the same for ten portfolios sorted on Dechow, Sloan, and Sweeney's (1995) discretionary accrual measure, and Panel C for ten portfolios sorted on Hirshleifer, Hou, Teoh, and Zhang's (2004) net operating assets measure. Following Fama and French (1993), we form portfolios in June of year t based on the accrual measures at the fiscal year-end of $t-1$. The portfolio sorts are effective from July of year t to June of year $t+1$. Total accruals, denoted ACC, are measured as the change in non-cash current assets (COMPUSTAT annual item 4 minus item 1), less the change in current liabilities (exclusive of short-term debt and taxes payable) (item 5 minus items 34 and 71), less depreciation expense (item 14), all divided by average total assets (the sum of item 6 and lagged item 6 divided by two). Discretionary accruals, denoted $DACC$, are measured as the residuals from the estimation of Dechow, Sloan, and Sweeney's modification of the original Jones (1991) model cross-sectionally for each SIC code and year combination. Following Hirshleifer et al., we measure net operating assets, denoted NOA, as operating assets minus operating liabilities, both divided by lagged total assets. Operating assets are total assets minus cash and short-term investment (item 1), and operating liabilities are total assets less debt included in current liabilities (item 34), less long term debt (item 9), less minority interests (item 38), less preferred stocks (item 130), less common equity (item 60). We use both equal-weighted and value-weighted returns.

	Panel A: Total accruals				Panel B: Discretionary accruals				Panel C: Net operating assets			
Decile	ACC_t	RET_{t-1}	RET_t	RET_{t+1}	$DACC_t$	RET_{t-1}	RET_t	RET_{t+1}	NOA_t	RET_{t-1}	RET_t	RET_{t+1}
	Equal-weighted returns				Equal-weighted returns				Equal-weighted returns			
Low	−0.207	0.037	0.065	0.187	−0.230	0.135	0.206	0.176	0.231	0.139	0.173	0.206
2	−0.108	0.077	0.115	0.189	−0.098	0.111	0.160	0.189	0.456	0.117	0.126	0.203
3	−0.076	0.121	0.137	0.200	−0.058	0.118	0.161	0.205	0.562	0.119	0.133	0.197
4	−0.054	0.130	0.149	0.200	−0.032	0.126	0.151	0.192	0.635	0.128	0.131	0.198
5	−0.036	0.150	0.144	0.172	−0.013	0.145	0.129	0.190	0.692	0.124	0.138	0.187
6	−0.018	0.161	0.164	0.186	0.004	0.138	0.140	0.181	0.744	0.127	0.150	0.186
7	0.001	0.194	0.167	0.168	0.023	0.180	0.148	0.171	0.797	0.145	0.148	0.179
8	0.027	0.218	0.190	0.164	0.047	0.208	0.152	0.158	0.862	0.193	0.173	0.152
9	0.069	0.305	0.243	0.151	0.090	0.253	0.193	0.156	0.969	0.276	0.213	0.134
High	0.191	0.428	0.347	0.098	0.255	0.378	0.280	0.086	1.509	0.483	0.353	0.059
L-H	−0.399	−0.391	−0.282	0.089	−0.485	−0.243	−0.074	0.090	−1.278	−0.344	−0.180	0.146
	(−25.39)	(−11.42)	(−10.65)	(5.92)	(−10.27)	(−12.45)	(−1.98)	(8.80)	(−10.00)	(−11.11)	(−6.41)	(4.81)
	Value-weighted returns				Value-weighted returns				Value-weighted returns			
Low		0.021	0.116	0.143		0.146	0.234	0.120		0.135	0.245	0.150
2		0.098	0.114	0.151		0.106	0.149	0.148		0.149	0.133	0.153
3		0.110	0.123	0.144		0.129	0.131	0.163		0.116	0.130	0.155
4		0.122	0.123	0.138		0.130	0.156	0.154		0.111	0.108	0.131
5		0.141	0.140	0.148		0.118	0.133	0.156		0.119	0.137	0.140
6		0.138	0.151	0.139		0.126	0.120	0.137		0.122	0.136	0.139
7		0.152	0.154	0.116		0.160	0.119	0.124		0.134	0.118	0.099
8		0.202	0.133	0.131		0.167	0.117	0.125		0.135	0.136	0.132
9		0.262	0.168	0.105		0.175	0.135	0.065		0.219	0.149	0.114
High		0.361	0.253	0.070		0.255	0.255	0.044		0.293	0.236	0.081
L-H		−0.340	−0.137	0.073		−0.109	−0.021	0.076		−0.157	0.010	0.069
		(−11.02)	(−3.23)	(3.02)		(−3.61)	(−0.39)	(3.98)		(−4.94)	(0.16)	(1.91)

Table 3 : Cross-Sectional Variations in the Accrual Anomaly (January 1970–December 2005)

This table reports the regressions of accruals on the sensitivity of accruals to the change in the discount rate (S_t), future stock returns (RET_{t+1}), and their interaction with S_t ($S_t \times RET_{t+1}$). The annual returns RET_{t+1} are from July of year t to June of year $t+1$. We estimate S_t for each two-digit SIC industry each year based on the most recent three years of data based on the following model: $ACC_t = \alpha_0 + \alpha_1 \times RET_t + \alpha_2 \times RET_{t-1} + \epsilon_t$, where ACC_t is accruals, and RET_t and RET_{t-1} are the annual returns over the fiscal years t and $t-1$, respectively. S_t is estimated as $\alpha_1 + \alpha_2$. Total accruals are measured as the change in non-cash current assets (COMPUSTAT annual item 4 minus item 1), less the change in current liabilities (exclusive of short-term debt and taxes payable) (item 5 minus items 34 and 71), less depreciation expense (item 14), all divided by average total assets (the sum of item 6 and lagged item 6 divided by two). Discretionary accruals are measured as the residuals from the estimation of Dechow, Sloan, and Sweeney's modification of the original Jones (1991) model cross-sectionally for each SIC code and year combination. Following Hirshleifer, Hou, Teoh, and Zhang (2004), we measure net operating assets as operating assets minus operating liabilities, both divided by lagged total assets. Operating assets are total assets minus cash and short-term investment (item 1), and operating liabilities are total assets less debt included in current liabilities (item 34), less long term debt (item 9), less minority interests (item 38), less preferred stocks (item 130), less common equity (item 60). The t-statistics reported in parentheses are adjusted for heteroscedasticity and autocorrelations.

Regression results for $ACC_t[DACC_t, NOA_t] = \beta_0 + \beta_1\, RET_{t+1} + \beta_2\, S_t + \beta_3\, (S_t \times RET_{t+1}) + \epsilon_t$														
Panel A: Total accruals					Panel B: Discretionary accruals					Panel C: Net operating assets				
β_0	β_1	β_2	β_3	Adj-R^2	β_0	β_1	β_2	β_3	Adj-R^2	β_0	β_1	β_2	β_3	Adj-R^2
-0.036	-0.003	0.325	-0.111	0.015	-0.004	-0.003	0.117	-0.186	0.005	0.722	-0.027	0.156	-0.107	0.009
(-7.76)	(-1.35)	(9.97)	(-2.78)		(-2.53)	(-1.79)	(0.94)	(-1.65)		(49.63)	(-4.47)	(2.47)	(-2.58)	

Table 4 : Descriptive Statistics of the Value-Weighted and the Equal-Weighted Investment Factors (January 1970–December 2005)

This table reports descriptive statistics for the value-weighted and the equal-weighted investment factors. We report the means, the CAPM alphas (α_{CAPM}), the alphas from the Fama-French (1993) three-factor regressions (α_{FF}), the alphas from the Carhart (1997) four-factor regressions (α_{4FAC}), and their corresponding t-statistics in parentheses and adjusted R^2s in curly brackets. To construct these factors, we do a double sort on size and investment-to-assets. In June of each year t from 1970 to 2005, all NYSE stocks on CRSP are sorted on market equity. We use the median NYSE size to split NYSE, AMEX, and NASDAQ stocks into two groups. We also break the NYSE, AMEX, and NASDAQ stocks into three investment-to-assets groups based on the breakpoints for the low 30%, middle 40%, and high 30% of the ranked values for stocks traded on all three exchanges. We form six portfolios from taking intersections of the two size and three investment-to-assets portfolios. Monthly returns on the six portfolios are calculated from July of year t to June of year $t + 1$, and the portfolios are rebalanced in June of $t+1$. INV_{vw} is the difference, each month, between the simple average of the value-weighted returns on the two low investment-to-assets portfolios and the simple average of the value-weighted returns on the two high investment-to-assets portfolios. INV_{ew} is the difference, each month, between the simple average of the equal-weighted returns on the two low investment-to-assets portfolios and the simple average of the equal-weighted returns on the two high investment-to-assets portfolios. Investment-to-assets is defined as the annual change in gross property, plant, and equipment (COMPUSTAT annual item 7) plus the annual change in inventories (item 3) divided by the lagged total assets (item 6). The returns for the market factor MKT, the size factor SMB, the value factor HML, and the momentum factor WML (all value-weighted) are obtained from Kenneth French's Web site. The t-statistics are adjusted for heteroscedasticity and autocorrelations. We also report the cross correlations of $INV_{vw}, INV_{ew}, MKT, SMB, HML,$ and WML (Pearson correlations above the diagonal and Spearman correlations below the diagonal).

	INV_{vw}	INV_{ew}	Cross correlations (Pearson/Spearman above/below the diagonal)					
				INV_{vw}	INV_{ew}	MKT	SMB	HML	WML
Mean	0.603	0.768	INV_{vw}	1	0.85	−0.44	−0.24	0.33	0.32
(t)	(5.89)	(8.04)	INV_{ew}	0.83	1	−0.44	−0.20	0.34	0.35
α_{CAPM}	0.714	0.872	MKT	−0.39	−0.42	1	0.27	−0.44	−0.09
(t)	(7.69)	(10.07)	SMB	−0.27	−0.24	0.25	1	−0.29	−0.02
$\{R^2\}$	{0.19}	{0.19}	HML	0.36	0.37	−0.43	−0.20	1	−0.10
α_{FF}	0.659	0.808	WML	0.25	0.25	−0.09	−0.06	−0.10	1
(t)	(7.05)	(9.25)							
$\{R^2\}$	{0.22}	{0.22}							
α_{4FAC}	0.500	0.642							
(t)	(5.53)	(7.73)							
$\{R^2\}$	{0.31}	{0.33}							

Table 5 : Calendar-Time Factor Regressions of the Low-Minus-High Accrual Portfolios, with and without the Investment Factor (January 1970–December 2005)

The dependent variables in the calendar-time factor regressions are equal-weighted and value-weighted low-minus-high accrual portfolio returns. In June of each year t, we assign stocks into ten deciles based on total accruals, discretionary accruals, or net operating assets in Panels A, B, and C, respectively. The accruals are measured at the fiscal year-end of year $t-1$. The monthly portfolio returns are calculated from July of year t to June of year $t+1$. We use the market factor (as in the CAPM) and the Fama and French (1993) three factors as explanatory variables in factor regressions. To quantify the effects of investment in driving the accrual anomaly, we augment the CAPM and the Fama-French model with the equal-weighted or value-weighted investment factor, corresponding to the weighting scheme used in the dependent portfolio returns. To construct the investment factor, we do a double sort on size and investment-to-assets. In June of each year t from 1970 to 2005, all NYSE stocks on CRSP are sorted on market equity. We use the median NYSE size to split NYSE, AMEX, and NASDAQ stocks into two groups. We also break the NYSE, AMEX, and NASDAQ stocks into three investment-to-assets groups based on the breakpoints for the low 30%, middle 40%, and high 30% of the ranked values for stocks traded on all three exchanges. We form six portfolios from taking intersections of the two size and three investment-to-assets portfolios. Monthly returns on the six portfolios are calculated from July of year t to June of year $t+1$, and the portfolios are rebalanced in June of $t+1$. Corresponding to the weighting scheme in the dependent portfolio returns, we either equal-weight or value-weight the six portfolio returns. INV_{ew} (INV_{vw}) is the difference, each month, between the simple average of the equal-weighted (value-weighted) returns on the two low investment-to-assets portfolios and the simple average of the equal-weighted (value-weighted) returns on the two high investment-to-assets portfolios. We define investment-to-assets as the annual change in gross property, plant, and equipment (COMPUSTAT annual item 7) plus the annual change in inventories (item 3) divided by the lagged total assets (item 6). The factor returns MKT, SMB and HML (all value-weighted) are from Kenneth French's Web site. We report the results from OLS regressions. Using Weighted Least Squares (WLS) regressions yields quantitatively similar results (not reported). The t-statistics reported in parentheses are adjusted for heteroscedasticity and autocorrelations. In the last column of each panel, $|\triangle\alpha|/\alpha$ is the percentage reductions in alphas from the INV-augmented regression relative to the alphas estimated in the CAPM and the Fama-French model.

	Panel A: Total accruals						Panel B: Discretionary accruals						Panel C: Net operating assets					
	α_{ew}	MKT	SMB	HML	INV_{ew}	$|\triangle\alpha|/\alpha$	α_{ew}	MKT	SMB	HML	INV_{ew}	$|\triangle\alpha|/\alpha$	α_{ew}	MKT	SMB	HML	INV_{ew}	$|\triangle\alpha|/\alpha$
	0.743	−0.077					0.635	0.000					1.344	−0.073				
	(5.42)	(−2.58)					(5.80)	(−0.00)					(7.21)	(−1.80)				
	0.489	−0.022			0.291	34.2%	0.417	0.047			0.249	34.2%	0.127	0.188			1.401	90.5%
	(3.25)	(−0.67)			(3.82)		(3.46)	(1.79)			(4.00)		(0.78)	(5.31)			(16.43)	
	0.801	−0.060	−0.186	−0.064			0.688	−0.029	0.015	−0.089			1.541	−0.204	0.144	−0.347		
	(5.80)	(−1.81)	(−4.37)	(−1.30)			(6.15)	(−1.10)	(0.42)	(−2.23)			(8.43)	(−4.66)	(2.55)	(−5.32)		
	0.568	−0.017	−0.176	−0.096	0.288	29.0%	0.456	0.014	0.021	−0.119	0.286	33.7%	0.264	0.033	0.187	−0.514	1.584	82.9%
	(3.81)	(−0.49)	(−4.18)	(−1.94)	(3.77)		(3.78)	(0.52)	(0.61)	(−3.00)	(4.56)		(1.91)	(1.05)	(4.82)	(−11.35)	(21.78)	
	α_{vw}	MKT	SMB	HML	INV_{vw}	$|\triangle\alpha|/\alpha$	α_{vw}	MKT	SMB	HML	INV_{vw}	$|\triangle\alpha|/\alpha$	α_{vw}	MKT	SMB	HML	INV_{vw}	$|\triangle\alpha|/\alpha$
	0.777	−0.252					0.627	−0.143					0.840	−0.181				
	(3.39)	(−5.05)					(3.05)	(−3.18)					(3.79)	(−3.75)				
	0.244	−0.101			0.747	68.6%	0.183	−0.023			0.610	70.9%	0.103	0.015			0.993	87.7%
	(1.04)	(−1.91)			(6.48)		(0.86)	(−0.48)			(5.69)		(0.47)	(0.30)			(8.98)	
	0.800	−0.144	−0.489	0.043			0.690	−0.137	−0.150	−0.077			1.089	−0.236	−0.270	−0.364		
	(3.61)	(−2.72)	(−7.13)	(0.54)			(3.27)	(−2.71)	(−2.30)	(−1.03)			(4.95)	(−4.49)	(−3.97)	(−4.63)		
	0.376	−0.042	−0.446	−0.022	0.644	53.0%	0.270	−0.038	−0.114	−0.127	0.612	60.8%	0.355	−0.072	−0.198	−0.478	1.075	67.4%
	(1.66)	(−0.78)	(−6.70)	(−0.29)	(5.74)		(1.25)	(−0.73)	(−1.81)	(−1.74)	(5.65)		(1.68)	(−1.45)	(−3.22)	(−6.68)	(10.00)	

Table 6 : Time-Series Means of Size-Adjusted and Size-And-Investment-Adjusted Abnormal Returns (in Percentage) for Accrual Portfolios (January 1970–December 2005)

In June of each year t, we assign firms into deciles based on accruals at the fiscal year-end of year $t-1$. The returns for years $t+1, t+2$, and $t+3$ are from July of year t to June of year $t+1$, July of year $t+1$ to June of year $t+2$, and July of year $t+2$ to June of year $t+3$, respectively. We compute the size-adjusted abnormal returns by subtracting the return on a size matched portfolio from the buy-and-hold returns for each firm in an accrual portfolio. The size portfolios are market equity deciles of NYSE, AMEX, and NASDAQ firms with NYSE/AMEX breakpoints. We compute the size-and-investment-adjusted abnormal returns by subtracting the return on a size-and-investment-matched portfolio from the buy-and-hold returns for each firm in an accrual portfolio. The size and investment portfolios are based on a sequential sort on size and investment-to-assets. Starting from the size deciles used for size-adjusted returns, we further split each size decile on investment-to-assets using the NYSE/AMEX/NASDAQ breakpoints. In the top (bottom) half of the table, we equal-weight (value-weight) the abnormal returns for a given accrual portfolio and its corresponding matching portfolios for all the firms in the portfolio. Size is the share price times the number of share outstanding. The definition of investment-to-assets is in the caption of Table 1. The t-statistics (in parentheses) are adjusted for heteroscedasticity and autocorrelations. * and ** denote significance at the 0.05 and 0.01 levels using a two-tailed t-test, respectively. $\triangle$ denotes the percentage reduction of abnormal performance induced by matching on investment-to-assets in addition to size.

	Panel A: Total accruals						Panel B: Discretionary accruals						Panel C: Net operating assets					
	Size-adjusted			Size/INV-adjusted			Size-adjusted			Size/INV-adjusted			Size-adjusted			Size/INV-adjusted		
Year	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$	$t+1$	$t+2$	$t+3$
	Equal-weighted returns						Equal-weighted returns						Equal-weighted returns					
Low	−0.26	−0.67	0.24	−0.03	−0.35	0.77	−0.23	−0.89	0.14	0.54	−0.52	0.40	*3.43	2.26	0.01	1.65	1.36	0.38
2	*1.63	**2.48	0.91	*1.08	**1.91	0.23	*1.54	1.00	*2.05	0.77	0.57	1.88	**2.84	0.80	1.12	1.22	−0.13	0.51
3	**3.48	1.04	0.59	**2.91	0.69	0.16	**2.88	**2.31	0.68	**1.87	**1.87	0.62	**2.94	**3.37	1.50	**1.20	**2.34	0.92
4	**2.46	*1.62	1.06	*1.60	0.60	0.67	**3.33	1.00	0.39	*2.12	0.33	0.16	**2.32	**2.38	1.28	*0.94	**1.61	*0.95
5	0.92	*1.10	1.18	0.13	0.59	0.73	**2.67	*1.63	−0.07	**1.89	*1.12	−0.31	**2.46	0.37	0.09	*1.15	−0.56	−0.31
6	**2.15	1.20	*1.55	**1.27	0.61	*1.46	0.09	0.90	0.22	−0.86	0.29	−0.08	**2.57	0.89	0.91	*1.38	0.22	0.50
7	*1.57	−0.30	−0.93	0.77	−0.73	−1.04	1.12	*1.04	0.26	0.49	0.38	−0.23	−0.30	−0.25	0.27	−1.21	−0.72	−0.15
8	*−1.75	0.44	0.51	**−2.04	0.59	0.50	*−0.90	−0.65	−0.50	**−1.05	−0.61	−0.64	−1.58	−0.98	0.48	−1.39	−1.02	0.10
9	**−2.65	**−1.76	−1.34	*−1.97	**−1.00	−1.21	*−1.85	*−1.26	0.07	−1.00	−0.62	0.12	**−3.77	**−3.03	**−2.65	−1.06	**−1.46	**−1.84
High	**−7.57	**−5.17	**−3.87	**−3.73	**−2.93	**−2.34	**−8.66	**−5.12	**−3.15	**−4.77	**−2.83	**−1.86	**−10.93	**−5.95	*−4.05	**−3.88	−1.68	−1.29
L-H	**7.31	**4.50	**4.11	*3.70	2.58	*3.10	**8.43	**4.23	3.29	**5.31	*2.30	2.25	**14.36	*8.21	4.74	*5.53	3.04	1.66
	(4.38)	(2.89)	(3.52)	(1.98)	(1.74)	(2.42)	(7.43)	(4.20)	(1.89)	(4.22)	(2.39)	(1.34)	(4.23)	(2.56)	(1.87)	(2.53)	(1.36)	(0.92)
$\triangle$				49.4%	42.6%	24.5%				36.9%	45.5%	31.6%				61.5%	62.9%	64.9%
	Value-weighted returns						Value-weighted returns						Value-weighted returns					
Low	0.83	−0.10	−2.32	0.19	0.75	−1.67	−0.85	0.28	1.52	−0.70	0.24	1.47	2.32	0.59	−1.25	0.94	0.70	−0.99
2	0.65	*2.18	1.48	0.65	*1.61	0.48	1.20	**4.71	1.54	1.01	**4.05	1.94	*2.12	0.64	0.35	*1.95	0.22	0.26
3	1.45	−0.02	0.96	*1.36	0.46	0.81	**3.83	*1.91	0.86	**3.30	*1.78	0.63	0.68	**2.15	−0.49	0.21	**1.87	−0.25
4	1.53	1.62	−0.58	1.16	0.50	−0.34	1.25	0.80	1.15	1.13	−0.03	0.97	−0.08	0.88	*1.86	−0.56	0.48	*1.81
5	−0.63	**1.83	0.62	−0.64	**1.47	0.60	**3.60	**2.17	0.17	**2.94	**1.83	−0.17	*1.59	−1.20	−1.10	1.19	−0.90	−0.38
6	1.42	−0.37	1.33	1.37	−0.26	1.47	−0.89	−1.15	0.22	−1.22	−1.27	−0.11	−0.94	−1.17	−0.17	−0.88	*−1.58	−0.52
7	−1.84	−0.85	−0.52	−1.63	−0.44	−0.73	−0.17	−0.16	−1.08	0.20	0.16	−1.35	**−3.06	−0.82	0.59	*−2.26	−0.37	0.03
8	−0.67	0.90	0.19	−0.00	1.17	−0.03	−1.77	−0.85	−0.63	−1.26	−0.60	−0.79	1.13	−1.31	0.51	1.30	−1.33	−0.35
9	**−4.37	**−4.17	−1.97	**−3.49	*−3.25	−0.84	**−6.54	**−5.07	0.13	**−5.58	**−4.01	1.12	−2.75	−0.88	−1.08	−0.85	−0.35	−1.50
High	**−6.47	**−5.47	*−2.87	**−3.15	*−3.10	*−2.64	**−8.08	**−5.67	−1.63	**−6.00	**−3.56	−0.81	**−6.83	**−5.91	−0.34	*−3.12	**−3.90	−0.24
L-H	**7.30	**5.37	0.55	3.34	*3.85	0.97	**7.23	*5.95	3.15	**5.32	3.79	2.28	**9.15	*6.51	−0.91	4.05	4.60	−0.75
	(4.22)	(3.03)	(0.38)	(1.83)	(2.34)	(0.69)	(4.21)	(2.47)	(1.39)	(3.25)	(1.88)	(1.15)	(2.64)	(2.20)	(−0.37)	(1.34)	(1.85)	(−0.34)
$\triangle$				54.3%	28.3%	−				26.4%	36.2%	27.7%				55.7%	29.2%	−

Table 7 : The Effect of Corporate Governance on the Accrual Anomaly (January 1990–December 2005)

This table reports annual Fama-MacBeth (1973) cross-sectional regression results using samples partitioned by Gompers, Ishii, and Metrick's (2003) corporate governance index and Bebchuk, Cohen, and Ferrell's (2005) management entrenchment index. Gompers et al. obtain firm-level corporate governance provisions from the Investor Responsibility Research Center (IRRC). The index counts the number of unique provisions each firm, and it ranges from 1 to 24. We intersect the sample used by Gompers et al. with our sample. Bebchuk et al. construct their index based on six out of 24 provisions from the IRRC. The six provisions include staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes. The entrenchment index counts the number of unique provisions each firm has in the sample, and it ranges from 0 to 6. We intersect the sample used by Bebchuk et al. with our sample. The dependent variable in the cross-sectional regressions is future annual stock returns RET_{t+1} from July of year t to June of year $t+1$. ACC is Sloan's (1996) measure of total accruals, $DACC$ is Dechow, Sloan, and Sweeney's (1995) measure of discretionary accruals, and NOA is Hirshleifer, Hou, Teoh, and Zhang's (2004) measure of net operating assets. ME is the market value of equity; and BM is the book-to-market ratio. See Table 1 for detailed variable definitions. The t-statistics reported in parentheses are adjusted for heteroscedasticity and autocorrelations.

	Strong governance (G-index ≤ 9)		Weak governance (G-index > 9)		Strong governance (E-index ≤ 2)		Weak governance (E-index > 2)	
Panel A: Total accruals								
Intercept	0.146	0.255	0.127	0.274	0.143	0.276	0.135	0.250
	(7.80)	(3.50)	(6.71)	(5.55)	(7.36)	(4.65)	(6.41)	(3.42)
ACC_t	−0.296	−0.273	−0.449	−0.401	−0.444	−0.400	−0.264	−0.220
	(−4.03)	(−3.75)	(−4.94)	(−5.45)	(−5.71)	(−5.78)	(−2.52)	(−2.39)
$\log(BM_t)$		0.004		−0.002		−0.001		0.011
		(0.26)		(−0.14)		(−0.07)		(0.77)
$\log(ME_t)$		−0.016		−0.021		−0.019		−0.016
		(−1.26)		(−3.43)		(−1.89)		(−1.68)
Panel B: Discretionary accruals								
Intercept	0.160	0.276	0.148	0.295	0.164	0.305	0.149	0.260
	(9.76)	(3.54)	(7.86)	(5.93)	(9.35)	(4.55)	(7.91)	(3.70)
$DACC_t$	−0.240	−0.229	−0.261	−0.238	−0.342	−0.309	−0.095	−0.082
	(−3.43)	(−3.56)	(−3.36)	(−3.42)	(−4.81)	(−4.48)	(−1.28)	(−1.18)
$\log(BM_t)$		0.002		0.001		−0.001		0.013
		(0.14)		(0.10)		(−0.04)		(0.87)
$\log(ME_t)$		−0.017		−0.021		−0.021		−0.015
		(−1.32)		(−3.29)		(−1.87)		(−1.64)
Panel C: Net operating assets								
Intercept	0.213	0.311	0.212	0.333	0.213	0.337	0.202	0.303
	(5.39)	(4.03)	(7.89)	(7.48)	(5.08)	(4.99)	(6.90)	(4.56)
NOA_t	−0.069	−0.055	−0.094	−0.078	−0.066	−0.055	−0.076	−0.062
	(−1.39)	(−1.17)	(−4.83)	(−3.86)	(−1.22)	(−1.02)	(−2.79)	(−2.22)
$\log(BM_t)$		0.013		0.008		0.013		0.016
		(1.05)		(0.65)		(0.96)		(1.33)
$\log(ME_t)$		−0.015		−0.018		−0.018		−0.015
		(−1.30)		(−2.88)		(−1.78)		(−1.68)

Table 8 : Median Corporate Governance Index (*G*-Index) and Median Entrenchment Index (*E*-Index) for Extreme Accrual Portfolios (1990–2004)

For extreme total accrual portfolios (Panel A), discretionary accruals portfolios (Panel B), and net operating assets portfolios (Panel C), we report the median corporate governance index and the median entrenchment index. In all panels, we also report Z-statistics from the Wilcoxon matched-pairs signed-rank test for differences in distributions. The null hypothesis is that the indexes for high and low accrual portfolios are both drawn from the same distribution. Z-statistics larger than two and smaller than -2 reject the null hypothesis. Gompers, Ishii, and Metrick (2003) obtain firm-level corporate governance provisions from the Investor Responsibility Research Center (IRRC). The index counts the number of unique provisions each firm, and it ranges from 1 to 24. We intersect the sample used by Gompers et al. from Andrew Metrick's Web site with our sample. Bebchuk, Cohen, and Ferrell (2005) construct their index based on six out of 24 provisions from the IRRC. The six provisions include staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes. The entrenchment index counts the number of unique provisions each firm has in the sample, and it ranges from 0 to 6. We intersect the sample used by Bebchuk et al. from Lucian Bebchuk's Web site with our sample.

	Panel A: Total accruals						Panel B: Discretionary accruals						Panel C: Net operating assets					
	Median *G*-index			Median *E*-index			Median *G*-index			Median *E*-index			Median *G*-index			Median *E*-index		
Year	High	Low	Z	High	Low	Z	High	Low	Z	High	Low	Z	High	Low	Z	High	Low	Z
1990	8.89	9.25	-1.10	1.89	2.00	1.61	8.98	8.50	-0.10	2.27	1.71	0.97	7.96	8.57	-0.86	2.25	1.73	-1.58
1991	8.46	8.33	-1.90	2.33	2.00	-0.72	7.88	8.10	-1.53	1.88	2.00	1.40	9.00	8.33	0.74	2.60	1.75	1.74
1992	7.29	8.45	-0.22	1.75	2.00	0.14	9.20	8.20	0.44	2.42	2.00	0.21	8.71	8.83	0.02	2.00	1.88	0.93
1993	8.00	9.18	-1.24	2.00	2.14	0.02	8.23	9.00	-1.13	2.00	2.00	-0.42	9.10	8.09	0.86	2.50	1.75	1.15
1994	8.00	9.17	-1.41	2.00	2.31	-0.45	8.67	9.00	-0.34	2.00	2.00	0.00	9.50	8.50	0.30	2.50	2.00	0.89
1995	9.00	8.27	-0.10	2.20	2.00	-0.20	8.88	8.86	1.06	1.92	1.86	0.39	9.00	8.75	0.95	2.10	1.70	1.67
1996	9.00	10.00	-2.02	2.29	2.39	-0.81	9.60	9.00	0.20	2.25	2.00	0.40	9.00	8.75	-0.42	2.17	2.00	0.00
1997	8.69	9.25	-1.92	2.06	2.29	-2.35	9.33	8.80	-0.52	2.50	2.75	0.30	8.67	9.50	0.02	2.56	2.00	0.40
1998	8.67	8.00	-1.07	2.40	2.00	-0.13	8.58	8.13	-0.51	2.29	2.00	-0.88	8.00	7.86	-0.03	2.20	2.00	0.70
1999	8.00	8.55	0.87	1.94	2.08	0.84	8.00	8.25	0.41	1.75	1.67	0.95	7.71	7.96	0.94	2.32	1.85	1.48
2000	9.00	8.60	-0.98	2.17	2.42	-1.12	8.58	8.46	-0.30	1.63	2.50	-3.14	8.55	8.00	1.84	2.00	2.00	0.61
2001	8.92	8.52	0.77	2.52	2.00	1.24	8.65	8.42	0.20	2.20	2.14	-0.42	8.86	8.20	0.70	2.00	1.83	1.98
2002	8.00	8.25	-0.04	2.00	2.33	-1.24	8.50	8.33	0.49	2.20	2.33	-0.62	8.67	8.13	0.58	2.54	1.83	0.83
2003	8.80	8.40	-0.04	2.50	2.00	-1.16	8.80	8.20	-1.57	2.38	2.17	-2.29	8.33	8.17	1.32	2.10	1.75	2.02
2004	8.57	8.67	0.41	2.50	2.40	-0.22	9.00	8.67	-0.73	2.40	2.33	0.23	8.81	8.33	1.24	2.14	2.00	1.79
All	8.50	8.67	-3.07	2.11	2.20	-1.26	8.67	8.50	0.44	2.17	2.04	0.22	8.67	8.29	1.82	2.20	1.86	4.77

Figure 1 : The Event-Time Evolution of Investment-to-Assets and Return-on-Assets for the Low and High Accrual Portfolios During Three Years Before and Three Years After the Portfolio Formation (January 1970–December 2005)

This figure presents event-time evolution of investment-to-assets and return-on-assets for extreme accrual deciles formed in each June. We consider three set of portfolios sorted on Sloan's (1996) total accruals (Panels A and D), Dechow, Sloan, and Sweeney's (1995) discretionary accruals (Panels B and E), and Hirshleifer, Hou, Teoh, and Zhang's (2004) net operating assets (Panels C and F). See Table 1 for detailed variable definitions. Panels A to C plot investment-to-assets, and Panels D to F plot return-on-assets. In each panel, the solid line represents the median investment-to-assets or return-on-assets ratio for the high accrual decile, whereas the broken line represents the median investment-to-assets or return-on-assets ratio for the low accrual decile. In June of each year t, we assign stocks into ten accruals deciles based on the magnitude of the accruals at the fiscal year-end in year $t-1$. The median investment-to-assets or return-on-assets ratios for the two extreme accrual deciles are calculated for $t+i, i = -3, \ldots 3$. The median investment-to-assets or return-on-assets ratios of each accrual portfolio for event-year $t+i$ are then averaged across portfolio formation years t. We measure investment-to-assets as the sum of the annual change in gross property, plant, and equipment (COMPUSTAT annual item 7) and the annual change in inventories (item 3) divided by the lagged total assets (item 6). We measure return-on-assets as earnings (income before extraordinary items, item 18) divided by the lagged total assets (item 6).

Panel A: ACC—investment-to-assets

Panel B: $DACC$—investment-to-assets

Panel C: NOA—investment-to-assets

Panel D: ACC—return-on-assets

Panel E: $DACC$—return-to-assets

Panel F: NOA—return-to-assets