Conditional Conservatism and Firm Investment Efficiency

Juan Manuel García Lara

Universidad Carlos III de Madrid

Beatriz García Osma

Universidad Autónoma de Madrid

Fernando Penalva[†]

IESE Business School, University of Navarra

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[†] Corresponding author. IESE Business School, University of Navarra, Av. Pearson, 21, 08034 Barcelona, Spain. E-mail: penalva@iese.edu. Tel. (+34) 93 253 4200, Fax. (+34) 93 253 4343.

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Abstract

Conditional conservatism, through the timelier recognition of losses in the income statement, is expected to increase firm investment efficiency through three main channels: (1) by decreasing information asymmetries between outside equity holders and managers, facilitating the monitoring of managerial investment decisions; (2) by increasing managerial incentives to abandon poorly performing projects earlier and undertake fewer negative net present-value investments; and (3) by facilitating the access to external financing at lower cost. Using a large US sample for the period 1975-2006 we find a negative association between conditional conservatism and measures of over- and under- investment, and a positive association between conservatism and future profitability. This is consistent with firms reporting more conditionally conservative numbers investing more efficiently and in more profitable projects. Our results add to a growing stream of literature suggesting that eliminating conservatism from accounting regulatory frameworks may lead to undesirable economic consequences.

Keywords: *Conditional conservatism, earnings asymmetric timeliness, investment efficiency, overinvestment, underinvestment*

Data Availability: *Data is available from the sources identified in the paper.*

JEL Classification: *G10, G31, M41.*

1. Introduction

We study the association between conditional accounting conservatism and firm investment efficiency. Classic agency theory shows that managers have superior information about the expected profitability and the timing of the payoffs of undertaken projects and investments (Lambert 2001) and can therefore make investment or operating decisions that are harmful to the interests of the providers of finance (Jensen and Meckling 1976). Accounting research argues that increased disclosure and higher quality financial reporting mitigates information asymmetry problems and agency costs (Healy and Palepu 2001). In particular, Bushman and Smith (2001) argue that the use of high quality accounting information in corporate governance is bound to improve firm's investment decisions. Even in the absence of agency problems, Lambert, Leuz and Verrecchia (2007) show that if accounting quality leads to decreases in cost of capital, this will change the investments viewed as optimal by the firm.

These arguments about the link between improved accounting information and investment efficiency are supported by recent empirical work by Biddle and Hilary (2006), McNichols and Stubben (2008) and Biddle, Hilary and Verdi (2008), who provide evidence on the positive association between efficient investment and accounting quality as measured by accruals quality. Regarding the relation between conservatism and investment efficiency, Bushman, Piotroski and Smith (2007) and Ahmed and Duellman (2007a) provide some initial evidence. Bushman et al. (2007) show that investment efficiency varies internationally with aggregate conservatism at the country-level, while Ahmed and Duellman (2007a) study the relation between conservatism and future outcomes of firms' investment policies. In this paper, we more directly address the issue of whether more conditionally conservative firms invest more efficiently by analysing if conditional conservative accounting constrains managerial tendencies to under- and over-invest. This analysis is of particular interest in light of the ongoing FASB debate on whether to eliminate conservatism.

Following Basu (1997), conditional conservatism can be defined as the more stringent verifiability requirements for the recognition of gains relative to losses into accounting earnings. This asymmetry in the verifiability requirements results in earnings that reflect bad news (difficult-to-verify economic losses) faster than good news (difficult-to-verify economic gains). Following Guay and Verrecchia (2007), conditional conservatism can be interpreted as a commitment by management to reflect low (bad) realizations of economic events in the financial statements in a timely manner. We hypothesize that this commitment to timely recognition of economic losses has a significant informational role and results in improvements to firm investment efficiency.

Specifically, we expect conditional conservatism to influence firm investment efficiency in three main ways. First, recent research demonstrates that conservatism appears as a reaction to information asymmetries. Conservatism reduces the adverse effects of existing asymmetries between managers and outside investors by restricting managerial accounting manipulation and endowing other sources of information to flourish (LaFond and Watts 2008). Therefore, increased conservatism ameliorates information asymmetry problems and contributes to facilitate the *ex post* monitoring process over managerial investment decisions. This is consistent with the evidence in Ahmed and Duellman (2007b) and Garcia Lara, Garcia Osma and Penalva (2009) that conditional conservatism is associated to the existence of stronger corporate governance mechanisms that decrease the CEO's power and improve monitoring.

Second, by requiring early recognition of poor realizations, accounting conservatism plays a significant role in resolving managerial agency conflicts. As argued by Ball and

Shivakumar (2005), because losses have to be recognised in a timelier manner, managers are aware that they will not be able to defer the earnings consequences of their investment decisions to the next generation of managers; i.e., managers have to bear the consequences of their investment decisions during their tenure. This is predicted to limit managerial investments in *ex ante* negative net present value (NPV) projects, reducing the likelihood of managers engaging in empire building strategies, 'pet' projects or 'trophy' acquisitions. Similarly, conditional conservatism is predicted to trigger the early abandonment of *ex post* poorly performing projects and deter strategies of continuing (over) investment in under performing projects. Under conditionally conservative reporting, because loss recognition cannot be deferred, managers opt to abandon negative NPV projects earlier. Therefore, timely loss recognition is expected to increase managerial incentives to react quickly to negative realizations, limiting losses on projects that do not perform.

Finally, conservative accounting mitigates bondholder-shareholder conflicts over dividends and lowers cost of debt financing (Ahmed, Billings, Morton and Stanford 2002), which permits access to less risky debt and therefore, reduces debt overhang negative effects on investment efficiency (Myers 1977, 1984). Conditional conservatism is also expected to decrease cost of equity capital (Guay and Verrecchia 2007, Suijs 2008). These decreases both in cost of debt and cost of equity capital are expected to facilitate financing investment opportunities that otherwise might not be pursued because of lack of funding or because the costs associated to accessing costly funding outweigh the benefits of undertaking the projects, even when they have positive net present values.

We study the association between conditional conservatism and investment efficiency using a large US sample of 79,803 firm-year observations for the period 1975-2006. We follow the method in Biddle et al. (2008) and analyse the association between our proxy of commitment to conditional conservative reporting and investment efficiency. In particular, we study if firms that are more conditionally conservative show lower capital over- and under-investment. The analysis yields three key findings. First, we find that conditional conservatism enhances investment efficiency by contributing to reduce both over- and under-investment. Specifically, firms with higher conditional conservatism invest less (more) in years when there are signs of over- (under-) investment in the whole economy and the industry of reference. The results are robust to the inclusion of multiple control variables. Second, we find that conditional conservatism increases investment among firms that face liquidity constraints, and decreases investment among cash rich firms. These results are consistent with conditional conservatism reducing under-investment by facilitating access to external funding. We also show that more conditionally conservative firms are less likely both to over- and under- invest relative to their optimal levels of investment. Finally, we analyse the association between conditional conservatism and future investment performance. To the extent that conservative firms invest more efficiently, we should observe superior future investment performance for these firms. Using measures of future firm returns and gross profit margins, we find evidence of superior investment performance in firms that are more conditionally conservative.

Our results add to the recent stream of empirical literature on the effects of higher quality reporting over investment efficiency (Verdi 2006, McNichols and Stubben, 2008; Biddle et al. 2008), and particularly, on the economic consequences of variation in conditional conservatism (Bushman et al. 2007, Ahmed and Duellman 2007a).

The rest of the paper is organised as follows. Section 2 discusses the expected association between investment efficiency and conservatism. Section 3 contains the research design and the description of the sample. Section 4 discusses the main results and robustness checks, and finally, section 5 concludes.

2. Accounting information, conditional conservatism and investment efficiency

A central question in accounting research is whether financial accounting information can affect the real value generating process of the firm, and if so, how. Bushman and Smith (2001) and Lambert et al. (2007) suggest that financial accounting information can increase firm value by improving firm investment decisions. Bushman and Smith (2001) argue that one channel through which financial reporting can affect firm investments and performance is through its governance role. By facilitating the monitoring of managerial decisions, financial accounting is expected to improve the allocation of firm resources. Thus, the more precise the reports prepared the greater expected investment efficiency. From a different perspective, Lambert et al. (2007) show that if improvements to financial statements quality reduce cost of capital, this will have an effect over the investments that managers view as profitable. Empirical research by Biddle and Hilary (2006), McNichols and Stubben (2008), Biddle et al. (2008) and Hope and Thomas (2008) confirm that firms with better quality accounting information and disclosure invest more efficiently. In particular, Biddle and Hillary (2006) provide evidence consistent with higher quality accounting being associated to lower investment-cash flow sensitivity both at the firm and country level, and Schleicher, Tahoun and Walker (2008) find that IFRS adoption in Europe contributes to lower investment cash-flow sensitivity. In a similar vein, Biddle et al. (2008) find that better quality earnings as measured by accruals quality are associated to lower over- and under-investment and McNichols and Stubben (2008) show that firms that manipulate their reported earnings make suboptimal investment decisions during the misreporting period. Finally, Hope and Thomas (2008) demonstrate that not disclosing geographic segment information has a negative effect on the efficiency of foreign investment.

An efficient investment policy can be defined simply as one in which all positive NPV investments projects are identified, funded and implemented, while all negative NPV projects are rejected (Julio 2007). The agency model predicts that whilst managers may be well informed about the existence of profitable investment opportunities, they might not always pursue them because of (1) moral hazard problems that derive in managerial expropriation of firm cash flows, myopic biases and inefficient selection of investment opportunities (Jensen and Meckling 1976, Jensen 1986, Stein 1989); and (2) lack of available funding derived from high cost of external financing. This high cost of equity capital can be due to the firm capital structure, which might drive a wedge between the overall return to investment and the return accrued to shareholders; but it can be also at least partly attributable to investors perceiving firm's accounting information to be of low quality, which increases information asymmetries and complicates the estimation of firm's future cash flows.

In this study, we focus on the association between investment efficiency and conditional accounting conservatism. Prior literature shows that timely recognition of economic losses appears as a reaction to the existence of information asymmetries (LaFond and Watts 2008), facilitates monitoring of CEO decisions (Beekes, Pope and Young 2004, Ahmed and Duellman 2007b, Garcia Lara et al. 2009), and decreases the cost of debt and equity capital (Ahmed et al. 2002, Guay and Verrecchia 2007, Suijs 2008). These effects are predicted to jointly improve investment efficiency.

2.1. The link between conditional conservatism and investment efficiency

Prior literature on the association between conditional conservatism and investment efficiency is scarce, and has looked at the issue from a relatively indirect way. In particular, Bushman et al. (2007) provide evidence consistent with a negative relation between country-level measures of investment cash flow sensitivity and country-level measures of conditional conservatism. From a different methodological perspective, Ahmed and Duellman (2007a) find more conditionally conservative firms present higher future profitability measures like gross profit margins and cash flows, and less special item charges. They interpret this evidence as indicative of more conditionally conservative firms investing more efficiently.

Conditional conservatism, through the timelier recognition of economic losses in the income statement, is expected to increase firm investment efficiency through three main channels: (1) by decreasing information asymmetries and facilitating the monitoring of investment decisions; (2) by increasing managerial incentives to abandon poorly performing projects earlier and undertake fewer negative net present-value investments; and (3) by facilitating access to external financing at lower cost. In this section, we explain each of these channels in detail.

2.1.1. Conditional conservatism, information asymmetry and increased monitoring

The work of LaFond and Watts (2008) demonstrates that conditional conservatism appears as a reaction to the existence of information asymmetries. Conditional conservatism serves to reduce existing asymmetries among the different parties to the firm by resolving agency conflicts and allowing other sources of information to flourish. Therefore, increased conditional conservatism resolves information asymmetry problems. This, in turn, facilitates the *ex post* monitoring of managerial investment decisions.

This monitoring role of conditional conservatism helps boards of directors and other governance mechanisms to detect and deter managerial sub-optimal behaviour. Conditional conservatism provides early warning signals to these governance bodies, which permits imposing limits to managerial control rights in a timely manner (Ahmed and Duellman 2007b, García Lara et al. 2009). Awareness of these constraints deters management from attempting to expropriate firm cash flows from shareholders and other parties to the firm by engaging in value reducing strategies such as empire building or investment in ‘pet’ projects and ‘trophy’ acquisitions. Consistent with this idea, Richardson (2006) demonstrates that the monitoring exerted by certain governance mechanisms can reduce firm over-investment of free cash flows.

Conditional conservatism also facilitates the selection of *ex ante* positive NPV projects, or at least, reduces the probability that bad projects will be pursued, even in the absence of moral hazard problems. Analysing investment decisions in a real options framework, Smith (2007) analytically illustrates that an accounting system biased towards conservatism avoids classifying bad investment projects as good, thus limiting investment in *ex ante* bad projects.

2.1.2. Conditional conservatism and constraints to shift investment losses across periods

Related to our prior argument on the association between conditional conservatism and decreased information asymmetries and increased monitoring, Ball and Shivakumar (2005) argue that timely incorporation of bad realizations into accounting income implies that managers will not be able to defer the recognition of losses to the next generation of managers. Thus, conditional conservatism creates incentives for managers to act quickly in the presence of poorly performing projects, discouraging further investments on bad projects. In a similar line, recent research by Pinnuck and Lillis (2007) shows that loss reporting serves to resolve agency problems and acts as a trigger to divest unproductive investments. Pinnuck and Lillis (2007) argue that reporting accounting losses triggers the exercise of the abandonment option and divest factors, divisions and projects that represent negative NPV investments. Thus, loss reporting has a clear agency role. Firm commitment to timely loss recognition is predicted to trigger early divestment of *ex post* unproductive investments, before they accumulate into losses on abandonment or sale.

2.1.3. Conditional conservatism and access to external financing

There is an ongoing debate in the accounting and finance literature on whether and how accounting quality can affect cost of capital. Using different analytical models, Easley and O'Hara (2004) and Lambert et al. (2007, 2008) demonstrate that high quality accounting information and disclosure can reduce firm cost of capital. Guay and Verrecchia (2007) and Suijs (2008) contribute to this debate by analytically demonstrating that increased conditional conservatism results in lower cost of capital. Specifically, Guay and Verrecchia (2007) argue that a commitment to timely loss recognition results in full disclosure of information, reducing the discount markets apply to firm value in the presence of uncertainty. Suijs (2008) demonstrates that conditional conservatism lowers cost of capital by reducing price volatility. Empirical results in García Lara et al. (2008a) provide corroborative evidence that firm commitment to conditional conservatism is associated to lower cost of capital.[1]

Conservatism is also expected to lower the cost of debt financing. Ahmed et al (2002) hypothesize and find evidence consistent with conservatism attenuating shareholder-bondholder conflicts over dividends. Conservative accounting on average reduces earnings. In the presence of more conservative accounting, bondholders are likely to accept a lower rate of return in light of the reduced risk of dividend overpayment to shareholders. By choosing conservative accounting methods, managers can negotiate more favourable debt terms and covenants, and likely, they can also renegotiate the terms of debt to resolve conflicts between security holders and bondholders in order to allow for more efficient investment choices.[2]

Therefore, we expect that conservative accounting will permit access to funding at a lower cost of capital (equity and debt). We expect that this lowering in financing costs will contribute to improve investment efficiency by facilitating access to capital funds to finance positive NPV projects that the firm would not have pursued had financing costs been higher. Especially for cash-constraint and highly leveraged firms we expect conditional conservatism to contribute to reduce under-investment.

To sum up, we hypothesize that conditionally conservative accounting increases investment efficiency both by lowering managerial selection of *ex ante* negative NPV projects and by triggering early abandonment of *ex post* poorly performing ones (thereby reducing over-

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[1] Empirical findings on the association between cost of capital and other earnings attributes, such as a accruals quality and income smoothing are somewhat mixed (see, e.g., Francis, LaFond, Olsson and Schipper 2004, 2005, Core, Guy and Verdi 2008, McInnis 2008).

[2] According to Julio (2007), renegotiation usually results in reductions in principal or interest, extensions of debt maturity, changes in covenants, or debt-for-equity exchanges.

investment). Additionally, conditional conservatism is expected to increase investment efficiency by facilitating firm access to external financing and lowering the cost of raising funds for new investments, which facilitates investment in positive NPV projects (thereby reducing under-investment).

3. Research design

In this section, we first present the models used to test the association between conditional conservatism and firm investment efficiency. In particular, we use three different specifications based on the work of Biddle et al. (2008). Then, we present and validate the proxy used to measure conditional conservatism at the firm level. Finally, we describe the sample used to test our predictions.

3.1. Association between conditional conservatism and investment efficiency

Our tests are based on the measurement of over- and under-investment proposed by Biddle et al. (2008). We adapt their model to capture the effects of conditional conservatism on investment efficiency as follows:

$$Capex_{t+1} = \beta_0 + \beta_1\ CONS_t + \beta_2\ CONS_t{*}OverInv_t + \beta_3\ OverInv_t + \delta\ Controls_t + \mu_{t+1} \qquad (1)$$

where Capex is a measure of future investment in capital goods, CONS is a firm-year-specific measure of conditional conservatism, increasing with commitment to conditional conservatism, OverInv is a ranked variable capturing settings where over- or under-investment is more likely, and Controls is a vector of control variables that affect the level of investment and conservatism. These control variables will be defined in more detail in the following sections.

Our investment proxy, Capex, is defined as capital expenditures scaled by lagged property plant and equipment. This measure ignores other types of non-capital investments such as research and development but it has been widely used in previous research (for a review of the literature see Hubbart, 1998). This fact will allows us to better compare our results with previous findings. In addition, including investments in intangible assets in our empirical design can be problematic given that these investments are likely affecting conservatism measures. OverInv takes values between 0 and 1, where 0 (or low realizations) indicate under-investment whereas 1 (or high realizations) indicate over-investment. In the above regression (model 1) the coefficients of interest are β_1 and β_2. Our main hypothesis is that conditional conservatism improves investment efficiency; that is, conservatism reduces both under- and over-investment. Therefore, when under-investment is present (i.e., OverInv = 0) we expect coefficient β_1 to be positive indicating that conservatism increases capital investment in settings where under-investment is most likely. On the contrary, when over-investment is present (i.e., OverInv = 1) we expect coefficient β_2 to be negative and greater in absolute value than β_1 (i.e., $\beta_1 + \beta_2 < 0$), indicating that conservatism decreases investment in settings where over-investment is most likely.

The key element in model (1) is the definition of OverInv, our proxy for the existence of incentives to under- or over-invest. Following Biddle et al. (2008), we define OverInv in three different ways. First, we measure OverInv at the aggregate economy level in order to identify years in which there is average under- or over-investment at the economy-wide level. OverInv is defined as the decile ranks of the residuals from a time-series regression of annual average future capital expenditures on annual average current sales growth. This regression is estimated in time-series fashion as follows:

$$Capex_{t+1} = \beta_0 + \beta_1\, SalesGrowth_t + \mu_{t+1} \qquad t = 1975, \ldots 2006 \qquad (2)$$

Where Capex is the average future investment for each sample year, and SalesGrowth is a proxy of firm investment opportunities calculated as the average change in sales from year *t*-1 to *t* for each sample year. We rank the residuals of regression (2) into deciles and rescale the ranks from 0 to 1 to facilitate the interpretation of the coefficients of regression (1). Thus, sample years with large positive (negative) residuals will be considered as years of average over-investment (under-investment).

Second, we measure OverInv at the industry level. To do so, we estimate regression (2) at the industry-year level. Using the 48 industry groups of Fama and French (1997) we obtain the annual average of Capex and SalesGrowth for each industry-year group. We impose a minimum of 20 observations per industry in a given year. This results in a sample of 1,022 industry-year observations. Then, we estimate regression (2) and rank the residuals into deciles, and rescale the decile rankings from 0 to 1. Finally, we assign to each firm-year observation its corresponding industry-year ranking. High (low) values of OverInv identify observations for which over-investment (under-investment) at the industry level is most likely.

Third, we measure OverInv at the firm level. Specifically, we create three firm-year specific measures of over- and under-investment based on firms' financing constraints: (a) firm liquidity (cash balance), (b) capital structure (leverage) and (c) a factor variable that combines the prior two measures (firm liquidity and capital structure). As described in Biddle et al. (2008), firms with larger cash balances are more likely to over-invest, while firms with high leverage have limited access to funds and are more likely to under-invest. To construct these additional measures, every year we sort firms into deciles according to their cash balance (Cash, defined as cash scaled by total assets) and leverage times minus one (Neg K-Structure, defined as the ratio of long-term debt to the sum of long-term debt and market value of equity). We use the negative of leverage to make it consistent with Cash, so that high high values of Neg K-Structure are associated with settings in which the firm is likely to over-invest. Finally, we create a composite rank variable that captures cash constraints and high leverage. We denote this variable as Factor, which is the average decile-rank values of the ranks created according to Cash and Neg K-Structure. We rescale the decile ranks of the three variables from 0 to 1 to facilitate the interpretation of the coefficients of regression (1). High (Low) values of Cash, Neg K-Structure and Factor are associated to situations where the firm does not face (faces) liquidity constraints and thus, is likely to over-invest (under-invest).

In summary, we construct OverInv in five different ways: at the economy-wide level identifying years in which over-investment is most likely, at the industry-year level identifying industry-years in which over-investment is most likely, and at the firm level identifying circumstances in which firms have strong incentives to over-invest, measuring these incentives in three different ways: Cash, Neg K-Structure, and Factor.

The model described in regression (1) includes controls for effects that could confound the findings by driving either investment efficiency or conservatism. Following Biddle et al. (2008), we control for firm size, the market-to-book ratio, volatility of cash flow from operations (CFO), bankruptcy risk, tangibility, capital structure, industry capital structure, CFO to sales, financial slack, and dividend payout ratio. We also incorporate controls for age of the firm, length of the operating cycle and frequency of losses, as these may influence the accruals generating process and, therefore, our measure of conservatism (CONS).

We define firm size (LogAssets) as the log of total assets. The market-to-book ratio (MTB) is the ratio of the market value of total assets to book value of total assets. Volatility of cash flow from operations (StdCFO) is the firm-specific standard deviation of the cash flow from operations measured in the five-year period ending in the current fiscal year. Z-Score is a measure of bankruptcy risk defined with the following Compustat data items: Z-Score = [3.3*data170 + data12 + 0.25*data36 + 0.5*(data4–data5)]/data6. Tangibility is the ratio of property, plant and equipment to total assets. Capital structure (K-Structure) is ratio of long-term debt to the sum of long-term debt and market value of equity. Industry capital structure (IND K-struc) is the mean of K-Structure for firms in the same SIC 3-digit industry. CFO to sales (CFOsale) is the ratio of CFO to sales. Financial slack is the ratio of cash to property, plant and equipment. Dividend payout ratio (Dividend) is a dummy variable that takes the value of 1 if the firm paid a dividend; 0 otherwise. Age is the difference between the first year when the firm appears in CRSP and the current year. Length of the operating cycle (OperCycle) is the log of receivables to sales plus inventory to COGS multiplied by 360. The frecuency of losses (Loss) is a dummy variable that takes the value of 1 if net income before extraordinary items is negative; 0 otherwise.

Finally, we include indicator variables for the 48 industry groups of Fama and French (1997) to control for industry-specific shocks to investment. Following Petersen (2008), we estimate regression (1) in a pooled fashion and report t-statistics based on standard errors that are robust to heteroskedasticity, serial and cross-sectional correlation with a two dimensional cluster at the firm and year level.[3]

[3] We use the Stata command *cluster2,* downloaded from Mitchell Petersen's website. We thank him for making the command available.

3.2. Conditional conservatism and deviations from optimal investment

As a final test of the association between conditional conservatism and investment efficiency, we model the probability that a firm will deviate from its optimal level of investment, conditional on its level of conservatism. To do so, we first estimate a firm-specific model of investment as a function of growth opportunities using model (2). The residuals from model (2) can be interpreted as a measure of firm-specific deviation from optimal levels of investment. We follow the method in Biddle et al. (2008) and use these residuals to classify firms into groups. Specifically, we sort firms annually into quartiles based on the firm-specific residuals from model (2). Firm-year observations in the bottom quartile are classified as under-investing, whilst observations in the top quartile are classified as over-investing. Firm-year observations in the middle two quartiles are considered to be near their optimal level of investment and are used as a benchmark group. Using these data, we estimate a multinomial logit model that predicts the likelihood that a firm will deviate from its level of optimal investment (i.e., be on the extreme quartiles as opposed to being in the middle quartiles) as follows:

$$Prob(Investment_{t+1}=j) = \beta_0 + \beta_1\, CONS_t + \delta\, Controls_t + v_{t+1} \qquad (3)$$

where j takes the value of 1 if the firm is classified as under-investing (Under); 2 if it belongs to the benchmark group; and 3 if it is classified as over-investing (Over). The main coefficient of interest in model (3) is β_1. If conditional conservatism deters firms from over- and under-investing, β_1 is expected to be negative both for the Over and Under specifications of the model, signifying that more conditionally conservative firms are less likely to invest away from their optimal levels.

3.3. Performance effects of conditional conservatism

Improved investment efficiency implies future improvements in firm profitability, holding everything else constant. Consequently, given that conditional conservatism is hypothesized to improve investment efficiency, we expect to observe a positive association between present and past commitment to conditional conservatism and future investment performance. Consistent with this idea, Ahmed and Duellman (2007a) find a positive association between conditional conservatism and firm gross profit margins and cash flows. More generally, Biddle et al. (2008) find that increasing earnings quality increases firm future ROA. To analyse the effect of conditional conservatism on future investment performance we employ these authors' research design and estimate the following model:

$$FutPerf = \beta_0 + \beta_1\ CONS\ 10yr_t + \delta\ Controls\ 10yr_t + \mu \qquad (4)$$

where FutPerf is, alternatively, the future three-year buy-and-hold return (measured from the end of year *t* to the end of year *t*+3) or the three-year average of future gross profit margin (using years *t*+1, *t*+2 and *t*+3). CONS and all control variables are measured during the 10-year window ending in year *t*. The reason for this long window is to ensure that we analyze a period that covers a full business cycle. In addition, this long window smoothes the errors in the measurement of the control variables. If conservatism improves investment efficiency, this improvement should translate into future increases in profitability. Consequently, we expect β_1 in equation (4) to be significantly positive.

CONS 10yr is the 10-yr average of CONS. The control variables are also measured as 10-year averages, with the exception of StdCFO which is the standard deviation of CFO over the period *t*-9 through *t*.

3.4. Measure of conditional conservatism

To estimate models (1), (3) and (4) we need a firm-specific measure of commitment to conditional conservatism. To construct this proxy, we follow the work of Givoly and Hayn (2000), who find that higher accounting conservatism results in more negative total accruals. We define total accruals as [(ΔCurrent assets – ΔCash) – (ΔCurrent liabilities – ΔShort term debt) – Depreciation]/Average assets. To reduce the effect of temporary large accruals which tend to reverse in one or two years (Richardson, Sloan, Soliman and Tuna 2005), we compute the three-year average of total accruals for years *t*-2 to *t*. To control for the great variation in the type and size of accruals across industry groups, we adjust our measure by subtracting the industry mean every year, using the Fama-French 48 industry groups as reference. Therefore, our measure of conditional conservatism, CONS, is the industry-adjusted three-year average of total accruals. Finally we multiply this variable by minus one so that CONS is increasing with conservatism.

Given that there is some controversy in the literature on the validity of firm-year estimates of conditional conservatism (Givoly, Hayn and Natarajan 2007), we validate our measure as follows. First, we rank firms annually into 5 portfolios according to CONS. Second, we estimate Fama and MacBeth (1973) mean annual regressions of conditional conservatism for each portfolio, following the method proposed by Basu (1997). Prior literature demonstrates that the Basu model is able to capture cross-sectional variation in conditional conservatism.[4] The model is as follows:

$$Earn_t = \beta_0 + \beta_1\, Neg_t + \beta_2\, Ret_t + \beta_3\, Ret_t{*}Neg_t + \mu_t \qquad (5)$$

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[4] See Ball and Kothari (2007) for a validation of the Basu (1997) model and for a summary of prior research using the model.

where Earn is net income before extraordinary items deflated by market value of equity at the beginning of the period, *Ret* is the annual stock rate of return of the firm, measured compounding twelve monthly CRSP stock returns ending at fiscal year end, Neg is a dummy variable that equals 1 in the case of bad news (negative or zero stock rate of return) and 0 in the case of good news (positive stock rate of return). In model (5), the main coefficient of interest is β_3, which captures the incremental timeliness of earnings to bad news. Under conservative accounting, β_3 is predicted to be positive, significant and larger than β_2. Larger β_3 coefficients indicate more pronounced conditional conservatism. Consequently, we expect β_3 to increase as we move from the portfolio with the smallest values of CONS (least conditionally conservative firms) to the portfolio with the largest values of CONS (most conditionally conservative firms).

As a further test of the construct validity of CONS we also validate it using the non-market based model of conditional conservatism proposed by Ball and Shivakumar (2005). The model is based on the relation between accruals and cash-flows, as follows:

$$Accr_t = \alpha_0 + \alpha_1 \, DCFO_t + \alpha_2 \, CFO_t + \alpha_3 \, CFO_t * DCFO_t + \mu_t \quad (6)$$

where Accr is total accruals, defined as [(ΔCurrent assets – ΔCash) – (ΔCurrent liabilities – ΔShort term debt) – Depreciation]/Average assets.[5] Accr and CFO are both scaled by average total assets. DCFO is a dummy variable equal to 1 in the case of negative CFO, and zero otherwise. This model is based on the expected negative relation between accruals and cash flows, which will be captured by a negative α_2 coefficient. In bad news periods (proxied by the existence of negative cash flows), the negative relation between accruals and cash flows is

[5] We measure accruals using the balance sheet for consistency. If we base our measure on the cash flow statement, we obtain identical inferences.

expected to be less pronounced as an outcome of conservative reporting. In bad news periods, conservative reporting will lead to asset impairments, provisions, etc. Therefore, in these periods, negative accruals and negative cash flows are more likely to go hand in hand. Consequently, conditional conservatism is captured in equation (6) through a significantly positive α_3 coefficient. As with the Basu (1997) model, we expect α_3 to increase as we move up from the portfolio with the smallest values of CONS to the portfolio with the largest values of CONS.

Table 1 Panel A presents descriptive evidence of our conditional conservatism proxy CONS. On average, CONS is zero by construction. Similar to the results that Biddle et al. (2008) report for their earnings quality measures, our proxy CONS is negatively correlated with Capex (*corr* = -0.07, *p*-value <0.01). However, as we show below, the relation between CONS and Capex is conditional on firm propensity to over- or under-invest. Table 2 presents results of the test of the construct validity of CONS. In Panel A, we report results of running Fama MacBeth (1973) mean annual regressions of the Basu (1997) model by portfolios of CONS. The coefficient β_3 is positive, larger than β_2, and significant in all cases indicating the presence of conditional conservatism in all portfolios. More importantly, the β_3 coefficients exhibit a clear ascending trend as we move up the conservatism portfolio ranks. The β_3 coefficient monotonically increases with CONS (portfolio 1, β_3 = 0.157, *t*-stat = 12.42; portfolio 5, β_3 = 0.356, *t*-stat = 10.42). The difference between portfolios 1 and 5 is significant at conventional levels. Regarding the results from the Ball and Shivakumar (2005) specification, presented in Panel B of Table 2, the α_3 coefficient increases as well monotonically from portfolio 1 through to portfolio 5 (portfolio 1, α_3 = 0.064, *t*-stat = 1.65; portfolio 5, α_3 = 0.505, *t*-stat = 9.84), and the difference in the coefficient between portfolios 1 and 5 is statistically significant at conventional levels. Finally, we also validate CONS using an asymmetric persistence model as proposed in

Basu (1997) and Ball and Shivakumar (2005). This model builds on the differences in the persistence of positive and negative income changes. In unreported tests, we obtain identical inferences as the ones obtained using models (5) and (6). The portfolio with the largest (smallest) values of CONS is the portfolio with the largest (smallest) conditional conservatism according to the model of asymmetric persistence of income changes, and the difference between portfolios 1 to 5 is statistically significant.

The evidence presented in Table 2 confirms that CONS correctly classifies firms according to their level of conditionally conservative reporting. Given that CONS captures conditional conservatism over a 3-year period, only firms that commit to conditionally conservative accounting policies are likely to obtain high CONS scores.

3.5. The sample

We use COMPUSTAT to extract accounting data and CRSP to extract stock market data. To increase the power of our tests, we employ as many observations as possible from the available data sources. Our sample period covers 32 years, t = 1975 to 2006. Financial firms are excluded because of the different nature of their accrual accounting process and nature of investment. To mitigate the influence of outliers, all continuous variables are winsorized annually at the 1 and 99 percentiles. The resulting sample consists of 79,803 firm-year observations with data available to run the main tests. Table 1 Panel A presents descriptive statistics of main variables. The mean (median) investment across all firm-years is 28.37% (20.33%) of prior years' property, plant and equipment. The mean (median) of Cash is 0.13 (0.063) and the equivalent statistics of K-Structure are 0.22 (0.16). These figures are consistent with the evidence reported in Biddle et al. (2008). Table 1 Panel B presents correlations among the variables.

4. Results

Table 3 Panel A presents descriptive statistics for the variables used to estimate model (2). We have 32 years of data for the estimates based on the aggregate economy, and 1,022 industry-years for the industry-specific regression. Only industry-year combinations that contain at least 20 observations are considered. The mean Capex in the economy is of 27.95% of prior years' property, plant and equipment, and of 27.05% of prior years' PPE across industries. Average SalesGrowth is of 12.7% across all firms in the economy in the 32 year-period under analysis, and of 12.4% across all industries and years. The differences in mean values between aggregate and industry values are driven by the above requirement that industry-year combinations contain at least 20 observations. Table 3 Panel B presents results of running model (2). The first (second) column presents results for aggregate (industry-year) investment. In both cases, the estimated coefficient on SalesGrowth is positive and significant. SalesGrowth explains 49% of aggregate Capex and 19% of industry-year Capex. These results are comparable to those in Biddle et al. (2008). We use the residuals obtained from these regressions to estimate our first two proxies of OverInv at the aggregate and industry levels, and to assign firm-years into over- and under-investment conditions. A firm is classified as facing incentives to over-invest based on the decile ranking of the residuals of these regressions. More positive (negative) values are associated to situations where firms face incentives to over-invest (under-invest).

4.1. Conditional conservatism and investment efficiency

As a first analysis, we study the association between conditional conservatism and investment efficiency in situations where firms have incentives to over-invest. Tables 4 and 5 report the results of running model (1) using the five different proxies of firm incentives to over-invest. All regressions include industry fixed-effects. Following the recommendations in Petersen (2008), reported standard errors are adjusted using a two-dimension clustering procedure at the firm and year levels.

Table 4 Panel A presents results based on the time-series aggregate measure. We find evidence that conditional conservatism is positively associated with investment in years with low aggregate-economy investment (i.e, OverInv = 0 or close to 0). The coefficient on CONS is positive and significant (CONS = 12.53, *t*-stat = 3.17), supporting the prediction that conditional conservatism increases investment among firms that have incentives to under-invest. The main coefficient of interest is the interaction between conditional conservatism and over-investment in years when there are signs of over-investment in the economy (i.e, OverInv = 1 or close to 1). CONS*OverInv is significantly negative (CONS*OverInv = -17.16, *t*-stat = -2.59) and greater in absolute value than β_1, which can be interpreted as conditional conservatism reducing over-investment. Table 4 Panel B provides results using the cross-sectional industry-level approach to proxy for over-investment. Similar to the results presented in Panel A, the coefficient associated with conditional conservatism is positive and significant (CONS = 41.99, *t*-stat = 7.70), which is consistent with conditional conservatism increasing investment in firms operating in under-investing industries. The interaction between conservatism and investment is significantly negative (CONS*OverInv = -61.49, *t*-stat = -8.04), as before, providing additional support for the prediction that conditional conservatism limits over-investment. Therefore, the results at the industry level are consistent with those obtained at the aggregate level and provide support for the hypothesis that conditional conservatism improves investment efficiency both by mitigating over- and under-investment.

In a second analysis, we examine the association between conditional conservatism and investment efficiency in firms that face liquidity constraints. It is expected that more conditionally conservative firms are capable of rising additional funding to finance their investments at a lower cost, compared to firms with more aggressive reporting policies and lower quality accounting and disclosure. Thus, we expect to see that, in the presence of liquidity constraints, firms that commit to conditional conservatism are less likely to under-invest. Conditional conservatism is also expected to limit over-investment in firms that are cash rich or with low leverage. Thus, it is predicted that within the set of firms that face no liquidity constraints, more conditionally conservative firms will be less likely to over-invest. We use three proxies to measure liquidity constraints: firm cash balance (Cash), firm leverage (Neg K-Structure) and a composite score of the prior two measures (Factor). Table 5 reports results of running model (2) by liquidity partitions. Reported results are based on pooled regressions with industry-fixed effects and two-way clustering at the firm and year levels. Consistent with our predictions, CONS is positive and significant across all partitions. This indicates that among firms that are liquidity constrained (and thus, are likely to under-invest), conditional conservatism increases investment. Regarding the interaction between conditional conservatism and the partition variables (CONS*Partition), the coefficients are negative and significant across all specifications. This evidence suggests that among firms that do not face liquidity constraints (i.e., cash-rich firms and firms with low leverage) conditionally conservative firms are less likely to over-invest. Overall, these findings are consistent with those reported in Table 4 and confirm the expected positive association between conditional conservatism and investment efficiency. Regarding the control variables used in the three specifications of Table 5, they are the same as those in Table 4. However, we exclude leverage (i.e., K-Structure) from the first and third specifications, and financial slack (i.e., Slack) from the first and second specifications, because we already include rank measures that capture these firm characteristics.

4.2. Optimal level of investment

As an additional test of the association between conditional conservatism and investment efficiency, we analyse whether conservatism impacts firm likelihood of over- or under-investment. To do so, we create a variable that takes the value of 1 if the residual from the Capex regression (model 2) is in the bottom quartile of the distribution (firm-observations that are under-investing relative to their optimal level of investment), the value of 2 if it is in the middle two quartiles (benchmark firms, near their optimal investment levels), and the value of 3 if it is in the top quartile of the distribution (firm-observations that are over-investing). Using this variable, we estimate model (3), a multinomial logistic regression that tests the likelihood that a firm is in the extreme investment quartiles (Under or Over) as a function of firm commitment to conditional conservatism. Table 6 reports results of this test. CONS is negative both for the Under and Over partitions. In the Under partition, where we model the probability that a firm will under-invest relative to its optimal level of investment, CONS is significantly negative (CONS = -2.44, *t*-stat= -11.78), consistent with more conditionally conservative firms being less likely to be in the extreme quartile of firms that under-invest. The results for the over-investment quartile (Over) are slightly weaker (CONS = -0.29, *t*-stat = -1.38), but they are also significant if we use a one-tail test (*p*-value = 0.08), suggesting that more conditionally conservative firms are generally less likely to be in both extremes, i.e., they are less likely to deviate from optimal investment both by under- or over-investing. Particularly, the evidence suggests more conditionally conservative firms are less likely to under-invest. This is consistent with conditional conservatism facilitating access to external financing at a lower cost, thereby minimizing under-investment.

As a sensitivity check, we estimate a model of future Capex on firm-level deviations from optimal investment. To do so, we model future Capex directly as a function of abnormal investment (AbnInv, the residuals from model 2), of our proxy of conditionally conservative reporting CONS, of the interaction between CONS and AbnInv, and of the control variables. Untabulated results from running this model for the full sample with industry-fixed effects and two-way clustering of standard errors at the firm and year levels corroborate the previous findings. More conditionally conservative firms are less likely both to under-invest (CONS = -15.51, *t*-stat = -6.76) and to over-invest (CONS*AbnInv = -18.30, *t*-stat = -5.36).

4.3. Association between conditional conservatism and future outcomes of investment policies

As a final test, we analyse whether firms committing to more conditionally conservative accounting policies increase future profitability thanks to the improvements in investment efficiency. To the extent that conditional conservatism results in improvements to investment efficiency (and thus, in improvements in project selection), we should observe increased future performance of the undertaken investments. To test this prediction we regress measures of future performance on our proxy of firm commitment to conditional conservatism and control variables. We use two proxies of future investment performance measured for the period *t*+1 to *t*+3: one proxy is accounting-based (gross profit margin) and the other is market-based (buy-and-hold return). To the extent that conservative accounting policies affect future earnings, we need to be careful in selecting our profitability measure. Measures such as ROA are endogenous to accounting choice and reflect conservatism in prior periods. We use gross profit margin as the measure of profitability that is least likely to be affected by prior conditional conservatism.

Table 7 Panels A and B reports results of estimating model (4). The sample size is reduced given that we measure all the variables as averages over a 10-year period, which imposes greater data requirements. We can observe that our proxy of commitment to conditional conservatism, measured as the average CONS for the 10-year period ending in year *t* (CONS 10yr), is positively associated to both the three year buy-and-hold return and to the three-year average gross profit margin (Panel A, CONS 10yr = 1.82, *t*-stat = 3.88; Panel B, CONS 10yr = 0.59, *t*-stat = 6.08). Thus, the results from this final test are consistent with prior evidence reported in the paper and provide corroborative evidence in support of our prediction of a positive association between conditional conservatism and investment efficiency.

5. Summary and Conclusions

Conditional conservatism, through the timelier recognition of losses in the income statement, is expected to increase firm investment efficiency through three main channels: (1) by decreasing information asymmetries and facilitating the monitoring of investment decisions; (2) by increasing managerial incentives to abandon poorly performing projects earlier and undertake fewer negative net present-value investments; and (3) by facilitating access to external financing at lower cost. Using a large US sample for the period 1975-2006 we find a negative association between conditional conservatism and measures of over- and under-investment. Our results suggest that conditional conservatism improves investment efficiency in firms facing liquidity constraints. We also show that more conditionally conservative firms outperform other firms in terms of future investment performance. This is consistent with firms reporting more conditionally conservative numbers investing more efficiently.

Our results add to the recent stream of empirical literature on the effects of higher quality reporting over investment efficiency (Verdi 2006, Biddle and Hilary 2006, McNichols and Stubben, 2008, Hope and Thomas, 2008, Biddle et al. 2008), and particularly, on whether conditional conservatism impacts managerial investment decisions (Bushman et al. 2007, Ahmed and Duellman 2007a). They also add to a growing stream of literature (Guay and Verrecchia, 2007, LaFond and Watts, 2008, Suijs, 2008) suggesting that eliminating conservatism from accounting regulatory frameworks is likely to lead to undesirable economic consequences.

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Table 1
Variable definition and descriptive statistics of main variables

Panel A: Univariate statistics

Variable	Mean	Std. Dev.	p10	p25	Median	p75	p90
$Capex_{t+1}$	28.368	28.514	6.252	11.626	20.325	34.514	57.314
CONS	0.000	0.056	-0.064	-0.028	0.000	0.029	0.064
LogAssets	5.171	2.097	2.553	3.610	4.988	6.600	8.073
MTB	1.600	1.227	0.804	0.950	1.201	1.748	2.771
StdCFO	0.086	0.077	0.022	0.366	0.064	0.107	0.174
Z-Score	1.591	1.229	0.381	0.913	1.611	2.253	2.933
Tangibility	0.338	0.235	0.072	0.153	0.281	0.483	0.719
K-Structure	0.222	0.217	0.000	0.023	0.161	0.367	0.554
IND K-Struc.	0.225	0.130	0.067	0.118	0.206	0.308	0.409
CFOsale	0.006	0.540	-0.071	0.010	0.601	0.122	0.211
Slack	1.434	4.504	0.017	0.059	0.215	0.844	3.132
Dividend	0.540	0.498	0.000	0.000	1.000	1.000	1.000
Age	17.560	14.376	5.255	7.510	12.674	22.104	37.025
OperCycle	4.746	0.689	3.895	4.371	4.816	5.205	5.540
Loss	0.225	0.418	0.000	0.000	0.000	0.000	1.000
Cash	0.130	0.163	0.008	0.021	0.063	0.174	0.356

Table 1 (Continued)

Panel B: Correlation Matrix

Variable	$Capex_{t+1}$	*CONS*	*LgAssets*	*MTB*	*StdCFO*	*Z-score*	*Tang*	*K-Struc*	*IND K-St*	*CFOsale*	*Slack*	*Dividend*	*Age*	*OpCycle*
CONS	-0.07													
LogAssets	-0.17	-0.02												
MTB	0.32	-0.03	-0.07											
StdCFO	0.20	0.01	-0.39	0.26										
Z-Score	0.08	-0.11	-0.02	-0.14	-0.25									
Tangibility	-0.28	0.16	0.30	-0.20	-0.32	-0.16								
K-Structure	-0.29	0.02	0.20	-0.42	-0.21	-0.07	0.39							
IND K-Struc.	-0.24	0.01	0.24	-0.37	-0.28	0.08	0.54	0.58						
CFOsale	-0.06	0.02	0.17	-0.22	-0.30	0.37	0.17	0.09	0.15					
Slack	0.30	-0.02	-0.13	0.25	0.27	-0.19	-0.34	-0.24	-0.26	-0.29				
Dividend	-0.16	-0.01	0.41	-0.17	-0.36	0.22	0.27	0.15	0.34	0.16	-0.19			
Age	-0.17	0.05	0.49	-0.11	-0.25	0.02	0.18	0.12	0.18	0.10	-0.12	0.35		
OperCycle	0.06	-0.20	-0.14	0.04	0.09	-0.14	-0.41	-0.14	-0.28	-0.06	0.01	-0.81	-0.03	
Loss	-0.06	0.17	-0.25	0.07	0.31	-0.48	-0.11	0.39	-0.16	-0.31	0.14	-0.34	-0.15	0.04

The sample contains 79,803 firm-year observations for the period 1975-2006. Capex is a measure of investment calculated as capital expenditure multiplied by 100 and scaled by lagged property, plant and equipment. CONS is a proxy of commitment to conditional conservatism, calculated as the industry-adjusted average total accruals over the last three years (*t*-2 to *t*), multiplied by minus one. Larger values of CONS are associated to greater conditional conservatism. LogAssets is the log of total assets. MTB is the ratio of the market value of total assets to book value of total assets. StdCFO is the firm-specific standard deviation of the cash flow from operations. Z-Score is a measure of bankruptcy risk. Tangibility is the ratio of property, plant and equipment to total assets. K-Structure is ratio of long-term debt to the sum of long-term debt and market value of equity. IND K-struc is the mean of K-Structure for firms in the same SIC-3 digit industry. CFOsale is the ratio of CFO to sales. Slack is the ratio of cash to property, plant and equipment. Dividend is a dummy variable that takes the value of 1 if the firm paid dividend; 0 otherwise. Age is the difference between the first ear when the firm appears in CRSP and the current year. OperCycle is the log of receivables to sales plus inventory to COGS multiplied by 360. Loss is a dummy variable that takes the value of 1 if net income before extraordinary items is negative; 0 otherwise. Cash is the ratio of cash to total assets.

Table 2
Test of validity of the CONS measure

Panel A: Fama-MacBeth results for the Basu (1997) model for portfolios of conservatism

$$Earn = \beta_0 + \beta_1 \text{ Neg} + \beta_2 \text{ Ret} + \beta_3 \text{ Ret*Neg} + \mu$$

Quintiles of CONS	Intercept	Neg	Ret	Neg*Ret	R-squared
Low conservatism: 1	0.074	0.005	0.056	0.157	0.12
	9.58	*1.58*	*7.00*	*12.42*	
2	0.082	0.003	0.049	0.224	0.12
	10.52	*0.60*	*5.18*	*12.20*	
3	0.083	0.001	0.043	0.262	0.12
	10.04	*0.22*	*3.92*	*10.93*	
4	0.069	-0.001	0.047	0.274	0.12
	8.34	*-0.19*	*4.54*	*13.18*	
High conservatism: 5	0.033	-0.014	0.038	0.356	0.12
	2.90	*-2.23*	*3.12*	*10.42*	

Panel B: Fama-MacBeth results for the Ball and Shivakumar (2005) cash flow model for portfolios of conservatism

$$Accr = \alpha_0 + \alpha_1 \text{ DCFO} + \alpha_2 \text{ CFO} + \alpha_3 \text{ CFO*DCFO} + \mu$$

Quintiles of CONS	Intercept	DCFO	CFO	DCFO*CFO	R-squared
Low conservatism: 1	0.033	0.031	-0.418	0.064	0.32
	10.68	*7.69*	*-15.65*	*1.65*	
2	0.010	0.016	-0.411	0.212	0.21
	3.24	*6.98*	*-18.45*	*4.53*	
3	-0.002	0.005	-0.413	0.297	0.20
	-0.59	*1.45*	*-24.34*	*5.05*	
4	-0.016	0.000	-0.393	0.348	0.16
	-4.89	*-0.02*	*-22.81*	*5.86*	
High conservatism: 5	-0.042	-0.022	-0.485	0.505	0.16
	-8.97	*-4.75*	*-24.43*	*9.84*	

The sample contains 79,803 firm-year observations for the period 1975-2006. Portfolios are formed based on the value of CONS. CONS is a proxy of commitment to conditional conservatism, calculated as average industry-adjusted firm total accruals over the last three years (*t*-2 to *t*), multiplied by minus one. Larger values of CONS are associated to greater conditional conservatism. Earn is net income, deflated by market value of equity at the beginning of the period. Ret is the stock rate of return of the firm, measured compounding twelve monthly CRSP stock returns ending three months after fiscal year end. Neg is a dummy variable that equals 1 in the case of bad news (negative or zero stock rate of return) and 0 in the case of good news (positive stock rate of return). CFO is cash flow from operations. Accr is total accruals, defined as [(ΔCurrent assets – ΔCash) – (ΔCurrent liabilities – ΔShort term debt) – Depreciation]/Average assets. Accr and CFO are both scaled by average total assets. DCFO is a dummy variable equal to 1 in the case of negative CFO, and zero otherwise.

Table 3
Industry and Economy wide measures of Over- and Under- Investment

Panel A: Descriptive statistics

Variable	N	Mean	Std. Dev.	Min.	Median	Max.
Aggregate Economy						
$Capex_{t+1}$	32	27.946	3.427	22.273	28.435	32.540
SalesGrowth	32	0.127	0.048	0.026	0.143	0.209
Industry-year						
$Capex_{t+1}$	1022	27.053	8.294	8.182	26.193	58.787
SalesGrowth	1022	0.124	0.085	-0.247	0.121	0.728

Panel B: Regression results

$$Capex_{t+1} = \beta_0 + \beta_1 \, SalesGrowth_t + \mu$$

	Aggr Economy $Capex_{t+1}$	***Industry-year*** $Capex_{t+1}$
Intercept	21.580	21.777
	16.97	*52.74*
$SalesGrowth_t$	50.089	42.386
	5.34	*15.50*
N	32	1022
R-Sq.	0.49	0.19

The sample contains 79,803 firm-year observations for the period 1975-2006. Panel A presents descriptive statistics for the aggregate (industry-year) variables included in the investment model equation. Capex is a measure of investment calculated as capital expenditure multiplied by 100 and scaled by lagged property, plant and equipment. SalesGrowth is a proxy of firm investment opportunities calculated as the mean percentage change in sales from year *t*-1 to *t*. In Panel B, we estimate equation (2). The model is first estimated using a time-series approach to identify years in which over-investment is more likely than under-investment. The residuals from the regression are used to form a measure of aggregate over-investment (*OverInv*) at the economy level. The same procedure is repeated at the industry level.

Table 4
Investment rate – Over-Investment

Association between investment rate, conditional conservatism and over-investment

$Capex_{t+1} = \beta_0 + \beta_1\ CONS_t + \beta_2\ CONS_t{*}OverInv_t + \beta_3\ OverInv_t + \delta\ Controls_t + \mu$

	Panel A: ***Aggr. Economy*** ***$Capex_{t+1}$***	***Panel B:*** ***Industry-Year*** ***$Capex_{t+1}$***
Intercept	7.15	8.13
	2.31	*2.69*
CONS	12.53	41.99
	3.17	*7.70*
*CONS*OverInv*	-17.16	-61.49
	-2.59	*-8.04*
OverInv	5.77	15.17
	4.58	*14.96*
LogAsset	-0.75	-0.63
	-4.79	*-4.29*
MTB	5.27	5.24
	20.10	*20.34*
StdCFO	24.22	23.58
	10.38	*9.70*
Z-Score	3.02	2.67
	14.04	*12.83*
Tangibility	-19.44	-20.11
	-13.10	*-13.22*
K-Structure	-8.15	-8.55
	-8.52	*-9.06*
IND K-Struc.	8.91	10.28
	2.93	*3.56*
CFOsale	0.71	0.94
	1.46	*1.90*
Slack	1.23	1.22
	10.57	*10.82*
Dividend	-1.74	-2.15
	-3.55	*-4.66*
Age	-0.11	-0.11
	-10.04	*-10.71*
OperCycle	2.19	1.82
	4.94	*4.42*
Loss	-7.16	-7.15
	-13.62	*-14.42*
Industry FE	Yes	Yes
Firm Year Cluster	Yes	Yes
N	79,803	79,803
R-sq	0.25	0.26

The sample contains 79,803 firm-year observations for the period 1975-2006. Capex is a measure of investment calculated as capital expenditure multiplied by 100 and scaled by lagged propety, plant and equipment. CONS is a proxy of commitment to conditional conservatism, calculated as the average industry-adjusted total accruals over the last three years (*t*-2 to *t*), multiplied by minus one. Larger values of CONS are associated to greater conditional conservatism. OverInv is a measure of over-investment. OverInv is a ranked variable based on the unexplained aggregate (industry-year) investment for all firms in the economy (industry-year). Specifically, in each year (industry-year), we measure the average investment in the economy (industry-year) for Capex, and regress aggregate (industry-year) investment on aggregate (industry-year) sales growth. We then rank the residuals from this model into deciles and re-scaled from 0 to 1; values closer to 0 (1) indicate settings in which under-investment (over-investment) is most likely. LogAssets is the log of total assets. MTB is the ratio of the market value of total assets to book value of total assets. StdCFO is the firm-specific standard deviation of the cash flow from operations. Z-Score is a measure of bankruptcy risk. Tangibility is the ratio of property, plant and equipment to total assets. K-Structure is ratio of long-term debt to the sum of long-term debt and market value of equity. IND K-struc is the mean of K-Structure for firms in the same SIC-3 digit industry. CFOsale is the ratio of CFO to sales. Slack is the ratio of cash to propety, plant and equipment. Dividend is a dummy variable that takes the value of 1 if the firm paid dividend; 0 otherwise. Age is the difference between the first ear when the firm appears in CRSP and the current year. OperCycle is the log of receivables to sales plus inventory to COGS multiplied by 360. Loss is a dummy variable that takes the value of 1 if net income before extraordinary items is negative; 0 otherwise. All regressions include 48 Fama-French (1997) industry fixed-effects. Reported t statistics are based on robust standard errors adjusted using a two-dimensional clustering procedure at the firm and year levels.

Table 5
Firm-Year investment Cross-sectional Partitions

Investment prediction by liquidity partitions (cash, capital structure and combination factor) as a function of conditional conservatism and controls

$$Capex_{t+1} = \beta_0 + \beta_1\, CONS_t + \beta_2\, CONS_t{*}Partition_t + \beta_3\, Partition_t + \delta\, Controls_t + \mu$$

	Capex$_{t+1}$		
	Partition =		
	Factor	*Cash*	*Neg K-Structure*
Intercept	15.44	19.30	7.47
	4.24	*5.37*	*2.32*
CONS	27.19	9.54	28.14
	4.42	*1.97*	*5.73*
*CONS*Partition*	-39.87	-17.30	-43.00
	-3.96	*-1.70*	*-4.47*
Partition	12.58	6.13	7.37
	13.41	*9.74*	*9.05*
Controls included	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Firm Year Cluster	Yes	Yes	Yes
N	79,803	79,803	79,803
R-sq	0.23	0.23	0.25

The sample contains 79,803 firm-year observations for the period 1975-2006. Capex is a measure of investment calculated as capital expenditure multiplied by 100 and scaled by lagged property, plant and equipment. CONS is a proxy of commitment to conditional conservatism, calculated as the average industry-adjusted total accruals over the last three years (*t*-2 to *t*), multiplied by minus one. Larger values of CONS are associated to greater conditional conservatism. Sample firms are partitioned on the basis of their liquidity constraints (Partition). The Partition used are based on Cash, K-Structure and a Factor that combines both variables. Cash is the ratio of cash to total assets. The controls are defined as follows. LogAssets is the log of total assets. MTB is the ratio of the market value of total assets to book value of total assets. StdCFO is the firm-specific standard deviation of the cash flow from operations. Z-Score is a measure of bankruptcy risk. Tangibility is the ratio of property, plant and equipment to total assets. K-Structure is ratio of long-term debt to the sum of long-term debt and market value of equity. IND K-struc is the mean of K-Structure for firms in the same SIC-3 digit industry. CFOsale is the ratio of CFO to sales. Slack is the ratio of cash to property, plant and equipment. Dividend is a dummy variable that takes the value of 1 if the firm paid dividend; 0 otherwise. Age is the difference between the first ear when the firm appears in CRSP and the current year. OperCycle is the log of receivables to sales plus inventory to COGS multiplied by 360. Loss is a dummy variable that takes the value of 1 if net income before extraordinary items is negative; 0 otherwise. All regressions include 48 Fama-French (1997) industry fixed-effects. Reported t statistics are based on robust standard errors adjusted using a two-dimensional clustering procedure at the firm and year levels.

Table 6
Firm-year investment rate – Investment Partitions

Multinomial pooled regression of unexplained investment on conditional conservatism and controls

	$Capex_{t+1}$	
	Under	*Over*
Intercept	-0.54	-0.73
	-2.91	*-4.27*
CONS	-2.44	-0.29
	-11.78	*-1.38*
LogAsset	-0.17	-0.11
	-16.99	*-11.42*
MTB	-0.12	0.19
	-7.60	*18.00*
StdCFO	0.97	1.63
	5.16	*9.33*
Z-Score	-0.10	0.05
	-6.07	*3.63*
Tangibility	0.83	-0.46
	9.49	*-4.96*
K-Structure	1.22	-1.16
	16.30	*-14.93*
IND K-Struc.	-0.30	2.78
	-1.94	*18.90*
CFOsale	-0.05	0.12
	-2.45	*4.21*
Slack	-0.02	0.04
	-4.63	*13.34*
Dividend	-0.07	-0.24
	-2.22	*-7.75*
Age	0.00	-0.01
	0.25	*-7.70*
OperCycle	0.05	0.01
	1.91	*0.25*
Loss	0.36	-0.41
	12.07	*-12.53*
Year FE	Yes	Yes
Firm Cluster	Yes	Yes
N	79,803	
Pseudo R-sq	0.067	

The sample contains 79,803 firm-year observations for the period 1975-2006. Dependent variable is the level of unexplained Capex. Firm-year observations in the bottom quartile of unpredicted investment are classified as under-investing ('Under'), observations in the top quartile of unpredicted investment are classified as over-investing ('Over'), and observations in the middle two quartiles are classified as the benchmark group. Capex is a measure of investment calculated as capital expenditure multiplied by 100 and scaled by lagged property, plant and equipment. CONS is a proxy of commitment to conditional conservatism, calculated as the average industry-adjusted total accruals over the last three years (*t*-2 to *t*), multiplied by minus one. Larger values of CONS are associated to greater conditional conservatism. LogAssets is the log of total assets. MTB is the ratio of the market value of total assets to book value of total assets. StdCFO is the firm-specific standard deviation of the cash flow from operations. Z-Score is a measure of bankruptcy risk. Tangibility is the ratio of property, plant and equipment to total assets. K-Structure is ratio of long-term debt to the sum of long-term debt and market value of equity. IND K-struc is the mean of K-Structure for firms in the same SIC-3 digit industry. CFOsale is the ratio of CFO to sales. Slack is the ratio of cash to PPE. Dividend is a dummy variable that takes the value of 1 if the firm paid dividend; 0 otherwise. Age is the difference between the first ear when the firm appears in CRSP and the current year. OperCycle is the log of receivables to sales plus inventory to COGS multiplied by 360. Loss is a dummy variable that takes the value of 1 if net income before extraordinary items is negative; 0 otherwise. Reported t statistics are based on robust standard errors adjusted using a one-dimensional clustering procedure at the firm level.

Table 7
Investment rate and investment performance

Association between investment rate, conditional conservatism and investment performance over a long window period

$$FutPerf = \beta_0 + \beta_1\ CONS\ 10yr_t + \delta\ Controls\ 10yr_t + \mu$$

	Panel A: ***Future Returns***	***Panel B:*** ***Future Average Gross Profit Margin***
Intercept	0.65	-0.51
	2.65	*-4.25*
CONS 10yr	1.82	0.59
	3.88	*6.08*
LogAsset 10yr	-0.01	0.00
	-0.35	*-1.8*
MTB 10yr	0.05	0.05
	1.74	*5.51*
StdCFO 10yr	0.41	0.20
	1.48	*1.86*
Z-Score 10yr	0.02	0.00
	0.98	*0.43*
Tangibility 10yr	-0.31	0.21
	-2.82	*5.99*
K-Structure 10yr	0.30	-0.06
	2.82	*-2.38*
IND K-Struc. 10yr	0.02	-0.18
	0.11	*-4.01*
CFOsale 10yr	-0.01	0.12
	-0.54	*4.42*
Slack 10yr	0.01	0.00
	1.5	*0.23*
Dividend 10yr	-0.21	-0.04
	-3.36	*-3.99*
Age 10yr	0.00	0.00
	-1.74	*-4.28*
OperCycle 10yr	0.03	0.17
	0.93	*8.55*
Loss 10yr	-1.16	-0.29
	-9.63	*-8.87*
Industry FE	Yes	Yes
Firm Year Cluster	Yes	Yes
N	37,674	38,480
R-sq	0.01	0.36

Panel A (B) contains 37,674 (38,480) firm-year observations for the period 1975-2006. FutPerf is a measure of future performance of current investments. In Panel A (B), FutPerf is calculated alternatively as the three-year buy-and-hold return starting at the end of year *t*, or the average gross profit margin calculated from *t*+1 to *t*+3. All independent variables are measured as averages over the 10-year window ending in year *t*, with the exception of StdCFO which is the standard devition of CFO over the period *t*-9 to *t*. CONS is a proxy of commitment to conditional conservatism, calculated as the average total accruals over the last three years (*t*-2 to *t*), multiplied by minus one. Larger values of CONS are associated to greater conditional conservatism. LogAssets is the log of total assets. MTB is the ratio of the market value of total assets to book value of total assets. StdCFO is the firm-specific standard deviation of the cash flow from operations. Z-Score is a measure of bankruptcy risk. Tangibility is the ratio of property, plant and equipment to total assets. K-Structure is ratio of long-term debt to the sum of long-term debt and market value of equity. IND K-struc is the mean of K-Structure for firms in the same SIC-3 digit industry. CFOsale is the ratio of CFO to sales. Slack is the ratio of cash to property, plant and equipment. Dividend is a dummy variable that takes the value of 1 if the firm paid dividend; 0 otherwise. Age is the difference between the first ear when the firm appears in CRSP and the current year. OperCycle is the log of receivables to sales plus inventory to COGS multiplied by 360. Loss is a dummy variable that takes the value of 1 if net income before extraordinary items is negative; 0 otherwise. All regressions include 48 Fama-French (1997) industry fixed-effects. Reported t statistics are based on robust standard errors adjusted using a two-dimensional clustering procedure at the firm and year levels.