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Does Unconditional Accounting Conservatism Imply Upside or Downside Risk? Evidence from the Options Market

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SYNOPSIS: Conservatism captures an asymmetric reporting practice in response to uncertainty in business operations (earnings). Such uncertainty in business operations implies that investors are exposed to tail risk such that there is a probability of large earnings growth, offset by the probability of a large earnings decline. Existing literature has shown that accounting conservatism relates positively to stock returns. However, the literature is silent on whether this pricing is driven by positive earnings expectation or by the potential negative earnings growth. Using option-implied assets, we find that conservatism is priced by investors' risk aversion (downside risk) rather than the potential upside. Several robustness tests confirm the findings. We also provide evidence that the returns are not driven by mispricing but as compensation for the risk implied by conservative reporting. We further decompose an alternate conservatism measure and find that our results are driven by the uncertainty in expenses rather than revenues.

Keywords: conservatism; risk; options.

I. INTRODUCTION

Accounting conservatism refers to the tendency to report lower values for assets and higher values for liabilities, which can bias net asset values downward (Watts and Zimmerman 1986). Thereby, conservative reporting involves an asymmetric reporting of uncertain revenues versus expenses, such that uncertain expenses are recorded via provisions, but uncertain revenues are not recorded until the uncertainty is resolved. As documented by Penman and Zhang (2021) (hereafter called PZ21), accounting conservatism thereby implies uncertainty in business operations. They further state that such uncertainty in revenues and expenses (as captured by return on equity (ROE)) exposes the investor to tail risk, with a probability of large earnings growth if future revenues are realized (or expenses do not materialize), offset by a probability of a large earnings decline if future (uncertain) revenues are not realized. Conservative reporting, therefore, implies risks inherent in the business.[1]

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[1] We argue that conservatism implies uncertainty in revenues, both current and future, as well as in expenses. Conservatism can imply uncertainty in current revenues via provisions for uncollectible debts or revenue deferrals. It can exhibit uncertainty in future revenues through higher expenses today. One example is accelerated depreciation today implying lower future economic life of assets and lower revenue generating capacity. Higher provisions for losses (loan losses) imply a potential impact on future collections (of interest income). Moreover, provisions can indicate probable future expenses. For instance, provision for lawsuit settlements indicate the possibility for a future expense, and accelerated depreciation can indicate quicker usage of assets (leading to quicker replacement in the future). Conservatism thereby indicates the "combined" uncertainty of revenues and expenses in earnings. As a result, we sometimes refer to conservatism denoting uncertainty in earnings.

Existing literature shows that the risk inherent in conservatism is priced by the market (Chan, Lakonishok, and Sougiannis 2001; Chambers, Jennings, and Thompson 2002; Penman and Zhang 2002).[2] In addition, García Lara, García Osma, and Penalva (2014) document a reduction in information asymmetry (bid-ask spread and return volatility) for conservative reporting. However, what drives this pricing is not conclusively documented in the existing literature. As identified earlier, conservative reporting captures the tail risk faced by the investor, with a probability of a large earnings growth offset by the probability of a large earnings decline. It is therefore important to investigate whether the pricing of the risk implied by conservatism is driven by the high upside potential or the high downside risk. We use an option-implied approach to answer this question.

We use an options-implied approach for three reasons. First, using put and call options allows us to test investors' pricing of this downside risk (in case future revenues are not realized) separate from the pricing of the upside potential (in case expected future revenues do materialize). Using just stock returns does not allow us to distinguish between the two. Second, existing literature has documented higher information content in options markets than in stock markets.[3] Higher information content in options limits the possibility of our results being driven by investor mispricing. Third, since options are limited-period assets, we expect the mispricing to be corrected within a short time frame. We use one-month expiry options in our study, so we believe that any mispricing in the options should get reversed within less than a month when the new series starts trading. This further reduces the potential for investor mispricing.

We follow the option-implied methodology from Bali and Murray (2013). Following their methodology, every month, for each firm, using one-month expiry options, we construct two "option assets."[4] Returns on these assets are calculated as the change in their value from the start of the trading of the options series till the expiry of the options series. Both the assets are constructed to be delta and vega neutral; that is, the asset values are not affected by small changes in the price and volatility of the underlying stock. This is another advantage of using options over using stocks. Deriving from the Black and Scholes (1973) model, controlling for the effect of price and volatility of the underlying stock sets expected returns to near zero. This is quite difficult using stocks. Of the two assets mentioned above, one asset (PUT asset) is designed to change value with a change in the left tail of the risk-neutral density. The other asset (CALL asset) is designed to change value with a change in the right tail of the risk-neutral density. The two assets thereby allow us to test investors' pricing of the left tail risk as well as of the right tail risk separately. A positive relation between conservatism and returns on option assets would indicate the pricing of the risk implied by conservatism. If the conservatism-option returns relation is exhibited primarily in the PUT (CALL) asset, it would imply that it is the downside risk (upside potential) that drives the pricing of conservatism.

We measure conservatism following the methodology of Penman and Zhang (2002) (hereafter called PZ02).[5] This is a measure of unconditional conservatism. Although conditional conservatism depends on new information affecting future cash flows (either positively or negatively) (Kim and Zhang 2016), unconditional conservatism does not depend on news and thereby captures the intrinsic *ex ante* level of conservatism inherent in the firm.[6] We use the intersection dataset of CRSP, Compustat, and OptionMetrics from 1996 to 2017.[7] We calculate an annual conservatism measure from the most recent annual financial data filed with the SEC and use the measure every month for the next 12 months (or until the next set of financial statements is filed).[8] We use the financial information to calculate conservatism only after it has been filed with the SEC and is publicly available for investors to use.

We find that conservatism is positively and significantly associated with returns on the PUT asset but either negatively or insignificantly associated with returns on the CALL asset. This finding shows that the risk implied by conservatism is priced (consistent with prior literature) but that investors' aversion to downside risk drives the pricing (since put options focus on the downside risk and call options on the upside potential). This result is consistent with prior literature, which states that investors place greater weights on losses relative to gains; they care more about covering the

[2] Zhang (2008) finds that conservative borrowers get lower interest rates and their lenders get a timely signal of default risk due to borrowers violating covenants.
[3] Lee and Cheong (2001) provide evidence that the options market exhibits more information-motivated trading than do stock markets. Skinner (1990) shows that more private information is produced about firms after their options are listed. Further, Amin and Lee (1997) document that option traders participate in price discovery.
[4] Detailed explanation on these assets can be found in Appendix A.
[5] The conservatism measure is described in Section III. In addition, we also use the conservatism measure from Penman and Zhang (2021) and find qualitatively similar results.
[6] Although Kim and Zhang (2016) document a reduction in skewness from conservative reporting, they use conditional conservatism, which is news dependent. Our measure captures unconditional conservatism, which as explained, refers to the risk/uncertainty inherent in the business operations, as perceived by the management.
[7] OptionMetrics does not report data prior to 1996.
[8] We use one-month expiry options, so our option returns are calculated every month. However, the conservatism measure cannot be updated monthly. Moreover, the variables required to calculate conservatism are not reported quarterly. So we use the same measure of conservatism every month until the next 10-K is filed.

downside risk than the upside potential. For example, Ang, Chen, and Xing (2006) show that investors demand a positive risk premium for downside risk, whereas no such opposite effect exists for any upside potential.

We also use an alternative measure of conservatism, from Penman and Zhang (2021) (which is an extended version of PZ02 measure). We find that our results continue to hold; conservatism continues to be significantly and positively associated with the returns on put option assets. We further decompose PZ21 measure into two components and find that the expense component drives the pricing of conservatism much more than the deferred revenue component. This outcome is consistent with our argument earlier that uncertainty in business operations can expose investors to a risk that is priced in the market.[9] In additional tests, our results hold even after excluding monthly observations where option asset returns are either extremely positive or negative.[10] Given that our results hold even after excluding the extreme return months shows that large price movements do not drive our results.

We perform several more robustness tests to confirm the primary findings. First, we use a standardized rank measure of conservatism instead of a continuous measure of conservatism. In another robustness test, we follow the portfolio approach and sort our sample into deciles every month based on the conservatism score. We then group all firms within the same decile rank into one "portfolio" and calculate equally weighted average returns on each option asset for all firms within the individual portfolio. We then find that the difference in returns for the highest conservatism portfolio and the lowest conservatism portfolio is positive and statistically significant, even after controlling for the established risk factors.

An alternative explanation for our results could be investor mispricing. Since conservative reporting impacts the information environment (García Lara et al. 2014), one could argue that our returns are driven by investors overreacting to information conveyed in conservatism rather than due to the risk implied by conservatism. If the returns are indeed driven by investor mispricing, then the impact of the mispricing should be the highest when new information (in the form of a new 10-K) is released. As a result, we omit the first month after the company files a new 10-K and rerun our regression with the remaining observations.[11] We continue to find a significant relation between conservatism and the returns on option assets, suggesting that the relation is driven by the risk implied by conservatism rather than by investor mispricing. Another way of distinguishing risk premium from investor mispricing is by observing how long the excess returns are generated. If the excess returns last for a short period and then die out, it would usually point to investor mispricing because returns generated by risk should not go away unless the risk has gone away too (Chambers et al. 2002). In addition, if the returns are driven by risk, there should be, on average, an equal probability of negative and positive returns. In line with this reasoning, we plot the average monthly returns on the two option assets and observe the pattern of the returns. In the monthly return graphs, we observe a substantial fluctuation in the returns for both option assets, indicating that the returns are driven by the risk in conservatism rather than by investor mispricing. In additional tests, we use National Bureau of Economic Research (NBER) data on recession versus expansion months and find stronger results when the previous month was a recession month than when the prior month was an expansionary month.[12] This is consistent with our main finding. When the prior month had recessionary effects, investors would be more risk averse and pay more to avoid downside risk.

Our paper contributes to the conservatism literature by documenting how investors price the risk implied by unconditional conservatism. Although the risk inherent in the business is implied in the asymmetric treatment of expenses (and losses) versus revenues (and gains), our results show that investors' pricing of the risk implied by conservatism is driven by the left tail risk or the possibility of a large negative earnings shock (as evidenced by the positive association with returns on the PUT asset) rather than by the upside potential (as evidenced by a lack of association with the returns on the CALL asset). This finding is consistent with the existing literature on investors' loss aversion tendency. Gemmill and Shackleton (2005) extend this literature by showing such a bias within investors in the options market. Their finding is also consistent with Prospect Theory, which states that investors' aversion to downside risk weighs more in their utility function than their inclination toward upside potential. Our findings also contribute to the literature on how

[9] Deferred revenue relates to unearned revenue or cash received in advance, whereas expenses can potentially be a greater signal of future business uncertainty compared with revenues. For instance, higher accrued expenses could indicate higher risks of future expenses if the accrual calculation is not very accurate. Higher R&D or higher advertising expenditure could signal uncertainty in future revenues if the R&D or advertising investment does not pay off. This is consistent with Penman and Yehuda (2019), who show that both immediate expensing of investment and revenue deferrals can impact expected risk in the firm's stock.

[10] We define extreme returns as the three largest positive or negative returns on each option asset in our sample. Figure 2 plots the average returns on each of the three option assets every month. The option assets are constructed such that their value is unaffected by small changes in the price or volatility of the underlying stock. This implies that their values might not be immune to large changes in price.

[11] Since options have an expiry date, we expect any mispricing to reverse by the time the options expire. Since we use one-month options, we expect the effect of investor mispricing to die out within the first month after the new 10-K.

[12] We conduct the main test separately on recession months versus expansion months. The difference in coefficients is statistically different when using a Welch test (assuming unequal variances for the two subsamples).

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conservative accounting information assists investors in assessing risks in the equity market. Our findings are important for several stakeholders. Regulators and standard setters can gain insights into the effectiveness of reporting policies by observing how conservative accounting is used by investors in assessing and hedging risks. Our results are potentially relevant for analysts if incorporating a firm's reporting conservatism into their price targets can provide richer insights. Our results show that investors can differentiate between downside risk and upside potential by incorporating the appropriate options contracts. This suggests that conservative reporting could be a potential channel for the flow of information from the options to the stock market.

The rest of the paper is organized as follows: Section II discusses the literature review; Section III discusses research design, sample selection, and hypothesis development; Section IV discusses descriptive statistics, main results as well as robustness tests, and additional analysis; and Section V concludes.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Conservatism has been a crucial feature of financial reporting. Under conservative accounting, expected losses are recorded immediately, but expected revenues are not recorded until their realization is reasonably certain, thereby biasing net asset values downward (Watts and Zimmerman 1986). Existing literature distinguishes between two distinct types of conservatism: conditional and unconditional conservatism (Beaver and Ryan 2005). Conditional conservatism refers to conservative reporting that is conditional on news—negative versus positive news. It is an *ex post* or news-dependent conservative reporting (Basu 1997; Zhang 2008; Cheng, Huang, and Li 2015). However, unconditional conservatism is the degree of conservatism adopted in the firm that is not conditional on news (news independent or *ex ante*). Unconditional conservatism captures in financial reporting the inherent level of business risk perceived by managers (Ahmed and Duellman 2013; Shaw and Whitworth 2022).[13]

We focus on unconditional conservatism because it allows us to capture a firm's inherent risk perception, which is not dependent on specific news. This allows us to examine investors' reaction to the *ex ante* perception of risk rather than their reaction to specific new information. Following PZ21, uncertainty in business (future revenues or expenses) implies that the investor is exposed to tail risk. There is a probability of a large earnings growth if the future revenues are realized (or expenses do not materialize), offset by the probability of a large earnings decline if the future revenues are not realized (or actual expenses exceed the provisions).[14] Existing literature has shown that conservatism relates positively to future stock returns (Chan et al. 2001; Chambers et al. 2002; Penman and Zhang 2002, 2020). However, it is unclear what drives this pricing—investors' aversion to downside risk (left tail) or their preference for the upside potential (right tail).

We use an options-implied approach to investigate the question. This approach offers four distinct advantages. First, put and call options allow us to test investors' pricing of the downside risk (negative earnings in case future revenues are not realized) separate from their pricing of the upside potential (positive earnings in case expected future revenues do get realized). Using stock returns does not allow us to distinguish between the two. Second, existing literature has documented higher information content in options markets than in stock markets (that is, the existence of informed investors in options markets). Amin and Lee (1997) document a more than 10 percent increase in options market activity in the four days before quarterly earnings announcements. They also show that the preannouncement option trading is in the direction of the subsequent earnings news. Black (1975) argues that informed investors will prefer to trade options because of higher leverage opportunities and less downside risk. Lee and Cheong (2001) provide evidence that the options market exhibits more information-motivated trading than stock markets. Skinner (1990) shows that more private information is produced about firms after their options are listed. In addition, Jayaraman, Frye, and Sabherwal (2001) show that the options market plays a vital role in price discovery. Botosan and Skinner (1993) find that post-earnings announcement drifts are less pronounced for firms with traded options than those without traded options. A greater information-motivated trading and higher information content in options limit the possibility of investor mispricing.

Third, the use of the option-implied approach following Bali and Murray (2013) allows us to control for the effect of the price and volatility of the underlying stock. Deriving from Black and Scholes (1973), controlling for the price and

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[13] There are numerous other papers written on conservatism. The papers listed are just indicative.

[14] ROE = $Earnings_1/B_0$, where $Earnings_1$ is current year earnings and B_0 is the opening balance of book value. Penman and Zhang (2021) state that ROE is affected by conservative accounting in two ways: one, conservatism reduces book value and thereby reduces the denominator in ROE; two, under conservative accounting, immediate expensing of investments (R&D, advertising) or deferral of uncertain revenues reduces the numerator (earnings) in ROE. Uncertain revenues indicate the risk inherent in revenues. If uncertain revenues are realized in the future, that will generate high ROE with high earnings and a suppressed denominator (book value). However, if these revenues are not realized but investments keep growing, the numerator will be suppressed substantially, causing a negative earnings surprise. This is consistent with Penman and Yehuda (2019), who show that both uncertain revenues and immediate expensing of investments relate to expected risk in stock pricing.

volatility of the underlying stock sets expected returns to near zero, making it easier to interpret the excess returns on the option assets at the firm level. The options approach allows us to limit expected returns to near zero, making it easier to interpret the excess returns on the option-based assets. Fourth, since options are limited-period assets, mispricing, if any, is expected to be corrected within a short time; we use one-month expiry options in our study, so we believe that mispricing, if any, in option prices should get reversed within less than a month, by which time the new options series will start trading. This selection process further reduces the potential for investor mispricing.

To summarize, conservatism implies risks inherent in the business. It suggests that there is a probability of a large earnings growth offset by a probability of a large earnings decline. But whether investors' aversion to downside risk or their preference for upside potential drives the risk captured by conservatism is an open question. To the best of our knowledge, no other paper has studied this question.

We follow Bali and Murray (2013) and use an option-implied approach to answer the question. Accordingly, we construct two "option assets" for each firm every month using one-month expiry options.[15] The two assets are a combination of long and short positions in put and call options and the underlying stock such that the assets are delta and vega neutral; that is, the value of the assets is not affected by small changes in the price and volatility of the underlying stock. Deriving from the Black and Scholes (1973) model, controlling for the effect of price and volatility of the underlying stock sets expected returns to near zero, something which is quite difficult using stocks. The first asset is called the PUT asset and is designed to change in value with a change in the left tail of the risk-neutral density. Its construction is given below.

$$POS^{P}_{P,OTM} = -1 \, contract \ of \ the \ OTM \ Put$$

$$POS^{P}_{P,ATM} = \frac{\upsilon_{P,OTM}}{\upsilon_{P,ATM}} \, contract \ of \ the \ ATM \ put$$

$$POS^{P}_{S} = -(POS^{P}_{P,OTM} * \Delta_{P,OTM} + POS^{P}_{P,ATM} * \Delta_{P,ATM}) \ shares$$

where OTM stands for out of the money option and the OTM put (call) option contract is that contract with a delta closest to -0.1 (0.1). Delta captures the association between the option price and the price of the underlying stock. Similarly, ATM stands for at the money option and the ATM put (call) option contract is that contract with a delta closest to -0.5 (0.5). $\Delta_{P,OTM}$ and $\Delta_{P,ATM}$ refer to the delta of the OTM and ATM put contracts, respectively. $\upsilon_{P,OTM}$ and $\upsilon_{P,ATM}$ refer to the vega of the OTM and ATM put contracts, respectively. Vega captures the sensitivity of the option price to the volatility of the underlying stock.

The second asset is called the CALL asset and is designed to change in value with a change in the right tail of the risk-neutral density. Its construction is given below.

$$POS^{C}_{C,OTM} = 1 \, contract \ of \ the \ OTM \ Call$$

$$POS^{C}_{C,ATM} = -\frac{\upsilon_{C,OTM}}{\upsilon_{C,ATM}} \, contracts \ of \ the \ ATM \ call$$

$$POS^{C}_{S} = -(POS^{C}_{C,OTM} * \Delta_{C,OTM} + POS^{C}_{C,ATM} * \Delta_{C,ATM}) \, shares$$

where OTM stands for out-of-the-money option and OTM put (call) option contract is that contract with a delta closest to -0.1 (0.1). Delta captures the association between the option price and the underlying stock price. Similarly, ATM stands for at the money option, and the ATM put (call) option contract is that contract with a delta closest to -0.5 (0.5). $\Delta_{C,OTM}$ and $\Delta_{C,ATM}$ refer to the delta of the OTM and ATM call contracts, respectively. $\upsilon_{C,OTM}$ and $\upsilon_{C,ATM}$ refer to the vega of the OTM and ATM call contracts, respectively. Vega captures the sensitivity of the option price to the volatility of the underlying stock.

[15] Detailed explanation on these assets can be found in Appendix A. We use one-month expiry options, as these options are the most traded. Using options series with a longer expiry cycle may limit our sample.

We investigate the link between conservatism and the returns on the option assets described above. We posit that the PUT asset returns will indicate the tail risk (downside risk) and the CALL asset returns will indicate upside potential. We state our hypothesis below.

H1: The relation between unconditional conservatism and PUT (CALL) option returns is driven by downside risk (upside potential).

III. SAMPLE SELECTION, RESEARCH DESIGN, AND DESCRIPTIVE STATISTICS

All other data filters relating to the option assets used in Bali and Murray (2013) are followed here as well. Accordingly, we remove observations with missing bid price or offer price, observations with a bid price less than \$0, observations with offer price less than or equal to the bid price, or observations with a spread (offer price – bid price) less than the minimum spread (\$0.05 for options with prices less than \$3.00, \$0.10 for options with prices greater than or equal to \$3.00). We also remove options where the special settlement flag[16] in the OptionMetrics database is set and options where there are multiple entries for a call or put option with the same underlier/strike/expiration combination on the same date. Options with missing or bad Greeks or implied volatilities are removed, as the Greeks (delta and vega) are required to calculate option returns. An example of a "bad Greek" would be observations where the vega is negative.[17] Another example would be a call option with a negative delta or a put option with a positive delta.[18]

We also exclude observations of options that violate basic arbitrage conditions. For call options, we exclude observations where the bid price is equal to or higher than the spot price or where the offer price is less than the spot price minus the strike price. For puts, we exclude observations where the bid price is equal to or higher than the strike price or offer price is less than the strike price minus the spot price.

The option price is calculated as the average of the bid and ask prices as quoted in the OptionMetrics database. The value (or price) of each of the two assets is calculated by adding up the net price of each component of the option assets. Returns on the option assets are thereby calculated as the change in the value of the assets from the date of purchase (or construction) of the asset until the expiry of the options series. Since we use one-month expiry options, the option assets also expire on that day. The option components in the option assets expire automatically, and the net value of the options component is calculated depending on the option type (put versus call), the trade direction (short or long position), and the strike price of the option.[19] Any stock position in the option assets is settled by taking the opposite position in the asset. Since we use one-month expiry options, we calculate returns on the three options assets every month. On the other hand, conservatism cannot be measured every month, so we calculate conservatism using the most recently reported annual financial statements and use the same measure of conservatism for the next 12 months (or until the next set of financial statements is reported). We use the most recent financial statement data that would have also been available to investors. That is, we use the latest financial statement data only after the 10-K has been filed and the information has become available to the public. Consequently, for option assets set up after the fiscal year-end but before the filing of the 10-K, we use information from the prior year's 10-K.

Following Bali and Murray (2013), we form these assets on the second trading day after the option series' start and hold them until their expiry. To study how the risk implied in conservatism is priced, we use the below regression model on each of the two option assets described above.

$$\begin{aligned} Option\ return_{it} = {} & \beta_0 + \beta_1 Conservatism_{it-1} + \beta_2 Size_{it-1} + \beta_3 BTM_{it-1} + \beta_4 Market\ return_{it} \\ & + \beta_5 Leverage_{it-1} + \beta_6 ROA_{it-1} + \beta_7 Neg\ ROA\ dummy_{it-1} + \beta_8 Litigation_{it-1} + \beta_9 CEOCHM_{it-1} \\ & + BIDASK_{it-1} + Turnover_{it-1} + STDIB_{it} + \Sigma \text{IND FE} + \Sigma \text{Year FE} + \varepsilon_{it} \end{aligned} \tag{1}$$

where conservatism is measured following PZ02 as below.

[16] Special settlement flag refers to nonstandard settlement (the number of shares to be delivered may be different from 100, additional securities and/or cash may be required, and the strike price and premium multipliers may be different than \$100 per tick; the option may have a nonstandard expiration date).

[17] Vega is the change in the price of a derivative asset caused by a change in the volatility of the distribution of the underlying asset. An increase in the volatility should increase the price of the option, both put and call options. Consequently, vega should always be positive.

[18] Delta is the change in the price of a derivative asset caused by a change in the price of the underlying asset. Since call option is an option to buy, delta for a call should always be positive, whereas a put option is an option to sell, so the delta for a put option should always be negative.

[19] For example, an in-the-money long call option will have a net positive value on expiry; a short put option where the stock price is higher than the strike price will also have a net positive value.

$$C_{it} = (RD_{it}^{res} + ADV_{it}^{res} + INV_{it}^{res})/NOA_{it}$$

— RD_{it}^{res} (R&D reserve) is calculated as the estimated amortized R&D asset that would have been on the balance sheet if R&D had not been expensed. R&D expenditures are capitalized and then amortized using the industry coefficients estimated by Lev and Sougiannis (1996).
— AD_{it}^{res} (advertisement expenses reserve) is the estimated brand asset created by advertising expenditures. Advertising expenses are capitalized and amortized using a sum-of-the-year's digits method over two years. This methodology follows Bublitz and Ettredge (1989) and Hall (1993), who have shown a short useful life for advertising expenses, typically one to two years.
— INV_{it}^{res} (inventory reserve) equals the LIFO reserve reported in the financial statement footnotes.

We draw our sample from the intersection of the Compustat, CRSP, and OptionMetrics databases for 1996–2017. We do not use data before 1996 because OptionMetrics starts publishing data in 1996. We collect all accounting data from Compustat. We use the OptionMetrics database to collect information on options prices and closing stock prices. We collect information on market returns, stock turnover, and stock bid-ask spread from CRSP.

We control for several factors that could either influence a firm's conservatism or returns on the option assets. These include *Size*, calculated as the natural logarithm of the firm's market capitalization, as well as book-to-market ratio. We control for size and book-to-market since the two factors have been identified as priced risk factors by prior literature.[20] We also control for the contemporaneous market return, as any movements in market return can impact option returns. We also control for leverage, litigation, as well as corporate governance, as these factors have been associated with conservatism as well as with future returns. *Leverage* is calculated as total debt divided by stockholders' equity. Following Ali, Chen, and Radhakrishnan (2007), *Litigation* is an indicator variable equal to 1 if the firm operates in a high-litigation industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370) and 0 otherwise. *CEOCHM* is an indicator variable equal to 1 if the CEO also chairs the board and 0 otherwise. We also control for *ROA*, as past ROA can be used to predict future ROA and future ROA predictions can impact expected returns. We also include a *Neg ROA dummy* variable. A company reporting a negative ROA would be expected to experience negative stock returns, which could influence the option returns. Prior literature has shown investors' asymmetry toward expected gains versus losses (Ang et al. 2006). Investors pay more to avoid expected losses than to earn expected gains. This asymmetry can impact expected option returns, especially if the company has recently reported a negative ROA. We also control for lagged values of bid-ask spread and turnover to control for informational proxies (informed trading, information asymmetry) that can impact expected returns. We also include the past five years' standard deviation of income to control for business fluctuation, which can increase expected returns. In addition, we include year fixed effects and industry fixed effects. We define industry using the Fama-French 48 industries classification. We cluster standard errors at the firm level.

IV. RESULTS

Summary Statistics

Table 1 presents the summary statistics of some of the variables used in the paper. The average returns on the two option assets are generally negative. This finding is in line with Bali and Murray (2013). The average size of companies is about \$4.8 billion; this appears larger than the average size of companies in the Compustat sample for the same period (\$2.35 billion). Since we use options data, the sample is expected to be tilted toward larger companies. The companies are, on average, profitable. The average *ROA* is about 5.5 percent. Average leverage is about 1.45, whereas median leverage is about 0.39, implying that the sample is tilted toward high-leverage firms.[21]

Table 2 presents correlations among the same variables. *Size* is correlated positively with call asset returns but exhibits an insignificant relation with *Put return*. This is potentially driven by the fact that larger companies are perceived by investors as safer and less prone to downside risk (Ang et al. 2006; Kim and Zhang 2016). Consequently, investors are less willing to pay a large premium for the downside risk on these companies. *BTM* correlates positively with *Put return*. This is consistent with the evidence in Fama and French (1993), who show higher risk for high-*BTM* firms. This is consistent with *BTM* exhibiting a negative correlation with *Size*—larger firms have lower *BTM* (lower risk). *Neg ROA dummy* also correlates positively with the *Put return*, indicating a higher potential downside risk in firms reporting negative ROAs. *Neg ROA dummy* correlates negatively with *Size*, indicating lower likelihood of negative

[20] Please refer to Appendix B for definition of all variables.
[21] Although we define leverage as total debt divided by total stockholders' equity, we also use total assets as the scalar and find similar results.

TABLE 1

Summary Statistics

Variables	n	Mean	Median	Std. Dev.	p25	p75
Put return	77,202	−0.009	−0.014	0.166	−0.058	0.045
Call return	77,202	−0.014	0.010	0.173	−0.075	0.068
Size	76,899	8.605	8.525	1.548	7.513	9.626
BTM	76,888	0.364	0.295	0.375	0.168	0.483
Leverage	77,191	1.289	0.433	30.646	0.062	0.979
Market return	77,202	0.004	0.011	0.045	−0.020	0.031
ROA	77,198	0.055	0.059	0.470	0.019	0.104
Neg ROA Dummy	77,202	0.163	0.000	0.369	0.000	0.000
Litigation	77,202	0.386	0.000	0.487	0.000	1.000
CEOCHM	57,571	0.570	1.000	0.495	0.000	1.000
STDIB	73,460	368.682	98.239	1,026.844	35.634	297.082
BIDASK	76,702	0.037	0.030	0.024	0.021	0.045
Turnover	76,702	0.341	0.250	0.357	0.156	0.410

The above table presents the summary statistics of some of the key variables used in the paper.

Variable Definitions:
Put return = the return on the PUT option asset; and
Call return = the return on the CALL option asset.
All variables are defined in Appendix B.

earnings for larger firms. *STDIB* also correlates positively with *Put return*. This is potentially driven by the higher downside risk in firms experiencing volatile earnings. Volatile earnings also correlate positively with *Call return*, since such volatility also enhances the possibility of higher upsides.

Figure 1 plots the number of observations in our sample each year and compares that with the annual trading volume for options traded on options exchanges in the U.S. each year.[22] As seen in Figure 1, the pattern in the annual observations in our sample matches quite closely with the annual volume of traded options on the options markets. As expected, the options trading volume grows quite rapidly closer to the end of the sample period. Also, as expected, there is a dip in both the number of observations in the sample and options trading activity in the options market during the 2008–2010 period. The graphs again rise, starting from 2013 up until 2017. This figure lends credibility to our sample and shows that our data filters are appropriate.

Main Result

Table 3 presents the main result from regression Equation (1). Conservatism is positively and significantly associated with option returns on the put asset but negatively associated with the returns on the call asset. This evidence is two-fold; firstly, this shows that, in line with existing literature, conservatism is priced in the market. However, more importantly, the association is positively related to returns on the put options, suggesting that it is investors' aversion to downside risk that drives the pricing rather than their expectation of upside potential. The result in Table 3 confirms our hypothesis; the results are initial evidence that the risk implied by conservatism is priced in the market by investors' aversion to downside risk. We also note that conservatism is negatively related to the returns on the call options. This suggests that investors are willing to accept lower returns for stocks with lower risk.[23]

We also use a standardized rank measure of conservatism. We sort our sample into deciles based on the conservatism score and standardize the decile ranks to range from 0 to 1. Using the standardized rank has two benefits. First, it allows us to show the impact of conservatism as we move from the lowest conservatism firms (standardized rank of 0) to the highest conservatism firms (standardized rank of 1). Second, using standardized ranks also allows us to reduce the impact of outliers (as all outliers are now treated equally within the same rank). The results are reported in Table 4,

[22] In Figure 1, the annual trading data are the daily average options volume, in the '000s of contracts. The data are sourced from the website of The Options Clearing Corporation.

[23] In addition, we also note that the coefficient on *Call return* does not retain its statistical significance in other tests (for instance, the hedge portfolio tests). This suggests that investors seem less concerned about the potential upside.

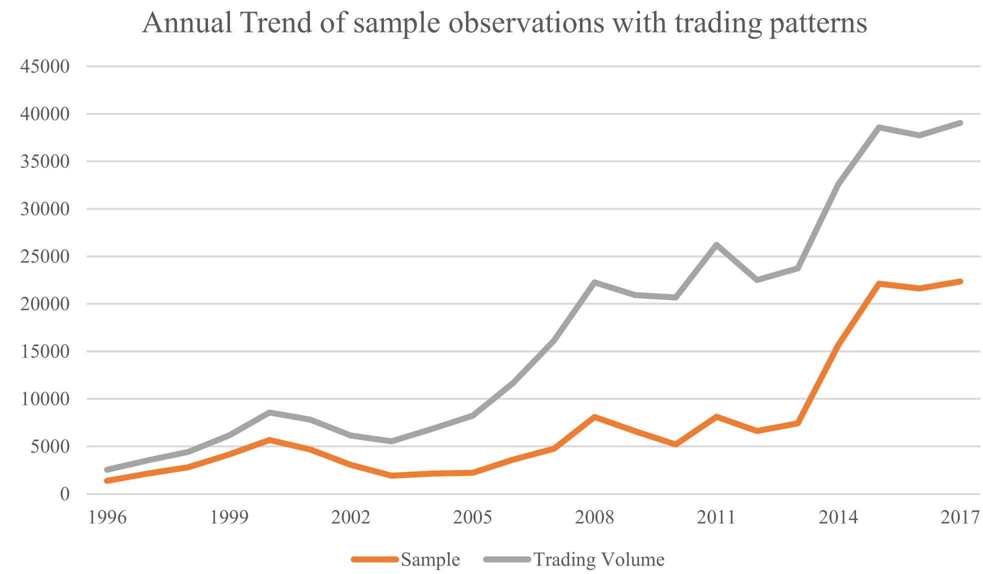
TABLE 2
Correlation Matrix

Variables	Put return	Call return	Size	BTM	Leverage	Market return	ROA	Negative ROA Dummy	Litigation	CEOCHM	STDIB	BIDASK
Call return	**0.177**											
Size	−0.001	**0.015**										
BTM	**0.019**	**0.008**	**−0.099**									
Leverage	0.003	0.001	**−0.009**	−0.004								
Market return	**0.017**	**0.034**	**−0.016**	**0.042**	0.002							
ROA	−0.005	−0.004	**0.052**	**−0.036**	−0.003	**−0.008**						
Negative ROA Dummy	**0.024**	0.002	**−0.258**	**0.056**	**0.015**	**0.023**	**−0.191**					
Litigation	0.006	**−0.008**	**−0.094**	**−0.179**	0.000	**0.008**	**−0.026**	**0.097**				
CEOCHM	−0.005	0.000	**0.160**	−0.001	−0.006	**−0.014**	0.001	**−0.054**	**−0.086**			
STDIB	**0.007**	**0.009**	**0.406**	**0.120**	0.004	**0.009**	**−0.016**	**0.033**	**−0.090**	**0.070**		
BIDASK	−0.003	**−0.025**	**−0.413**	**−0.011**	0.003	**−0.122**	**−0.076**	**0.277**	**0.143**	**−0.033**	**−0.116**	
Turnover	0.006	**−0.006**	**−0.269**	**0.034**	**−0.007**	**−0.025**	**−0.038**	**0.144**	**0.111**	**−0.077**	**−0.045**	**0.437**

The above table presents the Pearson correlations among some of the key variables used in the paper. Bolded values represent significance at 10 percent or lower.

Variable Definitions:
ROA = return on assets;
Put return = the returns on option assets using just put options and stock; and
Call return = the returns on the option assets using just call options and stock.
All other variables are defined in Appendix B.

FIGURE 1
Comparison with Annual Number of Observations with the Annual Trading Volume of Options



This figure compares the number of observations each year with the actual options trading volume in that year. Since we use several data-filtering options, we need to ensure that our final data are a good representation of the population. Consequently, we plot the annual observations and compare them with the year's trading volume. We get the data on options trading from the website of The Options Clearing Corporation (https://www.theocc.com/). The annual trading data are the average daily volume for that year, quoted in the '000s.
(The full-color version is available online.)

Panel A. Columns (1) and (2) present results using decile-based standardized rank measures.[24] As can be seen, the results are still qualitatively similar. Even after using a standardized rank measure, conservatism is still strongly and positively associated with returns on the PUT asset. However, the return on the CALL asset is not significantly associated with conservatism. This is further evidence that the pricing of the risk implied by conservatism is driven by investors' aversion to downside risk.

We also use an alternative conservatism measure (Penman and Zhang 2021) to provide more credibility to our main results.[25] Table 4, Panel A presents results using the conservatism measure in Penman and Zhang (2021). This alternative measure is an expanded version of PZ02. We calculate the alternative conservatism measure as follows:

$$C_{it} = (RD_{it}^{res} + ADV_{it}^{res} + INV_{it}^{res} + BD_{it}^{res} + DEP_{it}^{res} + DEFREV_{it}^{res} + ACCEXP_{it}^{res})/NOA_{it}$$

where *RD* reserve, *ADV* reserve, and *INV* reserve are calculated as explained earlier. *BD* reserve stands for bad debt reserve, *DEP* reserve stands for depreciation reserve, *DEFREV* reserve stands for deferred revenue reserve, and *ACCEXP* reserve stands for accrued expenses reserve. As can be seen, the results are qualitatively similar and conservatism is positively and significantly associated with returns on the PUT asset and negatively with returns on the CALL asset.

Additionally, we decompose the PZ21 measure into revenues and expenses components and investigate what drives the pricing of the risk. To investigate this, we regress the put and call *Option returns* on the two components separately. The results are presented in Table 4, Panel B. We find that the expense portion (*RD* + *ADV* + *BD* + *DEP*) drives the pricing of the risk implied by conservatism, much more than the deferred revenue component. There is a strong positive correlation between the put *Option returns* and the expense portion of the conservatism measure, whereas the relation is negative with returns on call option assets. The expense portion of the conservatism measure includes depreciation, R&D, advertising, bad debts, as well as accrued expenses. These are not just current period expenses but also indicate

[24] Using quintile-based sort rank measure of conservatism yields qualitatively similar results.
[25] We also use the conservatism measure from Khan and Watts (2009) and find similar results. However, since their measure captures conditional conservatism, we do not focus on that result.

TABLE 3

Association between *Conservatism* and Option Asset Returns

	Returns on Put Option Asset	Returns on Call Option Asset
Conservatism	0.125***	−0.097**
	(0.033)	(0.041)
Size	0.000	0.002***
	(0.001)	(0.001)
BTM	0.005**	0.002
	(0.002)	(0.003)
Leverage	0.000	0.000
	(0.000)	(0.000)
Market return	−0.008	0.094***
	(0.017)	(0.017)
ROA	−0.013	−0.005
	(0.008)	(0.009)
Negative ROA dummy	0.003	−0.002
	(0.003)	(0.003)
Litigation	0.007**	−0.000
	(0.003)	(0.003)
CEOCHM	0.002	−0.000
	(0.001)	(0.001)
STDIB	−0.000	0.000
	(0.000)	(0.000)
BIDASK	0.245***	−0.049
	(0.059)	(0.084)
Turnover	−0.000	0.001
	(0.003)	(0.004)
Intercept	−0.069***	−0.078***
	(0.020)	(0.022)
Observations	58,197	58,197
Fixed Effects	Year and Industry	Year and Industry
Standard Errors	Firm Clustering	Firm Clustering
R^2	0.011	0.006

***, **, * Significance at the 0.01, 0.05, and 0.1 levels, respectively, for the two-tailed test of coefficients.
The above table presents the results of regression Equation (1). The dependent variable is the return on the two option assets, following the methodology in Bali and Murray (2013) and explained in the paper. The main variable of interest is *Conservatism*, calculated following the methodology in Penman and Zhang (2002). The scale of the conservatism measure has been adjusted by a factor of 100 to reflect the coefficients clearly. The regression includes fixed effects on year and industry. Industry is defined following Fama-French 48 industries classification. Standard errors, clustered at the firm level, are shown in parentheses.
All other variables are defined in Appendix B.

future risks to the firms. For instance, higher R&D or advertising can lead to low negative payoffs if the investments do not pay off. In addition, higher bad debts could point to credit-related risk for the firm's customers and can negatively impact future sales. Higher depreciation could indicate aggressive usage of assets, which could lead to quicker replacements or quicker obsolescence (as with computers). Similarly, provisions for losses (loan losses) could imply a potential impact on future collections (of interest income). Moreover, provision for lawsuit settlements could indicate possibility for a future expense. Penman and Yehuda (2019) show that both expensing and revenue deferrals can indicate expected risk in stock pricing.

In a further test, we exclude observations belonging to months with extreme positive and negative returns. This test follows from the construction of the two option assets. The option assets are constructed such that their value is not affected by small changes in the underlying stock price. However, the option asset values need not be immune to large changes in the price of the underlying asset. In order to show that our results are indeed driven by the risk implied by conservatism rather than by large changes in the price of the underlying asset, we exclude observations with extreme

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TABLE 4

Using Alternate Conservatism Measures

Panel A: Results Using Alternative Measurement of Conservatism

	Using Standardized Rank Measure of Conservatism		Using Conservatism Measure from Penman and Zhang (2021)	
	Returns on Put Option Asset	**Returns on Call Option Asset**	**Returns on Put Option Asset**	**Returns on Call Option Asset**
Conservatism	0.010***	0.004	0.094***	−0.080***
	(0.004)	(0.004)	(0.029)	(0.031)
Observations	58,197	58,197	56,237	56,237
Fixed Effects	Year and Industry	Year and Industry	Year and Industry	Year and Industry
Standard Errors	Firm Clustering	Firm Clustering	Firm Clustering	Firm Clustering
R^2	0.011	0.006	0.011	0.006

Panel B: Decomposition of PZ21 measure

	Returns on Put Option Asset	**Returns on Call Option Asset**
Conservatism_Deferred Rev	−0.837***	−0.184
	(0.245)	(0.213)
Conservatism_Expenses	0.142***	−0.092**
	(0.028)	(0.041)
Observations	56,237	56,237
Fixed Effects	Year and Industry	Year and Industry
Standard Errors	Firm Clustering	Firm Clustering
R^2	0.011	0.006

***, **, * Significance at the 0.01, 0.05, and 0.1 levels, respectively, for the two-tailed test of coefficients.
This table provides results on the regression Equation (1) using two alternate measures of conservatism. Panel A presents results using the expanded conservatism measure in Penman and Zhang (2021) (PZ21). Panel B presents results by decomposing the PZ21 measure into deferred revenue and the expense components. The scale of the conservatism measure has been adjusted by a factor of 100 to reflect the coefficients clearly. The regression includes fixed effects on year and industry. Industry is defined following Fama-French 48 industries classification. Standard errors, clustered at the firm level, are shown in parentheses. The coefficients on the control variables as well as on the intercept are not reported for brevity.
All other variables are defined in Appendix B.

returns on the option assets. We define extreme returns as the three largest positive and negative returns. We then rerun our main test by excluding such observations. Table 5, columns (1) and (2) present the impact on Put and Call *Option returns*, respectively, after excluding such extreme observations.[26] As Table 5 shows, our results continue to hold even after excluding such extreme return observations. This evidence further corroborates our finding that the risk implied by conservatism is priced in the market rather than by large fluctuations.

Investor Mispricing Is Not an Explanation

An alternative explanation for our results could be related to investor mispricing. Following prior studies, one could argue that the returns are driven by investors over-reacting to the information contained in the 10-K. In the following tests, we attempt to provide evidence that investor mispricing is not a driver for our results.

Since we calculate conservatism every year from the information presented in the 10-K, one could argue that our returns could be driven by investors over-reacting to the information in the 10-K rather than the risk implied by conservatism. One way to distinguish between risk premium and investor mispricing is by excluding the first month when a new 10-K is made available to investors.[27] If the returns are indeed driven by investor mispricing, then the impact of the

[26] The results hold even if we just exclude top three positive return months or top three negative return months.
[27] According to Thomas and Zhang (2011), if returns are due to mispricing, then the mispricing would be greater in situations of higher information uncertainty. We believe that, by the second month after 10-K release, any uncertainty relating to the content of the 10-K would be resolved. This further increases the likelihood of insignificant returns using this methodology, if the original results are driven by mispricing.

TABLE 5

Excluding Certain Months from the Analysis

	Excluding Top Three Positive and Negative Return Months		**Excluding First Month after New 10-K**		**Compounding Returns for Current and Next Month**	
	Returns on Put Option Asset	**Returns on Call Option Asset**	**Returns on Put Option Asset**	**Returns on Call Option Asset**	**Returns on Put Option Asset**	**Returns on Call Option Asset**
Conservatism	0.133***	−0.088**	0.131***	−0.102	0.335***	−0.140
	(0.034)	(0.040)	(0.037)	(0.077)	(0.099)	(0.124)
Observations	56,601	56,954	53,289	53,289	31,731	31,731
Fixed Effects	Year and Industry		Year and Industry		Year and Industry	
S.E.	Firm Clustering		Firm Clustering		Firm Clustering	
R^2	0.009	0.009	0.011	0.005	0.024	0.010

***, **, * Significance at the 0.01, 0.05, and 0.1 levels, respectively, for the two-tailed test of coefficients.
This table provides results on the regression Equation (1) in three different scenarios. Columns (1) and (2) exclude the top three positive and negative return months from the analysis. The main variable of interest is *Conservatism*, calculated following the methodology in Penman and Zhang (2002). Although our option assets are constructed to be delta-neutral, they may not be immune to large changes in the underlying stock price. Results in columns (1) and (2) are to show that such large changes do not drive our results. In columns (3) and (4), we exclude the first month after a new 10-K is issued. If our results are driven by investors over-reacting to the information conveyed by conservatism, it would be expected to get reversed once the information has percolated into stock prices. Excluding the first month after 10-K allows us to investigate whether investors over-react to conservative reporting or if our results indicate risk premium. In columns (5) and (6), we compound the current month returns with returns for next month. The scale of the conservatism measure has been adjusted by a factor of 100 to reflect the coefficients clearly. The regression includes fixed effects on year and industry. Industry is defined following Fama-French 48 industries classification. Standard errors, clustered at the firm level, are shown in parentheses. The coefficients on the control variables as well as on the intercept are not reported for brevity.
All other variables are defined in Appendix B.

mispricing should be the highest when new information (in the form of a new 10-K) is released. As a result, we omit the first month after the company files a new 10-K and rerun our regression with the remaining observations. If the result is driven by investor mispricing, omitting the first month after a new 10-K is filed will make the result weaker or insignificant. The results of this test are presented in Table 5. Columns (3) and (4) present the results for the put and call option assets, respectively. Even after omitting the first month after new 10-K is released, there is still a significantly positive relation between conservatism and the returns on the PUT option asset. This suggests that the pricing of conservatism shown earlier is indeed due to the risk captured by conservatism rather than by investor mispricing. Further, the significance on the PUT assets further strengthens the evidence that the pricing of the risk is driven by investors' aversion to the downside.

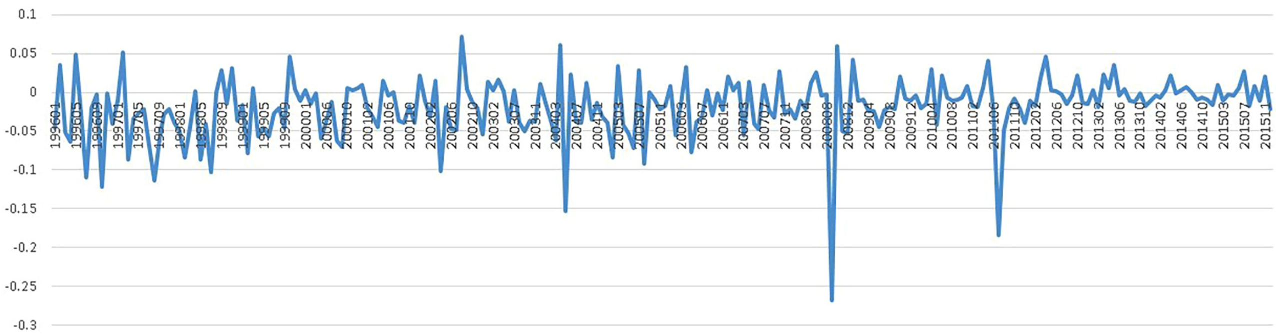
Another way of distinguishing risk premium from investor mispricing is by observing how long the excess returns are generated. Following Chambers et al. (2002), if the excess returns last for a short period and then die out, it would usually point to investor mispricing because returns generated by risk should not go away unless the risk has gone away too. In addition, following Thomas and Zhang (2011), if the returns are due to compensation for risk, we should observe a reasonable number of loss periods (that is, there should be, on average, a relatively equal probability of negative and positive returns). In line with this reasoning, we plot the average monthly returns on both the option assets and observe the pattern of the returns. The two graphs are presented in Figure 2. Panels A and B present average monthly returns on PUT and CALL assets, respectively. The graphs exhibit, on average, significant fluctuation, with several months displaying negative returns. This indicates an equal probability of positive and negative excess returns. This illustration further supports that the conservatism-option asset return relation is driven by the risk implied by conservatism rather than by investor mispricing.

A third approach to providing evidence that the returns are driven by risk rather than investor mispricing follows Chambers et al. (2002). They state that persistent positive excess returns (to high R&D firms) are attributable to risk premium rather than mispricing. This implies that, if returns are driven by mispricing, they would be expected to reverse relatively quickly.[28] We test for mispricing using the compounding methodology used in Keloharju, Linnainmaa, and Nyberg (2021). Following this methodology, we compound the current month's returns with the following one-month or two-month returns. If the returns are due to investor mispricing, then the mispricing should quickly reverse, especially

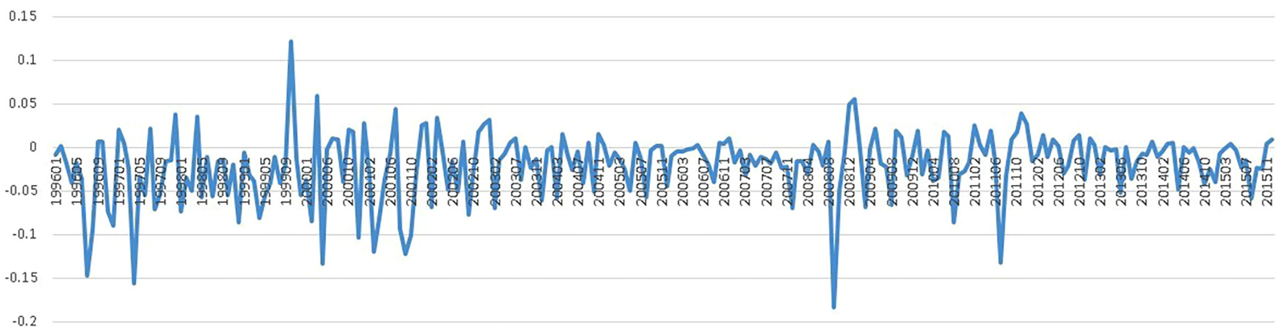
[28] Since we use option assets constructed using one-month options, we believe that returns due to mispricing should reverse quickly, as the options expire, and a new one-month options series begin.

FIGURE 2
Monthly Average Return on Each Option Asset

Panel A: Put Asset



Panel B: Call Asset



The above figure plots the average return on each option asset by month. The graphs depict the fluctuations in the returns across our sample. The graphs indicate that investor mispricing may not be an explanation for two reasons: first, returns caused by investor mispricing are usually expected to die out soon (Chambers et al. 2002). However, in the graphs above, the positive returns do not die out. Second, returns caused by compensation for risk should display the potential for risk (probability of negative returns). The graphs above show sufficient frequency of negative and positive returns.
(The full-color version is available online.)

for one-month expiry options. As a result, combining the current month's options returns with the returns on the next month's options (which will be a new series of options) would make the results either weaker or insignificant. The results are presented in Table 5. Columns (5) and (6) present results (for put and call option assets, respectively) after compounding the current month's returns with the next month's returns. As seen in Table 5, the magnitude of returns on the option assets increases as we go from one-month returns (beta coefficient of 0.125, from Table 3) to two-month compounded returns (beta coefficient of 0.335).[29] If the returns were driven by investor mispricing, the magnitude of the return should have been reduced rather than increased.[30] This increase is further evidence that the returns on option assets are indeed driven by the risk implied by conservatism.

Hedge Portfolio Methodology

In this test, we follow the portfolio approach to study the pricing of the risk implied by conservatism. This methodology has been extensively used in the literature since it does not require the assumption of linearity between the

[29] Our results are consistent with compounding the current and next two months' returns as well. When we use the current and next two months' returns, the coefficient for the PUT option assets increases to 0.600, which is significant at the 1 percent level. To maintain brevity, we have not presented this result.
[30] We go until the next two to three months only, since options assets are not very liquid beyond that point. The number of observations drops fast as we move toward future returns.

dependent and independent variables. We thereby use this methodology as a robustness check for our results. Accordingly, we sort our sample every month into deciles based on the conservatism measure. We then group all firms within the same decile rank into one "portfolio" and calculate average returns on each option asset for all firms within the same portfolio. We then calculate the difference in monthly returns for the highest and lowest conservatism portfolios. We test whether the high-minus-low return difference is statistically significant. The results of this test are presented in Table 6. Panel A shows the result of the excess returns without controlling for any risk factors established in the literature. Panel B shows the statistical significance of the return difference after controlling for four risk factors—small minus big (SMB), high minus low (HML), Market Beta (MKT) (Fama and French 1993), and Momentum (UMD) (Carhart 1997). Both panels show that the difference in returns on the PUT asset between the high- and low-conservatism portfolios is positive and statistically significant. This further shows that the risk implied by conservatism is priced by investors' aversion to downside risk. Using the hedge portfolio approach has two advantages. First, it allows us to corroborate the results presented in Table 3. Second, although the regression methodology assumes a linear relation between conservatism and option asset returns, using the hedge portfolio approach does not require a linear relation, which provides further credibility to our results.

Additional Analyses

Effect of Recessionary Months

In this test, we split our sample into two subsamples based on whether the previous month was a recessionary period as defined by the National Bureau of Economic Research (NBER). The reason for this test is that, if the previous month were marred by a recession, investors would worry more about the downside risk than if the previous month exhibited economic expansion. As a result, we split the sample into two subsamples depending on whether the lagged month (the month before the construction of options assets) was a recession month or expansion month as defined by NBER and rerun our regression Equation (1) separately for the two subsamples. We hypothesize that the effect of conservatism on

TABLE 6

Using Portfolio Analysis to Present the Pricing of Conservatism Risk

Panel A: Without including Any Return Factors as Control Variables

	Returns on Put Option Asset	Returns on Call Option Asset
Decile 1	−0.016***	−0.022***
	(0.004)	(0.003)
Decile 2	−0.018***	−0.016***
	(0.006)	(0.003)
Decile 3	−0.020***	−0.017***
	(0.004)	(0.003)
Decile 4	−0.028***	−0.019***
	(0.006)	(0.003)
Decile 5	−0.019***	−0.016***
	(0.004)	(0.004)
Decile 6	−0.017***	−0.018***
	(0.004)	(0.004)
Decile 7	−0.016***	−0.018***
	(0.005)	(0.004)
Decile 8	−0.006*	−0.014***
	(0.003)	(0.004)
Decile 9	−0.017***	−0.015***
	(0.004)	(0.005)
Decile 10	−0.005*	−0.015***
	(0.003)	(0.004)
Decile 10 − Decile 1	0.011**	0.007
S.E.	(0.005)	(0.005)

(continued on next page)

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TABLE 6 (continued)

Panel B: Controlling for Fama and French (1993) Return Factors and Carhart (1997) Momentum Factor

	Returns on Put Option Asset	Returns on Call Option Asset
Decile 1	−0.017***	−0.023***
	(0.004)	(0.003)
Decile 2	−0.017***	−0.017***
	(0.006)	(0.004)
Decile 3	−0.021***	−0.018***
	(0.004)	(0.003)
Decile 4	−0.029***	−0.0193**
	(0.006)	(0.004)
Decile 5	−0.020***	−0.016***
	(0.005)	(0.004)
Decile 6	−0.018***	−0.017***
	(0.004)	(0.004)
Decile 7	−0.017***	−0.019***
	(0.005)	(0.004)
Decile 8	−0.005	−0.014***
	(0.003)	(0.004)
Decile 9	−0.018***	−0.016***
	(0.005)	(0.005)
Decile 10	−0.006*	−0.017***
	(0.003)	(0.004)
Decile 10 − Decile 1	0.011**	0.006
	(0.005)	(0.005)

***, **, * Significance at the 0.01, 0.05, and 0.1 levels, respectively, for the two-tailed test of coefficients.
This table presents the pricing of the risk implied in conservatism by using a portfolio analysis method. Accordingly, every month, we sort our sample based on the conservatism measure, as calculated using Penman and Zhang (2002). We use decile sorting to ensure that the extreme returns are correctly separated. We then calculate the average return for each sort group for the two option assets. We then calculate a hedge portfolio return (buy option assets from Decile 10 and sell option assets in Decile 1). Panel A reports the returns on Decile 1 to Decile 10 and the hedge portfolio without controlling for the other risk factors identified in the literature. Panel B presents the returns after controlling for four risk factors identified in the literature—market beta, size, book-to-market as per Fama and French (1993), and momentum as per Carhart (1997).

option asset returns would be higher when the prior month was a recession rather than when the prior month was an expansion. The results of this test are given in Table 7. Panel A presents results for the recession subsample, and Panel B presents results for the expansion subsample. As expected, the pricing of conservatism persists regardless of whether the previous month was a recession or not, although the effect is much stronger when the previous month exhibited economic recession than when the previous month exhibited economic expansion. When the previous month was a recession, investors are more risk averse and would be more worried about the downside risk than when the prior month was an expansion month. This finding further adds credibility to our earlier conclusion about the pricing of the risk implied by conservatism.

Effect of Revenue Volatility

In this test, we investigate the impact of revenue volatility on the pricing of accounting conservatism. Since accounting conservatism captures the inherent uncertainty in revenues, we hypothesize that firms with high revenue volatility would experience a much larger impact from the revenue uncertainty. We calculate firm-specific revenue volatility and calculate median volatility across all firms. We then define *High Rev Vol* as an indicator variable, equal to 1 if the firm has experienced revenue volatility higher than the median volatility and 0 otherwise. We then interact this variable with the conservatism measure and assess any incremental impact of revenue volatility on the pricing of conservatism. The results are presented in Table 8. Table 8 shows that revenue volatility does play a role in the pricing of conservatism. Columns (1) and (2) present the results on the *Put return* and *Call return*, respectively. We see that, for firms with high revenue volatility, the pricing of conservatism is much larger than when the revenue volatility is low. The coefficient on

TABLE 7

Impact of Recession versus Expansion on the *Conservatism-Option Returns* Association

Panel A: When the Prior Month is Classified as a Recession Month by NBER

	Returns on Put Option Asset	Returns on Call Option Asset
Conservatism	0.254***	−0.013
	(0.033)	(0.041)
Observations	7,646	7,646
Fixed Effects	Year and Industry	Year and Industry
Standard Errors	Firm Clustering	Firm Clustering
R^2	0.023	0.022

Panel B: When the Prior Month is Not Classified as a Recession Month by NBER

	Returns on Put Option Asset	Returns on Call Option Asset
Conservatism	0.080*	−0.176
	(0.041)	(0.112)
Observations	37,979	37,979
Fixed Effects	Year and Industry	Year and Industry
Standard Errors	Firm Clustering	Firm Clustering
R^2	0.010	0.005

***, **, * Significance at the 0.01, 0.05, and 0.1 levels, respectively, for the two-tailed test of coefficients.
This table presents the results of running the main test (Equation (1)) by splitting the sample into two subsamples based on whether the previous month (the month prior to the construction of the option assets) was a recession or not, as defined by NBER. *Option returns* is calculated following the methodology in Bali and Murray (2013). *Conservatism* is calculated following the methodology in Penman and Zhang (2002). The regression includes fixed effects on year and industry. Industry is defined following Fama-French 48 industries classification. Standard errors, clustered at the firm level, are shown in parentheses. The coefficients on the control variables and on the coefficient are not reported for brevity.
All other variables are defined in Appendix B.

Conservatism ∗ *High Rev Vol* is positive and statistically significant. This finding adds robustness to our earlier results, as higher revenue volatility could indicate higher risk perceived by investors.

Overall, the results from our tests show that the risk implied by conservatism is priced by investors' aversion to downside risk.

V. CONCLUSION

Conservatism captures uncertainty in both revenues and expenses and thereby indicates the "combined" uncertainty in earnings. As documented by PZ21, this exposes the investor to tail risk, with a probability of large earnings growth if the future uncertain revenues are realized (or expenses do not materialize), offset by the probability of large earnings decline if the future revenues are not realized (or if future expenses exceed provisions). Existing literature has shown that conservatism relates positively to future stock returns. However, existing literature has not conclusively documented whether this pricing is driven by investors' aversion to downside risk (losses) or their preference for upside potential (profits). This paper aims to investigate what drives the pricing of conservatism.

We use an option-implied approach to answer this question because using options has multiple benefits. First, using put and call options allows us to clearly test whether the pricing is driven by the left tail (downside risk) or right tail (upside potential). Second, as identified in existing literature, options markets are characterized by higher information content and by informed traders. The use of options thereby reduces the possibility of investor mispricing, biasing our results. Third, the methodology we follow allows us to control the effect of the price and volatility of the underlying stock on option returns. Deriving from Black and Scholes (1973), controlling for these two components sets expected returns to near zero, making it easier to calculate "excess" returns. Following Bali and Murray (2013), we construct two option assets, with one asset focused on the left tail (PUT asset, focused on downside risk) and the other asset focused on the right tail (CALL asset, focused on upside potential). The returns on these option assets are measured as the difference in their price from the date of construction until the date of expiry of the options series.

TABLE 8

Impact of Revenue Volatility on the Pricing of Conservatism

	Returns on Put Option Asset	Returns on Call Option Asset
Conservatism	0.071**	−0.085***
	(0.034)	(0.033)
High Rev Vol	−0.005**	0.002
	(0.002)	(0.003)
Conservatism ∗ High Rev Vol	0.137***	−0.081*
	(0.042)	(0.045)
Observations	37,496	37,496
Fixed Effects	Year and Industry	Year and Industry
Standard Errors	Firm Clustering	Firm Clustering
R^2	0.011	0.007

***, **, * Significance at the 0.01, 0.05, and 0.1 levels, respectively, for the two-tailed test of coefficients.
This table investigates the impact of revenue volatility on the pricing of conservatism. We first calculate a median of firmwise revenue volatility and define *High Rev Vol* as an indicator variable, which equals 1 if the firm year has revenue volatility higher than the median and 0 otherwise. We then interact the conservatism variable with the *High Rev Vol* dummy. Column (1) presents the results using returns on the Put Option Asset, whereas column (2) presents the results using returns on the Call Option Asset. Calculation of Returns on Put Option Asset (*Put return*) in column (1) and of Returns on Call Option Asset (*Call return*) in column (2) follows Bali and Murray (2013). *Conservatism* is calculated following the methodology in Penman and Zhang (2002). The regression includes fixed effects on year and industry. Industry is defined following Fama-French 48 industries classification. Standard errors, clustered at the firm level, are shown in parentheses. The coefficients on the control variables and on the intercept are not reported for brevity.
All other variables are defined in Appendix B.

By regressing the option asset returns on the conservatism measure, we study the pricing of the risk implied by conservatism. We find a positive and statistically significant link between conservatism and returns on the PUT option assets. This evidence suggests that the risk implied by conservatism is priced by investors' aversion to downside (losses) rather than by their preference for upside potential. Our results hold in several robustness tests. We use an alternative conservatism measure to demonstrate the credibility of our results. We also show that our results are driven by the risk implied by accounting conservatism rather than by large market movements or investor mispricing. Our results are robust to several alternate measures and specifications.

Our paper contributes to the literature on conservatism by documenting that the risk implied by conservatism is priced in the options market. We also document evidence that it is investors' aversion to downside risk that drives this pricing.

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APPENDIX A

Description of Construction of Option Assets

This section briefly describes the construction of the skewness assets we use for the tests. The methodology follows Bali and Murray (2013) (BM). Although the methodology has been described in the paper, we reproduce the key parts to help understand the construction of the three option assets. For all the assets, the OTM (out of the money) put (call) option contract is that contract with a delta closest to -0.1 (0.1). Similarly, ATM (at the money) put (call) option contract is that contract with a delta closest to -0.5 (0.5). Also, please note that $\Delta_{P,OTM}$ refers to the delta of the OTM put contract and $\upsilon_{P,OTM}$ refers to the vega of the OTM put contract. We define other terms analogously for ATM as well as call contracts. The two assets are described below. Please note that we use the same terminology as in BM.

Put Asset

$$POS^{P}_{P,OTM} = -1\, contract\ of\ the\ OTM\ Put$$

$$POS^{P}_{P,ATM} = \frac{\upsilon_{P,OTM}}{\upsilon_{P,ATM}}\ contracts\ of\ the\ ATM\ put$$

$$POS^{P}_{S} = -(POS^{P}_{P,OTM} * \Delta_{P,OTM} + POS^{P}_{P,ATM} * \Delta_{P,ATM})\ shares$$

Call Asset

$$POS^{C}_{C,OTM} = 1\, contract\ of\ the\ OTM\ Call$$

$$POS^{C}_{C,ATM} = -\frac{\upsilon_{C,OTM}}{\upsilon_{C,ATM}}\ contracts\ of\ the\ ATM\ call$$

$$POS^{C}_{S} = -(POS^{C}_{C,OTM} * \Delta_{C,OTM} + POS^{C}_{C,ATM} * \Delta_{C,ATM})\ shares$$

The construction of the above assets makes the assets delta and vega neutral. That is, small changes in the price or volatility of the underlying stock are controlled for, so any changes in returns can be associated with the underlying variable being studied—in this case, conservatism.

APPENDIX B

Variable Definitions

Variable Name	Definition
Key Variables	
Conservatism	Unconditional conservatism, as calculated following the methodology in Penman and Zhang (2002) $C_{it} = \frac{RD^{res}_{it} + ADV^{res}_{it} + INV^{res}_{it}}{NOA_{it}}$.
Option returns	Returns on two one-month expiry options, following Bali and Murray (2013), constructed using put options and call options. Please see Appendix A for a detailed explanation of the assets.
High Rev Vol	Indicator variable equal to 1 if the firm has experienced revenue volatility higher than the median volatility and 0 otherwise.
Control Variables	
BIDASK	Lagged bid-ask spread, scaled by the opening price.
BTM	Book-to-market ratio, calculated as a firm's book value of equity divided by the firm's market value of equity.

(continued on next page)

APPENDIX B (continued)

Variable Name	Definition
CEOCHM	Indicator variable, equal to 1 if the CEO is also the chair of the board and 0 otherwise.
Leverage	Total debt divided by total book equity.
Litigation	Indicator variable, equal to 1 if the firm operates in the following industries: biotechnology (2833–2836 and 8731–8734), computer/electronics (3570–3577, 3600–3674, and 7370–7374), or retail (5200–5961); 0 otherwise.
Market return	Return on the CRSP value-weighted index.
Negative ROA dummy	Indicator variable, equal to 1 if the ROA in the latest published 10-K was negative; 0 otherwise.
ROA	Return on assets, calculated as income before extraordinary items divided by average assets.
Size	Natural log of market capitalization.
STDIB	Standard deviation of income before extraordinary items for the current and the last four years.
Turnover	Lagged value of the sum of daily turnover; daily turnover is calculated as the volume of shares traded divided by the shares outstanding for the firm.