

Option Prices, Analyst Expectations, and Stock Returns

AVTORJI: Ian W. R. Martin, Moritz Rodenkirchen, Christian Wagner, Andrew Wang

POVZETEK: Raziskava se ukvarja z predviđanjem tržnih vrednosti na podlagi opcijskih cijen in analističih očekovanj. Izračunana opcijska mera očekanih vrednosti (OI_{Ret}) bolje predviđa tržne vrednosti uvek i izveza, od 1 do 12 mjeseci, učinkovitije od očekivanj analista. OI_{Ret} i šokovi u njo uključeni tako objašnjaju veću delovinu tržnih vrednosti: na 12 mjesecnom horizontu, objašnjena delovina realiziranih vrednosti povećava se od 17% na 33%, a na 1 mjesecnom horizontu od 1.1% na 22%.

METODA: Raziskava se osnovna na analizi opcijskih cijena i analističkih očekivanja tržnih vrednosti. Izračunana opcijska mera očekanih vrednosti (OI_{Ret}) je izračunana iz podatkov o opcijskim cijenama indeksa i individualnih akcija, bez uporabe procenjenih parametra. OI_{Ret} se upotrebljava za predviđanje tržnih vrednosti i objašnjanje tržnih vrednosti.

KLJUČNE UGOTOVITVE:

- OI_{Ret} bolje predviđa tržne vrednosti uvek i izveza, od 1 do 12 mjeseci, učinkovitije od očekivanj analista.
- OI_{Ret} i šokovi u njo uključeni objašnjaju veću delovinu tržnih vrednosti: na 12 mjesecnom horizontu, objašnjena delovina realiziranih vrednosti povećava se od 17% na 33%, a na 1 mjesecnom horizontu od 1.1% na 22%.
- OI_{Ret} i šokovi u njo uključeni imaju majorno vlogo pri objašnjanju tržnih vrednosti.

POMEN ZA TRGOVANJE: Raziskava je koristan znanstveni prispevek za trgovce, ker objavi, da opcijske cijene in očekovanja analista predstavljaju učinkovite predviđanja tržnih vrednosti. OI_{Ret}, kot je izračunana v raziskavi, je učinkovit prediktor tržnih vrednosti, kar lahko pomaga trgovcem pri ustanovitvi strategij in investicij.

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Ian W. R. Martin Moritz Rodenkirchen

Christian Wagner Andrew Wang*

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Abstract

Movements in stock prices are hard to forecast, and hard to explain even in hindsight. We show that OIRet, an option-implied measure of expected returns with no free parameters, outperforms predictions based on analysts' expectations, in and out of sample, at horizons from one to 12 months. OIRet and shocks to OIRet also play a major role in explaining stock returns ex post: relative to explanations based on shocks to analysts' cash-flow expectations alone, they raise the explained share of realized returns from 17% to 33% at the 12-month horizon, and from 1.1% to 22% at the 1-month horizon.

*Martin: London School of Economics, i.w.martin@lse.ac.uk; Rodenkirchen: Vienna Graduate School of Finance, moritz.rodenkirchen@vgsf.ac.at; Wagner: WU Vienna University of Economics and Business, christian.wagner@wu.ac.at; Wang: London School of Economics, J.Wang185@lse.ac.uk. We thank John Campbell, Stefanos Delikouras, Stefan Nagel, and seminar participants at LSE and at the Liverpool Workshop in Option Markets for their comments.

Asset returns are hard to explain even in hindsight (Roll, 1984). As Ross (2005, pp. 51–52) has written, “this lack of ex post explanatory power is one of the great puzzles of neoclassical finance.”

Part of the difficulty is that expected returns are not directly observed ex ante, and are hard to estimate, whether from historical realized returns, which are noisy and backward-looking, from firm characteristics, or from survey forecasts. Compounding the difficulty, “expectations” are not a monolithic concept. Different people—different investors, policy-makers, even econometricians—have different beliefs, and the empirical measures available to us are informative about the expectations of different groups. It is therefore important to distinguish clearly between different individuals’ subjective beliefs.

A recent literature replaces the rational expectations of earlier work with forecasts reported by analysts and investors. De La O and Myers (2021) find that analysts’ cash-flow growth expectations account for most of the variation in aggregate valuation ratios. Bordalo et al. (2024) construct an index of long-term earnings growth expectations that predicts returns in both the aggregate market and the cross section, and argue that overreaction in these expectations helps resolve major asset-pricing puzzles without time-series or cross-sectional variation in required returns. Closest to our exercise, Bordalo et al. (BGLS, 2025) construct a firm-level measure of expectations-based returns (EBRs) from analysts’ forecast errors and revisions, shutting down cross-sectional differences in required returns, and show that it accounts, ex post, for a large share of the return spreads associated with value, investment, size, and momentum.

In this paper, we exploit a different source of information about market participants’ beliefs: option prices. We follow the approach of Martin and Wagner (2019), which delivers a measure that we refer to as $\text{OIRet}_{i,t}$. This measure is computed from index and individual stock option prices, with no estimated parameters. It can be interpreted as the subjectively expected excess return on stock i that would induce an unconstrained investor with log utility, who is marginal in stock and option markets, to invest in the stock in proportion to its market capitalization (as in the traditional thought-experiment used in derivations of the CAPM).

We use $\text{OIRet}_{i,t}$ to address two questions. First, how do option-implied and survey-based forecasts of returns compare when predicting returns ex ante? Second, following

Roll,¹ to what extent can we explain returns ex post? Valuation ratios speak to the first question but cannot be used to address the second because their innovations are mechanically related to realized returns: it is unsatisfying to “explain” a stock’s high return by noting that its price-dividend ratio has increased.

Our analysis focuses on S&P 500 stocks over a sample period from January 1996 to December 2025, combining option data from OptionMetrics with analyst forecasts from I/B/E/S. We start by showing that $\text{OIRet}_{i,t}$ is a successful predictor of twelve-month excess stock returns. By comparison with alternative predictor variables based on analyst forecasts of price targets, $\text{PTGRet}_{i,t}$, and of long-term earnings growth, $\text{LTG}_{i,t}$, we find that $\text{OIRet}_{i,t}$ is the best performing predictor by a wide margin.² Used directly as a forecast, with no in-sample fitting, it delivers an out-of-sample R^2 of 21.3% relative to a forecast based on $\text{PTGRet}_{i,t}$. In sample, we find that it enters pooled panel regressions with a statistically significant coefficient that is close to one. This continues to hold if we include stock and date fixed effects and firm characteristics used to describe expected returns in the cross-sectional literature. Meanwhile, price targets forecast returns in univariate regressions, but are driven out by $\text{OIRet}_{i,t}$ in multivariate pooled panel regressions. Our findings are robust to accounting for staleness and biases in analyst price targets. Long-term growth forecasts predict returns negatively, and remain significant even in multivariate regressions, but add little explanatory power once $\text{OIRet}_{i,t}$ is included.

We then turn to the question of understanding returns ex post. Using EBRs to measure analysts’ cash-flow news, we show that $\text{OIRet}_{i,t}$ has a major role to play. Adding the ex ante level of, and ex post shocks to, $\text{OIRet}_{i,t}$ to a specification containing EBR alone raises the explained share of realized 12-month returns from 17% to 33% at the stock level. (At this 12-month horizon, the two $\text{OIRet}_{i,t}$ components together explain a similar amount of variation in realized returns as EBR does. They explain a substantially larger share at shorter horizons, as we will show in Section 4.) The same

¹The literature following Campbell (1991) asks a different question. Discount-rate news is typically constructed as a linear combination of shocks to state variables that include valuation ratios, with cash-flow news defined as a residual. The two news terms, calculated from state variables, therefore “explain” realized returns with an R^2 of 100%, by construction: the goal of the exercise is to determine what fraction of return variance reflects news about cash flows versus news about discount rates. In contrast, the explanatory variables we study—like the EBRs of BGLS—are not mechanically related to the realized return, so the explained share of variation is an informative quantity.

²Due to limited availability of price target data in the early part of the sample, we work with a sample period from August 1999 for results that involve $\text{PTGRet}_{i,t}$.

pattern holds for the characteristic-sorted long-short portfolios that are the focus of BGLS’s analysis: we replicate their finding that EBRs explain a large share of these spreads, but also show that the $\text{OIRet}_{i,t}$ components have a substantial (and for some characteristics, dominant) influence.

While we conduct our baseline analysis at the twelve-month horizon over which analyst price targets are formulated, our conclusions are not specific to this choice. We repeat both exercises at horizons of one, three, and six months, computing $\text{OIRet}_{i,t}$ from options with matching maturities. Ex ante, $\text{OIRet}_{i,t}$ predicts realized returns with a significant coefficient close to one at every horizon, and its advantage over analyst-based predictors is, if anything, more pronounced at short horizons. Ex post, $\text{OIRet}_{i,t}$ and shocks to $\text{OIRet}_{i,t}$ account for a larger share of the explained variation at shorter horizons: at one month, they raise the explained share of realized returns from 1.1% to 22%. This reflects in part the fact that (unlike analyst forecasts) the option-implied measure is almost continuously observable, an advantage that matters most at short horizons.

Related literature. Our paper relates to several strands of the literature. The first asks how much of the variation in realized returns can be accounted for, even in hindsight. Roll (1984) showed that in the orange-juice futures market—where one of the dominant fundamentals, the weather, is observable—news about freezing temperatures explains only a small fraction of return variation. Roll (1988) made a related point for stocks, finding that systematic factors and public news explain only a limited share of the variance of stock-level returns, and Cutler et al. (1989) reached a similar conclusion for the aggregate market.

A second strand asks whether cash-flow news or discount-rate news drives prices, often using the framework of Campbell and Shiller (1988) or Campbell (1991) to organize the analysis; we discuss the relation to this part of the literature at greater length at the start of Section 3. Campbell (1991) and Cochrane (2011) find that discount-rate news dominates at the aggregate level, while Vuolteenaho (2002) finds that cash-flow news is considerably more important for individual stocks. More recently, De La O et al. (2025) decompose cross-sectional dispersion in price–earnings ratios, and find that 75% is reflected in differences in future returns rather than in future earnings growth. A related literature exploits survey measures of expectations, including De La O and Myers (2021), Bordalo et al. (2024), and Bordalo et al. (2025); La Porta

(1996) is an early paper documenting that high-growth forecasts predict low subsequent returns. Exploiting the log-linear present value framework under both objective and subjective expectations, [Bretscher et al. \(2026\)](#) measure bias in cash-flow and return expectations and study its relation to return predictability. In a similar vein, [Anarkulova et al. \(2025\)](#) infer subjective expectations of the representative investor by combining a VAR approach with the return decomposition of [Chen et al. \(2013\)](#) that uses analyst forecasts.

A third strand studies the properties of analyst and investor expectations directly. Sell-side analysts issue price targets to support their stock recommendations ([Bradshaw, 2002](#)) and justify their estimates by applying valuation heuristics such as multiples ([Bradshaw, 2004](#); [Ben-David and Chinco, 2025](#)). [Bastianello \(2025\)](#) argues that, among commonly studied surveys, sell-side analysts' return expectations are the closest to rational and the most informative about future outcomes. There is a growing body of literature exploiting information from analyst reports, studying the models ([Bastianello et al., 2025](#)) and inputs ([Décaire and Graham, 2024](#)) used to conduct valuations. [Nagel and Xu \(2023\)](#) show that subjective risk premia exhibit limited comovement with business-cycle variables that predict objective risk premia, and suggest that investor learning may explain much of the gap. [Dahlquist and Ibert \(2024\)](#) find countercyclical equity premia expectations of large asset managers. [Greenwood and Shleifer \(2014\)](#) document procyclical return expectations among retail investors and financial professionals, with survey participants extrapolating from past returns.

A fourth strand uses option prices to measure expected returns, and to interpret realized returns; [Martin \(2025\)](#) surveys this literature. Related stock-level measures are proposed by [Kadan and Tang \(2020\)](#) and [Chabi-Yo et al. \(2023\)](#). At the index level, [Knox and Vissing-Jorgensen \(2025\)](#) decompose realized capital gains into changes in the real yield curve, equity premia, and expected dividends, using observable inputs to the present-value formula.

1 Data and summary statistics

This section introduces the data and describes the construction of the variables used in the empirical analysis.

1.1 Option-implied expected returns

We construct the stock-level measure of expected excess returns proposed by [Martin and Wagner \(2019\)](#) on a daily basis for stocks in the S&P 500 index. This approach requires options on the S&P 500 index (“the market”) and options on individual stocks. We obtain option prices, stock prices, and risk-free rate data from OptionMetrics over the period January 1996 to August 2025.

To measure the 12-month expected excess return on stock i , $\mathbb{E}_t[R_{i,t+12}] - R_{f,t+12}$, we compute

$$\text{OIRet}_{i,t} = R_{f,t+12} \left[\text{SVIX}_t^2 + \frac{1}{2} \left(\text{SVIX}_{i,t}^2 - \overline{\text{SVIX}}_t^2 \right) \right], \quad (1)$$

where $R_{f,t+12}$ is the gross 12-month risk-free rate, $\text{SVIX}_t^2 = \text{var}_t^*(R_{t+12}/R_{f,t+12})$ is the risk-neutral variance of the 12-month return on the market, $\text{SVIX}_{i,t}^2 = \text{var}_t^*(R_{i,t+12}/R_{f,t+12})$ is the risk-neutral variance of the 12-month return on stock i , and $\overline{\text{SVIX}}_t^2 = \sum_j w_{j,t} \text{SVIX}_{j,t}^2$ is the value-weighted average of stock-level risk-neutral variances of S&P 500 stocks.

These quantities can be observed using S&P 500 index options and individual stock options with maturities of 12 months. For example,

$$\text{SVIX}_t^2 = \frac{2}{R_{f,t+12} S_t^2} \left\{ \int_0^{F_t} \text{put}_t(K) dK + \int_{F_t}^{\infty} \text{call}_t(K) dK \right\} \quad (2)$$

as in [Martin \(2017\)](#). Here S_t and F_t are the spot and 12-month-forward prices of the index, respectively, and $\text{put}_t(K)$ and $\text{call}_t(K)$ are prices of out-of-the-money (OTM) put and call options on the index with strike price K expiring at time $t + 12$. We calculate $\text{SVIX}_{i,t}$ similarly, replacing the spot, forward and option prices in equation (2) with the spot and forward prices of stock i and prices of options on stock i . Appendix A.1 contains further details. The formulas (1) and (2) can also be implemented with options of different maturities to compute measures of option-implied returns at different horizons; we do this in Section 4.³

$\text{OIRet}_{i,t}$ is a measure of the expected excess return on stock i as perceived by an unconstrained investor with log utility over wealth in 12 months who chooses to invest fully in the market. The first term inside the square brackets in equation (1) represents the aggregate equity premium from such an investor’s perspective ([Martin, 2017](#)) while

³We have made daily and monthly data for $\text{OIRet}_{i,t}$ and SVIX_t^2 at a range of horizons available on our websites.

the second term is stock-specific: it raises the risk premium for firms whose stock-level risk-neutral variance is higher than average.

1.2 Analyst expectations

We obtain analyst expectations from the I/B/E/S Summary History file. On each monthly consensus date, I/B/E/S aggregates analyst-level forecasts into consensus estimates.⁴ Following the norm in the literature, we focus on median long-term growth rate (LTG) forecasts of earnings-per-share (EPS), and median price targets (PTG) with a 12-month forecast horizon.

Using the 12-month consensus price targets, we define the PTG-implied expected excess return on stock i as

$$\text{PTGRet}_{i,t} = \frac{\text{PTG}_{i,t}}{P_{i,t}} - R_{f,t+12}. \quad (3)$$

where $P_{i,t}$ is the corresponding stock price observed on the consensus date t . Hence, $\text{PTGRet}_{i,t}$ reflects analysts' expected 12-month stock price appreciation in excess of the risk-free rate, analogous to $\text{OIRet}_{i,t}$.

1.3 Expectations-Based Returns

We calculate the EBR measure of [Bordalo et al. \(BGLS, 2025\)](#). For each stock, we first compute “analyst prices” by using a discounted cash flow approach applied to consensus EPS and LTG forecasts from the I/B/E/S Summary History file:

$$\tilde{P}_{i,t}^a = \sum_{s=1,\dots,5} \frac{\tilde{\mathbb{E}}_t^a \text{DPS}_{i,t+12s}}{(1+r)^s} + \frac{1+g}{(1+r)^5} \times \frac{\tilde{\mathbb{E}}_t^a \text{DPS}_{i,t+60}}{r-g}. \quad (4)$$

Here $\tilde{\mathbb{E}}_t^a \text{DPS}_{i,t+12s}$ denotes the analysts' consensus expectation of DPS at time $t+12s$. These are computed by multiplying analysts' consensus EPS forecasts by a fixed payout ratio. The discount rate r and long-run growth rate g are fixed constants across stocks and over time, as in BGLS. [Appendix A.3](#) provides further details of the empirical implementation.

⁴Appendix [A.2](#) has further detail on the I/B/E/S consensus estimates and on analyst-level I/B/E/S Detail data, which we use in robustness checks.

We then compute 12-month EBRs excluding dividends and in excess of the risk-free rate, for consistency with the definitions of $\text{OI Ret}_{i,t}$ and $\text{PTG Ret}_{i,t}$ above. That is, we define

$$\text{EBR}_{i,t+12} = \frac{\tilde{P}_{i,t+12}^a}{\tilde{P}_{i,t}^a} - R_{f,t+12}. \quad (5)$$

The EBR represents the hypothetical excess return on stock i that would be realized if prices were determined by analyst cash flow expectations in a world with constant discount rates and long-run growth rates. EBRs are therefore ex post objects, driven by revisions in analyst expectations.

1.4 Stock returns and characteristics

We obtain split-adjusted stock prices from CRSP and measure realized returns between monthly I/B/E/S consensus dates. We define the realized twelve-month excess return as

$$\text{Ret}_{i,t+12} = \frac{P_{i,t+12}}{P_{i,t}} - R_{f,t+12}. \quad (6)$$

We obtain the 153 stock characteristics studied in [Jensen et al. \(2023\)](#), accessible through WRDS. The data is monthly and we match characteristics from month ends predating the I/B/E/S consensus dates to our stock, options, and analyst data.

1.5 Sample and summary statistics

We study S&P 500 index stocks from the beginning of 1996 until the end of December 2025. This sample period is determined by the availability of option and analyst expectation data. Almost all of our analysis is conducted at the monthly I/B/E/S consensus dates, the third Thursday of each month.

The usable samples are constrained by the availability of $\text{OI Ret}_{i,t}$, $\text{PTG Ret}_{i,t}$, $\text{LTG}_{i,t}$, and/or $\text{EBR}_{i,t+12}$, which is illustrated in Internet Appendix Figure [IA.1](#). PTG data first become available in March 1999 and reach adequate coverage only from August 1999. From that point, $\text{PTG Ret}_{i,t}$ is available for almost all stocks in the S&P 500. $\text{LTG}_{i,t}$ coverage is near-total early in the sample but declines to less than 350 firms by the end of 2023 (still accounting for about 79% of index market capitalization), but somewhat recovers to around 430 firms by the end of the sample period (roughly 94% of index market capitalization). The EBR data, which we directly take from [Bordalo](#)

et al. (2025), is available from the beginning of our sample in January 1996 until the end of their sample in December 2023. Variation in the coverage of EBR reflects the filters applied by BGLS and the availability of the underlying analyst data; towards the end of the sample period, availability declines somewhat, in line with $\text{LTG}_{i,t}$.

Table 1 reports summary statistics for the variables introduced above, together with the most important of the firm characteristics we use in the paper. We winsorize all variables cross-sectionally at the 1st and 99th percentiles on each date, with two exceptions: (i) we use the raw realized excess return, and (ii) EBRs arrive already winsorized from the replication code of BGLS. We report summary statistics for unwinsorized variables in Internet Appendix Table IA.1.

Analyst-implied expected returns are both higher on average and more volatile than option-implied expected returns: $\text{PTGRet}_{i,t}$ has a mean of 13% and a standard deviation of 21%, by comparison with 5% and 7%, respectively, for $\text{OIRet}_{i,t}$. Figure 1, Panel A, plots the cross-sectional mean and standard deviation of $\text{OIRet}_{i,t}$ and $\text{PTGRet}_{i,t}$ over time. Panel B plots $\text{OIRet}_{i,t}$ and $\text{PTGRet}_{i,t}$ over time for two well-known firms.

2 Forecasting returns

This section studies the predictive performance of option-implied expected returns, $\text{OIRet}_{i,t}$, analyst-implied expected returns, $\text{PTGRet}_{i,t}$, and of long-term growth rate forecasts, $\text{LTG}_{i,t}$. We begin with in-sample and out-of-sample evidence, then we turn to the relationship of the three measures with each other and with other stock characteristics in Section 2.1.

Table 2 reports panel regressions of 12-month-ahead realized excess returns onto $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$. The three panels of the table report results with different fixed effect specifications: Panel A is pooled OLS, Panel B includes stock fixed effects, and Panel C includes stock and date fixed effects. Standard errors are Driscoll–Kraay with 12 lags throughout. We restrict the sample to stock-months in which all three measures are simultaneously observed.

A priori, there are reasons to think $\text{OIRet}_{i,t}$ and $\text{PTGRet}_{i,t}$ should have a natural scale. If the log investor’s perspective is a useful one, the estimated coefficient on $\text{OIRet}_{i,t}$ should be close to one; likewise, the estimated coefficient on $\text{PTGRet}_{i,t}$ should be close to one if analyst price target forecasts are accurate on average. In contrast,

Table 1: Summary Statistics

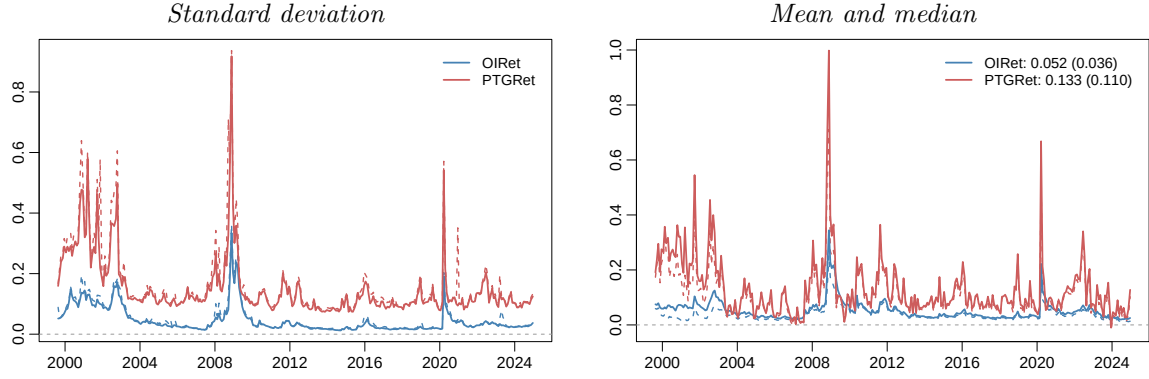
This table presents summary statistics for the stock-level S&P 500 constituents panel used in the analysis. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2025. We measure predictors and characteristics from January 1996 through December 2024 (if available) and calculate the corresponding 12-month realized returns using price data through December 2025. We report the number of observations, mean, median, standard deviation, minimum, maximum, and the 5th, 25th, 75th, and 95th percentiles. $\text{Ret}_{i,t+12}$ is the realized 12-month excess price return computed from CRSP daily prices. $\text{OIRet}_{i,t}$ is the option-implied expected return in the spirit of [Martin and Wagner \(2019\)](#), computed from OptionMetrics data, and $\text{OIRet}_{i,t+12}^\perp$ is the orthogonalized option-implied expected return 12 months ahead. $\text{OIRet}_{i,t+12}^\perp$ is the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$. $\text{PTGRet}_{i,t}$ and $\text{LTG}_{i,t}$ are based on I/B/E/S Summary History price target and long-term growth rate forecasts. $\text{EBR}_{i,t+12}$ is the Expectations-Based Return excluding dividends, obtained from the replication package of [Bordalo et al. \(2025\)](#); it is already winsorized in that input. The table also reports the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) and four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P) which we obtain from the set of 153 stock characteristics studied in [Jensen et al. \(2023\)](#), accessible through WRDS. $\text{D/P}_{i,t}$ is constructed from CRSP monthly returns with a look-back window of 12 months. All variables other than $\text{Ret}_{i,t+12}$ and $\text{EBR}_{i,t+12}$ are winsorized within each monthly cross section at the 1st and 99th percentiles.

Variable	N	Mean	SD	Min	P5	P25	Median	P75	P95	Max
$\text{Ret}_{i,t+12}$	174,436	0.075	0.383	-1.057	-0.466	-0.135	0.054	0.246	0.654	10.224
$\text{OIRet}_{i,t}$	172,812	0.052	0.069	-0.066	0.006	0.020	0.034	0.060	0.153	1.999
$\text{PTGRet}_{i,t}$	153,506	0.132	0.210	-0.403	-0.076	0.023	0.093	0.189	0.446	5.418
$\text{LTG}_{i,t}$	162,956	0.119	0.086	-0.479	0.026	0.080	0.110	0.150	0.250	2.189
$\text{OIRet}_{i,t+12}^\perp$	162,082	-0.001	0.060	-0.707	-0.039	-0.023	-0.013	0.005	0.072	1.936
$\text{EBR}_{i,t+12}$	141,119	0.085	0.434	-1.008	-0.457	-0.095	0.055	0.196	0.648	8.454
$\beta_{i,t}$	164,476	1.023	0.567	-0.367	0.221	0.636	0.968	1.319	2.063	3.867
$\text{Size}_{i,t}$	168,557	9.572	1.219	5.923	7.656	8.759	9.492	10.323	11.800	13.955
$\text{B/M}_{i,t}$	165,015	0.482	0.413	0.005	0.072	0.211	0.373	0.640	1.221	9.883
$\text{MOM}_{i,t}$	167,348	0.125	0.348	-0.909	-0.379	-0.076	0.105	0.291	0.687	5.029
$\text{OP}_{i,t}$	151,860	0.395	0.599	-1.151	0.076	0.187	0.289	0.421	0.914	16.624
$\text{INV}_{i,t}$	168,208	0.106	0.249	-0.486	-0.120	-0.003	0.055	0.139	0.486	3.464
$\text{Rev(1m)}_{i,t}$	168,466	0.010	0.095	-0.614	-0.139	-0.040	0.011	0.060	0.158	0.944
$\text{RVol(21d)}_{i,t}$	168,497	0.020	0.013	0.003	0.008	0.012	0.016	0.023	0.043	0.192
$\text{SalesGr}_{i,t}$	167,919	0.089	0.250	-0.918	-0.217	-0.015	0.059	0.148	0.489	6.111
$\text{D/P}_{i,t}$	173,255	0.019	0.017	0.000	0.000	0.004	0.016	0.028	0.051	0.131
$\text{E/P}_{i,t}$	168,477	0.040	0.101	-3.445	-0.037	0.029	0.048	0.069	0.119	0.442

Figure 1: Summary Statistics for Option- and Price-Target-Implied Expected Returns

This figure presents summary statistics of option-implied expected returns ($\text{OIRet}_{i,t}$, blue) and price target-implied expected returns ($\text{PTGRet}_{i,t}$, red) over time. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and predictors span August 1999 to December 2024. Panel A summarizes the cross-section of S&P 500 firms. The left subpanel plots the cross-sectional standard deviation; solid lines use cross-sectionally winsorized data (1%/99% per consensus date), dashed lines use raw data. The right subpanel plots the cross-sectional mean (solid) and median (dashed) computed on winsorized data; the legend reports the time-series mean and standard deviation (in parentheses) of the cross-sectional mean. Panel B shows firm-level time series of $\text{OIRet}_{i,t}$ and $\text{PTGRet}_{i,t}$ for Apple and General Electric; the legend reports the time-series mean and standard deviation (in parentheses) for each series.

Panel A. Cross-section of S&P 500 firms



Panel B. Firm-level examples

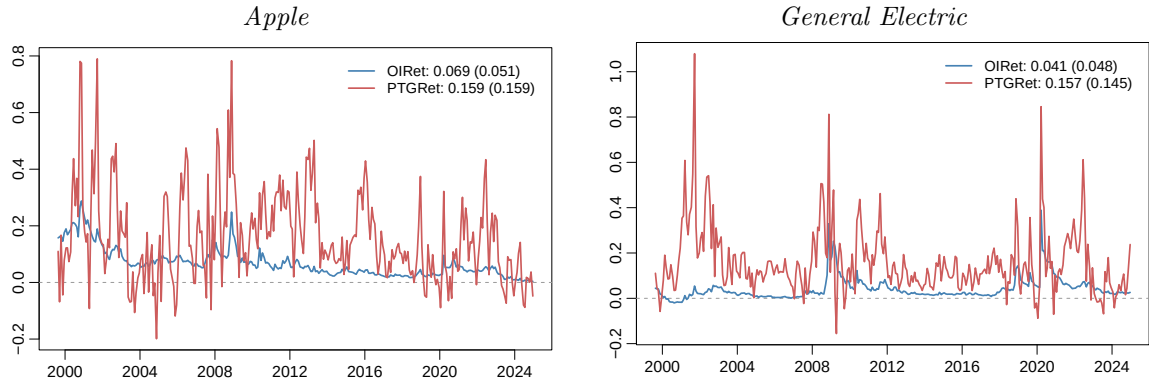


Table 2: Predictive Regressions with Analyst- and Option-Implied Expected Returns

This table presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on three return predictors of interest: the option-implied expected return ($\text{OIRet}_{i,t}$), the price target-implied expected return ($\text{PTGRet}_{i,t}$), and the long-term growth rate forecast ($\text{LTG}_{i,t}$). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. We measure predictors from August 1999 through December 2024 and calculate the corresponding 12-month realized returns using price data through December 2025. The sample is restricted to stock-months in which the realized return and all three predictors are jointly observed. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.012 (0.026)	0.043* (0.026)	0.100*** (0.033)	0.012 (0.027)	0.052 (0.032)	0.079** (0.031)	0.051 (0.032)
$\text{OIRet}_{i,t}$	1.120** (0.513)			1.114** (0.477)	1.173** (0.483)		1.140** (0.450)
$\text{PTGRet}_{i,t}$		0.204 (0.133)		0.003 (0.057)		0.224* (0.129)	0.021 (0.054)
$\text{LTG}_{i,t}$			-0.247* (0.139)		-0.355** (0.153)	-0.322** (0.146)	-0.359** (0.152)
N	140,335	140,335	140,335	140,335	140,335	140,335	140,335
R ²	0.047	0.014	0.004	0.047	0.055	0.020	0.055

<i>Panel B: Stock fixed effects</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{OIRet}_{i,t}$	1.861*** (0.389)			1.799*** (0.385)	1.863*** (0.372)		1.763*** (0.369)
$\text{PTGRet}_{i,t}$		0.313*** (0.112)		0.039 (0.051)		0.334*** (0.109)	0.063 (0.050)
$\text{LTG}_{i,t}$			-0.498*** (0.155)		-0.502*** (0.145)	-0.573*** (0.170)	-0.516*** (0.149)
Stock FE	X	X	X	X	X	X	X
N	140,335	140,335	140,335	140,335	140,335	140,335	140,335
R ²	0.177	0.112	0.096	0.178	0.188	0.127	0.189
Within R ²	0.100	0.030	0.012	0.101	0.113	0.045	0.114

<i>Panel C: Stock and date fixed effects</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{OIRet}_{i,t}$	1.334*** (0.356)			1.201*** (0.354)	1.340*** (0.347)		1.198*** (0.346)
$\text{PTGRet}_{i,t}$		0.244*** (0.077)		0.111** (0.047)		0.252*** (0.076)	0.119** (0.046)
$\text{LTG}_{i,t}$			-0.236*** (0.086)		-0.250*** (0.092)	-0.271*** (0.093)	-0.265*** (0.096)
Stock FE	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X
N	140,335	140,335	140,335	140,335	140,335	140,335	140,335
R ²	0.388	0.368	0.358	0.390	0.390	0.370	0.393
Within R ²	0.049	0.018	0.003	0.053	0.053	0.022	0.057

there is no reason to expect the coefficient on $\text{LTG}_{i,t}$ (as a long-term cash flow growth expectations measure) to take any particular numerical value, but prior evidence that high-LTG stocks earn low subsequent returns (La Porta, 1996; Bordalo et al., 2024) leads us to expect a negative coefficient.

In the univariate specifications (columns 1–3), $\text{OIRet}_{i,t}$ enters with a coefficient close to one in Panels A and C (1.12 and 1.33) and above one in Panel B (1.86), and is statistically significantly different from zero in each panel. The proximity of the coefficient to one is consistent with options pricing a near-unbiased forecast of subsequent excess returns. $\text{PTGRet}_{i,t}$ is insignificantly different from zero in pooled regressions, but becomes significant in the presence of fixed effects. The estimated coefficient on $\text{PTGRet}_{i,t}$ is positive in all three specifications but well below one, ranging from 0.20 to 0.31. The coefficient estimates for $\text{LTG}_{i,t}$ are negative and significantly below zero in each panel, in line with previous empirical research.

Of the three quantities, $\text{OIRet}_{i,t}$ has the highest explanatory power by a wide margin, with R^2 (or within R^2) between 4.7% and 10.0%; $\text{PTGRet}_{i,t}$ and LTG have R^2 (or within R^2) around a third and a tenth as large, respectively. In the pooled specification, it is the only predictor that does not leave a significant intercept.

Multivariate specifications are reported in columns 4–7. $\text{OIRet}_{i,t}$ largely drives out $\text{PTGRet}_{i,t}$ (column 4). The $\text{PTGRet}_{i,t}$ coefficient collapses from 0.20 to essentially zero in pooled OLS, and is reduced sharply under fixed effects, while the coefficient on $\text{OIRet}_{i,t}$ remains close to one; and adding $\text{PTGRet}_{i,t}$ contributes very little incremental R^2 relative to column 1. By contrast, $\text{LTG}_{i,t}$ is approximately orthogonal to the other predictors (columns 5–7): the coefficient estimates on $\text{OIRet}_{i,t}$ and $\text{PTGRet}_{i,t}$ change little in the presence of $\text{LTG}_{i,t}$, and $\text{LTG}_{i,t}$ itself retains its negative coefficient. However, while LTG remains statistically significant in the joint specification of column 7 (and $\text{PTGRet}_{i,t}$ is significant when stock and date fixed effects are included), $\text{LTG}_{i,t}$ and $\text{PTGRet}_{i,t}$ jointly contribute limited incremental R^2 relative to what $\text{OIRet}_{i,t}$ achieves on its own.

Table 3 evaluates the out-of-sample predictive power of $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ based on the out-of-sample R^2 of Campbell and Thompson (2008),

$$R_{OS}^2 = 1 - \frac{\sum_{i,t} FE_M^2}{\sum_{i,t} FE_B^2},$$

Table 3: Out-of-Sample Forecast Accuracy Across Return Predictors

This table presents pairwise out-of-sample forecast accuracy comparisons at the 12-month horizon. Each entry reports $R_{OS}^2 = 1 - \sum_i \sum_t FE_M^2 / \sum_i \sum_t FE_B^2$, where candidate forecasts are in columns and benchmark forecasts are in rows. The constrained forecasts use $OIRet_{i,t}$ or $PTGRet_{i,t}$ directly. The estimated forecasts are fitted values from expanding-window predictive regressions with three year initial estimation window for $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. We forecast returns from August 1999 through December 2024 and calculate 12-month realized returns using price data through December 2025. Positive values indicate that the column forecast has a lower sum of squared forecast errors than the row forecast.

	Constrained Coefficient		Estimated Coefficient			Observations	
	$OIRet_{i,t}$	$PTGRet_{i,t}$	$OIRet_{i,t}$	$PTGRet_{i,t}$	$LTG_{i,t}$	Constr.	Est.
$OIRet_{i,t}$ (Constrained)	—	-27.01	-8.10	-10.11	-11.27	150,991	117,881
$PTGRet_{i,t}$ (Constrained)	21.27	—	6.71	4.99	3.98	150,991	117,881
$OIRet_{i,t}$ (Estimated)	7.50	-7.20	—	-1.85	-2.93	117,881	117,881
$PTGRet_{i,t}$ (Estimated)	9.18	-5.25	1.82	—	-1.06	117,881	117,881
$LTG_{i,t}$ (Estimated)	10.13	-4.14	2.85	1.05	—	117,881	117,881

where FE_M and FE_B are the forecast errors of a candidate predictor and a competitor benchmark, respectively. We consider two forecast specifications. The “Constrained” specification sets the coefficient on $OIRet_{i,t}$ or $PTGRet_{i,t}$ to one. In this case the measure itself is used directly as a forecast without estimating any free parameters. (This is a natural exercise for $OIRet_{i,t}$ and $PTGRet_{i,t}$, both of which are in the units of an excess return, but not for $LTG_{i,t}$.) The “Estimated” specification uses the fitted value from an expanding-window predictive regression of realized returns on the candidate predictor, using an initial three-year estimation window.

We begin with the constrained specifications. Table 3 shows that against $PTGRet_{i,t}$ as the benchmark, $OIRet_{i,t}$ delivers an out-of-sample R^2 of 21.3%; in the reverse comparison, $PTGRet_{i,t}$ delivers -27.0% . Figure IA.3 in the Internet Appendix shows that the head-to-head dominance of $OIRet_{i,t}$ over $PTGRet_{i,t}$ is not driven by a few unusual periods or stock types. The sample R_{OS}^2 of 21.3% from Table 3 is generated steadily over time with $OIRet_{i,t}$ generating lower squared forecast error in 80% of months and across different types of stocks as classified by standard characteristics and industries. Additionally, Figure IA.4 in the Internet Appendix presents bootstrap evidence that the R_{OS}^2 is significantly different from zero (with 95% confidence intervals of approximately 9% to 31%) and that the test of Diebold and Mariano (1995) rejects equal predictive accuracy with a p -value less than 0.01.

PTGRet $_{i,t}$ performs so poorly in part because it is systematically too high. The sample mean of PTGRet $_{i,t}$ is 13.2%, almost twice the mean realized excess return of 7.5% (Table 1). OIRet $_{i,t}$, by contrast, has a sample mean of 5.2%, much closer to realized returns, and a coefficient near one in Table 2, so using it directly as a forecast works well.

Is there predictive content in PTGRet $_{i,t}$ once we correct for the level mismatch? To answer this question, the “Estimated” specifications allow each predictor’s forecast to be the fitted value using an expanding-window regression of realized excess returns on the predictor. We apply this procedure to OIRet $_{i,t}$ and PTGRet $_{i,t}$, and also to LTG $_{i,t}$ for which there is no natural theory-constrained specification.

The estimated specification helps PTGRet $_{i,t}$ somewhat. PTGRet $_{i,t}$ still loses head-to-head against the constrained OIRet $_{i,t}$ forecast, but by a smaller margin than its constrained forecast (−10.1%); in the estimated specification, it also beats LTG $_{i,t}$. In contrast, allowing for parameter estimation hurts the performance of OIRet $_{i,t}$. Estimated OIRet $_{i,t}$ beats all PTGRet $_{i,t}$ and LTG $_{i,t}$ forecasts, but it is beaten by its constrained counterpart (−8.1%). The reason is that the Estimated specification chases in-sample performance: following an episode in which unpredictable realized shocks to returns cause the apparent relationship between OIRet $_{i,t}$ and subsequent returns to weaken (resp., strengthen), the estimated specification reduces (resp., increases) the coefficient on OIRet $_{i,t}$, and this degrades subsequent performance.⁵ Imposing the unit coefficient suggested by theory (Martin and Wagner, 2019) is a disciplining force that improves predictive performance by comparison.

A natural concern with the consensus price targets we use for PTGRet $_{i,t}$ is that individual analysts may not refresh their price targets frequently. If so, consensus price targets will incorporate stale forecasts. The Internet Appendix reports a series of robustness checks based on price targets we construct from the analyst-level I/B/E/S Detail History data.⁶ First, we rerun the predictive regressions from Table 2 with price-target implied returns based only on PTGs that have been newly issued/updated since the most recent consensus date (Table IA.2). Second, since analysts tend to

⁵Martin and Shi (2026) document a closely related “crying wolf” phenomenon in the context of forecasting crashes: models with flexible coefficients dramatically underperform models with theory-constrained coefficients.

⁶We also verify that the self-computed consensus price targets and the monthly consensus price targets reported by I/B/E/S are virtually identical.

update their forecasts around earnings announcements (see Figure [IA.2](#)), we restrict the sample to days around earnings announcements. Table [IA.3](#) reports the results of predictive regressions using all active analyst-level price targets, Table [IA.4](#) uses only price targets issued or updated within days of the most recent earnings announcement. Our baseline finding reemerges in all three tables: the coefficient on $\text{OIRet}_{i,t}$ is close to one and statistically significant (in all but a single specification), while price-target-implied returns add at most modest incremental predictive power once $\text{OIRet}_{i,t}$ is controlled for.

2.1 Predictability and characteristics

This section takes up two questions. First, how do the three variables— $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ —relate to one another and to the firm characteristics that the cross-sectional literature has long used to describe expected returns? (We find that they relate to characteristics in quite different ways, and that the option-implied measure and price targets are closely connected.) Second, do they contain information about realized returns beyond what those characteristics capture? (They do. In sample, the option-implied measure in particular retains its predictive power once characteristics are controlled for. Out of sample, the option-implied measure with unit coefficient—hence zero free parameters—outperforms four-, five-, and six-factor models even if those models are estimated in sample.)

We begin with the five Fama–French characteristics—beta, size, book-to-market, profitability, and investment—together with momentum. Henceforth we refer to these variables as the six standard characteristics. For our main analysis, we add four further characteristics from the [Jensen et al. \(2023\)](#) universe of 153 characteristics based on their univariate relation to $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$: return volatility, short-term reversal, sales growth, and the earnings-to-price ratio. The number of characteristics that can be used jointly trades off against sample coverage: requiring all 153 to be observed at once cuts the number of observations from 140,335 in Table [2](#) to 28,255. In Internet Appendix [IA.A](#), we repeat the analysis using the 86 characteristics for which there are at least 135,000 stock-month observations. Our results suggest that the compact set of ten characteristics captures most of what the full universe explains.

Table [4](#) reports, for each of the three variables, a pooled regression on the other two variables and ten firm characteristics, together with the (order-invariant) Shapley

Table 4: Determinants of $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$

This table presents pooled regressions of option-implied expected returns ($\text{OIRet}_{i,t}$), price target-implied expected returns ($\text{PTGRet}_{i,t}$) and long-term growth rate forecasts ($\text{LTG}_{i,t}$) on each other, on the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) and on four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2024. The three column blocks use $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ as the left-hand-side variable, respectively. For each regressor, the table reports the slope coefficient, its standard error, and the order-invariant Shapley contribution to the regression R^2 . For the firm characteristics, we standardize estimates by multiplying with the regressor's standard deviation. Standard errors are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags. The Shapley contributions sum to the total R^2 reported in the bottom row.

Variable	OIRet			PTGRet			LTG		
	$\hat{\beta}$	(SE)	R^2 -contrib.	$\hat{\beta}$	(SE)	R^2 -contrib.	$\hat{\beta}$	(SE)	R^2 -contrib.
$\text{OIRet}_{i,t}$	—	—	—	1.368***	(0.202)	0.157	0.044	(0.039)	0.008
$\text{PTGRet}_{i,t}$	0.089***	(0.014)	0.133	—	—	—	0.056***	(0.016)	0.014
$\text{LTG}_{i,t}$	0.012	(0.012)	0.007	0.225***	(0.039)	0.013	—	—	—
<i>Firm characteristics, standardized coefficients</i>									
$\beta_{i,t}$	0.010***	(0.002)	0.070	-0.002	(0.004)	0.010	0.012***	(0.002)	0.026
$\text{Size}_{i,t}$	-0.004***	(0.001)	0.026	0.009*	(0.005)	0.004	-0.000	(0.002)	0.002
$\text{B/M}_{i,t}$	0.009***	(0.003)	0.043	0.001	(0.006)	0.011	-0.022***	(0.003)	0.051
$\text{MOM}_{i,t}$	0.001	(0.002)	0.010	-0.026***	(0.006)	0.020	0.010***	(0.003)	0.021
$\text{OP}_{i,t}$	0.003***	(0.001)	0.002	-0.005***	(0.002)	0.001	-0.005***	(0.001)	0.002
$\text{INV}_{i,t}$	0.003***	(0.001)	0.004	0.008***	(0.002)	0.007	0.002	(0.002)	0.012
$\text{Rev}(1\text{m})_{i,t}$	0.002	(0.001)	0.008	-0.065***	(0.005)	0.116	0.003***	(0.001)	0.001
$\text{RVol}(21\text{d})_{i,t}$	0.032***	(0.003)	0.292	0.010	(0.012)	0.068	0.006***	(0.002)	0.008
$\text{SalesGr}_{i,t}$	-0.001**	(0.001)	0.001	0.007***	(0.002)	0.004	0.018***	(0.004)	0.047
$\text{E/P}_{i,t}$	-0.012***	(0.001)	0.056	0.022***	(0.003)	0.007	-0.006***	(0.002)	0.005
Total R^2			0.652			0.417			0.199

share of the regression R^2 attributable to each regressor.⁷ The coefficients estimates on the firm characteristics are standardized, i.e. multiplied with the regressor's standard deviation, so that the coefficient estimate is interpretable as the effect of a 1-sd move in the associated characteristic on the left-hand side variable ($\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, or $\text{LTG}_{i,t}$).

A considerable amount of the variation in $\text{OIRet}_{i,t}$ is explained by $\text{PTGRet}_{i,t}$ and the characteristics. (There is almost no role for $\text{LTG}_{i,t}$, indicating that $\text{OIRet}_{i,t}$ is

⁷The corresponding univariate results are reported in Internet Appendix Table [IA.5](#) for reference. Figure [IA.5](#) provides a heatmap of the pairwise correlations among the variables. Figure [IA.6](#) shows the Shapley shares of R^2 contributed by the explanatory variables for each of the three quantities of interest.

not simply a measure of growth optimism in disguise.) Combined, they achieve an R^2 of 65.2%. A 1pp increase in $PTGRet_{i,t}$ increases $OIRet_{i,t}$ by 9bps. The dominant characteristic is realized volatility over the past 21 days (RVol): a 1sd increase in RVol raises fitted $OIRet_{i,t}$ by 3.2pp. Stocks also tend to have higher $OIRet_{i,t}$ if they have high betas, high book-to-market ratios, high profitability, high investment, or low earnings-price ratios, or if they are small.

The single most important determinant of $PTGRet_{i,t}$ is $OIRet_{i,t}$: a 1pp increase in $OIRet_{i,t}$ increases $PTGRet_{i,t}$ by 1.37pp. $LTG_{i,t}$ also enters positively—a 1pp increase in $LTG_{i,t}$ increases $PTGRet_{i,t}$ by around 23bps—but explains little of its variation. Among the characteristics, short-term reversal (that is, the 1-month lagged return), and realized volatility are most important. A 1sd increase in lagged return decreases $PTGRet_{i,t}$ by 6.5pp; and a 1sd increase in realized volatility increases $PTGRet_{i,t}$ by 1.0pp (though with a large associated standard error).

Of the three variables, $LTG_{i,t}$ is least explainable by the other two variables and the ten characteristics: collectively, they explain around 20% of its variance. High $LTG_{i,t}$ is concentrated in growth firms with strong past performance, consistent with the view of $LTG_{i,t}$ as a growth-extrapolation measure. $OIRet_{i,t}$ and $PTGRet_{i,t}$ enter positively, but each contributes little explanatory power. The most important determinants of $LTG_{i,t}$ are beta (a 1sd increase in beta increases $LTG_{i,t}$ by 1.2pp), book-to-market (a 1sd increase in B/M decreases $LTG_{i,t}$ by 2.2pp), momentum (a 1sd increase in trailing 12-1 return increases $LTG_{i,t}$ by 1.0pp) and sales growth (a 1sd increase in SalesGr increases $LTG_{i,t}$ by 1.8pp).

These results raise the question of whether the predictive performance of $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$ simply reflects the measures' differing exposures to characteristics. Table 5 reports the results of predictive regressions in which the three measures together with the 10 characteristics are used to forecast the 12-month realized excess return.⁸ Column (1) includes the characteristics alone; columns (2) to (8) add $OIRet_{i,t}$, $PTGRet_{i,t}$ and $LTG_{i,t}$ in turn, first one at a time, then in pairs, and finally jointly.⁹ Panels A to C use pooled OLS, stock fixed effects, and stock and date fixed effects.

As before, $OIRet_{i,t}$ predicts realized returns in every panel and every specification.

⁸In Internet Appendix IA.A, we show that the results of this section carry over to a much broader set of characteristics used by Jensen et al. (2023). See Tables IA.14 through IA.19.

⁹Requiring all ten characteristics to be observed shrinks the sample compared to Table 2, but Table IA.6 in the Internet Appendix shows that this does not affect the results meaningfully.

Table 5: Predictability of Realized Excess Returns with Characteristics

This table presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on option-implied expected returns ($\text{OIRet}_{i,t}$), the price target-implied expected return ($\text{PTGRet}_{i,t}$), and long-term growth rate forecasts ($\text{LTG}_{i,t}$). We additionally include the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) and four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P) as explanatory variables. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. We measure predictors and characteristics from August 1999 through December 2024 and calculate 12-month realized returns using price data through December 2025. The sample is restricted to stock-months in which all variables are jointly observed. Column (1) includes only the characteristics. Columns (2) to (8) add predictors in three univariate, three pairwise, and one joint specification. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.027 (0.109)	0.031 (0.111)	0.031 (0.110)	0.036 (0.104)	0.032 (0.112)	0.046 (0.105)	0.045 (0.103)	0.047 (0.105)
$\text{OIRet}_{i,t}$		1.417*** (0.418)			1.388*** (0.415)	1.435*** (0.415)		1.394*** (0.414)
$\text{PTGRet}_{i,t}$			0.145** (0.065)		0.021 (0.041)		0.153** (0.064)	0.030 (0.039)
$\text{LTG}_{i,t}$				-0.094 (0.127)		-0.146 (0.127)	-0.136 (0.130)	-0.152 (0.126)
Characteristics	X	X	X	X	X	X	X	X
N	121,102	121,102	121,102	121,102	121,102	121,102	121,102	121,102
R ²	0.042	0.070	0.047	0.042	0.070	0.071	0.048	0.071
<i>Panel B: Stock fixed effects</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{OIRet}_{i,t}$		1.565*** (0.330)			1.448*** (0.320)	1.586*** (0.329)		1.447*** (0.317)
$\text{PTGRet}_{i,t}$			0.212*** (0.059)		0.075** (0.033)		0.227*** (0.059)	0.090*** (0.031)
$\text{LTG}_{i,t}$				-0.250** (0.124)		-0.286** (0.124)	-0.307** (0.133)	-0.306** (0.126)
Characteristics	X	X	X	X	X	X	X	X
Stock FE	X	X	X	X	X	X	X	X
N	121,102	121,102	121,102	121,102	121,102	121,102	121,102	121,102
R ²	0.203	0.232	0.212	0.206	0.233	0.235	0.215	0.236
Within R ²	0.129	0.160	0.138	0.131	0.161	0.163	0.142	0.165
<i>Panel C: Stock and date fixed effects</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{OIRet}_{i,t}$		1.221*** (0.349)			1.026*** (0.341)	1.222*** (0.348)		1.028*** (0.341)
$\text{PTGRet}_{i,t}$			0.235*** (0.046)		0.154*** (0.026)		0.236*** (0.045)	0.155*** (0.026)
$\text{LTG}_{i,t}$				0.016 (0.067)		-0.016 (0.062)	-0.027 (0.065)	-0.040 (0.062)
Characteristics	X	X	X	X	X	X	X	X
Stock FE	X	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X	X
N	121,102	121,102	121,102	121,102	121,102	121,102	121,102	121,102
R ²	0.412	0.425	0.420	0.412	0.429	0.425	0.420	0.429
Within R ²	0.096	0.118	0.109	0.096	0.122	0.118	0.109	0.122

It enters with a coefficient that is positive, statistically significant, and close to one, and it is little changed when the characteristics, the other two measures, or fixed effects are added. Added to the characteristics on its own, it produces the largest gain in fit of any of the three measures: in pooled OLS the R^2 rises from 0.042 to 0.070, and the within- R^2 rises comparably under fixed effects.

PTGRet $_{i,t}$ is a significant predictor of realized returns conditional on characteristics, entering with a coefficient that is significantly different from zero but well below one. Its coefficient shrinks further in the presence of OIRet $_{i,t}$, becoming insignificant in pooled regressions. In the presence of fixed effects, the coefficient on PTGRet $_{i,t}$ is statistically significant, if small, indicating that there is *some* useful information in analyst price targets that survives in the presence of OIRet $_{i,t}$; but in all specifications they add very little marginal explanatory power.

LTG $_{i,t}$ enters with a marginally negative coefficient and is fragile across specifications. It is significant only with stock fixed effects, and not in pooled regressions, nor with stock and date fixed effects; and, like PTGRet $_{i,t}$, it adds little explanatory power in the presence of OIRet $_{i,t}$ and the characteristics.

Table 6 reports results for an out-of-sample forecast exercise. It compares the predictive success of OIRet $_{i,t}$, PTGRet $_{i,t}$, and LTG $_{i,t}$ with the time- t historical average realized excess return of stock i , with the CAPM, and with three models that exploit four, five or six characteristics emphasized in the prior literature. We allow the CAPM and the characteristics-based models to use *in-sample* information about the relationship between returns and characteristics. Analyst price targets underperform all of these competitors when the coefficient on PTGRet $_{i,t}$ is constrained to 1; when we allow for estimated coefficients, both PTGRet $_{i,t}$ and LTG $_{i,t}$ continue to underperform the CAPM and the four-, five-, and six-factor models. By contrast, we find that OIRet $_{i,t}$, with coefficient constrained to 1, outperforms all these models despite having no estimated parameters.¹⁰

In short, option prices, as embodied in OIRet $_{i,t}$, successfully forecast stock returns ex ante. The cross-sectional literature routinely uses “expected returns” to refer to fitted values from predictive regressions. Given that OIRet $_{i,t}$ forecasts successfully even without estimating any parameters, we would be justified in calling it simply “the

¹⁰As discussed in Section 2, and consistent with the findings in Table 3, OIRet $_{i,t}$ predicts better out of sample when its coefficient is constrained to 1 than when it is estimated.

Table 6: Out-of-Sample Forecast Accuracy Against Benchmarks

This table presents pairwise out-of-sample forecast accuracy comparisons at the 12-month horizon. Each entry reports $R_{OS}^2 = 1 - \sum_i \sum_t FE_M^2 / \sum_i \sum_t FE_B^2$, where candidate forecasts are in columns and benchmark forecasts are in rows. The constrained forecasts use $OIRet_{i,t}$ or $PTGRet_{i,t}$ directly. The estimated forecasts are fitted values from expanding-window predictive regressions with three year initial estimation window for $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. We forecast returns from August 1999 through December 2024 and calculate 12-month realized returns using price data through December 2025. We compare the forecasts against the following benchmarks: the time- t historical average realized excess return of stock i , $\overline{RX}_{i,t}$; an in-sample CAPM model; a model based on the three Fama–French characteristics plus momentum (FF3+MOM); a model based on the five Fama–French characteristics (FF5); and a model that adds momentum to FF5 (FF5+MOM). A positive value indicates that the column forecast outperforms the row forecast.

Benchmark	Constrained Coefficient		Estimated Coefficient			Observations	
	$OIRet_{i,t}$	$PTGRet_{i,t}$	$OIRet_{i,t}$	$PTGRet_{i,t}$	$LTG_{i,t}$	Constr.	Est.
$\overline{RX}_{i,t}$	19.96	-1.72	12.27	10.64	9.69	150,651	117,661
In-sample CAPM	5.17	-19.23	-0.00	-1.80	-2.80	142,021	112,846
In-sample four-factor model	2.25	-23.19	-2.61	-4.38	-5.46	138,892	110,210
In-sample five-factor model	2.19	-22.86	-2.60	-4.34	-5.44	127,779	102,011
In-sample six-factor model	2.02	-23.07	-2.61	-4.35	-5.45	127,779	102,011

expected return”. We will continue to refer to it as an option-implied expected return, not because we are cautious about its merits as a predictor but because we want to emphasize that there are several different notions of expected returns in play, with varying degrees of success in predicting returns.

3 Understanding stock returns

We now turn to the question of *understanding* returns ex post. Roll (1984, 1988) pointed out that it is hard to understand returns even in hindsight: it is hard to find a set of economically motivated variables, expected to influence returns a priori, that do indeed explain a substantial fraction of returns ex post.

It is important to distinguish this from the question of what fraction of return variance can be attributed to news about expected cash flows as opposed to news about expected returns. This distinction was first noted by Campbell (1991), who

showed that the log return on any asset, r_{t+1} , can be decomposed as

$$r_{t+1} - \mathbb{E}_t r_{t+1} = \underbrace{(\mathbb{E}_{t+1} - \mathbb{E}_t) \sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j}}_{\text{cash-flow news, } N_{CF,t+1}} - \underbrace{(\mathbb{E}_{t+1} - \mathbb{E}_t) \sum_{j=1}^{\infty} \rho^j r_{t+1+j}}_{\text{discount-rate news, } N_{DR,t+1}}. \quad (7)$$

It is standard in the literature to implement this identity by forecasting returns using a VAR with coefficient matrix A and state vector z_t , so that $z_{t+1} = Az_t + \varepsilon_{t+1}$ and $\mathbb{E}_t z_{t+1} = Az_t$. If the first entry of the state vector is the log return, $r_{t+1} = e'_1 z_{t+1}$, then the forecast expected return is

$$\mathbb{E}_t r_{t+1} = e'_1 A z_t, \quad (8)$$

and discount-rate news is

$$N_{DR,t+1} = e'_1 \rho A (I - \rho A)^{-1} \varepsilon_{t+1}. \quad (9)$$

Cash-flow news is then defined as the residual that makes the identity (7) hold,

$$N_{CF,t+1} = r_{t+1} - \mathbb{E}_t r_{t+1} + N_{DR,t+1}. \quad (10)$$

In practice, the state vector $z_t = (r_t, pd_t, pd_{t-1}, \dots)'$ includes the log return, the log price-dividend ratio, and other variables.¹¹ Discount-rate news (9) is therefore a linear combination of shocks to these variables (with the linear combination itself determined by their interrelationships and by the loglinearization parameter ρ , via the vector $e'_1 \rho A (I - \rho A)^{-1}$).

The distinction between cash-flow news and discount-rate news has been extraordinarily fruitful in the literature and has enabled many important empirical and theoretical insights. The prevailing view is that discount-rate news is a dominant contributor to variation in realized returns at the aggregate level (Campbell, 1991; Cochrane, 2011) while cash-flow news is considerably more important at the individual stock level (Vuolteenaho, 2002).

¹¹We include the log price-dividend ratio *and its lag* so that the specification is not sensitive to whether cash flows, Δd_{t+1} , or returns, r_{t+1} , enter the VAR, a point made by Engsted et al. (2012). One can also replace the log return with the excess log return, the log price-dividend ratio with the log market-to-book ratio, and so on, without affecting the point made here.

But the literature that follows [Campbell \(1991\)](#) does not address—and does not seek to address—Roll’s puzzle, for the simple reason that realized returns are part of the state vector. Thus, although one can identify $e_1' A$ in (8) by running the predictive regression

$$r_{t+1} = a + b' z_t + \text{error}_{t+1} \quad (11)$$

and (in population) would find $b' = e_1' A$, it does *not* make sense to run the contemporaneous, Roll-style, regression

$$r_{t+1} = a + b' z_t + c' z_{t+1} + \text{error}_{t+1}. \quad (12)$$

Estimating (12) in population mechanically delivers $a = b = 0$, $c' = e_1'$, and $R^2 = 100\%$ because $e_1' z_{t+1}$ is the realized return.

In order to address Roll’s puzzle, we want the return *not* to be part of our predictive system. Suppose, then, that we simply drop r_t from the state vector. We can set $z_t = (pd_t, pd_{t-1}, \dots)'$ and estimate a VAR $z_{t+1} = A z_t + \varepsilon_{t+1}$, as before. We can then use a return-forecasting regression (11) to generate a time series of return forecasts and hence a discount-rate news series. Similarly, we can use the same set of variables to forecast dividend growth, and hence generate a cash-flow news series.

Having now stepped outside the [Campbell \(1991\)](#) framework, we will *not* find that cash-flow news and discount-rate news perfectly explain returns, so it might seem that we can hope to find interesting results in (12). But, with the log price-dividend ratio as one of the state variables, a problem arises due to the one-period Campbell–Shiller identity, which states that

$$r_{t+1} = k + \Delta d_{t+1} + \rho pd_{t+1} - pd_t. \quad (13)$$

This generates a perfect (up to the Campbell–Shiller loglinearization) mechanical relationship between the realized $r_{t+1} - \Delta d_{t+1}$ and shocks to price-dividend ratios: it is unsatisfying to “explain” a large positive return by noting that the price-dividend ratio has risen substantially. Given the relationship (13), the question of why the price-dividend ratio has risen is almost equivalent to the question of why the return was high.

The same issue afflicts other measures based on price ratios, such as market-to-

book. The challenge is to explain realized returns using variables that do not depend on price in this way. The option-implied measures we use exploit risk-neutral variances of *returns*, so they are not mechanically linked to the asset’s price in the way that valuation ratios are. (In the data, risk-neutral variances of returns do tend to rise when prices drop, but this is an empirical fact about the world rather than a mechanical relationship.)

We should be clear that rather than aiming to identify genuinely exogenous causes of returns, our more modest goal is to identify variables that permit a coherent account of returns in hindsight. Analogously, within the CAPM one might “explain” the expected return on a stock by pointing to its beta, or might “explain” a sudden decline in a stock’s price by noting that its beta, or the equity premium, or the riskless interest rate, had sharply increased. Such explanations would be of some interest despite the fact that these are all endogenous quantities. Within the CAPM, one might then ask for still more fundamental explanations: Why do some stocks have high betas and others low betas? What are the fundamental drivers of changes in a stock’s beta, in the equity premium, or in the interest rate? Analogously, one might ask why some stocks have high $OIRet_{i,t}$ and others low $OIRet_{i,t}$. These interesting questions are beyond the scope of the present paper, but we note that the predictive success of $OIRet_{i,t}$ is perfectly consistent with the presence of irrational agents in the market. Indeed, the risk to which our hypothetical log investor reacts might in principle be created by the actions of irrational agents.¹²

Although the [Campbell \(1991\)](#) approach serves as important motivation for us, we do not use Campbell’s identity directly because we work with simple returns throughout. We do so because both analyst forecasts and the [Martin and Wagner \(2019\)](#) approach apply to simple rather than log returns, and because the simple return on a portfolio relates straightforwardly to the simple returns of its constituents (which is not true of log returns).

Instead, we start from a much simpler identity: a realized excess return equals the conditionally expected return plus an unexpected shock. This allows us to speak to recent work of [Bordalo et al. \(2024, 2025\)](#) which argues that (non-rational) variation in

¹²[DeLong et al. \(1990\)](#) present a model in which such “noise trader risk” is modeled exogenously. In [Martin and Papadimitriou \(2022\)](#) (building on [Geanakoplos \(2010\)](#)) the risk arises endogenously in equilibrium due to heterogeneity in agents’ beliefs, which creates volatility that influences the expectations and behavior of all investors.

investors’ cash-flow expectations can resolve the leading cross-sectional and aggregate return puzzles without needing to appeal to variation in expected returns. Specifically, [Bordalo et al. \(2025\)](#) hold the conditional expected return constant, across stocks and over time, so that all variation in realized returns is swept into the unexpected shock and interpreted as cash-flow news, as measured by expectations-based returns (EBRs), plus noise. Moreover, using valuation ratios as their preferred measure of expected returns, they find little explanatory power beyond EBR and conclude that the return spreads associated with standard characteristics reflect predictable errors in analysts’ cash-flow expectations rather than differences in required returns.

BGLS represents a natural reference point for our work for two reasons. First, EBRs reveal changes in analysts’ expectations about cash flows; in complementary fashion, shocks to $\text{OIRet}_{i,t}$ measure changes in the log investor’s expectations about returns. Second, neither EBRs nor $\text{OIRet}_{i,t}$ is backed out of a system that “knows” the ex post realized return: they are each constructed using an outside data source (analyst cash flow forecasts and option prices, respectively) that is not mechanically tied to the realized return.¹³ The R^2 of an ex post regression that includes them on the right-hand side is therefore an informative quantity that measures how much of the realized return we can account for.

As we combine measures that reflect the beliefs of different groups—analysts, in the case of EBR, and participants in stock and option markets, in the case of $\text{OIRet}_{i,t}$ —so that different expectations operators are implicitly in play, our right-hand side variables should not be thought of as cash-flow news and discount-rate news in the sense of [Campbell \(1991\)](#). We refer instead to analysts’ cash-flow shocks, as measured by EBR,¹⁴ and to the level of and shocks to $\text{OIRet}_{i,t}$, which capture the influence of discount rates as perceived by the hypothetical log investor.

More specifically, we find that option prices have a major role to play in explaining movements in stock prices, both as captured ex ante by $\text{OIRet}_{i,t}$, and ex post, through the subsequent shock measured from $\text{OIRet}_{i,t+12}$. The component of the realized return

¹³Consistent with our argument, BGLS use log valuation ratios as measures of ex ante expected returns, but do not use shocks to log valuation ratios as measures of ex post shocks to expected returns (which would introduce the mechanical relationship described after equation (13) above).

¹⁴[Nagel \(2024\)](#) points out that as analysts observe prices when they make forecasts, one might worry that they adjust their long-term growth forecasts to rationalize prevailing prices. To the extent that this occurs, EBR may inherit a relationship to realized returns; if so, our analysis will understate the contribution of the option-implied measures.

that is left unexplained by EBR lines up with both.

Nor is there a clear reason to think that movements in $\text{OIRet}_{i,t}$ might mechanically represent, say, growth optimism in disguise. As we saw in Section 2.1, $\text{LTG}_{i,t}$ explains almost none of the variation in $\text{OIRet}_{i,t}$. $\text{PTGRet}_{i,t}$ is much more closely related to $\text{OIRet}_{i,t}$, but the optimism in price targets is concentrated in the component that is uncorrelated with $\text{OIRet}_{i,t}$: while the component of $\text{PTGRet}_{i,t}$ orthogonal to $\text{OIRet}_{i,t}$ has almost no predictive power for returns, it strongly forecasts subsequent downward revisions in analysts' cash-flow expectations, as we discuss in the next subsection.

3.1 Decomposing stock returns

Table 7 reports results of panel regressions of realized 12-month excess returns onto potential explanatory variables: the level of $\text{OIRet}_{i,t}$, shocks to $\text{OIRet}_{i,t}$ measured from $\text{OIRet}_{i,t+12}$, and EBR as a proxy for analysts' cash-flow shocks.¹⁵

Panel A reports pooled OLS estimates. Column (1) reports the results of a univariate regression of the realized excess return onto EBR. The coefficient on EBR is strongly significant, with a point estimate of 0.36 and an R^2 of 17%. Column (4) shows that the results are essentially unchanged when the earnings-price ratio¹⁶ is included as a putative return-forecasting variable motivated by the literature that follows [Campbell and Shiller \(1988\)](#): the coefficient on $\text{E/P}_{i,t}$ is close to zero, insignificant, and there is almost no marginal contribution to R^2 . These results are in line with the evidence in [Bordalo et al. \(2025\)](#).

Column (2) adds $\text{OIRet}_{i,t}$, the option-implied expected return. It enters with a coefficient that (at 1.33) is close to one, close to the univariate estimates of earlier sections, and strongly significant. This raises R^2 from 17% to 22% and renders the intercept insignificant; meanwhile the coefficient on EBR is almost unchanged and remains strongly significant. Column (5) adds $\text{E/P}_{i,t}$ to this specification. In the presence of $\text{OIRet}_{i,t}$, the earnings-price ratio enters with a positive and strongly significant coefficient, though its marginal contribution to R^2 is modest.

Column (3) adds our measure of shocks to $\text{OIRet}_{i,t}$, which we label $\text{OIRet}_{i,t+12}^\perp$.

¹⁵[Bordalo et al. \(2025\)](#) use a broader cross-section than S&P 500 firms. We verify that the linkages between EBR and realized returns are qualitatively the same and quantitatively very similar in their cross-section and in ours; see Table IA.7 in the Internet Appendix.

¹⁶We choose not to use the dividend-price ratio because many stocks do not pay dividends.

Table 7: Stock-Level Return Decomposition with Orthogonalized Future OIRet

This table presents stock-level panel regressions of realized 12-month excess returns, $\text{Ret}_{i,t+12}$, on 12-month ahead Expectations Based Returns ($\text{EBR}_{i,t+12}$), option-implied expected returns ($\text{OIRet}_{i,t}$), orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{i,t+12}^\perp$) and $\text{E/P}_{i,t}$. $\text{OIRet}_{i,t+12}^\perp$ is the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ under the same fixed effects structure as the reported panel. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2023. We measure predictors from January 1996 through December 2022 while $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. The sample is restricted to stock-months in which all variables including $\text{D/P}_{i,t}$ are jointly observed. Columns (1) to (3) build up specifications without $\text{E/P}_{i,t}$. Columns (4) to (6) repeat the previous specifications with $\text{E/P}_{i,t}$ included. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors (in parentheses) are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

Panel A: Pooled OLS						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.051** (0.025)	-0.017 (0.026)	-0.013 (0.019)	0.046* (0.026)	-0.039 (0.027)	-0.034* (0.019)
$\text{OIRet}_{i,t}$		1.332*** (0.444)	1.335*** (0.278)		1.452*** (0.458)	1.443*** (0.291)
$\text{OIRet}_{i,t+12}^\perp$			-2.071*** (0.320)			-2.060*** (0.312)
$\text{EBR}_{i,t+12}$	0.360*** (0.030)	0.351*** (0.034)	0.315*** (0.027)	0.362*** (0.031)	0.358*** (0.034)	0.322*** (0.027)
$\text{E/P}_{i,t}$				0.090 (0.097)	0.359*** (0.080)	0.323*** (0.065)
N	136,830	136,830	136,830	136,830	136,830	136,830
R ²	0.170	0.221	0.326	0.170	0.227	0.331
Panel B: Stock fixed effects						
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{OIRet}_{i,t}$		1.931*** (0.359)	1.949*** (0.266)		2.031*** (0.373)	2.046*** (0.276)
$\text{OIRet}_{i,t+12}^\perp$			-1.957*** (0.279)			-1.953*** (0.273)
$\text{EBR}_{i,t+12}$	0.349*** (0.029)	0.343*** (0.031)	0.306*** (0.025)	0.350*** (0.029)	0.350*** (0.032)	0.313*** (0.026)
$\text{E/P}_{i,t}$				0.059 (0.088)	0.336*** (0.078)	0.324*** (0.067)
Stock FE	X	X	X	X	X	X
N	136,830	136,830	136,830	136,830	136,830	136,830
R ²	0.210	0.289	0.369	0.211	0.294	0.373
Within R ²	0.159	0.242	0.327	0.159	0.248	0.332
Panel C: Stock and date fixed effects						
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{OIRet}_{i,t}$		1.514*** (0.348)	1.535*** (0.293)		1.626*** (0.375)	1.649*** (0.315)
$\text{OIRet}_{i,t+12}^\perp$			-1.271*** (0.338)			-1.273*** (0.335)
$\text{EBR}_{i,t+12}$	0.300*** (0.025)	0.297*** (0.026)	0.284*** (0.026)	0.300*** (0.025)	0.301*** (0.027)	0.288*** (0.026)
$\text{E/P}_{i,t}$				0.013 (0.064)	0.244*** (0.062)	0.249*** (0.057)
Stock FE	X	X	X	X	X	X
Date FE	X	X	X	X	X	X
N	136,830	136,830	136,830	136,830	136,830	136,830
R ²	0.412	0.444	0.466	0.412	0.447	0.469
Within R ²	0.145	0.192	0.224	0.145	0.196	0.228

In order to capture the effect of unanticipated shocks, we orthogonalize $\text{OIRet}_{i,t+12}$ with respect to $\text{OIRet}_{i,t}$.¹⁷ It enters with a strongly significant coefficient of -2.07 ; the loadings on $\text{OIRet}_{i,t}$ and on EBR are essentially unchanged; and R^2 rises to 33%. Column (6) shows that, as before, the results are little changed when $E/P_{i,t}$ is included: the earnings-price ratio itself enters with a positive and significant coefficient, but makes only a minor contribution to R^2 .

The coefficient of -2.07 on $\text{OIRet}_{i,t+12}^\perp$ is larger in magnitude than one. To see why this is what one should expect, consider¹⁸ the log-return decomposition of Campbell (1991), under which the unexpected return is cash-flow news minus discount-rate news, and discount-rate news is the revision in expected returns capitalized over all future horizons, $N_{DR,t+1} = (\mathbb{E}_{t+1} - \mathbb{E}_t) \sum_{j=1}^{\infty} \rho^j r_{t+1+j}$, where $\rho \approx 0.97$ is a loglinearization constant. Our measure $\text{OIRet}_{i,t}$ captures the (log investor's) expected return over the coming year, whereas $N_{DR,t+1}$ reflects revisions to expected returns at *all* horizons. The relationship between $\text{OIRet}_{i,t+12}$ and (the log investor's) discount-rate news therefore depends on the persistence of $\text{OIRet}_{i,t}$. If it follows an AR(1) with annual autocorrelation ψ then the discount-rate-news term is $N_{DR,t+1} = \frac{\rho}{1-\rho\psi} v_{t+1}$. In this case, the orthogonalized shock to $\text{OIRet}_{i,t+12}$ should enter with a coefficient of $-\frac{\rho}{1-\rho\psi}$. As the autocorrelation of $\text{OIRet}_{i,t}$ is $\psi = 0.44$ (see Table IA.8), this predicts a coefficient on $\text{OIRet}_{i,t+12}^\perp$ of -1.68 , comparable to the estimate of -2.07 in Table 7, Panel A.

Summarizing, the results in columns (1) to (3) establish that option-implied expected returns have a major role to play in accounting for stock-level realized returns, both through the ex ante level of $\text{OIRet}_{i,t}$ and ex post, through the subsequent shock to it. Columns (4) to (6) of Table 7 add the earnings-to-price ratio $E/P_{i,t}$ to our spec-

¹⁷We measure $\text{OIRet}_{i,t+12}^\perp$ as residuals from regressing $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$, based on the full options data sample and using the same pooled and fixed-effects specifications as in the empirical analysis. We report the results of these regressions in column (1) of Internet Appendix Table IA.8; the remaining columns demonstrate the equivalency of regressing realized returns on $\text{OIRet}_{i,t}$ and $\text{OIRet}_{i,t+12}$ or on $\text{OIRet}_{i,t}$ and $\text{OIRet}_{i,t+12}^\perp$. As an alternative to the full sample measurement of shocks, we have implemented expanding window regressions and rerun the analysis of Table 7. Table IA.9 in the Internet Appendix shows that the results are very similar to those discussed in this section. For $\text{OIRet}_{i,t+12}^\perp$ to be interpretable as news, it should also not be forecastable using information available at time t . Internet Appendix Table IA.10 confirms that it is close to unforecastable from analyst beliefs: $\text{PTGRet}_{i,t}$ has essentially no ability to predict it, while $\text{LTG}_{i,t}$ enters with a statistically significant positive coefficient but with an R^2 of only 0.008.

¹⁸We are glossing over the distinction between log returns and simple returns, so this should be viewed as a back-of-the-envelope sanity check. That said, Vuolteenaho (2002) and Bordalo et al. (2025) report that they find similar results whether they work with log or with simple returns.

ifications, and the coefficients on $\text{OIRet}_{i,t}$, $\text{OIRet}_{i,t+12}^\perp$, and $\text{EBR}_{i,t+12}$, as well as the R^2 , barely move. Like [Bordalo et al. \(2025\)](#), we find that valuation ratios add little explanatory power. We read this as a limitation of valuation ratios as stock-level predictor variables, rather than as evidence against discount rates, which our option-implied measures reveal play a major role.¹⁹

Panel B adds stock fixed effects. All three components retain the signs and roughly the magnitudes of Panel A. The within- R^2 rises from 15.9% with $\text{EBR}_{i,t+12}$ alone, to 24.2% with $\text{OIRet}_{i,t}$ added; and to 32.7% with the shock to option-implied expected returns, $\text{OIRet}_{i,t+12}^\perp$, added.

Panel C reports results with stock and date fixed effects. All coefficients enter with the same sign and statistical significance as in previous panels, and with roughly similar magnitudes. The one noteworthy difference is the somewhat reduced importance of $\text{OIRet}_{i,t+12}^\perp$ in the presence of date fixed effects, indicating that much of the shock to $\text{OIRet}_{i,t}$ is common across firms. This echoes the finding of [Vuolteenaho \(2002\)](#) that discount-rate news is largely common across firms.

Columns (4) to (6) of Panels B and C add $\text{E/P}_{i,t}$. The slopes on the three decomposition components are essentially unchanged, and $\text{E/P}_{i,t}$ itself adds little once again, a point also visible in the Shapley R^2 decomposition in Internet Appendix Figure [IA.7](#). Setting $\text{E/P}_{i,t}$ aside, the figure shows the explanatory contributions of $\text{OIRet}_{i,t}$, $\text{OIRet}_{i,t+12}^\perp$, and EBR . The two $\text{OIRet}_{i,t}$ components account for more of the explained variation than EBR in pooled OLS (0.18 versus 0.15 of an R^2 of 0.33) and in the presence of stock fixed effects (0.19 versus 0.14), and somewhat less with stock and date fixed effects (0.09 versus 0.14).

We can also ask what analyst beliefs tell us about the components of the decomposition. Optimistic price targets and high growth forecasts are followed by downward revisions in analysts' cash-flow expectations: $\text{PTGRet}_{i,t}$ and $\text{LTG}_{i,t}$ both predict $\text{EBR}_{i,t+12}$ with significantly negative coefficients, consistent with the overextrapolation mechanism of [Bordalo et al. \(2024\)](#) (Internet Appendix Table [IA.10](#)). The component of $\text{PTGRet}_{i,t}$ that is orthogonal to $\text{OIRet}_{i,t}$ —the price optimism of analysts that is not reflected in option prices—predicts these revisions more strongly still. $\text{OIRet}_{i,t}$, by con-

¹⁹In their aggregate analysis, [Bordalo et al. \(2024, Table 2\)](#) control for an option-implied measure of the equity premium proposed by [Martin \(2017\)](#) (SVIX_t^2) and find that it predicts market returns with a univariate R^2 of 19% and enters approximately orthogonally to their long-term growth measure. This is the aggregate analog of the result shown in Column (2) of Table [7](#).

trast, has almost no predictive power for $\text{EBR}_{i,t+12}$ (and, as discussed in footnote 17, analyst expectations have almost no predictive power for $\text{OIRet}_{i,t+12}^\perp$).

3.2 Decomposing characteristic-sorted return spreads

We now aggregate stocks into characteristic-sorted portfolios. Each month we form value-weighted quintile portfolios for each of the six standard characteristics and regress the resulting long-short realized return on contemporaneous spreads in the decomposition components. Table 8 reports the results. Columns (1), (3) and (5) run the BGLS specification with EBR alone. EBR is positive and highly significant for every characteristic, with slopes between 0.67 and 0.97 and R^2 values between 25% and 41%, consistent with the findings of BGLS.

Columns (2), (4) and (6) add the spreads in $\text{OIRet}_{i,t}$ and $\text{OIRet}_{i,t+12}^\perp$; they show that the level of $\text{OIRet}_{i,t}$ and its subsequent shock both add substantial explanatory power. The spread in $\text{OIRet}_{i,t}$ enters positively and significantly in all portfolios: it is not significantly different from 1 for Beta, HML, RMW, CMA, and WML, but is significantly larger than 1 for SMB. The spread in $\text{OIRet}_{i,t+12}^\perp$ enters negatively and significantly for Beta, SMB, RMW, CMA and WML; and negatively but not significantly for HML. In all cases, R^2 rises substantially in the presence of $\text{OIRet}_{i,t}$ and $\text{OIRet}_{i,t+12}^\perp$. EBR continues to enter positively and significantly throughout.

These findings are robust to including valuation ratios and to changing the weighting scheme, as summarized in Internet Appendix Figure IA.8. The figure reports Shapley R^2 decompositions for regressions of each long-short spread on EBR, $\text{OIRet}_{i,t}$, $\text{OIRet}_{i,t+12}^\perp$, and valuation ratios. The three decomposition components account for the bulk of the explained variation; valuation ratios add little. The underlying regressions are reported in Table 8 and in the Internet Appendix in Tables IA.11–IA.13.

4 Shorter horizons

We now repeat our baseline analysis at horizons of one, three, and six months. To obtain $\text{OIRet}_{i,t}^{(h)}$ at a horizon of h months, we use options and risk-free rates with time to maturity equal to h months in equations (1) and (2). For $\text{PTGRet}_{i,t}$, we scale the twelve-month price target by $h/12$. $\text{LTG}_{i,t}$ is left unadjusted. As in our main analysis, all variables are cross-sectionally winsorized at the 1st and 99th percentiles.

Table 8: Understanding Characteristic-Sorted Return Spreads

This table presents time-series regressions of value-weighted long-short realized 12-month excess return spreads, Ret_{t+12} , on long-short spreads of option-implied expected returns (OIRet_t), long-short spreads of orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{t+12}^\perp$) and long-short Expectations Based Return spreads (EBR_{t+12}). We compute $\text{OIRet}_{i,t+12}^\perp$ as the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ and aggregate these residuals into portfolios to obtain $\text{OIRet}_{t+12}^\perp$. At each monthly I/B/E/S consensus date from January 1996 through December 2022, we sort S&P 500 stocks into quintiles based on Beta, Size, B/M, Profitability, Investment, and Momentum. $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. Stocks must satisfy the stock-level decomposition sample requirements from Table 7 and the relevant sorting characteristic needs to be available. We do not impose joint availability requirements across characteristics. The corresponding long-short spread labels are Beta, SMB, HML, RMW, CMA, and WML. For each characteristic sort, column (1) regresses the long-short realized return on EBR_{t+12} and column (2) regresses it on OIRet_t , EBR_{t+12} , and $\text{OIRet}_{t+12}^\perp$. Panel A reports Beta, SMB, and HML while Panel B reports RMW, CMA, and WML. Portfolios use formation-date market-capitalization weights, and long-short spreads follow the Fama–French sign convention. Standard errors, reported in parentheses, are computed using the [Newey and West \(1987\)](#) procedure with 12 lags. N is the number of monthly portfolio observations.

Panel A: Beta, SMB, and HML						
	Beta		SMB		HML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.009 (0.031)	0.009 (0.038)	0.018 (0.025)	-0.019 (0.036)	0.030 (0.029)	0.026 (0.031)
OIRet_t		1.939*** (0.580)		2.685*** (0.445)		1.532** (0.680)
$\text{OIRet}_{t+12}^\perp$		-3.950*** (1.013)		-2.716** (1.189)		-0.896 (0.646)
EBR_{t+12}	0.732*** (0.117)	0.548*** (0.109)	0.857*** (0.155)	0.414*** (0.129)	0.971*** (0.176)	0.961*** (0.162)
N	324	324	324	324	324	324
R ²	0.299	0.520	0.253	0.637	0.318	0.421
Panel B: RMW, CMA, and WML						
	RMW		CMA		WML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.051*** (0.014)	0.065*** (0.017)	0.002 (0.016)	-0.031** (0.014)	-0.077** (0.033)	-0.047* (0.028)
OIRet_t		1.417*** (0.407)		0.997** (0.485)		1.243* (0.668)
$\text{OIRet}_{t+12}^\perp$		-0.929* (0.550)		-3.650*** (1.137)		-1.768* (1.047)
EBR_{t+12}	0.666*** (0.104)	0.612*** (0.102)	0.818*** (0.159)	0.677*** (0.127)	0.694*** (0.132)	0.493*** (0.106)
N	324	324	324	324	324	324
R ²	0.407	0.492	0.348	0.467	0.269	0.425

Table 9 reports the results of predictive regressions at different horizons, with columns (7) and (8) repeating results at the 12-month horizon that were previously reported in columns (1) and (7) of Table 2. The evidence is consistent with our earlier findings. The option-implied expected return, $\text{OIRet}_{i,t}^{(h)}$ predicts returns with a significant coefficient close to one at every horizon and in every specification. The analyst price-target-implied expected return, $\text{PTGRet}_{i,t}$, is marginally significant at the 1-, 3-, and 12-month horizons when we include stock and date fixed effects, and is otherwise insignificant. The analyst long-term cash-flow growth forecast, $\text{LTG}_{i,t}$, enters with significantly negative coefficients throughout. Together, the analyst-implied predictors, $\text{PTGRet}_{i,t}$ and $\text{LTG}_{i,t}$ make a modest contribution to explanatory power that increases with horizon. Our baseline conclusions thus carry over to horizons below one year: indeed, $\text{OIRet}_{i,t}^{(h)}$ plays an even bigger role at short horizons. The increased importance of the option-implied measure at short horizons may reflect in part its inherent advantage of being calculated directly from market prices. It is therefore almost continuously observable during market hours, whereas analyst forecasts are updated relatively infrequently by comparison.

To interpret returns in hindsight, we extend the stock-level decomposition of Section 3 and compute $\text{EBR}_{i,t+h}^{(h)}$ from the BGLS analyst prices h months ahead. Table 10 shows that the regression results are consistent with our earlier findings. The coefficients on $\text{OIRet}_{i,t}^{(h)}$, $\text{OIRet}_{i,t+h}^{(h)\perp}$, and $\text{EBR}_{i,t+h}^{(h)}$ are significant, and have the expected sign, at all horizons and for all specifications; moreover, the coefficient on $\text{OIRet}_{i,t}^{(h)}$ is consistently close to 1.

The coefficients on $\text{OIRet}_{i,t+h}^{(h)\perp}$ become increasingly negative as the horizon shortens, from -2.07 at 12 months to -7.81 at 1 month. This is what the argument of Section 3 predicts: a shock to the h -month expected return is capitalized by a factor $\rho_h/(1 - \rho_h\psi_h)$, where $\rho_h = \rho^{h/12}$ is the loglinearization constant at an h -month horizon and ψ_h is the autocorrelation of $\text{OIRet}_{i,t}^{(h)}$ over h months. For a given degree of persistence, this quantity is larger over shorter horizons. At each horizon, and for each fixed-effects specification, the row labeled “Estimated ψ ” in Table 10 reports the directly estimated autocorrelation of $\text{OIRet}_{i,t}^{(h)}$, and the row labeled “Implied ψ ” reports the autocorrelation implied by the estimated coefficient on $\text{OIRet}_{i,t+h}^{(h)\perp}$. For ease of comparability across horizons, we express each in monthly terms. In pooled regressions, the estimated monthly autocorrelation rises with horizon, from 0.690 at the 1-month hori-

Table 9: Predictive Regressions Across a Range of Forecast Horizons

This table presents panel regressions of realized excess returns over horizons $h \in \{1, 3, 6, 12\}$ months, $\text{Ret}_{i,t+h}$, on three return predictors of interest: option-implied expected returns with corresponding h -month forecast horizon ($\text{OIRet}_{i,t}^{(h)}$); the price-target-implied expected return ($\text{PTGRet}_{i,t}$), scaled by $h/12$; and the long-term growth rate forecast ($\text{LTG}_{i,t}$). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. Predictors are measured from August 1999 through December 2024 while realized returns use price data through December 2025. The sample is restricted to stock-months in which all three forecasting variables, $\text{Ret}_{i,t+h}$, and $\text{Ret}_{i,t+12}$ are jointly observed. Panels A, B, and C report pooled OLS, stock fixed effects, and stock-and-date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with h lags.

<i>Panel A: Pooled OLS</i>								
	1 month		3 months		6 months		12 months	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.000 (0.003)	0.003 (0.004)	0.015** (0.007)	0.024*** (0.008)	0.003 (0.013)	0.025 (0.016)	0.012 (0.026)	0.051 (0.032)
$\text{OIRet}_{i,t}^{(h)}$	1.300* (0.738)	1.238* (0.674)	0.995* (0.531)	1.057* (0.544)	1.232** (0.491)	1.375*** (0.511)	1.120** (0.513)	1.140** (0.450)
$\text{PTGRet}_{i,t}$		0.073 (0.156)		-0.023 (0.095)		-0.061 (0.067)		0.021 (0.054)
$\text{LTG}_{i,t}$		-0.032** (0.015)		-0.073** (0.037)		-0.182** (0.079)		-0.359** (0.152)
N	139,407	139,407	139,407	139,407	139,407	139,407	140,335	140,335
R ²	0.012	0.012	0.014	0.015	0.032	0.037	0.047	0.055

<i>Panel B: Stock fixed effects</i>								
	1 month		3 months		6 months		12 months	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{OIRet}_{i,t}^{(h)}$	1.724** (0.784)	1.496** (0.715)	1.526** (0.629)	1.457** (0.637)	1.952*** (0.433)	1.965*** (0.477)	1.861*** (0.389)	1.763*** (0.369)
$\text{PTGRet}_{i,t}$		0.199 (0.167)		0.044 (0.103)		-0.011 (0.070)		0.063 (0.050)
$\text{LTG}_{i,t}$		-0.044*** (0.015)		-0.109*** (0.036)		-0.251*** (0.077)		-0.516*** (0.149)
Stock FE	X	X	X	X	X	X	X	X
N	139,407	139,407	139,407	139,407	139,407	139,407	140,335	140,335
R ²	0.028	0.029	0.053	0.056	0.112	0.118	0.177	0.189
Within R ²	0.017	0.019	0.026	0.028	0.063	0.069	0.100	0.114

<i>Panel C: Stock and date fixed effects</i>								
	1 month		3 months		6 months		12 months	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\text{OIRet}_{i,t}^{(h)}$	1.292** (0.529)	1.061** (0.495)	1.303*** (0.460)	1.145** (0.472)	1.461*** (0.385)	1.368*** (0.400)	1.334*** (0.356)	1.198*** (0.346)
$\text{PTGRet}_{i,t}$		0.244* (0.125)		0.131* (0.071)		0.076 (0.050)		0.119** (0.046)
$\text{LTG}_{i,t}$		-0.023** (0.010)		-0.061** (0.025)		-0.135*** (0.051)		-0.265*** (0.096)
Stock FE	X	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X	X
N	139,407	139,407	139,407	139,407	139,407	139,407	140,335	140,335
R ²	0.323	0.324	0.303	0.304	0.348	0.350	0.388	0.393
Within R ²	0.007	0.009	0.014	0.016	0.030	0.033	0.049	0.057

zon to 0.933 at the 12-month horizon (with the latter corresponding to an autocorrelation of $0.437 = 0.933^{12}$ annually). The corresponding implied monthly autocorrelations range from 0.874 at the 1-month horizon to 0.951 at the 12-month horizon; the estimated and implied rows match fairly closely at the 6- and 12-month horizons and least well at the 1-month horizon. In other words, the estimated coefficient on $\text{OIRet}_{i,t+h}^{(h)\perp}$ is even larger in magnitude than this back-of-the-envelope calculation would predict.

Once date fixed effects are added, the (within) R^2 and the Shapley shares of $\text{OIRet}_{i,t+h}^{(h)\perp}$ decline, indicating that there is a substantial common component of option-implied expected returns, as discussed in Section 3.

Figure 2 summarizes the contributions to explanatory power of $\text{EBR}_{i,t+h}^{(h)}$, $\text{OIRet}_{i,t}^{(h)}$, and $\text{OIRet}_{i,t+h}^{(h)\perp}$ as Shapley R^2 shares. The level of $\text{OIRet}_{i,t}^{(h)}$ and the subsequent shock ($\text{OIRet}_{i,t+h}^{(h)\perp}$) are more important at short horizons than they are at the 12-month horizon, in pooled regressions and in both fixed effects specifications. At the 1-month horizon, pooled, for example, EBR alone contributes an R^2 of 1.1%. With the ex ante predictor $\text{OIRet}_{i,t}^{(h)}$ also included, R^2 rises to 2.7%; adding $\text{OIRet}_{i,t+h}^{(h)\perp}$ raises R^2 substantially, to 22.4%. At the 3-month horizon, R^2 is 4.1% with EBR alone; 6.4% with $\text{OIRet}_{i,t}^{(h)}$ added; and 26.6% with $\text{OIRet}_{i,t+h}^{(h)\perp}$ also included.

5 Conclusion

We have used the option-implied expected return of [Martin and Wagner \(2019\)](#), a theoretically motivated stock-level measure computed from index and individual option prices with no estimated parameters, to revisit two questions: how well stock returns can be forecasted ex ante, and how much of their variation can be understood ex post.

We compared the option-implied measure, $\text{OIRet}_{i,t}$, with forecasts of stock returns based on analysts' expectations. $\text{OIRet}_{i,t}$ is a superior predictor by a wide margin in all specifications and at all forecast horizons. In sample, it enters panel regressions with a coefficient close to one (and significantly different from zero); and it drives out price-target-implied forecasts in pooled multivariate regressions. These conclusions also survive the introduction of firm characteristics that have been used to describe expected returns in the cross-sectional literature.

Meanwhile, analyst forecasts of long-term cash-flow growth ($\text{LTG}_{i,t}$) enter significantly, and with a negative sign, in multivariate regressions, but contribute relatively

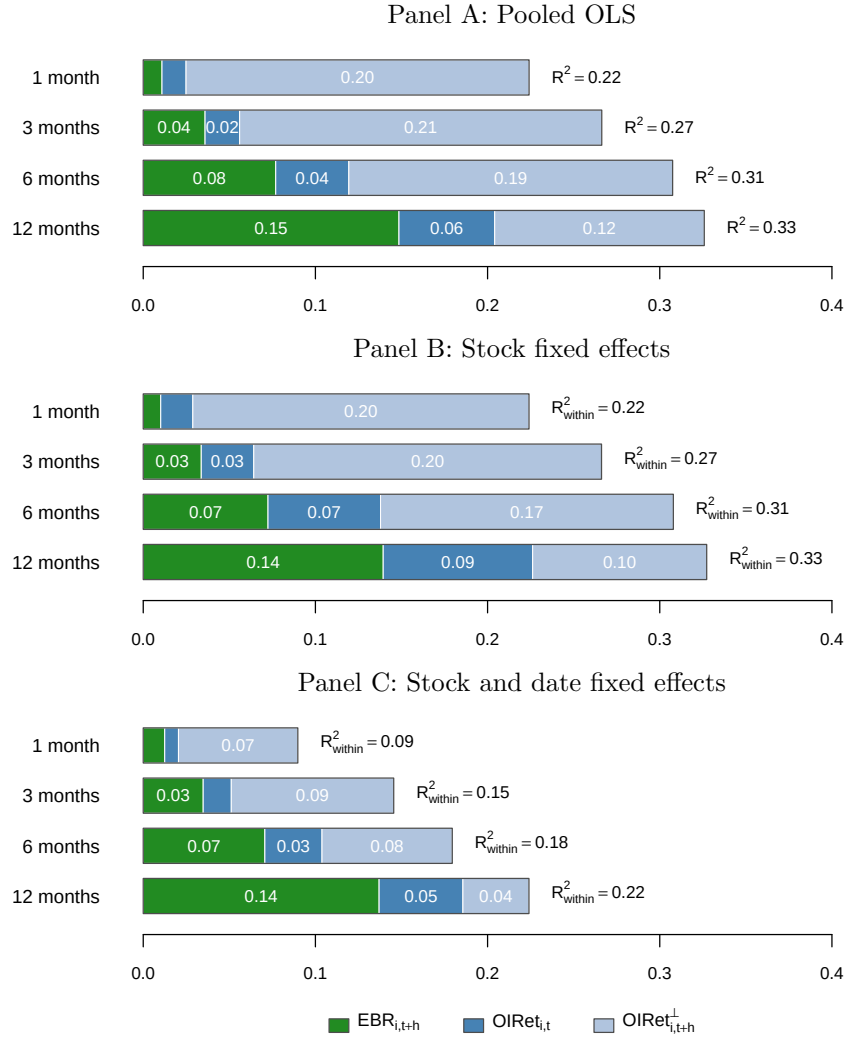
Table 10: Stock-Level Return Decomposition Across Horizons

This table presents panel regressions of realized excess returns over horizons $h \in \{1, 3, 6, 12\}$ months, $\text{Ret}_{i,t+h}$, on the h -month option-implied expected return ($\text{OIRet}_{i,t}^{(h)}$), the h -month ahead shock to the option-implied expected return ($\text{OIRet}_{i,t+h}^{(h)\perp}$), and the h -month ahead Expectations Based Return ($\text{EBR}_{i,t+h}^{(h)}$). $\text{OIRet}_{i,t+h}^{(h)\perp}$ is the full-sample residual from regressing $\text{OIRet}_{i,t+h}^{(h)}$ on $\text{OIRet}_{i,t}^{(h)}$ under the same fixed effects structure as the reported panel. Estimated ψ is the autocorrelation of $\text{OIRet}_{i,t}^{(h)}$, obtained from the same regression. Implied ψ is obtained from equating the coefficient estimate for $\text{OIRet}_{i,t+h}^{(h)\perp}$ to $-\rho_h/(1 - \rho_h\psi_h)$, where $\rho_h = 0.97^{h/12}$. For ease of comparability across horizons, we express both in monthly terms, i.e., we report $\psi_h^{1/h}$. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2023. The sample is restricted to stock-months in which all variables including $\text{E/P}_{i,t}$ and $\text{D/P}_{i,t}$ are jointly observed. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with h lags.

Panel A: Pooled OLS												
	1 month			3 months			6 months			12 months		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	0.007** (0.003)	-0.001 (0.003)	-0.001 (0.003)	0.029*** (0.007)	0.010 (0.007)	0.011* (0.006)	0.029** (0.014)	-0.012 (0.013)	-0.010 (0.009)	0.051** (0.025)	-0.017 (0.026)	-0.013 (0.019)
$\text{OIRet}_{i,t}^{(h)}$		1.586** (0.701)	1.573*** (0.560)		1.375*** (0.507)	1.336*** (0.417)		1.562*** (0.437)	1.552*** (0.247)		1.332*** (0.444)	1.335*** (0.278)
$\text{OIRet}_{i,t+h}^{(h)\perp}$			-7.805*** (1.154)			-5.386*** (0.693)			-3.681*** (0.489)			-2.071*** (0.320)
$\text{EBR}_{i,t+h}^{(h)}$	0.106*** (0.014)	0.117*** (0.012)	0.100*** (0.006)	0.176*** (0.016)	0.184*** (0.017)	0.153*** (0.009)	0.253*** (0.021)	0.254*** (0.024)	0.215*** (0.015)	0.360*** (0.030)	0.351*** (0.034)	0.315*** (0.027)
Estimated ψ			0.690			0.875			0.906			0.933
Implied ψ			0.874			0.937			0.952			0.951
N	147,481	147,481	147,481	144,667	144,667	144,667	141,444	141,444	141,444	136,830	136,830	136,830
R ²	0.011	0.027	0.224	0.041	0.064	0.266	0.090	0.133	0.307	0.170	0.221	0.326
Panel B: Stock fixed effects												
	1 month			3 months			6 months			12 months		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\text{OIRet}_{i,t}^{(h)}$		1.978*** (0.751)	1.968*** (0.644)		1.891*** (0.614)	1.851*** (0.508)		2.217*** (0.387)	2.214*** (0.290)		1.931*** (0.359)	1.949*** (0.266)
$\text{OIRet}_{i,t+h}^{(h)\perp}$			-7.831*** (1.157)			-5.371*** (0.701)			-3.602*** (0.469)			-1.957*** (0.279)
$\text{EBR}_{i,t+h}^{(h)}$	0.103*** (0.014)	0.116*** (0.012)	0.097*** (0.006)	0.171*** (0.016)	0.184*** (0.017)	0.148*** (0.009)	0.245*** (0.020)	0.253*** (0.023)	0.209*** (0.014)	0.349*** (0.029)	0.343*** (0.031)	0.306*** (0.025)
Estimated ψ			0.632			0.832			0.860			0.888
Implied ψ			0.875			0.937			0.951			0.947
Stock FE	X	X	X	X	X	X	X	X	X	X	X	X
N	147,481	147,481	147,481	144,667	144,667	144,667	141,444	141,444	141,444	136,830	136,830	136,830
R ²	0.018	0.038	0.230	0.058	0.091	0.281	0.118	0.184	0.333	0.210	0.289	0.369
Within R ²	0.011	0.031	0.224	0.039	0.073	0.266	0.084	0.152	0.308	0.159	0.242	0.327
Panel C: Stock and date fixed effects												
	1 month			3 months			6 months			12 months		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\text{OIRet}_{i,t}^{(h)}$		1.507*** (0.511)	1.514** (0.635)		1.576*** (0.455)	1.599*** (0.385)		1.701*** (0.367)	1.745*** (0.248)		1.514*** (0.348)	1.535*** (0.293)
$\text{OIRet}_{i,t+h}^{(h)\perp}$			-5.569*** (1.040)			-4.555*** (0.811)			-2.737*** (0.575)			-1.271*** (0.338)
$\text{EBR}_{i,t+h}^{(h)}$	0.094*** (0.006)	0.099*** (0.006)	0.092*** (0.005)	0.146*** (0.008)	0.151*** (0.009)	0.137*** (0.007)	0.205*** (0.014)	0.207*** (0.015)	0.190*** (0.013)	0.300*** (0.025)	0.297*** (0.026)	0.284*** (0.026)
Estimated ψ			0.645			0.859			0.881			0.898
Implied ψ			0.823			0.924			0.931			0.889
Stock FE	X	X	X	X	X	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X	X	X	X	X	X
N	147,481	147,481	147,481	144,667	144,667	144,667	141,444	141,444	141,444	136,830	136,830	136,830
R ²	0.317	0.323	0.371	0.312	0.324	0.390	0.358	0.381	0.430	0.412	0.444	0.466
Within R ²	0.013	0.021	0.090	0.037	0.054	0.145	0.076	0.109	0.179	0.145	0.192	0.224

Figure 2: Shapley R^2 Decomposition Across Horizons

This figure decomposes the fit of the regression of realized excess stock returns over horizons $h \in \{1, 3, 6, 12\}$ months, $\text{Ret}_{i,t+h}$, on option-implied expected returns with forecast horizon h ($\text{OIRet}_{i,t}^{(h)}$), orthogonalized option-implied expected returns h months ahead ($\text{OIRet}_{i,t+h}^{(h)\perp}$), and h -month ahead Expectations Based Returns, $\text{EBR}_{i,t+h}^{(h)}$, into the Shapley R^2 contributions of the three regressors. The specifications correspond to those in Table 10. $\text{OIRet}_{i,t+h}^{(h)\perp}$ is the full-sample residual from projecting $\text{OIRet}_{i,t+h}^{(h)}$ on $\text{OIRet}_{i,t}^{(h)}$ under the same fixed effects structure as the reported panel. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2023. $\text{OIRet}_{i,t}^{(h)}$ is measured through December 2022 while $\text{Ret}_{i,t+h}$, $\text{EBR}_{i,t+h}^{(h)}$, and $\text{OIRet}_{i,t+h}^{(h)\perp}$ use data through December 2023. The sample is restricted to stock-months in which all variables are jointly observed. Bars are stacked in the order $\text{EBR}_{i,t+h}^{(h)}$ (green), $\text{OIRet}_{i,t}^{(h)}$ (blue), $\text{OIRet}_{i,t+h}^{(h)\perp}$ (light blue), and the three segments sum to the reported R^2 . Panel A reports the pooled-OLS R^2 ; Panels B and C report the within R^2 from the stock fixed effects and stock and date fixed effects specifications.



little explanatory power; and the significance of $\text{LTG}_{i,t}$ becomes fragile in presence of firm characteristics.

Turning to the second question, our option-implied measures of expected returns play a major role in explaining realized returns in hindsight, both ex ante (through the level of $\text{OIRet}_{i,t}$) and ex post (through shocks to $\text{OIRet}_{i,t}$). At the 12-month horizon, the EBR measure of [Bordalo et al. \(2025\)](#) explains a substantial fraction of realized returns ($R^2 = 17.0\%$). Adding the level of $\text{OIRet}_{i,t}$ and the subsequent shock raises the explained share to 32.6%. The relative importance of the two $\text{OIRet}_{i,t}$ components increases at shorter horizons: at the 1-month horizon, EBR alone contributes an R^2 of 1.1%; including our $\text{OIRet}_{i,t}$ measures raises R^2 to 22.4%.

The same pattern holds for the characteristic-sorted long-short portfolios that are the focus of the [Bordalo et al. \(2025\)](#) analysis: we replicate their finding that analysts' cash-flow shocks explain a large share of characteristic-sorted portfolio spreads, but also show that the level of $\text{OIRet}_{i,t}$ and shocks to it explain a large—and for some characteristics dominant—further share. Unlike our option-implied measure, predictor variables based on valuation ratios play an extremely limited role in these regressions.

As $\text{OIRet}_{i,t}$ is computed from option prices, shocks to it are not mechanically related to movements in the underlying stock prices, as they would be if changes in a valuation ratio were used. Moreover, there is essentially no contemporaneous relationship between $\text{OIRet}_{i,t}$ and $\text{LTG}_{i,t}$, so our measure is not simply a disguised proxy for analyst overoptimism.

In short, expected returns matter. $\text{OIRet}_{i,t}$ is a measure of expected returns motivated theoretically on traditional risk–return lines. We emphasize, however, that we are agnostic about the fundamental determinants of different assets' $\text{OIRet}_{i,t}$ (just as the CAPM is agnostic about the fundamental determinants of different assets' market betas). In principle, movements in $\text{OIRet}_{i,t}$ might reflect the presence of irrational market participants, or of rational market participants with different beliefs. “Expectations” are not a monolithic object. Our results show that both shocks to analyst expectations, as captured by the EBR measure of [Bordalo et al. \(2025\)](#), and shocks to the expectations of a hypothetical log investor, as captured by $\text{OIRet}_{i,t}$, have a major role to play in understanding returns.

A Construction of empirical measures

A.1 Option-implied expected returns

For the construction of $\text{OIRet}_{i,t}$, we rely on data from IvyDB US by OptionMetrics, accessible through WRDS. We download volatility surface data and security price data for S&P 500 stocks as well as the zero curve on a daily basis spanning January 1996 to December 2025. Next, we apply the formula of [Martin \(2017\)](#) to S&P 500 index options and stock-level equity options of S&P 500 constituents to estimate risk-neutral variances:

$$\text{SVIX}_{i,t}^2 = \frac{2}{R_{f,t+12} S_{i,t}^2} \left\{ \int_0^{F_{i,t}} \text{put}_{i,t}(K) dK + \int_{F_{i,t}}^{\infty} \text{call}_{i,t}(K) dK \right\}. \quad (\text{A.1})$$

$R_{f,t+12}$ is the risk-free rate from t to $t + 12$, $S_{i,t}$ and $F_{i,t}$ are the security's spot price and forward price from t to $t + 12$, respectively, and $\text{put}_{i,t}(K)$ and $\text{call}_{i,t}(K)$ are prices of out-of-the-money (OTM) put and call options with strike price K expiring at time $t + 12$.

As we do not observe a continuum of strikes, we discretize equation (A.1) using options available in the volatility surface. We require at least two OTM put and call options for the formula to be computed. Forward prices are defined as $F_{i,t} = S_{i,t} e^{rT}$, where r is the continuously compounded zero-coupon interest rate with 365 days to maturity obtained from the zero curve file and $T = 1$.

We plug the risk-neutral variances obtained from equation (A.1) into equation (1) in the main body to arrive at $\text{OIRet}_{i,t}$ with a 12-month forecast horizon.

We use the OptionMetrics CRSP Link provided by WRDS to assign CRSP PERMNOs to our option-implied measures. Taking 12-month consensus PTGs on I/B/E/S consensus dates as the reference, we allow $\text{OIRet}_{i,t}$ to be up to six days old.

A.2 Analyst expectations

I/B/E/S Summary History. We link I/B/E/S Summary History records by their internal IBTICs to PERMNOs using the I/B/E/S CRSP Link from WRDS. Consensus PTGs are adjusted for stock-splits using adjustment factors for prices (CFACPR) from the CRSP Daily Stock file. To obtain $\text{PTGRet}_{i,t}$, we scale 12-month median consensus

price targets $PTG_{i,t}$ by corresponding (split-adjusted) stock prices from CRSP around consensus dates which we allow to be up to six days old.

I/B/E/S Detail History. Using the I/B/E/S Detail History data, we compute consensus price targets following I/B/E/S methodology as closely as possible:

- Analyst-level forecasts are grouped by stock (identified via PERMNO after linking to IBTIC using the I/B/E/S CRSP Link) and forecast horizon and adjusted for stock-splits using adjustment factors for prices (CFACPR) from the CRSP Daily Stock file.
- We keep price targets that have been issued prior to or on the day of the consensus computation at the latest.
- If for a given broker a price target is flagged as “stopped” in the Stop Price Target file, we exclude it from our computations.
- We only keep the most recent price target for a given broker, e.g., JP Morgan, as opposed to the most recent price target of an individual analyst.

In untabulated results, we find that our self-computed consensus estimates are nearly identical to off-the-shelf consensus estimates from the I/B/E/S Summary History file. We also compute versions of price-target-implied returns

- that are computed on I/B/E/S consensus dates and only incorporate price targets that have been issued since the last I/B/E/S consensus date scaled by corresponding stock price on the same day ($\text{FreshPTGRet}_{i,t}^{1m}$),
- at the daily frequency scaled by corresponding stock price from the prior day ($\text{PTGDETRet}_{i,t}$),
- at the daily frequency following earnings announcements that only incorporate price targets that have been issued since earnings announcement scaled by corresponding stock price from the prior day ($\text{FreshPTGRet}_{i,t}^{EA}$).

A.3 Expectations-Based Returns

This section describes the computation of EBRs in [Bordalo et al. \(2025\)](#) using replication code provided with the article, which is available at <https://dataverse>.

[harvard.edu/dataverse/BLGS2025](https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7927/H731-7393). In order to compute EBRs, one first needs to compute monthly “analyst prices” on I/B/E/S consensus dates as

$$\tilde{P}_{i,t}^a = \sum_{s=1,\dots,5} \frac{\tilde{\mathbb{E}}_t^a DPS_{i,t+12s}}{(1+r)^s} + \frac{1+g}{(1+r)^5} \times \frac{\tilde{\mathbb{E}}_t^a DPS_{i,t+60}}{r-g}. \quad (\text{A.2})$$

$\tilde{\mathbb{E}}_t^a DPS_{i,t+12s}$ denotes the analysts’ consensus expectation of DPS at time $t + 12s$. Note that DPS expectations are computed from analysts’ consensus EPS forecasts (i.e., interpolated fiscal-year-end forecasts to match horizons $t + 12s$), multiplied by a fixed payout ratio.

Typically, EPS forecasts are not available for horizons beyond two (fiscal) years. In these cases, BGLS assume that EPS expectations grow at $(1+LTG_{i,t})$ per year of forecast horizon, e.g., $\tilde{\mathbb{E}}_t^a EPS_{i,t+36} = \tilde{\mathbb{E}}_t^a EPS_{i,t+24} \times (1 + LTG_{i,t})$. In the full sample, BGLS winsorize LTG at the 1% and 99% quantiles while at the firm level, BGLS interpolate missing LTG from the time series of $LTG_{i,t}$.

BGLS set r to equal the average realized market return in their sample while g is chosen such that the ratio of analyst price to actual market price is as close as possible to one, on average in the full sample. Whenever the analyst price $\tilde{P}_{i,t}^a \leq 0$, BGLS set the observation to N/A .

BGLS mainly focus on portfolio-level analysis in logs but also present some firm-level results in the Online Appendix. The computation of firm-level EBRs for horizons $h \in (1, 3, 12)$ is defined as

$$EBR_{i,t+h} = \left(\frac{\sum_{j=1}^h D_{i,t+j} + \tilde{P}_{i,t+h}^a}{\tilde{P}_{i,t}^a} \right). \quad (\text{A.3})$$

$D_{i,t+j}$ are dividend payments collected throughout month j and $\tilde{P}_{i,t}^a$ ($\tilde{P}_{i,t+h}^a$) is today’s (h months ahead) analyst price. Ignore $D_{i,t+j}$ and subtract $R_{f,t+12}$ to arrive at our definition of EBRs in equation (5) in the main text. We can directly match EBRs from the replication package to our main panel since we follow the same timing conventions around consensus dates and use identical identifiers (I/B/E/S IBTICs to CRSP PERMNOs links) as BGLS.

References

- Anarkulova, A., Cederburg, S., and Zhou, Y. (2025). The stock market’s two truths: Subjective beliefs and objective reality. *Available at SSRN*.
- Bastianello, F. (2025). Time-series and cross-section of risk premia expectations: Evidence from financial analysts. *Working paper, London Business School*.
- Bastianello, F., Decaire, P., and Guenzel, M. (2025). Valuation models. *Available at SSRN 5767524*.
- Ben-David, I. and Chinco, A. (2025). Expected $\text{eps} \times$ trailing p/e pricing without discounting.
- Bordalo, P., Gennaioli, N., La Porta, R., and Shleifer, A. (2024). Belief overreaction and stock market puzzles. *Journal of Political Economy*, 132(5):1450–1484.
- Bordalo, P., Gennaioli, N., La Porta, R., and Shleifer, A. (2025). Finance without exotic risk. *Journal of Financial Economics*, 173:104145.
- Bradshaw, M. T. (2002). The use of target prices to justify sellside analysts’ stock recommendations. *Accounting Horizons*, 16(1):27–41.
- Bradshaw, M. T. (2004). How do analysts use their earnings forecasts in generating stock recommendations? *The Accounting Review*, 79(1):25–50.
- Bretscher, L., Malkhozov, A., Tamoni, A., and Yang, H. (2026). Distorted beliefs and asset prices. Working paper.
- Campbell, J. Y. (1991). A variance decomposition for stock returns. *Economic Journal*, 101(405):157–179.
- Campbell, J. Y. and Shiller, R. J. (1988). The dividend-price ratio and expectations of future dividends and discount factors. *Review of Financial Studies*, 1(3):195–228.
- Campbell, J. Y. and Thompson, S. B. (2008). Predicting excess stock returns out of sample: Can anything beat the historical average? *Review of Financial Studies*, 21(4):1509–1531.

- Chabi-Yo, F., Dim, C., and Vilkov, G. (2023). Generalized bounds on the conditional expected excess return on individual stocks. *Management Science*, 69(2):922–939.
- Chen, L., Da, Z., and Zhao, X. (2013). What drives stock price movements? *The Review of Financial Studies*, 26(4):841–876.
- Cochrane, J. H. (2011). Presidential address: Discount rates. *The Journal of Finance*, 66(4):1047–1108.
- Cutler, D. M., Poterba, J. M., and Summers, L. H. (1989). What moves stock prices? *Journal of Portfolio Management*, 15(3):4–12.
- Dahlquist, M. and Ibert, M. (2024). Equity return expectations and portfolios: Evidence from large asset managers. *The Review of Financial Studies*, 37(6):1887–1928.
- De La O, R., Han, X., and Myers, S. (2025). The return of return dominance: Decomposing the cross-section of prices. *Journal of Financial Economics*, 169:104059.
- De La O, R. and Myers, S. (2021). Subjective cash flow and discount rate expectations. *Journal of Finance*, 76(3):1339–1387.
- Décaire, P. and Graham, J. R. (2024). Valuation fundamentals. *HKU Jockey Club Enterprise Sustainability Global Research Institute-Archive*.
- DeLong, J. B., Shleifer, A., Summers, L. H., and Waldmann, R. J. (1990). Noise trader risk in financial markets. *Journal of Political Economy*, 98(4):703–738.
- Diebold, F. X. and Mariano, R. S. (1995). Comparing predictive accuracy. *Journal of Business & Economic Statistics*, 13(3):253–263.
- Driscoll, J. C. and Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of economics and statistics*, 80(4):549–560.
- Engsted, T., Pedersen, T. Q., and Tanggaard, C. (2012). Pitfalls in VAR based return decompositions: A clarification. *Journal of Banking & Finance*, 36(5):1255–1265.
- Fama, E. F. and French, K. R. (2015). A five-factor asset pricing model. *Journal of financial economics*, 116(1):1–22.

- Geanakoplos, J. (2010). The leverage cycle. In Acemoglu, D., Rogoff, K., and Woodford, M., editors, *NBER Macroeconomics Annual 2009, Volume 24*, pages 1–65. University of Chicago Press, Chicago.
- Greenwood, R. and Shleifer, A. (2014). Expectations of returns and expected returns. *The Review of Financial Studies*, 27(3):714–746.
- Jensen, T. I., Kelly, B., and Pedersen, L. H. (2023). Is there a replication crisis in finance? *The Journal of Finance*, 78(5):2465–2518.
- Kadan, O. and Tang, X. (2020). A bound on expected stock returns. *Review of Financial Studies*, 33(4):1565–1617.
- Knox, B. and Vissing-Jorgensen, A. (2025). A stock return decomposition using observables. Finance and Economics Discussion Series 2022-014r1, Board of Governors of the Federal Reserve System.
- La Porta, R. (1996). Expectations and the cross-section of stock returns. *Journal of Finance*, 51(5):1715–1742.
- Martin, I. W. R. (2017). What is the expected return on the market? *Quarterly Journal of Economics*, 132(1):367–433.
- Martin, I. W. R. (2025). Information in derivatives markets: Forecasting prices with prices. *Annual Review of Financial Economics*, 17:295–319.
- Martin, I. W. R. and Papadimitriou, D. (2022). Sentiment and speculation in a market with heterogeneous beliefs. *American Economic Review*, 112(8):2465–2517.
- Martin, I. W. R. and Shi, R. (2026). Forecasting crashes with a smile. Working paper, London School of Economics.
- Martin, I. W. R. and Wagner, C. (2019). What is the expected return on a stock? *Journal of Finance*, 74(4):1887–1929.
- Nagel, S. (2024). Stock market valuation: Explanations, non-explanations, and some open questions. Working Paper.
- Nagel, S. and Xu, Z. (2023). Dynamics of subjective risk premia. *Journal of Financial Economics*, 150(2):103713.

- Newey, W. K. and West, K. D. (1987). Hypothesis testing with efficient method of moments estimation. *International Economic Review*, pages 777–787.
- Roll, R. (1984). Orange juice and weather. *American Economic Review*, 74(5):861–880.
- Roll, R. (1988). R^2 . *Journal of Finance*, 43(3):541–566.
- Ross, S. A. (2005). *Neoclassical Finance*. Princeton Lectures in Finance. Princeton University Press, Princeton, NJ.
- Vuolteenaho, T. (2002). What drives firm-level stock returns? *Journal of Finance*, 57(1):233–264.

Internet Appendix for
“Option Prices, Analyst Expectations, and Stock Returns”

Ian W. R. Martin Moritz Rodenkirchen
Christian Wagner Andrew Wang

Section [IA.A](#) of this internet appendix summarizes the results of repeating the analysis from Section [2.1](#) of the paper using the full universe of 153 characteristics of [Jensen et al. \(2023\)](#).

Section [IA.B](#) provides tables and figures with additional empirical results referred to throughout the paper and the internet appendix.

IA.A Predictability on the JKP universe of characteristics

This section complements the analysis of Section 2.1 by expanding the right-hand-side universe from the ten characteristics used in the main analysis to the full set of 153 firm characteristics of Jensen et al. (2023, JKP) .

We first catalog the characteristics and their data availability in our sample. Table IA.14 lists the 153 characteristics together with brief definitions, grouped by JKP theme and ordered alphabetically within each theme. Table IA.15 keeps the same theme/alphabetical ordering but replaces the definitions with the number of stock-month observations available within our 140,335-stock-month joint sample of $\text{Ret}_{i,t+12}$, $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$. Table IA.16 reports the same availability counts but reorders the 153 characteristics from most to least observed, which makes transparent how a minimum- N filter trims the universe: requiring $N \geq 125,000$ retains 138 characteristics, and requiring $N \geq 135,000$ retains 86.

We then revisit the determinants of $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ on this broader universe, both characteristic-by-characteristic and theme-by-theme. Table IA.17 reports, separately for $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$, the top fifteen of the 153 characteristics by univariate R^2 and by absolute Driscoll–Kraay t -statistic from pooled OLS regressions of each expected return on a single characteristic at a time. Table IA.18 aggregates these univariate fits to the theme level: for each JKP theme it reports the adjusted R^2 and number of observations from a pooled OLS regression of each expected return on all characteristics belonging to the theme, with an “All k ” row that uses the full design. The three side-by-side blocks correspond to three nested universes of characteristics defined by minimum availability ($N \geq 0$, $N \geq 125,000$, $N \geq 135,000$).

Finally, we re-run the realized-return predictability regressions of Table 5 with the 86 characteristics that pass a minimum-availability filter as controls. Table IA.19 regresses the 12-month realized excess return $\text{Ret}_{i,t+12}$ on $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ with the 86 characteristics that pass the $N \geq 135,000$ filter as controls, under pooled OLS, stock fixed effects, and stock and date fixed effects.

IA.B Additional Tables and Figures

Table IA.1: Summary Statistics Without Winsorizing

This table presents summary statistics for the stock-level S&P 500 constituents panel used in the analysis. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2025. We measure predictors and characteristics from January 1996 through December 2024 (if available) and calculate the corresponding 12-month realized returns using price data through December 2025. We report the number of observations, mean, median, standard deviation, minimum, maximum, and the 5th, 25th, 75th, and 95th percentiles. $\text{Ret}_{i,t+12}$ is the realized 12-month excess price return computed from CRSP daily prices. $\text{OIRet}_{i,t}$ is the option-implied expected return in the spirit of [Martin and Wagner \(2019\)](#), computed from OptionMetrics data, and $\text{OIRet}_{i,t+12}^\perp$ is the orthogonalized option-implied expected return 12 months ahead. $\text{OIRet}_{i,t+12}^\perp$ is the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$. $\text{PTGRet}_{i,t}$ and $\text{LTG}_{i,t}$ are based on I/B/E/S Summary History price target and long-term growth rate forecasts. $\text{EBR}_{i,t+12}$ is the Expectations-Based Return excluding dividends, obtained from the replication package of [Bordalo et al. \(2025\)](#); it is already winsorized in that input. The table also reports the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) and four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P) which we obtain from the set of 153 stock characteristics studied in [Jensen et al. \(2023\)](#), accessible through WRDS. $\text{D/P}_{i,t}$ is constructed from CRSP monthly returns with a look-back window of 12 months.

Variable	N	Mean	SD	Min	P5	P25	Median	P75	P95	Max
$\text{Ret}_{i,t+12}$	174,436	0.075	0.383	-1.057	-0.466	-0.135	0.054	0.246	0.654	10.224
$\text{OIRet}_{i,t}$	172,812	0.053	0.078	-0.079	0.006	0.020	0.034	0.060	0.156	3.052
$\text{PTGRet}_{i,t}$	153,506	0.134	0.236	-0.803	-0.076	0.023	0.093	0.189	0.453	13.838
$\text{LTG}_{i,t}$	162,956	0.120	0.109	-1.656	0.025	0.080	0.110	0.150	0.250	4.093
$\text{OIRet}_{i,t+12}^\perp$	162,082	-0.000	0.070	-1.123	-0.040	-0.023	-0.013	0.005	0.074	2.967
$\text{EBR}_{i,t+12}$	141,119	0.085	0.434	-1.008	-0.457	-0.095	0.055	0.196	0.648	8.454
$\beta_{i,t}$	164,476	1.026	0.582	-0.702	0.217	0.636	0.968	1.319	2.064	5.229
$\text{Size}_{i,t}$	168,557	9.574	1.234	4.757	7.650	8.759	9.492	10.323	11.807	15.093
$\text{B/M}_{i,t}$	165,015	0.490	0.513	0.000	0.072	0.211	0.373	0.640	1.223	63.006
$\text{MOM}_{i,t}$	167,348	0.129	0.383	-0.990	-0.385	-0.076	0.105	0.291	0.693	20.409
$\text{OP}_{i,t}$	151,860	0.616	13.053	-21.239	0.076	0.187	0.289	0.421	0.914	1417.333
$\text{INV}_{i,t}$	168,208	0.118	0.417	-1.000	-0.120	-0.003	0.055	0.139	0.486	27.910
$\text{Rev}(1\text{m})_{i,t}$	168,466	0.011	0.101	-0.886	-0.141	-0.040	0.011	0.060	0.160	2.450
$\text{RVol}(21\text{d})_{i,t}$	168,497	0.020	0.013	0.001	0.008	0.012	0.016	0.023	0.043	0.333
$\text{SalesGr}_{i,t}$	167,919	0.113	1.762	-11.583	-0.219	-0.015	0.059	0.148	0.489	270.791
$\text{D/P}_{i,t}$	173,255	0.019	0.028	0.000	0.000	0.004	0.016	0.028	0.051	1.704
$\text{E/P}_{i,t}$	168,477	0.034	0.328	-54.382	-0.037	0.029	0.048	0.069	0.120	1.220

Table IA.2: Predictive Regressions with Newly Issued or Updated Price Targets

This table presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on option-implied expected returns ($\text{OIRet}_{i,t}$), price target-implied expected returns that only incorporate price targets that have been issued/updated since the last I/B/E/S consensus date ($\text{FreshPTGRet}_{i,t}^{1m}$), and long-term growth rate forecasts ($\text{LTG}_{i,t}$). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. $\text{OIRet}_{i,t}$, $\text{FreshPTGRet}_{i,t}^{1m}$, and $\text{LTG}_{i,t}$ are measured from August 1999 through December 2024 and 12-month realized returns use price data through December 2025. The sample is restricted to stock-months in which the realized return and all three predictors (plus $\text{PTGRet}_{i,t}$) are jointly observed. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.010 (0.026)	0.042 (0.026)	0.102*** (0.034)	0.007 (0.027)	0.048 (0.031)	0.077** (0.031)	0.044 (0.031)
$\text{OIRet}_{i,t}$	1.212** (0.495)			1.168** (0.476)	1.259*** (0.467)		1.190*** (0.450)
$\text{FreshPTGRet}_{i,t}^{1m}$		0.247* (0.137)		0.042 (0.051)		0.275** (0.134)	0.068 (0.049)
$\text{LTG}_{i,t}$			-0.243* (0.136)		-0.341** (0.147)	-0.322** (0.143)	-0.355** (0.147)
N	117,860	117,860	117,860	117,860	117,860	117,860	117,860
R ²	0.054	0.013	0.004	0.054	0.062	0.020	0.062

<i>Panel B: Stock fixed effects</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{OIRet}_{i,t}$	1.938*** (0.373)			1.893*** (0.365)	1.934*** (0.357)		1.860*** (0.349)
$\text{FreshPTGRet}_{i,t}^{1m}$		0.338** (0.136)		0.044 (0.044)		0.363*** (0.133)	0.072* (0.043)
$\text{LTG}_{i,t}$			-0.479*** (0.152)		-0.470*** (0.135)	-0.541*** (0.164)	-0.483*** (0.138)
Stock FE	X	X	X	X	X	X	X
N	117,860	117,860	117,860	117,860	117,860	117,860	117,860
R ²	0.182	0.103	0.094	0.183	0.193	0.117	0.194
Within R ²	0.108	0.022	0.012	0.109	0.120	0.037	0.121

<i>Panel C: Stock and date fixed effects</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{OIRet}_{i,t}$	1.373*** (0.335)			1.313*** (0.328)	1.375*** (0.327)		1.309*** (0.321)
$\text{FreshPTGRet}_{i,t}^{1m}$		0.206** (0.081)		0.084** (0.037)		0.215*** (0.080)	0.093** (0.037)
$\text{LTG}_{i,t}$			-0.213*** (0.079)		-0.219*** (0.082)	-0.239*** (0.084)	-0.230*** (0.084)
Stock FE	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X
N	117,860	117,860	117,860	117,860	117,860	117,860	117,860
R ²	0.396	0.370	0.366	0.397	0.399	0.372	0.400
Within R ²	0.051	0.009	0.003	0.053	0.055	0.013	0.056

Table IA.3: Predictive Regressions After Earnings Announcements: All Price Targets

This table presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on option-implied expected returns ($\text{OIRet}_{i,t}$) and self-computed price target-implied expected returns ($\text{PTGDETRet}_{i,t}$) constructed from analyst-level price targets in the I/B/E/S Detail History file applying the I/B/E/S consensus methodology at the daily frequency. We index the sample by earnings announcements for S&P 500 constituents from August 1999 through December 2024 while 12-month realized returns use price data through December 2025. The column groups use price target information as of the earnings announcement day, three and five trading days after the announcement. The sample is restricted to stock-announcement observations in which the realized return and both predictors are jointly observed. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>									
	0			+3			+5		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.074*** (0.027)	0.026 (0.022)	0.025 (0.022)	0.064** (0.028)	0.029 (0.026)	0.027 (0.026)	0.064** (0.028)	0.021 (0.025)	0.020 (0.025)
PTGDETRet _{i,t}	0.029*** (0.007)		0.017*** (0.006)	0.028*** (0.008)		0.018*** (0.006)	0.029*** (0.009)		0.016*** (0.005)
OIRet _{i,t}		1.109*** (0.387)	1.086*** (0.393)		0.792* (0.474)	0.773 (0.476)		0.943** (0.462)	0.923** (0.466)
N	32,040	32,040	32,040	46,325	46,325	46,325	46,655	46,655	46,655
R ²	0.003	0.038	0.039	0.003	0.030	0.031	0.003	0.037	0.038
<i>Panel B: Stock fixed effects</i>									
	0			+3			+5		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PTGDETRet _{i,t}	0.213*** (0.081)		0.011 (0.048)	0.243** (0.097)		0.074 (0.068)	0.232** (0.095)		0.018 (0.047)
OIRet _{i,t}		1.863*** (0.393)	1.851*** (0.395)		1.337*** (0.506)	1.274** (0.522)		1.643*** (0.367)	1.623*** (0.374)
Stock FE	X	X	X	X	X	X	X	X	X
N	32,040	32,040	32,040	46,325	46,325	46,325	46,655	46,655	46,655
R ²	0.120	0.182	0.182	0.101	0.149	0.150	0.100	0.164	0.164
Within R ²	0.010	0.080	0.080	0.014	0.067	0.068	0.014	0.084	0.084
<i>Panel C: Stock and date fixed effects</i>									
	0			+3			+5		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PTGDETRet _{i,t}	0.156*** (0.053)		0.069* (0.037)	0.209*** (0.069)		0.121** (0.054)	0.202*** (0.067)		0.080** (0.040)
OIRet _{i,t}		1.365*** (0.287)	1.311*** (0.286)		0.979** (0.451)	0.897** (0.453)		1.291*** (0.324)	1.212*** (0.338)
Stock FE	X	X	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X	X	X
N	32,040	32,040	32,040	46,325	46,325	46,325	46,655	46,655	46,655
R ²	0.377	0.399	0.399	0.353	0.371	0.373	0.354	0.381	0.382
Within R ²	0.006	0.041	0.042	0.012	0.039	0.043	0.013	0.053	0.055

Table IA.4: Predictive Regressions After Earnings Announcements: Newly Issued Price Targets

This table presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on option-implied expected returns ($\text{OIRet}_{i,t}$) and self-computed price target-implied expected returns ($\text{FreshPTGRet}_{i,t}^{EA}$) constructed from analyst-level price targets in the I/B/E/S Detail History file, retaining only price targets newly issued after the earnings announcement when computing the daily consensus. We index the sample by earnings announcements for S&P 500 constituents from August 1999 through December 2024 while 12-month realized returns use price data through December 2025. The column groups use price target information as of the earnings announcement day, three and five trading days after the announcement. The sample is restricted to stock-announcement observations in which the realized return and both predictors are jointly observed. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>									
	0			+3			+5		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.075*** (0.028)	0.026 (0.022)	0.024 (0.022)	0.065** (0.028)	0.029 (0.026)	0.027 (0.026)	0.065** (0.028)	0.021 (0.025)	0.019 (0.025)
$\text{FreshPTGRet}_{i,t}^{EA}$	0.027*** (0.005)		0.021*** (0.006)	0.025*** (0.006)		0.019*** (0.005)	0.026*** (0.006)		0.018*** (0.005)
$\text{OIRet}_{i,t}$		1.109*** (0.387)	1.093*** (0.391)		0.792* (0.474)	0.781 (0.475)		0.943** (0.462)	0.930** (0.464)
N	32,040	32,040	32,040	46,325	46,325	46,325	46,655	46,655	46,655
R ²	0.003	0.038	0.040	0.002	0.030	0.031	0.002	0.037	0.038
<i>Panel B: Stock fixed effects</i>									
	0			+3			+5		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{FreshPTGRet}_{i,t}^{EA}$	0.137*** (0.045)		0.051 (0.036)	0.180** (0.073)		0.051 (0.040)	0.189** (0.086)		0.020 (0.033)
$\text{OIRet}_{i,t}$		1.863*** (0.393)	1.838*** (0.393)		1.337*** (0.506)	1.313*** (0.507)		1.643*** (0.367)	1.630*** (0.365)
Stock FE	X	X	X	X	X	X	X	X	X
N	32,040	32,040	32,040	46,325	46,325	46,325	46,655	46,655	46,655
R ²	0.115	0.182	0.183	0.093	0.149	0.149	0.093	0.164	0.164
Within R ²	0.005	0.080	0.081	0.006	0.067	0.067	0.007	0.084	0.084
<i>Panel C: Stock and date fixed effects</i>									
	0			+3			+5		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{FreshPTGRet}_{i,t}^{EA}$	0.079*** (0.029)		0.055** (0.028)	0.121*** (0.038)		0.068** (0.027)	0.137** (0.053)		0.057** (0.026)
$\text{OIRet}_{i,t}$		1.365*** (0.287)	1.351*** (0.288)		0.979** (0.451)	0.959** (0.450)		1.291*** (0.324)	1.265*** (0.323)
Stock FE	X	X	X	X	X	X	X	X	X
YearMonth FE	X	X	X	X	X	X	X	X	X
N	32,040	32,040	32,040	46,325	46,325	46,325	46,655	46,655	46,655
R ²	0.375	0.399	0.399	0.347	0.371	0.372	0.349	0.381	0.381
Within R ²	0.002	0.041	0.042	0.003	0.039	0.040	0.004	0.053	0.054

Table IA.5: Determinants of $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$: Univariate Regressions

This table presents univariate pooled OLS regressions of option-implied expected returns ($\text{OIRet}_{i,t}$), price target-implied expected returns ($\text{PTGRet}_{i,t}$) and long-term growth rate forecasts ($\text{LTG}_{i,t}$) on each other, on the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) and on four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2024. The sample is restricted to stock-months in which all three return predictors and all ten characteristics are jointly observed. The three column blocks use $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ as the left-hand-side variable, respectively. For each regressor, the table reports the univariate slope coefficient, its standard error, and the regression R^2 . Standard errors are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

Char	OIRet			PTGRet			LTG		
	$\hat{\beta}$	(SE)	R^2	$\hat{\beta}$	(SE)	R^2	$\hat{\beta}$	(SE)	R^2
$\text{OIRet}_{i,t}$	—	—	—	1.599***	(0.143)	0.277	0.168**	(0.076)	0.017
$\text{PTGRet}_{i,t}$	0.173***	(0.020)	0.277	—	—	—	0.062***	(0.015)	0.022
$\text{LTG}_{i,t}$	0.101**	(0.047)	0.017	0.346***	(0.086)	0.022	—	—	—
$\beta_{i,t}$	0.047***	(0.008)	0.161	0.065***	(0.014)	0.034	0.030***	(0.004)	0.039
$\text{Size}_{i,t}$	-0.016***	(0.003)	0.076	-0.020***	(0.007)	0.013	0.003**	(0.002)	0.002
$\text{B/M}_{i,t}$	0.055***	(0.018)	0.108	0.095***	(0.021)	0.035	-0.047***	(0.008)	0.048
$\text{MOM}_{i,t}$	-0.036	(0.023)	0.033	-0.111***	(0.031)	0.034	0.043***	(0.012)	0.029
$\text{OP}_{i,t}$	-0.008**	(0.003)	0.005	-0.017***	(0.005)	0.003	-0.002**	(0.001)	0.000
$\text{INV}_{i,t}$	0.025**	(0.012)	0.008	0.113***	(0.023)	0.018	0.062***	(0.007)	0.030
$\text{Rev(1m)}_{i,t}$	-0.112**	(0.044)	0.024	-0.863***	(0.110)	0.153	-0.001	(0.011)	0.000
$\text{RVol(21d)}_{i,t}$	3.845***	(0.405)	0.511	6.942***	(1.006)	0.180	0.904**	(0.388)	0.017
$\text{SalesGr}_{i,t}$	0.005	(0.014)	0.000	0.083***	(0.024)	0.008	0.104***	(0.014)	0.071
$\text{E/P}_{i,t}$	-0.222***	(0.025)	0.102	-0.071	(0.071)	0.001	-0.067**	(0.034)	0.006

Table IA.6: Predictability of Realized Excess Returns Without Characteristic Controls

This table presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on option-implied expected returns ($\text{OIRet}_{i,t}$), price target-implied expected returns ($\text{PTGRet}_{i,t}$), and long-term growth rate forecasts ($\text{LTG}_{i,t}$). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. Predictors and characteristics are measured from August 1999 through December 2024 and 12-month realized returns use price data through December 2025. The sample is restricted to stock-months in which the realized return, all three predictors, and all ten characteristics are jointly observed. Columns (1) to (7) include $\text{OIRet}_{i,t}$, $\text{PTGRet}_{i,t}$, and $\text{LTG}_{i,t}$ in the three univariate, three pairwise, and one joint specification. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	0.013 (0.025)	0.044* (0.024)	0.099*** (0.031)	0.012 (0.025)	0.051* (0.029)	0.077*** (0.028)	0.049* (0.030)
$\text{OIRet}_{i,t}$	1.190** (0.500)			1.155** (0.480)	1.248*** (0.473)		1.188*** (0.454)
$\text{PTGRet}_{i,t}$		0.222* (0.120)		0.022 (0.049)		0.241** (0.117)	0.038 (0.047)
$\text{LTG}_{i,t}$			-0.218 (0.138)		-0.344** (0.150)	-0.302** (0.143)	-0.351** (0.150)
N	121,102	121,102	121,102	121,102	121,102	121,102	121,102
R ²	0.050	0.016	0.003	0.050	0.056	0.021	0.057

<i>Panel B: Stock fixed effects</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{OIRet}_{i,t}$	1.927*** (0.409)			1.851*** (0.414)	1.932*** (0.391)		1.816*** (0.396)
$\text{PTGRet}_{i,t}$		0.317*** (0.103)		0.045 (0.049)		0.339*** (0.101)	0.070 (0.048)
$\text{LTG}_{i,t}$			-0.493*** (0.154)		-0.504*** (0.146)	-0.574*** (0.169)	-0.520*** (0.150)
Stock FE	X	X	X	X	X	X	X
N	121,102	121,102	121,102	121,102	121,102	121,102	121,102
R ²	0.175	0.113	0.096	0.176	0.186	0.127	0.187
Within R ²	0.098	0.030	0.011	0.099	0.110	0.045	0.111

<i>Panel C: Stock and date fixed effects</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\text{OIRet}_{i,t}$	1.390*** (0.373)			1.249*** (0.378)	1.397*** (0.363)		1.246*** (0.369)
$\text{PTGRet}_{i,t}$		0.247*** (0.069)		0.113** (0.045)		0.255*** (0.068)	0.122*** (0.044)
$\text{LTG}_{i,t}$			-0.233*** (0.085)		-0.250*** (0.091)	-0.272*** (0.092)	-0.267*** (0.094)
Stock FE	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X
N	121,102	121,102	121,102	121,102	121,102	121,102	121,102
R ²	0.381	0.361	0.351	0.383	0.383	0.363	0.386
Within R ²	0.049	0.018	0.003	0.052	0.052	0.022	0.056

Table IA.7: Expectations-Based Returns within S&P 500 and Broader BGLS Sample
(Stock-Level and Portfolios)

Panel A presents panel regressions of the realized 12-month excess stock return $\text{Ret}_{i,t+12}$ on Expectations Based Returns, $\text{EBR}_{i,t+12}$, estimated on three samples. Columns (1)–(3) use S&P 500 constituents for which $\text{OIRet}_{i,t}$, $\text{OIRet}_{i,t+12}^\perp$, $\text{EBR}_{i,t+12}$, $\text{Ret}_{i,t+12}$, $\text{D/P}_{i,t}$ and $\text{E/P}_{i,t}$ are jointly observed, the sample of the stock-level return decomposition. Columns (4)–(6) use all S&P 500 stock-months with $\text{EBR}_{i,t+12}$ and $\text{Ret}_{i,t+12}$ observed. Columns (7)–(9) use the full cross section of U.S. stocks, including S&P 500 constituents, with $\text{EBR}_{i,t+12}$ and $\text{Ret}_{i,t+12}$ observed. Within each block the first column is pooled OLS, the second adds stock fixed effects, and the third adds stock and date fixed effects. We use the BGLS-provided winsorized EBR without winsorizing it again. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags. Panels B and C present time-series regressions of long-short realized 12-month excess return spreads on long-short spreads of Expectations Based Returns, EBR_{t+12} . At each monthly formation date from January 1996 through December 2022, we sort stocks into quintile portfolios on each of the six standard characteristics and form long-short spreads following the Fama–French sign convention; the spread labels are Beta, SMB, HML, RMW, CMA and WML. The corresponding 12-month returns and EBR observations extend through December 2023. Columns (1)–(6) sort S&P 500 constituents for which $\text{OIRet}_{i,t}$, $\text{OIRet}_{i,t+12}^\perp$, $\text{EBR}_{i,t+12}$, $\text{Ret}_{i,t+12}$, $\text{E/P}_{i,t}$, $\text{D/P}_{i,t}$ and market capitalization are jointly observed. Columns (7)–(12) sort the full cross section of U.S. stocks, including S&P 500 constituents, imposing the same requirements except those on $\text{OIRet}_{i,t}$, which is undefined outside the index. Sorting characteristics are winsorized at the 1st and 99th percentiles within the cross section being sorted. Portfolios use formation-date market-capitalization weights in Panel B and equal weights in Panel C. Standard errors, reported in parentheses, are computed using Newey–West with 12 lags. T is the number of monthly portfolio observations.

Panel A: Stock-level

	S&P 500, paper sample			S&P 500, all EBR			Full cross section		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{EBR}_{i,t+12}$	0.357*** (0.029)	0.345*** (0.028)	0.296*** (0.024)	0.360*** (0.029)	0.346*** (0.027)	0.298*** (0.024)	0.385*** (0.033)	0.374*** (0.029)	0.344*** (0.027)
Stock FE		✓	✓		✓	✓		✓	✓
Date FE			✓			✓			✓
R^2	0.168	0.211	0.413	0.168	0.211	0.410	0.155	0.223	0.328
Within R^2		0.157	0.143		0.156	0.142		0.146	0.137
N	138,744	138,744	138,744	141,119	141,119	141,119	642,055	642,055	642,055
Stocks	1,024	1,024	1,024	1,039	1,039	1,039	7,928	7,928	7,928

Panel B: Portfolios: value-weighted

	Sorted within the S&P 500						Sorted on the full cross section					
	Beta (1)	SMB (2)	HML (3)	RMW (4)	CMA (5)	WML (6)	Beta (7)	SMB (8)	HML (9)	RMW (10)	CMA (11)	WML (12)
Constant	0.008 (0.031)	0.016 (0.025)	0.029 (0.029)	0.051*** (0.014)	0.003 (0.017)	-0.078** (0.033)	-0.014 (0.033)	0.012 (0.029)	0.042 (0.028)	0.065*** (0.017)	0.011 (0.017)	-0.090*** (0.032)
EBR_{t+12}	0.731*** (0.122)	0.828*** (0.167)	0.971*** (0.177)	0.649*** (0.104)	0.812*** (0.162)	0.697*** (0.128)	0.776*** (0.145)	0.956*** (0.210)	1.123*** (0.191)	0.394*** (0.092)	0.767*** (0.155)	0.608*** (0.127)
R^2	0.299	0.252	0.322	0.395	0.341	0.280	0.293	0.312	0.369	0.195	0.318	0.225
T	324	324	324	324	324	324	324	324	324	324	324	324

Panel C: Portfolios: equal-weighted

	Sorted within the S&P 500						Sorted on the full cross section					
	Beta (1)	SMB (2)	HML (3)	RMW (4)	CMA (5)	WML (6)	Beta (7)	SMB (8)	HML (9)	RMW (10)	CMA (11)	WML (12)
Constant	0.007 (0.031)	0.020 (0.025)	0.028 (0.026)	0.047*** (0.011)	-0.007 (0.013)	-0.081** (0.033)	0.007 (0.037)	0.031 (0.028)	0.079*** (0.030)	0.085*** (0.027)	-0.006 (0.016)	-0.140*** (0.039)
EBR_{t+12}	0.621*** (0.091)	0.692*** (0.123)	0.768*** (0.149)	0.537*** (0.073)	0.516*** (0.145)	0.620*** (0.142)	0.726*** (0.142)	0.983*** (0.204)	1.037*** (0.191)	0.617*** (0.155)	0.547*** (0.078)	0.730*** (0.203)
R^2	0.265	0.203	0.188	0.376	0.196	0.201	0.246	0.295	0.290	0.243	0.321	0.259
T	324	324	324	324	324	324	324	324	324	324	324	324

Table IA.8: Persistence and Return Predictability of Option-Implied Expected Returns

This table presents results of univariate regressions of $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ in Column (1) and multivariate regressions of $\text{Ret}_{i,t+12}$ on $\text{OIRet}_{i,t}$ and (orthogonalized) $\text{OIRet}_{i,t+12}$ in Columns (2) to (6). Orthogonalized $\text{OIRet}_{i,t+12}$ is denoted $\text{OIRet}_{i,t+12}^\perp$ and is the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ under the same fixed effects structure as the reported panel. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2025. $\text{OIRet}_{i,t}$ is measured through December 2024 while $\text{Ret}_{i,t+12}$ uses price data through December 2025. The sample is restricted to stock-months in which all variables used in the regressions are jointly observed. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors (in parentheses) are computed using the Driscoll and Kraay (1998) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>						
	$\text{OIRet}_{i,t+12}$	$\text{Ret}_{i,t+12}$				
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.028*** (0.006)	0.009 (0.026)	0.146*** (0.021)	0.075*** (0.024)	0.079*** (0.020)	0.009 (0.018)
$\text{OIRet}_{i,t}^{(h)}$	0.437*** (0.114)	1.382*** (0.482)		2.398*** (0.312)		1.382*** (0.304)
$\text{OIRet}_{i,t+12}$			-1.321*** (0.217)	-2.323*** (0.314)		
$\text{OIRet}_{i,t+12}^\perp$					-2.323*** (0.407)	-2.323*** (0.314)
N	162,082	162,082	162,082	162,082	162,082	162,082
R ²	0.183	0.059	0.057	0.203	0.144	0.203
<i>Panel B: Stock fixed effects</i>						
	$\text{OIRet}_{i,t+12}$	$\text{Ret}_{i,t+12}$				
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{OIRet}_{i,t}^{(h)}$	0.241*** (0.077)	1.963*** (0.382)		2.504*** (0.293)		1.963*** (0.284)
$\text{OIRet}_{i,t+12}$			-1.673*** (0.162)	-2.242*** (0.285)		
$\text{OIRet}_{i,t+h}^{(h)\perp}$					-2.242*** (0.351)	-2.242*** (0.285)
Stock FE	X	X	X	X	X	X
N	162,082	162,082	162,082	162,082	162,082	162,082
R ²	0.312	0.154	0.134	0.266	0.180	0.266
Within R ²	0.055	0.093	0.071	0.213	0.121	0.213
<i>Panel C: Stock and date fixed effects</i>						
	$\text{OIRet}_{i,t+12}$	$\text{Ret}_{i,t+12}$				
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{OIRet}_{i,t}^{(h)}$	0.276*** (0.079)	1.540*** (0.356)		1.965*** (0.288)		1.540*** (0.290)
$\text{OIRet}_{i,t+12}$			-1.027*** (0.234)	-1.540*** (0.370)		
$\text{OIRet}_{i,t+h}^{(h)\perp}$					-1.540*** (0.406)	-1.540*** (0.370)
Stock FE	X	X	X	X	X	X
Date FE	X	X	X	X	X	X
N	162,082	162,082	162,082	162,082	162,082	162,082
R ²	0.553	0.349	0.331	0.384	0.348	0.384
Within R ²	0.072	0.051	0.024	0.102	0.050	0.102

Table IA.9: Stock-Level Return Decomposition with Orthogonalized Future OIRet
(Expanding Window Estimation)

This table presents stock-level panel regressions of realized 12-month excess returns, $\text{Ret}_{i,t+12}$, on 12-month ahead Expectations Based Returns ($\text{EBR}_{i,t+12}$), option-implied expected returns ($\text{OIRet}_{i,t}$), orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{i,t+12}^\perp$) and $\text{E/P}_{i,t}$. $\text{OIRet}_{i,t+12}^\perp$ is the expanding window residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ under the same fixed effects structure as the reported panel. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2023. $\text{OIRet}_{i,t}$ is measured through December 2022 while $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. The sample is restricted to stock-months in which all variables, including $\text{D/P}_{i,t}$, are jointly observed. Columns (1) to (3) build up specifications without $\text{E/P}_{i,t}$. Columns (4) to (6) repeat the previous specifications with $\text{E/P}_{i,t}$ included. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors (in parentheses) are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

<i>Panel A: Pooled OLS</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.050** (0.025)	-0.018 (0.026)	-0.006 (0.020)	0.046* (0.026)	-0.040 (0.026)	-0.026 (0.021)
$\text{OIRet}_{i,t}$		1.346*** (0.441)	1.004*** (0.337)		1.468*** (0.455)	1.110*** (0.352)
$\text{OIRet}_{i,t+12}^\perp$			-2.030*** (0.302)			-2.013*** (0.292)
$\text{EBR}_{i,t+12}$	0.360*** (0.030)	0.350*** (0.034)	0.321*** (0.027)	0.362*** (0.031)	0.358*** (0.034)	0.327*** (0.027)
$\text{E/P}_{i,t}$				0.089 (0.097)	0.360*** (0.080)	0.306*** (0.073)
N	135,963	135,963	135,963	135,963	135,963	135,963
R ²	0.170	0.222	0.318	0.170	0.229	0.323
<i>Panel B: Stock fixed effects</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{OIRet}_{i,t}$		1.944*** (0.357)	1.677*** (0.305)		2.045*** (0.370)	1.780*** (0.316)
$\text{OIRet}_{i,t+12}^\perp$			-1.837*** (0.237)			-1.840*** (0.232)
$\text{EBR}_{i,t+12}$	0.348*** (0.029)	0.343*** (0.031)	0.313*** (0.026)	0.349*** (0.029)	0.350*** (0.032)	0.320*** (0.026)
$\text{E/P}_{i,t}$				0.058 (0.088)	0.336*** (0.078)	0.343*** (0.069)
Stock FE	X	X	X	X	X	X
N	135,963	135,963	135,963	135,963	135,963	135,963
R ²	0.211	0.291	0.353	0.211	0.296	0.358
Within R ²	0.159	0.244	0.310	0.159	0.249	0.316
<i>Panel C: Stock and date fixed effects</i>						
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{OIRet}_{i,t}$		1.525*** (0.346)	1.373*** (0.326)		1.638*** (0.373)	1.490*** (0.350)
$\text{OIRet}_{i,t+12}^\perp$			-1.155*** (0.306)			-1.163*** (0.304)
$\text{EBR}_{i,t+12}$	0.300*** (0.025)	0.297*** (0.026)	0.285*** (0.025)	0.300*** (0.025)	0.301*** (0.026)	0.290*** (0.026)
$\text{E/P}_{i,t}$				0.013 (0.064)	0.246*** (0.061)	0.256*** (0.057)
Stock FE	X	X	X	X	X	X
Date FE	X	X	X	X	X	X
N	135,963	135,963	135,963	135,963	135,963	135,963
R ²	0.414	0.446	0.462	0.414	0.449	0.465
Within R ²	0.146	0.193	0.216	0.146	0.197	0.220

Table IA.10: Analyst Expectations, $EBR_{i,t+12}$, and $OIRet_{i,t}$

This table presents stock-level univariate panel regressions linking option-implied expected returns ($OIRet_{i,t}$), price target-implied expected returns ($PTGRet_{i,t}$) and long-term growth rate forecasts ($LTG_{i,t}$) to Expectations Based Returns ($EBR_{i,t+12}$) and orthogonalized 12 months ahead option-implied expected returns ($OIRet_{i,t+12}^\perp$). $OIRet_{i,t+12}^\perp$ is the full-sample residual from projecting $OIRet_{i,t+12}$ on $OIRet_{i,t}$ under the same fixed effects structure as the reported panel. $PTGRet_{i,t}^\perp$ is the full-sample residual from projecting $PTGRet_{i,t}$ on $OIRet_{i,t}$ under the same fixed effects structure as the reported panel. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2023. Predictors are measured from August 1999 through December 2022 and $EBR_{i,t+12}$ and $OIRet_{i,t+12}^\perp$ use data through December 2023. The sample is restricted to stock-months that satisfy the stock-level decomposition requirements in Table 7. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

Panel A: Pooled OLS								
	$EBR_{i,t+12}$				$OIRet_{i,t+12}^\perp$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.075*** (0.017)	0.131*** (0.024)	0.088*** (0.022)	0.141*** (0.032)	0.001 (0.006)	-0.001 (0.005)	-0.001 (0.005)	-0.009* (0.005)
$OIRet_{i,t}$	0.215 (0.291)				-0.027 (0.110)			
$PTGRet_{i,t}$		-0.335*** (0.046)				-0.002 (0.022)		
$PTGRet_{i,t}^\perp$			-0.496*** (0.064)				0.004 (0.012)	
$LTG_{i,t}$				-0.457*** (0.154)				0.073*** (0.022)
N	115,142	115,142	115,142	115,142	115,142	115,142	115,142	115,142
R ²	0.001	0.025	0.041	0.009	0.001	0.000	0.000	0.010
Panel B: Stock fixed effects								
	$EBR_{i,t+12}$				$OIRet_{i,t+12}^\perp$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$OIRet_{i,t}$	0.082 (0.248)				-0.009 (0.080)			
$PTGRet_{i,t}$		-0.392*** (0.057)				0.003 (0.016)		
$PTGRet_{i,t}^\perp$			-0.521*** (0.069)				0.006 (0.011)	
$LTG_{i,t}$				-0.961*** (0.214)				0.049** (0.020)
Stock FE	X	X	X	X	X	X	X	X
N	115,142	115,142	115,142	115,142	115,142	115,142	115,142	115,142
R ²	0.062	0.092	0.103	0.088	0.011	0.011	0.012	0.015
Within R ²	0.000	0.032	0.044	0.028	0.000	0.000	0.000	0.004
Panel C: Stock and date fixed effects								
	$EBR_{i,t+12}$				$OIRet_{i,t+12}^\perp$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$OIRet_{i,t}$	0.040 (0.218)				-0.006 (0.082)			
$PTGRet_{i,t}$		-0.393*** (0.055)				0.002 (0.013)		
$PTGRet_{i,t}^\perp$			-0.448*** (0.066)				0.003 (0.010)	
$LTG_{i,t}$				-0.771*** (0.149)				0.030* (0.017)
Stock FE	X	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X	X
N	115,142	115,142	115,142	115,142	115,142	115,142	115,142	115,142
R ²	0.162	0.183	0.186	0.177	0.017	0.017	0.017	0.019
Within R ²	0.000	0.025	0.029	0.019	0.000	0.000	0.000	0.002

Table IA.11: Characteristic-Sorted Return Spreads with Valuation Ratios

This table presents time-series regressions of value-weighted long-short realized 12-month excess return spreads, Ret_{t+12} , on long-short spreads of the option-implied expected return (OIRet_t), long-short spreads of orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{t+12}^\perp$), long-short Expectations Based Return spreads (EBR_{t+12}) and either E/P_t or D/P_t spreads. We compute $\text{OIRet}_{i,t+12}^\perp$ as the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ and aggregate these residuals into portfolios to obtain $\text{OIRet}_{t+12}^\perp$. At each monthly I/B/E/S consensus date from January 1996 through December 2022, we sort S&P 500 stocks into quintiles based on Beta, Size, B/M, Profitability, Investment, and Momentum. $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. Stocks must satisfy the stock-level decomposition sample requirements from Table 7 and the relevant sorting characteristic needs to be available. We do not impose joint availability across sorting characteristics. The corresponding long-short spread labels are Beta, SMB, HML, RMW, CMA, and WML. For each characteristic sort, column (1) regresses the long-short realized return on long-short spreads of OIRet_t , EBR_{t+12} , $\text{OIRet}_{t+12}^\perp$, and $\text{E/P}_{i,t}$; column (2) replaces $\text{E/P}_{i,t}$ with $\text{D/P}_{i,t}$. Panel A reports Beta, SMB, and HML while Panel B reports RMW, CMA, and WML. Portfolios use formation-date market-capitalization weights, and long-short spreads follow the Fama–French sign convention. Standard errors, reported in parentheses, are computed using the Newey and West (1987) procedure with 12 lags. N is the number of monthly portfolio observations.

Panel A: Beta, SMB, and HML						
	Beta		SMB		HML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.000 (0.038)	-0.047 (0.084)	-0.024 (0.031)	-0.002 (0.035)	0.027 (0.026)	0.009 (0.043)
OIRet_t	2.438*** (0.581)	1.822*** (0.577)	3.015*** (0.388)	2.606*** (0.414)	1.513*** (0.513)	1.598*** (0.491)
$\text{OIRet}_{t+12}^\perp$	-3.768*** (1.000)	-4.010*** (1.026)	-2.544** (1.058)	-2.493** (0.972)	-0.895 (0.656)	-0.857 (0.569)
EBR_{t+12}	0.649*** (0.129)	0.591*** (0.131)	0.479*** (0.127)	0.393*** (0.146)	0.961*** (0.161)	0.957*** (0.173)
E/P_t	1.874*** (0.488)		0.695 (0.600)		-0.039 (0.578)	
D/P_t		-3.877 (5.452)		6.980* (3.810)		1.183 (3.785)
N	324	324	324	324	324	324
R ²	0.574	0.524	0.648	0.674	0.421	0.422
Panel B: RMW, CMA, and WML						
	RMW		CMA		WML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.063*** (0.020)	0.060*** (0.015)	-0.031* (0.016)	-0.049* (0.026)	-0.020 (0.025)	-0.032 (0.030)
OIRet_t	1.537*** (0.576)	1.076*** (0.391)	1.008 (0.640)	1.240** (0.618)	1.802*** (0.610)	1.409** (0.575)
$\text{OIRet}_{t+12}^\perp$	-0.945 (0.574)	-1.041* (0.554)	-3.651*** (1.144)	-3.746*** (1.135)	-1.764* (0.991)	-1.686* (0.992)
EBR_{t+12}	0.623*** (0.114)	0.577*** (0.098)	0.678*** (0.127)	0.675*** (0.127)	0.497*** (0.108)	0.479*** (0.121)
E/P_t	0.147 (0.408)		0.010 (0.360)		1.801*** (0.614)	
D/P_t		-2.895 (1.946)		1.811 (2.388)		2.132 (1.922)
N	324	324	324	324	324	324
R ²	0.493	0.506	0.467	0.471	0.459	0.433

Table IA.12: Characteristic-Sorted Return Spreads: Equal-Weighted

This table presents time-series regressions of equal-weighted long-short realized 12-month excess return spreads, Ret_{t+12} , on long-short spreads of the option-implied expected return (OIRet_t), long-short spreads of orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{t+12}^\perp$) and long-short Expectations Based Return spreads (EBR_{t+12}). We compute $\text{OIRet}_{t+12}^\perp$ as the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ and aggregate these residuals into portfolios to obtain $\text{OIRet}_{t+12}^\perp$. At each monthly I/B/E/S consensus date from January 1996 through December 2022, we sort S&P 500 stocks into quintiles based on Beta, Size, B/M, Profitability, Investment, and Momentum. $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. Stocks must satisfy the stock-level decomposition sample requirements from Table 7 and the relevant sorting characteristic needs to be available. We do not impose joint availability requirements across characteristics. The corresponding long-short spread labels are Beta, SMB, HML, RMW, CMA, and WML. For each characteristic sort, column (1) regresses the long-short realized return on EBR_{t+12} and column (2) regresses it on OIRet_t , EBR_{t+12} , and $\text{OIRet}_{t+12}^\perp$. Panel A reports Beta, SMB, and HML while Panel B reports RMW, CMA, and WML. Portfolios use formation-date market-capitalization weights, and long-short spreads follow the Fama–French sign convention. Standard errors, reported in parentheses, are computed using the [Newey and West \(1987\)](#) procedure with 12 lags. N is the number of monthly portfolio observations.

Panel A: Beta, SMB, and HML						
	Beta		SMB		HML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.009 (0.031)	-0.032 (0.040)	0.025 (0.025)	-0.013 (0.037)	0.033 (0.027)	0.023 (0.028)
OIRet_t		1.702*** (0.638)		2.669*** (0.464)		1.395** (0.690)
$\text{OIRet}_{t+12}^\perp$		-2.309** (1.064)		-2.663** (1.209)		-1.783* (1.016)
EBR_{t+12}	0.618*** (0.092)	0.518*** (0.133)	0.710*** (0.122)	0.273*** (0.095)	0.795*** (0.157)	0.654*** (0.138)
N	324	324	324	324	324	324
R ²	0.267	0.498	0.204	0.682	0.192	0.419

Panel B: RMW, CMA, and WML						
	RMW		CMA		WML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.045*** (0.011)	0.059*** (0.012)	-0.006 (0.013)	-0.027** (0.011)	-0.086** (0.033)	-0.040 (0.028)
OIRet_t		1.360*** (0.344)		-0.189 (0.739)		1.472*** (0.476)
$\text{OIRet}_{t+12}^\perp$		-0.795* (0.455)		-2.793*** (0.941)		-2.875** (1.177)
EBR_{t+12}	0.548*** (0.075)	0.451*** (0.059)	0.532*** (0.146)	0.452*** (0.073)	0.629*** (0.153)	0.350*** (0.086)
N	324	324	324	324	324	324
R ²	0.383	0.544	0.204	0.407	0.201	0.522

Table IA.13: Characteristic-Sorted Return Spreads with Valuation Ratios: Equal-Weighted

This table presents time-series regressions of equal-weighted long-short realized 12-month excess return spreads, Ret_{t+12} , on long-short spreads of the option-implied expected return ($OIRet_t$), long-short spreads of orthogonalized option-implied expected returns 12 months ahead ($OIRet_{t+12}^\perp$), long-short Expectations Based Return spreads (EBR_{t+12}) and either E/P_t or D/P_t spreads. We compute $OIRet_{t+12}^\perp$ as the full-sample residual from projecting $OIRet_{t+12}$ on $OIRet_{i,t}$ and aggregate these residuals into portfolios to obtain $OIRet_{t+12}^\perp$. At each monthly I/B/E/S consensus date from January 1996 through December 2022, we sort S&P 500 stocks into quintiles based on Beta, Size, B/M, Profitability, Investment, and Momentum. $Ret_{i,t+12}$, $EBR_{i,t+12}$, and $OIRet_{i,t+12}^\perp$ use data through December 2023. Stocks must satisfy the stock-level decomposition sample requirements from Table 7 and the relevant sorting characteristic needs to be available. We do not impose joint availability requirements across characteristics. The corresponding long-short spread labels are Beta, SMB, HML, RMW, CMA, and WML. For each characteristic sort, column (1) regresses the long-short realized return on long-short spreads of $OIRet_t$, EBR_{t+12} , $OIRet_{t+12}^\perp$, and $E/P_{i,t}$; column (2) replaces $E/P_{i,t}$ with $D/P_{i,t}$. Panel A reports Beta, SMB, and HML while Panel B reports RMW, CMA, and WML. Portfolios use equal weights, and long-short spreads follow the Fama–French sign convention. Standard errors, reported in parentheses, are computed using the [Newey and West \(1987\)](#) procedure with 12 lags. N is the number of monthly portfolio observations.

Panel A: Beta, SMB, and HML						
	Beta		SMB		HML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.046 (0.040)	0.035 (0.080)	-0.017 (0.031)	0.019 (0.028)	0.025 (0.027)	-0.074 (0.057)
$OIRet_t$	2.267*** (0.670)	2.015*** (0.673)	2.996*** (0.358)	2.566*** (0.396)	1.332* (0.678)	1.619*** (0.501)
$OIRet_{t+12}^\perp$	-2.056** (1.035)	-2.131** (0.990)	-2.448** (1.091)	-2.425*** (0.931)	-1.782* (1.019)	-1.487* (0.848)
EBR_{t+12}	0.746*** (0.164)	0.476*** (0.153)	0.358*** (0.091)	0.267*** (0.095)	0.655*** (0.139)	0.609*** (0.161)
E/P_t	1.877*** (0.614)		0.778 (0.509)		-0.123 (0.295)	
D/P_t		5.898 (5.869)		12.595*** (4.334)		7.007 (5.067)
N	324	324	324	324	324	324
R ²	0.567	0.512	0.696	0.748	0.419	0.443

Panel B: RMW, CMA, and WML						
	RMW		CMA		WML	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.059*** (0.014)	0.055*** (0.011)	-0.035** (0.015)	-0.056** (0.023)	-0.034 (0.027)	0.002 (0.027)
$OIRet_t$	1.381** (0.575)	1.214*** (0.338)	-0.585 (0.846)	-0.125 (0.728)	1.836*** (0.443)	1.863*** (0.388)
$OIRet_{t+12}^\perp$	-0.796* (0.456)	-0.877* (0.463)	-2.672*** (0.910)	-2.824*** (0.893)	-2.737** (1.161)	-2.563** (1.031)
EBR_{t+12}	0.452*** (0.056)	0.438*** (0.061)	0.420*** (0.074)	0.452*** (0.079)	0.436*** (0.099)	0.252** (0.112)
E/P_t	0.018 (0.321)		-0.259 (0.224)		1.148*** (0.406)	
D/P_t		-2.554 (2.443)		3.440 (2.949)		6.501** (3.105)
N	324	324	324	324	324	324
R ²	0.544	0.553	0.414	0.416	0.541	0.556

Table IA.14: JKP Characteristics: Definitions

This table lists the 153 stock characteristics studied in [Jensen et al. \(2023\)](#) (JKP characteristics) we use in the appendix analysis. Variables are grouped by JKP theme and ordered alphabetically within each theme. The table reports the characteristic name and a brief definition.

Char	Definition	Theme	Char	Definition	Theme
cowc_gr1a	Change in current operating working capital	Accruals	niq_su	Standardized earnings surprise	Profit Growth
oaccruals_at	Operating accruals	Accruals	ocf_at_chg1	Change in operating cash flow to assets	Profit Growth
oaccruals_ni	Percent operating accruals	Accruals	ret_12.7	Price momentum t-12 to t-7	Profit Growth
seas_16_20na	Years 16-20 lagged returns, nonannual	Accruals	sale_emp_gr1	Labor force efficiency	Profit Growth
taccruals_at	Total accruals	Accruals	saleq_su	Standardized revenue surprise	Profit Growth
taccruals_ni	Percent total accruals	Accruals	seas_1_1an	Year 1-lagged return, annual	Profit Growth
capex_abn	Abnormal corporate investment	Debt Issuance	tax_gr1a	Tax expense surprise	Profit Growth
debt_gr1	Growth in book debt (3 years)	Debt Issuance	dolvol_var_126d	CoV for dollar trading volume	Profitability
fml_gr1a	Change in financial liabilities	Debt Issuance	ebit_bev	Return on net operating assets	Profitability
ncol_gr1a	Change in noncurrent operating liabilities	Debt Issuance	ebit_sale	Profit margin	Profitability
nfna_gr1a	Change in net financial assets	Debt Issuance	f_score	Piotroski F-score	Profitability
ni_ar1	Earnings persistence	Debt Issuance	ni_be	Return on equity	Profitability
noa_at	Net operating assets	Debt Issuance	niq_be	Quarterly return on equity	Profitability
aliq_at	Liquidity of book assets	Investment	o_score	Ohlson O-score	Profitability
at_gr1	Asset Growth	Investment	ocf_at	Operating cash flow to assets	Profitability
be_gr1a	Change in common equity	Investment	ope_be	Operating profits-to-book equity	Profitability
capx_gr1	CAPEX growth (1 year)	Investment	ope_bel1	Operating profits-to-lagged book equity	Profitability
capx_gr2	CAPEX growth (2 years)	Investment	turnover_var_126d	CoV for share turnover	Profitability
capx_gr3	CAPEX growth (3 years)	Investment	at_turnover	Capital turnover	Quality
coa_gr1a	Change in current operating assets	Investment	cop_at	Cash-based operating profits-to-book assets	Quality
col_gr1a	Change in current operating liabilities	Investment	cop_atl1	Cash-based operating profits-to-lagged book assets	Quality
emp_gr1	Hiring rate	Investment	dgp_dsale	Change gross margin minus change sales	Quality
inv_gr1	Inventory growth	Investment	gp_at	Gross profits-to-assets	Quality
inv_gr1a	Inventory change	Investment	gp_atl1	Gross profits-to-lagged assets	Quality
lnoa_gr1a	Change in long-term net operating assets	Investment	mispicing_perf	Mispricing factor: Performance	Quality
mispicing_mgmt	Mispricing factor: Management	Investment	ni_inc8q	Consecutive quarters with earnings increases	Quality
ncoa_gr1a	Change in noncurrent operating assets	Investment	niq_at	Quarterly return on assets	Quality
nncoa_gr1a	Change in net noncurrent operating assets	Investment	op_at	Operating profits-to-book assets	Quality
noa_gr1a	Change in net operating assets	Investment	op_atl1	Operating profits-to-lagged book assets	Quality
ppeinv_gr1a	Change PPE and Inventory	Investment	opex_at	Operating leverage	Quality
ret_60_12	Long-term reversal	Investment	qmj	Quality minus Junk: Composite	Quality
sale_gr1	Sales Growth (1 year)	Investment	qmj-growth	Quality minus Junk: Growth	Quality
sale_gr3	Sales Growth (3 years)	Investment	qmj_prof	Quality minus Junk: Profitability	Quality
saleq_gr1	Sales growth (1 quarter)	Investment	qmj_safety	Quality minus Junk: Safety	Quality
seas_2.5na	Years 2-5 lagged returns, nonannual	Investment	sale_bev	Assets turnover	Quality
age	Firm age	Low Leverage	corr_1260d	Market correlation	Seasonality
aliq_mat	Liquidity of market assets	Low Leverage	coskew_21d	Coskewness	Seasonality
at_be	Book leverage	Low Leverage	dbnetis_at	Net debt issuance	Seasonality
bidaskhl_21d	The high-low bid-ask spread	Low Leverage	kz_index	Kaplan-Zingales index	Seasonality
cash_at	Cash-to-assets	Low Leverage	lti_gr1a	Change in long-term investments	Seasonality
netdebt_me	Net debt-to-price	Low Leverage	pi_nix	Taxable income-to-book income	Seasonality
ni_ivol	Earnings volatility	Low Leverage	seas_11_15an	Years 11-15 lagged returns, annual	Seasonality
rd5_at	R&D capital-to-book assets	Low Leverage	seas_11_15na	Years 11-15 lagged returns, nonannual	Seasonality
rd_sale	R&D-to-sales	Low Leverage	seas_16_20an	Years 16-20 lagged returns, annual	Seasonality
tangibility	Asset tangibility	Low Leverage	seas_2.5an	Years 2-5 lagged returns, annual	Seasonality
z_score	Altman Z-score	Low Leverage	seas_6_10an	Years 6-10 lagged returns, annual	Seasonality
beta_60m	Market Beta	Low Risk	sti_gr1a	Change in short-term investments	Seasonality
beta_dimson_21d	Dimson beta	Low Risk	ami_126d	Amihud measure	Size
betabab_1260d	Frazzini-Pedersen market beta	Low Risk	dolvol_126d	Dollar trading volume	Size
betadown_252d	Downside beta	Low Risk	market_equity	Market equity	Size
earnings_variability	Earnings variability	Low Risk	prc	Price per share	Size
ivol_capm_21d	Idio. volatility from CAPM (21d)	Low Risk	rd_me	R&D-to-market	Size
ivol_capm_252d	Idio. volatility from CAPM (252d)	Low Risk	iskew_capm_21d	Idio. skewness from CAPM	Short-Term Reversal
ivol_ff3_21d	Idio. volatility from FF3	Low Risk	iskew_ff3_21d	Idio. skewness from FF3	Short-Term Reversal
ivol_hxz4_21d	Idio. volatility from q-factor	Low Risk	iskew_hxz4_21d	Idio. skewness from q-factor	Short-Term Reversal
ocfq_saleq_std	Cash flow volatility	Low Risk	ret_1_0	Short-term reversal	Short-Term Reversal
rmax1_21d	Maximum daily return	Low Risk	rmax5_rvol_21d	Highest 5 days of return scaled by volatility	Short-Term Reversal
rmax5_21d	Highest 5 days of return	Low Risk	rskew_21d	Total skewness	Short-Term Reversal
rvol_21d	Return volatility	Low Risk	at_me	Assets-to-market	Value
seas_6_10na	Years 6-10 lagged returns, nonannual	Low Risk	be_me	Book-to-market equity	Value
turnover_126d	Share turnover	Low Risk	bev_mev	Book-to-market enterprise value	Value
zero_trades_126d	# zero-trade days, 6 months	Low Risk	chcsho_12m	Net stock issues	Value
zero_trades_21d	# zero-trade days, 1 month	Low Risk	debt_me	Debt-to-market	Value
zero_trades_252d	# zero-trade days, 12 months	Low Risk	div12m_me	Dividend yield	Value
prc_highprc_252d	Current price to high price over last year	Momentum	ebitda_mev	EBITDA-to-market enterprise value	Value
resff3_12_1	Residual momentum t-12 to t-1	Momentum	eq_dur	Equity duration	Value
resff3_6_1	Residual momentum t-6 to t-1	Momentum	eqnetis_at	Net equity issuance	Value
ret_12.1	Price momentum t-12 to t-1	Momentum	eqnpo_12m	Equity net payout	Value
ret_3.1	Price momentum t-3 to t-1	Momentum	eqnpo_me	Net payout yield	Value
ret_6.1	Price momentum t-6 to t-1	Momentum	eqpo_me	Payout yield	Value
ret_9.1	Price momentum t-9 to t-1	Momentum	fcf_me	Free cash flow-to-price	Value
seas_1_1na	Year 1-lagged return, nonannual	Momentum	ival_me	Intrinsic value-to-market	Value
dsale_dinv	Change sales minus change inventory	Profit Growth	netis_at	Net total issuance	Value
dsale_drec	Change sales minus change receivables	Profit Growth	ni_me	Earnings-to-price	Value
dsale_dsga	Change sales minus change SG&A	Profit Growth	ocf_me	Operating cash flow-to-market	Value
niq_at_chg1	Change in quarterly ROA	Profit Growth	sale_me	Sales-to-market	Value
niq_be_chg1	Change in quarterly ROE	Profit Growth			

Table IA.15: JKP Characteristics: Data Availability by Theme

This table presents data availability for the 153 stock characteristics studied in [Jensen et al. \(2023\)](#) (JKP characteristics). The sample contains 140,335 stock-months dated from August 1999 through December 2024 with jointly observed $OIRet_{i,t}$, $PTGRet_{i,t}$, $LTG_{i,t}$, and $Ret_{i,t+12}$, which use price data through December 2025. For each characteristic, the table reports the number of non-missing stock-month observations in that sample. Variables are grouped by JKP theme and ordered alphabetically within each theme.

Char	Theme	N	Char	Theme	N
cowc_gr1a	Accruals	127,842	niq_su	Profit Growth	135,547
oaccruals_at	Accruals	135,088	ocf_at_chg1	Profit Growth	136,563
oaccruals_ni	Accruals	135,088	ret_12_7	Profit Growth	136,647
seas_16_20na	Accruals	94,474	sale_emp_gr1	Profit Growth	135,082
taccruals_at	Accruals	135,004	saleq_su	Profit Growth	135,414
taccruals_ni	Accruals	135,004	seas_1_1an	Profit Growth	136,718
capex_abn	Debt Issuance	126,800	tax_gr1a	Profit Growth	137,054
debt_gr3	Debt Issuance	128,925	dolvol_var_126d	Profitability	137,297
fnl_gr1a	Debt Issuance	137,234	ebit_bev	Profitability	135,060
ncol_gr1a	Debt Issuance	128,227	ebit_sale	Profitability	137,384
nfna_gr1a	Debt Issuance	137,234	f_score	Profitability	126,674
ni_ar1	Debt Issuance	132,323	ni_be	Profitability	134,543
noa_at	Debt Issuance	127,828	niq_be	Profitability	134,038
aliq_at	Investment	129,504	o_score	Profitability	126,948
at_gr1	Investment	137,234	ocf_at	Profitability	136,990
be_gr1a	Investment	133,812	ope_be	Profitability	124,036
capx_gr1	Investment	129,400	ope_bell	Profitability	124,146
capx_gr2	Investment	128,250	turnover_var_126d	Profitability	137,297
capx_gr3	Investment	126,934	at_turnover	Quality	137,377
coa_gr1a	Investment	129,407	cop_at	Quality	135,088
col_gr1a	Investment	128,656	cop_atl1	Quality	135,004
emp_gr1	Investment	128,120	dgp_dsale	Quality	135,943
inv_gr1	Investment	113,016	gp_at	Quality	137,389
inv_gr1a	Investment	134,599	gp_atl1	Quality	137,226
lnoa_gr1a	Investment	127,477	mispricing_perf	Quality	137,419
mispricing_mgmt	Investment	137,286	ni_inc8q	Quality	133,904
ncoa_gr1a	Investment	129,407	niq_at	Quality	137,182
nncoa_gr1a	Investment	127,413	op_at	Quality	137,397
noa_gr1a	Investment	127,413	op_atl1	Quality	137,234
ppeinv_gr1a	Investment	125,173	opex_at	Quality	137,389
ret_60_12	Investment	131,186	qmj	Quality	132,871
sale_gr1	Investment	137,053	qmj_growth	Quality	132,871
sale_gr3	Investment	135,427	qmj_prof	Quality	137,395
saleq_gr1	Investment	137,023	qmj_safety	Quality	137,419
seas_2_5na	Investment	131,277	sale_bev	Quality	135,088
age	Low Leverage	137,424	corr_1260d	Seasonality	134,440
aliq_mat	Low Leverage	126,427	coskew_21d	Seasonality	137,409
at_be	Low Leverage	134,555	dbnetis_at	Seasonality	137,369
bidaskhl_21d	Low Leverage	137,411	kz_index	Seasonality	129,527
cash_at	Low Leverage	137,400	lti_gr1a	Seasonality	120,113
netdebt_me	Low Leverage	137,400	pi_nix	Seasonality	127,807
ni_ivol	Low Leverage	132,323	seas_11_15an	Seasonality	107,904
rd5_at	Low Leverage	70,994	seas_11_15na	Seasonality	107,902
rd_sale	Low Leverage	74,769	seas_16_20an	Seasonality	94,474
tangibility	Low Leverage	125,586	seas_2_5an	Seasonality	131,277
z_score	Low Leverage	127,682	seas_6_10an	Seasonality	120,736
beta_60m	Low Risk	134,500	sti_gr1a	Seasonality	133,160
beta_dimson_21d	Low Risk	137,409	ami_126d	Size	137,296
betabab_1260d	Low Risk	134,440	dolvol_126d	Size	137,297
betadown_252d	Low Risk	137,079	market_equity	Size	137,424
earnings_variability	Low Risk	131,796	prc	Size	137,424
ivol_capm_21d	Low Risk	137,409	rd_me	Size	74,769
ivol_capm_252d	Low Risk	137,127	iskew_capm_21d	Short-Term Reversal	137,409
ivol_ff3_21d	Low Risk	137,409	iskew_ff3_21d	Short-Term Reversal	137,409
ivol_hxz4_21d	Low Risk	137,409	iskew_hxz4_21d	Short-Term Reversal	137,409
ocfq_saleq_std	Low Risk	135,266	ret_1_0	Short-Term Reversal	137,374
rmax1_21d	Low Risk	137,409	rmax5_rvol_21d	Short-Term Reversal	137,127
rmax5_21d	Low Risk	137,409	rskew_21d	Short-Term Reversal	137,409
rvol_21d	Low Risk	137,409	at_me	Value	137,400
seas_6_10na	Low Risk	120,720	be_me	Value	134,555
turnover_126d	Low Risk	137,297	bev_mev	Value	135,014
zero_trades_126d	Low Risk	137,297	chcsho_12m	Value	136,647
zero_trades_21d	Low Risk	137,410	debt_me	Value	137,400
zero_trades_252d	Low Risk	137,127	div12m_me	Value	136,721
prc_highprc_252d	Momentum	137,127	ebitda_mev	Value	136,483
resff3_12_1	Momentum	135,698	eq_dur	Value	133,343
resff3_6_1	Momentum	135,698	eqnetis_at	Value	134,966
ret_12_1	Momentum	136,647	eqnpo_12m	Value	136,647
ret_3_1	Momentum	137,265	eqnpo_me	Value	134,792
ret_6_1	Momentum	137,080	eqpo_me	Value	130,069
ret_9_1	Momentum	136,871	fcf_me	Value	134,484
seas_1_1na	Momentum	136,718	ival_me	Value	125,246
dsale_dinv	Profit Growth	112,621	netis_at	Value	134,966
dsale_drec	Profit Growth	134,654	ni_me	Value	137,397
dsale_dsga	Profit Growth	108,960	ocf_me	Value	136,990
niq_at_chg1	Profit Growth	136,415	sale_me	Value	137,384
niq_be_chg1	Profit Growth	132,741			

Table IA.16: JKP Characteristics: Data Availability by Sample Size

This table presents the same availability information as Table IA.15, ordered by the number of non-missing stock-month observations. The sample contains 140,335 stock-months dated from August 1999 through December 2024 with jointly observed $OIRet_{i,t}$, $PTGRet_{i,t}$, $LTG_{i,t}$, and $Ret_{i,t+12}$, which use price data through December 2025. Ties in availability are broken alphabetically.

Char	Theme	N	Char	Theme	N
age	Low Leverage	137,424	oaccruals_at	Accruals	135,088
market_equity	Size	137,424	oaccruals_ni	Accruals	135,088
prc	Size	137,424	sale_bev	Quality	135,088
mispricing_perf	Quality	137,419	sale_emp_gr1	Profit Growth	135,082
qmj_safety	Quality	137,419	ebit_bev	Profitability	135,060
bidaskhl_21d	Low Leverage	137,411	bev_mev	Value	135,014
zero_trades_21d	Low Risk	137,410	cop_atl1	Quality	135,004
beta_dimson_21d	Low Risk	137,409	taccruals_at	Accruals	135,004
coskew_21d	Seasonality	137,409	taccruals_ni	Accruals	135,004
iskew_capm_21d	Short-Term Reversal	137,409	eqnetis_at	Value	134,966
iskew_ff3_21d	Short-Term Reversal	137,409	netis_at	Value	134,966
iskew_hxz4_21d	Short-Term Reversal	137,409	eqnpo_me	Value	134,792
ivol_capm_21d	Low Risk	137,409	dsale_drec	Profit Growth	134,654
ivol_ff3_21d	Low Risk	137,409	inv_gr1a	Investment	134,599
ivol_hxz4_21d	Low Risk	137,409	at_be	Low Leverage	134,555
rmax1_21d	Low Risk	137,409	be_me	Value	134,555
rmax5_21d	Low Risk	137,409	ni_be	Profitability	134,543
rskew_21d	Short-Term Reversal	137,409	beta_60m	Low Risk	134,500
rvol_21d	Low Risk	137,409	fcf_me	Value	134,484
at_me	Value	137,400	betabab_1260d	Low Risk	134,440
cash_at	Low Leverage	137,400	corr_1260d	Seasonality	134,440
debt_me	Value	137,400	niq_be	Profitability	134,038
netdebt_me	Low Leverage	137,400	ni_inc8q	Quality	133,904
ni_me	Value	137,397	be_gr1a	Investment	133,812
op_at	Quality	137,397	eq_dur	Value	133,343
qmj_prof	Quality	137,395	sti_gr1a	Seasonality	133,160
gp_at	Quality	137,389	qmj	Quality	132,871
opex_at	Quality	137,389	qmj_growth	Quality	132,871
ebit_sale	Profitability	137,384	niq_be_chg1	Profit Growth	132,741
sale_me	Value	137,384	ni_ar1	Debt Issuance	132,323
at_turnover	Quality	137,377	ni_ivol	Low Leverage	132,323
ret_1_0	Short-Term Reversal	137,374	earnings_variability	Low Risk	131,796
dbnetis_at	Seasonality	137,369	seas_2_5an	Seasonality	131,277
dolvol_126d	Size	137,297	seas_2_5na	Investment	131,277
dolvol_var_126d	Profitability	137,297	ret_60_12	Investment	131,186
turnover_126d	Low Risk	137,297	eqpo_me	Value	130,069
turnover_var_126d	Profitability	137,297	kz_index	Seasonality	129,527
zero_trades_126d	Low Risk	137,297	aliq_at	Investment	129,504
ami_126d	Size	137,296	coa_gr1a	Investment	129,407
mispricing_mgmt	Investment	137,286	ncoa_gr1a	Investment	129,407
ret_3_1	Momentum	137,265	capx_gr1	Investment	129,400
at_gr1	Investment	137,234	debt_gr3	Debt Issuance	128,925
fnl_gr1a	Debt Issuance	137,234	col_gr1a	Investment	128,656
nfna_gr1a	Debt Issuance	137,234	capx_gr2	Investment	128,250
op_atl1	Quality	137,234	ncol_gr1a	Debt Issuance	128,227
gp_atl1	Quality	137,226	emp_gr1	Investment	128,120
niq_at	Quality	137,182	cowc_gr1a	Accruals	127,842
ivol_capm_252d	Low Risk	137,127	noa_at	Debt Issuance	127,828
prc_highprc_252d	Momentum	137,127	pi_nix	Seasonality	127,807
rmax5_rvol_21d	Short-Term Reversal	137,127	z_score	Low Leverage	127,682
zero_trades_252d	Low Risk	137,127	lnoa_gr1a	Investment	127,477
ret_6_1	Momentum	137,080	nncoa_gr1a	Investment	127,413
betadown_252d	Low Risk	137,079	noa_gr1a	Investment	127,413
tax_gr1a	Profit Growth	137,054	o_score	Profitability	126,948
sale_gr1	Investment	137,053	capx_gr3	Investment	126,934
saleq_gr1	Investment	137,023	capex_abn	Debt Issuance	126,800
ocf_at	Profitability	136,990	f_score	Profitability	126,674
ocf_me	Value	136,990	aliq_mat	Low Leverage	126,427
ret_9_1	Momentum	136,871	tangibility	Low Leverage	125,586
div12m_me	Value	136,721	ival_me	Value	125,246
seas_1_1an	Profit Growth	136,718	ppeinv_gr1a	Investment	125,173
seas_1_1na	Momentum	136,718	ope_bell	Profitability	124,146
chcsho_12m	Value	136,647	ope_be	Profitability	124,036
eqnpo_12m	Value	136,647	seas_6_10an	Seasonality	120,736
ret_12_1	Momentum	136,647	seas_6_10na	Low Risk	120,720
ret_12_7	Profit Growth	136,647	lti_gr1a	Seasonality	120,113
ocf_at_chg1	Profit Growth	136,563	inv_gr1	Investment	113,016
ebitda_mev	Value	136,483	dsale_dinv	Profit Growth	112,621
niq_at_chg1	Profit Growth	136,415	dsale_dsga	Profit Growth	108,960
dgp_dsale	Quality	135,943	seas_11_15an	Seasonality	107,904
resff3_12_1	Momentum	135,698	seas_11_15na	Seasonality	107,902
resff3_6_1	Momentum	135,698	seas_16_20an	Seasonality	94,474
niq_su	Profit Growth	135,547	seas_16_20na	Accruals	94,474
sale_gr3	Investment	135,427	rd_me	Size	74,769
saleq_su	Profit Growth	135,414	rd_sale	Low Leverage	74,769
ocfq_saleq_std	Low Risk	135,266	rd5_at	Low Leverage	70,994
cop_at	Quality	135,088			

Table IA.17: Determinants of $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$: Univariate JKP Characteristics

This table extends the determinant analysis in Table 4 to the Jensen et al. (2023) characteristics. It presents univariate pooled OLS regressions of return predictors on the JKP characteristics. The data are monthly and use the JKP appendix sample; all characteristics are winsorized within each monthly cross-section at the 1st and 99th percentiles. For each return predictor, the table reports the 15 characteristics with the highest univariate R^2 and the 15 characteristics with the largest absolute t -statistic. Panels A, B, and C use $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$ as the left-hand-side variable, respectively. Standard errors used to form the t -statistics are computed using the Driscoll and Kraay (1998) procedure with 12 lags.

Panel A. $OIRet_{i,t}$.

Top 15 by R^2							Top 15 by $ t $ (DK12)					
Rank	Char	Theme	$\hat{\beta}$	s.e.	R^2	N	Char	Theme	$\hat{\beta}$	s.e.	R^2	N
1	rvol_21d	Low Risk	3.902	0.388	0.5181	137,409	tangibility	Low Leverage	0.035	0.003	0.0103	125,586
2	bidaskhl_21d	Low Leverage	11.249	1.160	0.4576	137,411	rvol_21d	Low Risk	3.902	0.388	0.5181	137,409
3	ivol_capm_252d	Low Risk	5.331	0.634	0.4482	137,127	bidaskhl_21d	Low Leverage	11.249	1.160	0.4576	137,411
4	rmax5_21d	Low Risk	2.766	0.291	0.4437	137,409	rmax5_21d	Low Risk	2.766	0.291	0.4437	137,409
5	ivol_capm_21d	Low Risk	4.592	0.626	0.4277	137,409	ni_me	Value	-0.221	0.025	0.0973	137,397
6	ivol_ff3_21d	Low Risk	4.770	0.670	0.4117	137,409	ivol_capm_252d	Low Risk	5.331	0.634	0.4482	137,127
7	ivol_hxz4_21d	Low Risk	4.756	0.677	0.3981	137,409	rmax1_21d	Low Risk	1.353	0.173	0.3749	137,409
8	rmax1_21d	Low Risk	1.353	0.173	0.3749	137,409	ivol_capm_21d	Low Risk	4.592	0.626	0.4277	137,409
9	prc_highprc_252d	Momentum	-0.267	0.037	0.3587	137,127	prc_highprc_252d	Momentum	-0.267	0.037	0.3587	137,127
10	turnover_126d	Low Risk	4.899	0.753	0.2147	137,297	ivol_ff3_21d	Low Risk	4.770	0.670	0.4117	137,409
11	zero_trades_126d	Low Risk	-28.660	4.921	0.1797	137,297	ivol_hxz4_21d	Low Risk	4.756	0.677	0.3981	137,409
12	zero_trades_252d	Low Risk	-27.812	4.718	0.1748	137,127	sale_gr3	Investment	0.021	0.003	0.0452	135,427
13	betadown_252d	Low Risk	0.063	0.011	0.1695	137,079	turnover_126d	Low Risk	4.899	0.753	0.2147	137,297
14	zero_trades_21d	Low Risk	-27.776	4.788	0.1693	137,410	rd_me	Size	0.514	0.082	0.0936	74,769
15	beta_60m	Low Risk	0.046	0.008	0.1523	134,500	ni_ivol	Low Leverage	0.446	0.072	0.0578	132,323

Panel B. $PTGRet_{i,t}$.

Top 15 by R^2							Top 15 by $ t $ (DK12)						
Rank	Char	Theme	$\hat{\beta}$	s.e.	R^2	N	Char	Theme	$\hat{\beta}$	s.e.	R^2	N	
1	prc_highprc_252d	Momentum	-0.660	0.082	0.2480	137,127	iskew_capm_21d	Short-Term Reversal	-0.015	0.002	0.0049	137,409	
2	rvol_21d	Low Risk	6.837	0.928	0.1797	137,409	sale_gr3	Investment	0.056	0.007	0.0347	135,427	
3	bidaskhl_21d	Low Leverage	19.363	2.751	0.1532	137,411	ret_1_0	Short-Term Reversal	-0.870	0.106	0.1530	137,374	
4	ret_1_0	Short-Term Reversal	-0.870	0.106	0.1530	137,374	ret_3_1	Momentum	-0.426	0.052	0.0743	137,265	
5	ivol_capm_21d	Low Risk	8.045	1.135	0.1483	137,409	iskew_ff3_21d	Short-Term Reversal	-0.017	0.002	0.0048	137,409	
6	ivol_ff3_21d	Low Risk	8.449	1.181	0.1459	137,409	prc_highprc_252d	Momentum	-0.660	0.082	0.2480	137,127	
7	ivol_hxz4_21d	Low Risk	8.436	1.176	0.1415	137,409	iskew_hxz4_21d	Short-Term Reversal	-0.017	0.002	0.0045	137,409	
8	seas_1_1na	Momentum	-2.516	0.432	0.1110	136,718	ret_60_12	Investment	0.020	0.002	0.0254	131,186	
9	ivol_capm_252d	Low Risk	7.442	1.678	0.0988	137,127	ppeinv_gr1a	Investment	0.258	0.035	0.0143	125,173	
10	rmax5_21d	Low Risk	3.766	0.741	0.0929	137,409	rvol_21d	Low Risk	6.837	0.928	0.1797	137,409	
11	rmax1_21d	Low Risk	1.931	0.398	0.0862	137,409	ivol_hxz4_21d	Low Risk	8.436	1.176	0.1415	137,409	
12	ret_6_1	Momentum	-0.277	0.044	0.0800	137,080	ivol_ff3_21d	Low Risk	8.449	1.181	0.1459	137,409	
13	ret_3_1	Momentum	-0.426	0.052	0.0743	137,265	ivol_capm_21d	Low Risk	8.045	1.135	0.1483	137,409	
14	ret_9_1	Momentum	-0.176	0.035	0.0554	136,871	bidaskhl_21d	Low Leverage	19.363	2.751	0.1532	137,411	
15	zero_trades_21d	Low Risk	-42.808	9.794	0.0454	137,410	ret_6_1	Momentum	-0.277	0.044	0.0800	137,080	

Panel C. $LTG_{i,t}$.

Top 15 by R^2							Top 15 by $ t $ (DK12)						
Rank	Char	Theme	$\hat{\beta}$	s.e.	R^2	N	Char	Theme	$\hat{\beta}$	s.e.	R^2	N	
1	div12m_me	Value	-1.854	0.219	0.1297	136,721	z_score	Low Leverage	0.005	0.000	0.0662	127,682	
2	eq_dur	Value	0.013	0.001	0.0808	133,343	sale_gr3	Investment	0.029	0.002	0.0509	135,427	
3	saleq_gr1	Investment	0.103	0.013	0.0699	137,023	age	Low Leverage	-0.000	0.000	0.0472	137,424	
4	z_score	Low Leverage	0.005	0.000	0.0662	127,682	cash_at	Low Leverage	0.139	0.012	0.0439	137,400	
5	seas_2_5na	Investment	1.633	0.170	0.0599	131,277	seas_6_10na	Low Risk	1.336	0.120	0.0379	120,720	
6	bev_mev	Value	-0.066	0.007	0.0597	135,014	aliq_mat	Low Leverage	-0.071	0.007	0.0194	126,427	
7	aliq_at	Investment	0.099	0.010	0.0546	129,504	aliq_at	Investment	0.099	0.010	0.0546	129,504	
8	ival_me	Value	-0.047	0.008	0.0545	125,246	seas_2_5na	Investment	1.633	0.170	0.0599	131,277	
9	sale_gr1	Investment	0.105	0.015	0.0527	137,053	bev_mev	Value	-0.066	0.007	0.0597	135,014	
10	ebitda_mev	Value	-0.315	0.057	0.0525	136,483	col_gr1a	Investment	0.448	0.051	0.0369	128,656	
11	sale_gr3	Investment	0.029	0.002	0.0509	135,427	eq_dur	Value	0.013	0.001	0.0808	133,343	
12	be_me	Value	-0.046	0.008	0.0495	134,555	div12m_me	Value	-1.854	0.219	0.1297	136,721	
13	ret_60_12	Investment	0.012	0.002	0.0478	131,186	cop_at11	Quality	0.108	0.013	0.0304	135,004	
14	age	Low Leverage	-0.000	0.000	0.0472	137,424	at_gr1	Investment	0.062	0.007	0.0303	137,234	
15	cash_at	Low Leverage	0.139	0.012	0.0439	137,400	mispricing_perf	Quality	0.083	0.010	0.0188	137,419	

Table IA.18: Determinants of $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$ by JKP Characteristic Theme

This table extends the determinant analysis in Table 4 by grouping Jensen et al. (2023) characteristics by theme. The data are monthly and use the JKP appendix sample; all characteristics are winsorized within each monthly cross section at the 1st and 99th percentiles. For each expected return and each JKP theme, the table reports the adjusted R^2 and number of observations from a pooled OLS regression on all characteristics in that theme. The row labeled “All k ” replaces the theme set with the full available design. The three column blocks vary the minimum availability filter for included characteristics: all 153 characteristics, the 138 characteristics with at least 125,000 observations, and the 86 characteristics with at least 135,000 observations. Within each block, themes are sorted by adjusted R^2 , with the full-design row pinned to the bottom. Panels A, B, and C use $OIRet_{i,t}$, $PTGRet_{i,t}$, and $LTG_{i,t}$ as the left-hand-side variable, respectively.

Panel A. $OIRet_{i,t}$.											
$N \geq 0$ (all)				$N \geq 125,000$				$N \geq 135,000$			
Theme	k	Adj. R^2	N	Theme	k	Adj. R^2	N	Theme	k	Adj. R^2	N
Low Risk	18	0.5960	118,462	Low Risk	17	0.6104	130,795	Low Risk	14	0.6166	135,183
Low Leverage	11	0.4981	67,604	Low Leverage	9	0.4887	116,602	Low Leverage	4	0.4883	137,387
Momentum	8	0.4152	135,698	Momentum	8	0.4152	135,698	Momentum	8	0.4152	135,698
Value	18	0.2198	115,491	Value	18	0.2198	115,491	Value	10	0.2270	133,905
Size	5	0.1846	74,701	Size	4	0.1351	137,296	Size	4	0.1351	137,296
Quality	17	0.1338	126,769	Quality	17	0.1338	126,769	Quality	14	0.1348	131,394
Investment	22	0.1144	87,038	Investment	21	0.1117	100,962	Investment	5	0.0582	135,035
Profitability	11	0.0711	117,637	Profitability	9	0.0640	121,334	Short-Term Reversal	6	0.0579	137,127
Short-Term Reversal	6	0.0579	137,127	Short-Term Reversal	6	0.0579	137,127	Accruals	4	0.0383	135,004
Accruals	6	0.0388	86,675	Accruals	5	0.0415	127,842	Profitability	5	0.0359	134,582
Seasonality	12	0.0221	72,184	Seasonality	7	0.0178	112,651	Profit Growth	8	0.0152	133,118
Profit Growth	12	0.0132	88,746	Profit Growth	10	0.0152	127,821	Seasonality	2	0.0009	137,354
Debt Issuance	7	0.0098	113,890	Debt Issuance	7	0.0098	113,890	Debt Issuance	2	0.0005	137,234
All	153	0.6462	28,255	All	138	0.6553	80,950	All	86	0.6855	127,941

Panel B. $PTGRet_{i,t}$.											
$N \geq 0$ (all)				$N \geq 125,000$				$N \geq 135,000$			
Theme	k	Adj. R^2	N	Theme	k	Adj. R^2	N	Theme	k	Adj. R^2	N
Momentum	8	0.2830	135,698	Momentum	8	0.2830	135,698	Momentum	8	0.2830	135,698
Low Risk	18	0.2328	118,462	Low Risk	17	0.2387	130,795	Low Risk	14	0.2425	135,183
Short-Term Reversal	6	0.1827	137,127	Short-Term Reversal	6	0.1827	137,127	Short-Term Reversal	6	0.1827	137,127
Low Leverage	11	0.1473	67,604	Low Leverage	9	0.1550	116,602	Low Leverage	4	0.1579	137,387
Value	18	0.0881	115,491	Value	18	0.0881	115,491	Value	10	0.0669	133,905
Size	5	0.0622	74,701	Size	4	0.0550	137,296	Size	4	0.0550	137,296
Investment	22	0.0495	87,038	Investment	21	0.0500	100,962	Investment	5	0.0404	135,035
Quality	17	0.0355	126,769	Quality	17	0.0355	126,769	Quality	14	0.0390	131,394
Profitability	11	0.0235	117,637	Profitability	9	0.0208	121,334	Profitability	5	0.0172	134,582
Accruals	6	0.0128	86,675	Debt Issuance	7	0.0117	113,890	Profit Growth	8	0.0051	133,118
Debt Issuance	7	0.0117	113,890	Seasonality	7	0.0087	112,651	Accruals	4	0.0051	135,004
Seasonality	12	0.0087	72,184	Accruals	5	0.0063	127,842	Debt Issuance	2	0.0041	137,234
Profit Growth	12	0.0063	88,746	Profit Growth	10	0.0055	127,821	Seasonality	2	0.0003	137,354
All	153	0.4227	28,255	All	138	0.4024	80,950	All	86	0.4004	127,941

Panel C. $LTG_{i,t}$.											
$N \geq 0$ (all)				$N \geq 125,000$				$N \geq 135,000$			
Theme	k	Adj. R^2	N	Theme	k	Adj. R^2	N	Theme	k	Adj. R^2	N
Value	18	0.1918	115,491	Value	18	0.1918	115,491	Value	10	0.1692	133,905
Low Leverage	11	0.1487	67,604	Investment	21	0.1451	100,962	Investment	5	0.0878	135,035
Investment	22	0.1465	87,038	Low Leverage	9	0.1216	116,602	Quality	14	0.0875	131,394
Quality	17	0.0886	126,769	Quality	17	0.0886	126,769	Low Leverage	4	0.0844	137,387
Low Risk	18	0.0783	118,462	Low Risk	17	0.0666	130,795	Momentum	8	0.0565	135,698
Momentum	8	0.0565	135,698	Momentum	8	0.0565	135,698	Low Risk	14	0.0562	135,183
Profit Growth	12	0.0534	88,746	Profit Growth	10	0.0441	127,821	Profit Growth	8	0.0422	133,118
Profitability	11	0.0331	117,637	Profitability	9	0.0330	121,334	Size	4	0.0258	137,296
Seasonality	12	0.0286	72,184	Size	4	0.0258	137,296	Profitability	5	0.0159	134,582
Size	5	0.0233	74,701	Seasonality	7	0.0151	112,651	Accruals	4	0.0042	135,004
Accruals	6	0.0084	86,675	Debt Issuance	7	0.0084	113,890	Debt Issuance	2	0.0026	137,234
Debt Issuance	7	0.0084	113,890	Accruals	5	0.0040	127,842	Short-Term Reversal	6	0.0012	137,127
Short-Term Reversal	6	0.0012	137,127	Short-Term Reversal	6	0.0012	137,127	Seasonality	2	-0.0000	137,354
All	153	0.3573	28,255	All	138	0.3347	80,950	All	86	0.2865	127,941

Table IA.19: Predictability of Realized Excess Returns: 86-Characteristic JKP Sample

This table extends Table 5 from the ten main characteristics to the 86 [Jensen et al. \(2023\)](#) characteristics with at least 135,000 non-missing stock-month observations. It presents panel regressions of realized 12-month excess stock returns, $\text{Ret}_{i,t+12}$, on return predictors and the 86 JKP characteristics. The data are monthly and the sample is restricted to stock-months in which $\text{Ret}_{i,t+12}$, $\text{OI Ret}_{i,t}$, $\text{PTG Ret}_{i,t}$, $\text{LTG}_{i,t}$, and all 86 characteristics are jointly observed. Columns (1) to (7) report the three univariate, three pairwise, and one joint specification in the expected-return proxies without characteristic controls. Column (8) includes only the 86 characteristics. Columns (9) to (15) repeat columns (1) to (7) with the 86 characteristics included as controls. Panels A, B, and C correspond to pooled OLS, stock fixed effects, and stock and date fixed effects, respectively. Standard errors, reported in parentheses, are computed using the [Driscoll and Kraay \(1998\)](#) procedure with 12 lags.

Panel A. Pooled OLS.															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
OIRet _{i,t}	1.138** (0.508)			1.098** (0.482)	1.193** (0.480)		1.129** (0.456)		1.475*** (0.388)			1.375*** (0.391)	1.479*** (0.389)		1.372*** (0.391)
PTGRet _{i,t}		0.219* (0.123)		0.025 (0.049)		0.238** (0.120)	0.042 (0.047)			0.187*** (0.057)		0.068** (0.033)		0.192*** (0.058)	0.073** (0.033)
LTG _{i,t}			-0.231* (0.140)		-0.345** (0.152)	-0.310** (0.147)	-0.353** (0.152)				-0.081 (0.083)		-0.094 (0.083)	-0.118 (0.088)	-0.107 (0.083)
Characteristics								X	X	X	X	X	X	X	X
N	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941
R ²	0.047	0.015	0.003	0.047	0.054	0.021	0.054	0.111	0.136	0.118	0.112	0.137	0.136	0.119	0.137

Panel B. Stock fixed effects.															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
OIRet _{i,t}	1.869*** (0.410)			1.800*** (0.408)	1.876*** (0.389)		1.767*** (0.387)		1.714*** (0.329)			1.499*** (0.329)	1.722*** (0.330)		1.499*** (0.328)
PTGRet _{i,t}		0.312*** (0.107)		0.043 (0.047)		0.334*** (0.104)	0.068 (0.046)			0.270*** (0.058)		0.130*** (0.034)		0.276*** (0.059)	0.136*** (0.033)
LTG _{i,t}			-0.507*** (0.159)		-0.521*** (0.150)	-0.584*** (0.175)	-0.536*** (0.154)				-0.139* (0.073)		-0.164** (0.072)	-0.183** (0.077)	-0.182** (0.073)
Characteristics								X	X	X	X	X	X	X	X
Stock FE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
N	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941
R ²	0.173	0.112	0.097	0.174	0.185	0.127	0.186	0.277	0.306	0.290	0.278	0.309	0.307	0.291	0.310
Within R ²	0.096	0.029	0.012	0.097	0.109	0.045	0.110	0.210	0.241	0.224	0.211	0.244	0.242	0.225	0.245

Panel C. Stock and date fixed effects.															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
OIRet _{i,t}	1.334*** (0.366)			1.200*** (0.366)	1.341*** (0.356)		1.198*** (0.356)		1.492*** (0.297)			1.292*** (0.285)	1.494*** (0.296)		1.293*** (0.285)
PTGRet _{i,t}		0.240*** (0.071)		0.113** (0.044)		0.249*** (0.070)	0.121*** (0.043)			0.246*** (0.046)		0.150*** (0.025)		0.248*** (0.046)	0.151*** (0.025)
LTG _{i,t}			-0.240*** (0.087)		-0.257*** (0.094)	-0.275*** (0.095)	-0.272*** (0.097)				-0.008 (0.048)		-0.027 (0.047)	-0.040 (0.047)	-0.044 (0.046)
Characteristics								X	X	X	X	X	X	X	X
Stock FE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Date FE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
N	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941	127,941
R ²	0.383	0.364	0.356	0.385	0.386	0.367	0.388	0.434	0.450	0.442	0.434	0.453	0.450	0.442	0.453
Within R ²	0.046	0.017	0.004	0.050	0.050	0.021	0.054	0.124	0.150	0.137	0.124	0.154	0.150	0.137	0.154

Figure IA.1: Data Coverage

This figure presents monthly cross-sectional coverage of realized 12-month excess returns, $\text{Ret}_{i,t+12}$, option-implied expected returns ($\text{OIRet}_{i,t}$), price target-implied expected returns ($\text{PTGRet}_{i,t}$), long-term growth rate forecasts ($\text{LTG}_{i,t}$), and Expectations Based Returns ($\text{EBR}_{i,t+12}$). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2025. Predictors are measured through December 2024 while 12-month realized returns use price data through December 2025. $\text{EBR}_{i,t+12}$ is available for formation dates through December 2022, with realizations until December 2023. Panel A reports the count of stocks with a non-missing value of each variable on each consensus date. Panel B reports the fraction of total S&P 500 market capitalization covered: the denominator is the total `mc` of stocks with a non-missing realised return on that consensus date, the numerator is the total `mc` of stocks for which the relevant variable is also observed (the $\text{Ret}_{i,t+12}$ line is therefore flat at one by construction); the y-axis starts at 75% to zoom in on the upper end where the fractions cluster. In both panels, the left grey dashed line marks August 19, 1999, the beginning of the main analysis sample, and the right grey dashed line marks December 15, 2022, the latest formation date for which a subsequent 12-month EBR realization is available.

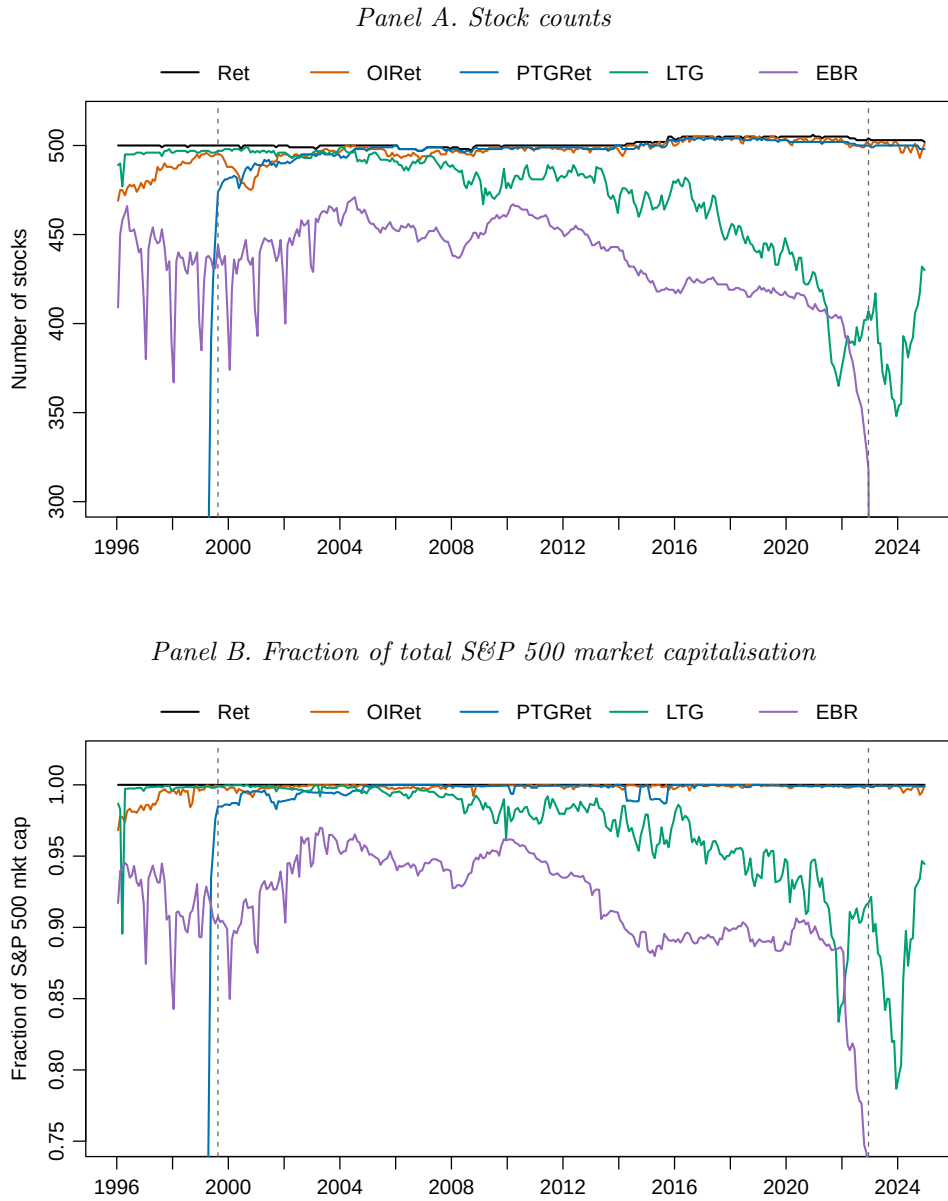


Figure IA.2: Frequency of Price Target Updates Relative to Earnings Announcement

This figure depicts the distribution of price target issuances by distance to the closest earnings announcement date in trading days. For each analyst-level price target estimate in the I/B/E/S Detail History file, we compute the distance to the closest earnings announcement in business days. We then group price target estimates by their distance to the closest earnings announcement and sum them up. The sample includes price-target issuances and updates for S&P 500 stocks from August 1999 through December 2024.

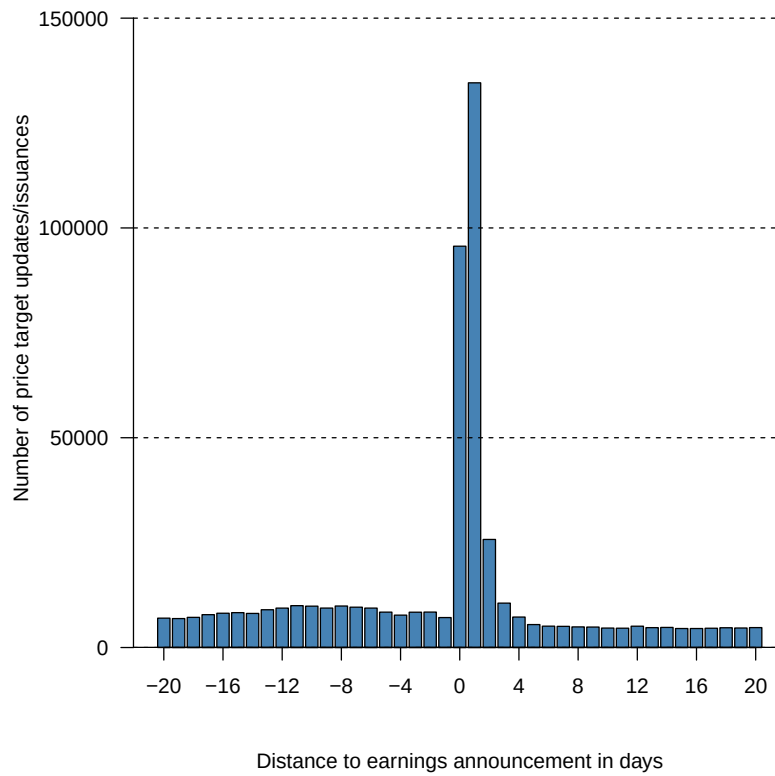
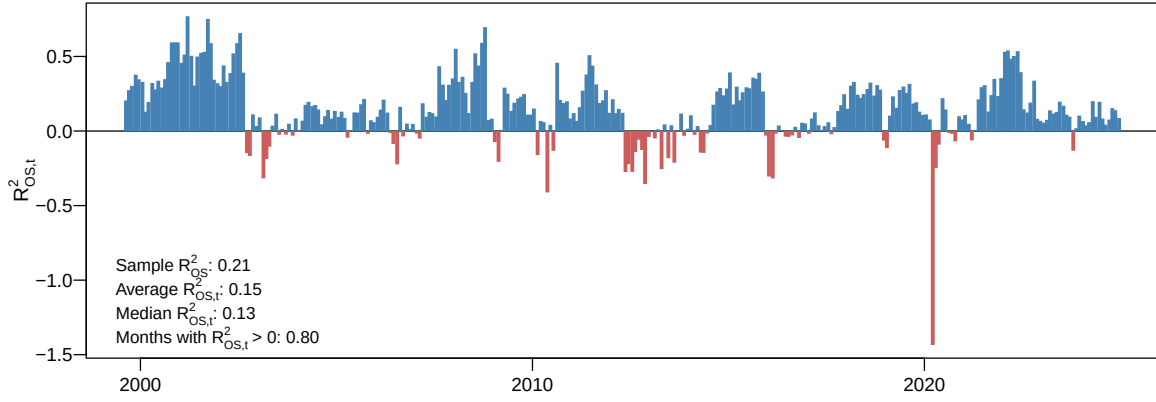


Figure IA.3: Out-of-sample Forecast Accuracy Diagnostics for OIRet versus PTGRet.

This figure compares the forecast accuracy of option-implied expected returns ($\text{OIRet}_{i,t}$) versus price target-implied expected returns ($\text{PTGRet}_{i,t}$). We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. Predictors are measured through December 2024 while 12-month realized returns use price data through December 2025. Panel A plots the monthly time-series of $R_{OS,t}^2 = 1 - \text{SSE}_t^{\text{OIRet}} / \text{SSE}_t^{\text{PTGRet}}$ where $\text{SSE}_t^{\text{OIRet}} = \sum_i (\text{Ret}_{i,t+12} - \text{OIRet}_{i,t})^2$ and $\text{SSE}_t^{\text{PTGRet}} = \sum_i (\text{Ret}_{i,t+12} - \text{PTGRet}_{i,t})^2$. Panel B reports the sample R_{OS}^2 within the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) sorted into cross-sectional quintiles (low to high, left to right within each group) and within the five Fama–French 5-industry buckets defined through SIC-codes. In both panels, bars are colored blue when $R_{OS,t}^2$ or R_{OS}^2 take positive values ($\text{OIRet}_{i,t}$ beats $\text{PTGRet}_{i,t}$) and colored red when they take negative values ($\text{PTGRet}_{i,t}$ beats $\text{OIRet}_{i,t}$).

Panel A: Time-series of monthly $R_{OS,t}^2$



Panel B: Sample R_{OS}^2 within Fama and French (2015) five-characteristic and momentum quintiles and FF5 industries

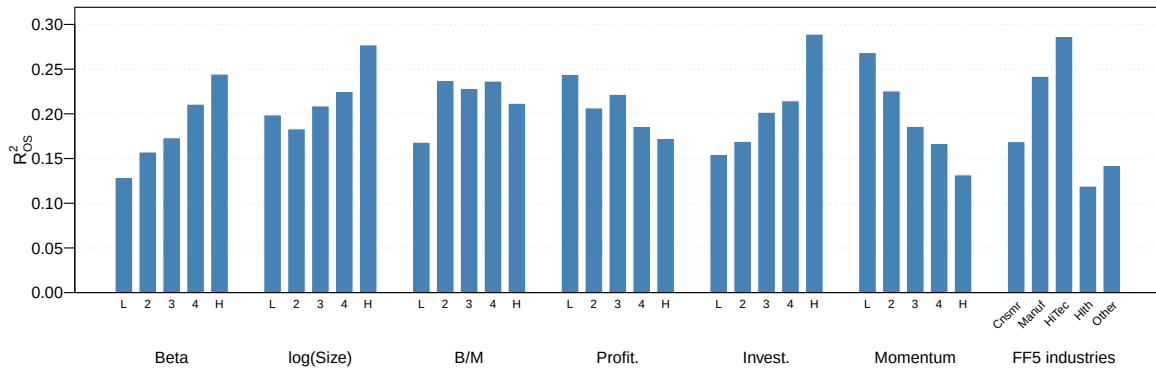


Figure IA.4: Out-of-sample Forecast Accuracy of $\text{OIRet}_{i,t}$ versus $\text{PTGRet}_{i,t}$: Bootstrap Evidence

This figure summarizes the out-of-sample evidence that the option-implied expected return ($\text{OIRet}_{i,t}$) forecasts 12-month realized excess returns, $\text{Ret}_{i,t+12}$, more accurately than the price-target-implied expected return ($\text{PTGRet}_{i,t}$). It reports the bootstrap distributions of three statistics: the out-of-sample $R_{OS}^2 = 1 - \sum_t \text{SSE}_t^{\text{OIRet}} / \sum_t \text{SSE}_t^{\text{PTGRet}}$ in Panel A; the mean squared-error loss differential $d_{i,t} = (\text{Ret}_{i,t+12} - \text{PTGRet}_{i,t})^2 - (\text{Ret}_{i,t+12} - \text{OIRet}_{i,t})^2$ in Panel B; and the Diebold-Mariano test statistic in Panel C, i.e. the mean loss differential scaled by its Driscoll–Kraay (lag 12) standard error. All distributions come from a block bootstrap with $B = 5,000$ resamples, either using moving-blocks (with $L = 12$, MBB in blue) or a stationary block bootstrap (with optimal $L = 22$, SBB in purple). The black vertical lines indicate the full sample estimates, the dashed vertical lines mark the 2.5th and 97.5th percentiles of the bootstrap distributions. The legends report the bootstrap p -values, which reject the null hypothesis that $R_{OS}^2 = 0$, $\bar{d} = 0$, and of equal forecast accuracy in the Diebold-Mariano test, respectively. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2025. Predictors are measured through December 2024 while 12-month realized returns use price data through December 2025.

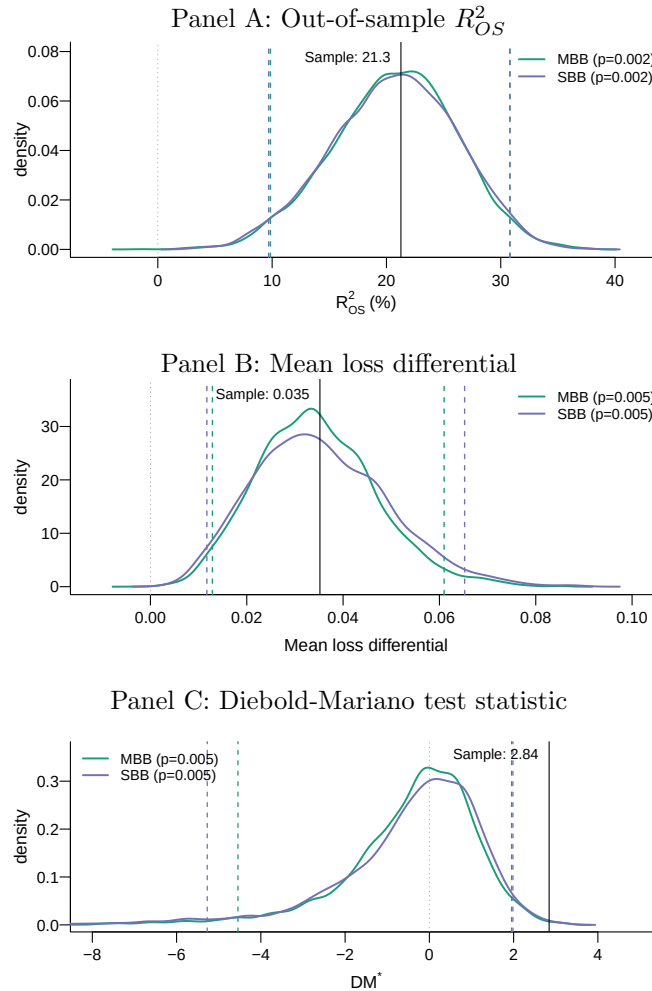


Figure IA.5: Correlation Heatmap

This figure presents pairwise-complete correlations among our three main predictors of interest: the option-implied expected return ($OIRet_{i,t}$), the price target-implied expected return ($PTGRet_{i,t}$) and the long-term growth rate forecast ($LTG_{i,t}$). We additionally include the six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) and four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P) from our empirical tests in the main body. All variables are winsorized cross-sectionally at the 1st and 99th percentiles. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2024.

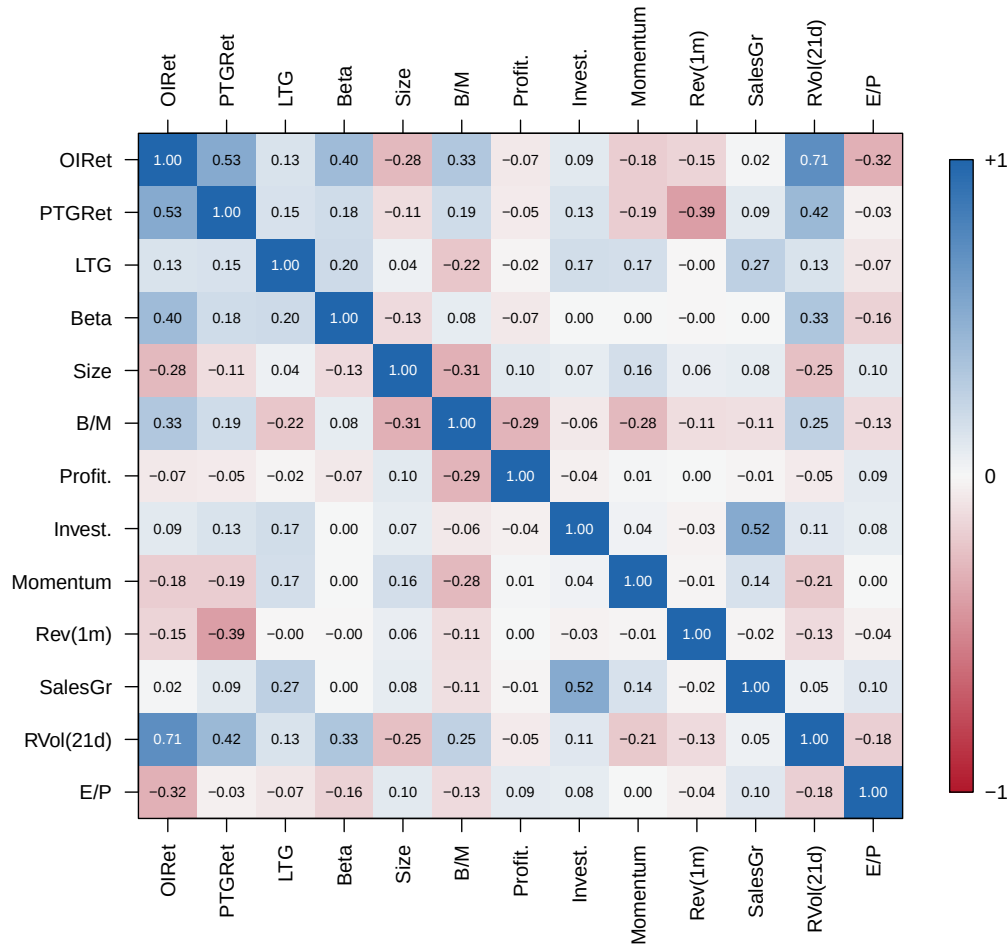


Figure IA.6: R^2 Decomposition of the Determinants Regressions

For each left-hand-side variable in Table 4 (OIRet_{*i,t*}, PTGRet_{*i,t*}, LTG_{*i,t*}), the figure shows the order-invariant Shapley share of the joint R^2 attributable to each regressor. Box widths are proportional to Shapley shares and the horizontal axis is shared across panels. The six standard characteristics (Beta, Size, B/M, Profitability, Investment, and Momentum) are shaded light purple and the four additional characteristics (Reversal, 21-day return volatility, quarterly sales growth, and E/P) are shaded light grey. OIRet_{*i,t*}, PTGRet_{*i,t*} and LTG_{*i,t*} retain their own colors. Labels for narrow boxes are placed above the bar with thin connectors. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from August 1999 to December 2024. As in Table 4, the sample is restricted to stock-months in which all variables are jointly observed.

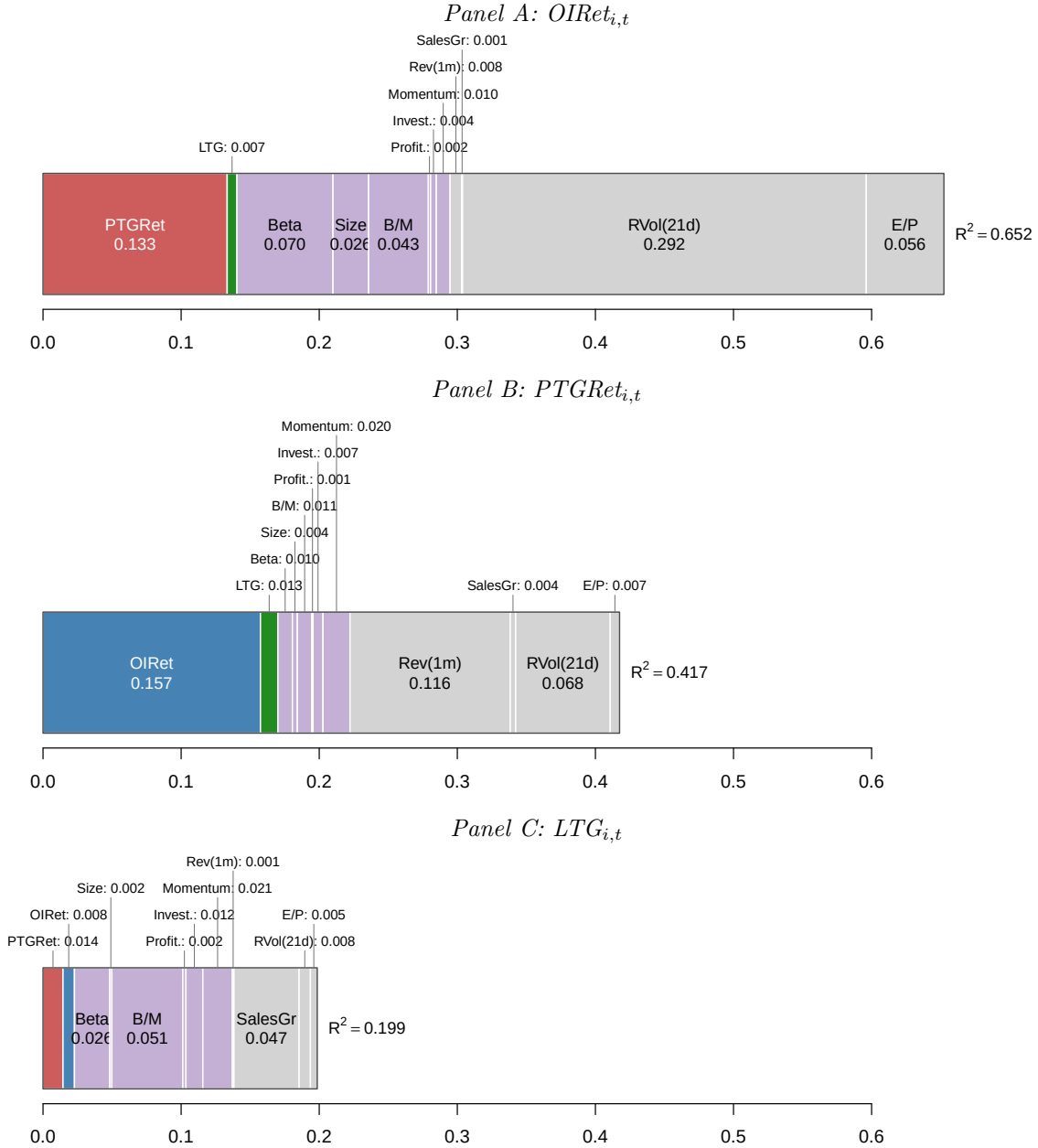


Figure IA.7: Shapley R^2 Decomposition

This figure decomposes the fit of the regression of realized 12-month excess return $\text{Ret}_{i,t+12}$, on Expectations Based Returns ($\text{EBR}_{i,t+12}$), option-implied expected returns ($\text{OIRet}_{i,t}$), orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{i,t+12}^\perp$) and $\text{E/P}_{i,t}$ into the Shapley R^2 contributions of the four regressors. The specification corresponds to column (6) of Table 7. $\text{OIRet}_{i,t+12}^\perp$ is the full-sample residual from projecting $\text{OIRet}_{i,t+12}$ on $\text{OIRet}_{i,t}$ under the same fixed effects structure as the reported panel. We study S&P 500 stocks using data collected on monthly I/B/E/S consensus dates, and our sample runs from January 1996 to December 2023. Predictors are measured through December 2022 while $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. The sample is restricted to stock-months in which all variables are jointly observed. Bars are stacked in the order $\text{EBR}_{i,t+12}$ (green), $\text{OIRet}_{i,t}$ (blue), $\text{OIRet}_{i,t+12}^\perp$ (light blue), $\text{E/P}_{i,t}$ (grey) and the four segments sum to the reported R^2 . Panel A reports the pooled-OLS R^2 ; Panels B and C report the within R^2 from the stock fixed effects and stock and date fixed effects specifications.

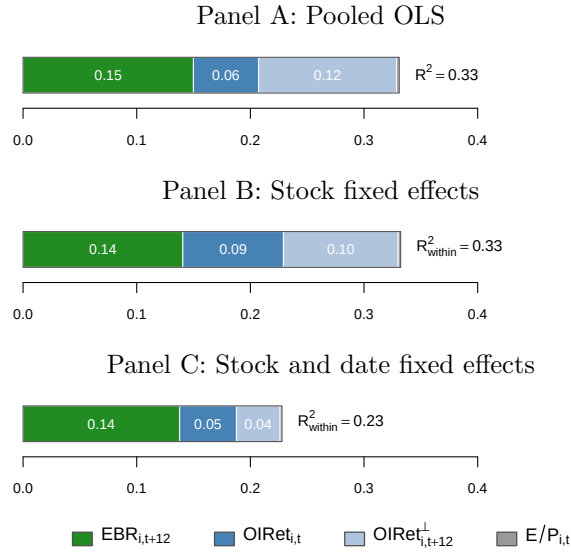
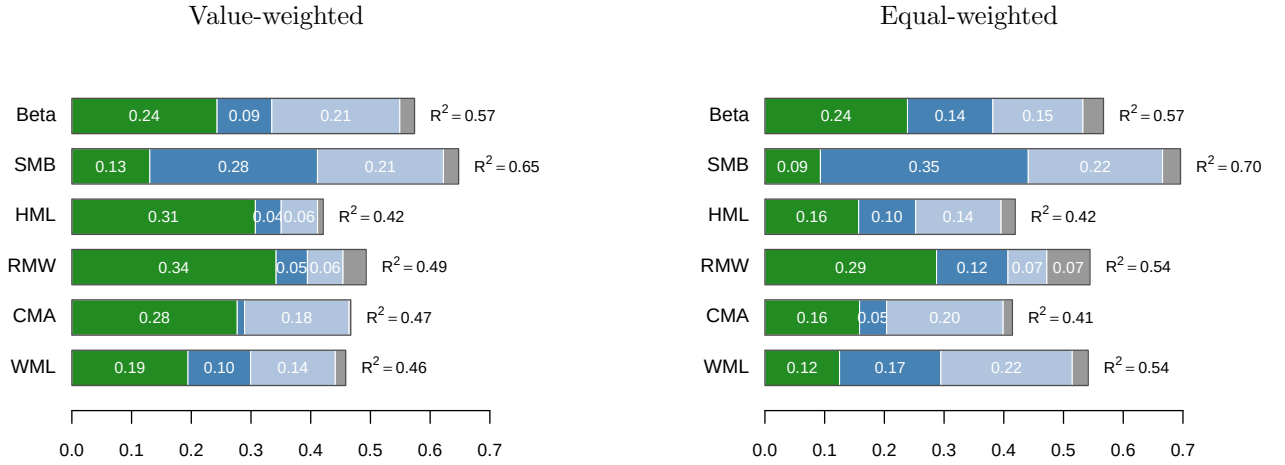


Figure IA.8: Shapley R^2 Decomposition of Characteristic-Sorted Return Spreads

This figure decomposes the fit of the regression of long-short realized 12-month excess return spreads, Ret_{t+12} , on long-short spreads of option-implied expected returns (OIRet_t), long-short spreads of orthogonalized option-implied expected returns 12 months ahead ($\text{OIRet}_{t+12}^\perp$), long-short Expectations Based Return spreads (EBR_{t+12}), and E/P_t or D/P_t spreads into the Shapley R^2 contributions of the four regressors. At each monthly I/B/E/S consensus date from January 1996 through December 2022, we sort S&P 500 stocks into quintiles based on Beta, Size, B/M, Profitability, Investment, and Momentum. $\text{Ret}_{i,t+12}$, $\text{EBR}_{i,t+12}$, and $\text{OIRet}_{i,t+12}^\perp$ use data through December 2023. Within each quintile, we aggregate the stock-level variables using either formation-date market-capitalization weights or equal weights, including the $\text{OIRet}_{i,t+12}^\perp$ residual defined in Table 7, and then form long-short spreads using the Fama–French sign convention. The sample is restricted to stocks satisfying the stock-level decomposition requirements in Table 7 for which the relevant sorting characteristic is observed; we do not impose joint availability across sorting characteristics. The corresponding long-short spread labels are Beta, SMB, HML, RMW, CMA, and WML. Bars are stacked in the order EBR (green), OIRet_t (blue), $\text{OIRet}_{t+12}^\perp$ (light blue), E/P (grey).

Panel A: Valuation ratio: $\text{E/P}_{i,t}$



Panel B: Valuation ratio: $\text{D/P}_{i,t}$

