# Salience Theory and Equity Option Returns

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**Abstract**

We study the asset pricing implications of salience theory in the equity option market. We find robust empirical evidence that option-based salience theory (OST) value predicts option returns negatively in the cross-section. Such relationship cannot be explained by standard risk factors identified in the equity and option returns literature. Our findings support the conjecture that investors overweight salient past options returns and result in the overvaluation of options with high salience theory value. The unveiled salience effect is stronger when limits to arbitrage and investor sentiment are high, and is robust to the controls of proxies for investor attention.

***Keywords***: *Salience theory, equity option pricing, behavioral bias, investor attention*

***JEL classifications***: G12, G13, G41

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# 1. Introduction

Since the seminal work of Bordalo, Gennaioli, and Shleifer (2012, 2013) explicating a behavioral tendency wherein investors' limited attention was drawn towards conspicuous payoffs resulting in an overweighting of salient outcomes, the salience theory has emerged as a focal point of scholarly inquiry. Cosemans and Frehen (2021) propose an empirical adaptation of salience theory capturing the distortion in return expectations by salient thinkers. Contingent on the hypothesis that overestimations of upside (downside) salient past returns lead to the overpricing (underpricing) of stocks resulting from the salient thinking, they empirically document a negative relationship between salience theory value and equity returns in the cross-section. Cakici and Zaremba (2022) further examine the salience effect in 49 countries and confirm the generally negative relationship between salience and future stock returns on a global scale. Their study also delves into the substantial impact of return reversals on the stock salience effect, as well as encapsulates the circumstances where the salience effect is most prominent: in the realms of microcaps and under extreme market conditions. Supporting evidence is also provided from alternative asset classes, with cross-sectional findings corroborated in the corporate bond market (Lin and Zhang, 2022) and the nascent cryptocurrency market (Cai and Zhao, 2024). However, empirical investigation of the salience effect in the derivative market such as the options market remains scarce.

In this paper, we offer the first empirical study of salience theory in the cross-section of equity option pricing. More specifically, we estimate option-based salience theory value (OST), defined as the distortion in return expectations due to salient thinking, from the daily delta-hedged option returns and examine the predictive power of OST to the cross-sectional future equity option returns. It is important to highlight that our paper goes beyond being a mere extension of Cosemans and Frehen (2021) as we diverge and focus on directionless delta-hedged option returns. First, it is unclear whether and to what extent the salience effect exists in the options market due to that directional risk is being taken away using the delta-hedged strategy. Second, given that the salience effect relies on the comparison to the choice context (e.g. market index), the existence and magnitude of salience perception in the options market, where the choice context is less obvious, remain questionable. Moreover, the options market is dominated by institutional investors with optionable stocks that tend to be larger, whereas extant literature in the stock market highlights a more pronounced salience effect among stocks with higher retail ownerships (Cosemans and Frehen, 2021) and microcaps (Cakici and Zaremba, 2022). Consequently, findings from directional markets (e.g., equity and bond) may not seamlessly translate to our exploration within the options market[1].

[1] We also examine and verify the salience theory value extracted from equity market (as in Cosemans and Frehen, 2021) is not priced in the cross-section of equity option returns, implying the information heterogeneity regarding salience effect between directional stock returns and directionless delta-hedged option returns.

Concentrating on options written on common shares traded in three major U.S. exchanges (NYSE, AMEX, NASDAQ) from January 1996 to December 2022, our empirical findings provide compelling evidence for the existence of the salience effect in the options market and complement results observed in other asset classes (e.g., Cosemans and Frehen, 2021; Lin and Zhang, 2022). OST constructed using daily delta-hedged option returns within the current month, exhibits strongly negative cross-sectional predictive power for delta-hedged option returns in the subsequent month. Using univariate portfolio sorting analyses, we observe a statistically significant equal-weighted return difference of -0.57% (t-stat=-7.99) per month between options in the highest and lowest OST deciles. The return predictability remains highly consistent when the portfolios are formed using both a stock-value-weighted scheme based on stock market capitalization and an option-value-weighted scheme derived from the open interest and mid-price quotes of options. Such a negative pricing direction also aligns with findings in the stock market documented by Cosemans and Frehen (2021). Furthermore, the OST-sorted return spreads cannot be reconciled by either standard risk factors in the stock market[2] or the idiosyncratic volatility and illiquidity factors recently proposed by Zhan et al. (2022).

To further verify if OST contains unique information not already encompassed by established pricing characteristics, we perform both bivariate sorting analyses at the portfolio level and Fama-Macbeth (1973) regressions at the firm level. Specifically, we control for a comprehensive list of 27 stock and option characteristics that have previously been identified as priced in the equity options market (Goyal and Saretto, 2009; Cao and Han, 2013; Vasquez, 2017; Zhan et al., 2022), and find the cross-sectional predictive power of OST retains consistently negative and significant under all circumstances. There are two noteworthy points that merit further elaboration. First, the stock-market salience theory (SST) value, estimated based on Cosemans and Frehen (2021), cannot explain the pricing effect of OST, underscoring the heterogeneous salience information embedded in directional stock returns versus directionless delta-hedged option returns. Second, contrasting the findings by Cosemans and Frehen (2021), we do not observe a sharp reduction in the statistical significance of the OST effect when controlling for the stock reversal effect. In addition, contrary to Cakici and Zaremba (2022) who document that the stock salience effect is stronger when the past market return is low, we do not observe this pattern in the options market and find OST performs consistently between bullish and bearish market conditions. This divergence reinforces our focus on directionless option returns and highlights the distinct nature of our investigations. These findings also rule out the investors' over-extrapolation of past returns as a behavioral explanation of the salience effect observed in the equity options market. [3] In contrast to the over-extrapolation of past returns, return salience

[2] See Fama and French (1992; 2015), Carhart (1997), and Pástor and Stambaugh (2003).
[3] As in Greenwood and Shleifer (2014), a common behavioral explanation for short-term stock return reversals is over-extrapolation of information about past returns when forming beliefs about future returns.

intuitively stems from past returns that conspicuously deviate from the choice context (market benchmark). The upside (downside) salient returns would then be overweighted, distort investor expectations of future returns, and inflict overpricing (underpricing) towards options.

The apparent irrelevance between OST and return reversal prompts us to investigate the behavioral interpretation of the salience effect on the delta-hedged option returns through alternative perspectives, including limits to arbitrage, investor sentiment, and investor attention. Our findings provide supporting evidence for the behavioral interpretation of the salience theory documented in the existing literature. First, we observe that the option salience effect is stronger when limits to arbitrage are high, in line with the findings by Barberis, Mukherjee and Wang (2016) and Cosemans and Frehen (2021) in the stock market. The OST's predictive power is more pronounced among options with underlying stocks characterized by smaller market capitalization, higher illiquidity, increased idiosyncratic volatility, and lower analyst coverage. Consistent with Cakici and Zaremba (2022), we also find the salience effect in the options market is heightened during periods of elevated past market volatility. Interestingly and plausibly, we do not detect a significant return difference between OST-sorted portfolios with higher and lower institutional ownerships. This could be attributed to the generally high level of institutional holdings associated with optionable stocks. Second, employing the investor sentiment index of Baker and Wurgler (2006), we find that the OST effect is stronger during periods of high investor sentiment. This finding is in line with the empirical trend documented by Cosemans and Frehen (2021), and offers evidence that the more sophisticated option investor also inflicts a stronger salience effect and overprices (underprices) upside (downside) salient options. Third, our supplementary analyses indicate that the option salience effect is robust to the control of various investor attention proxies (Barber and Odean, 2008; Choy and Wei, 2023).

Furthermore, we carry out an extensive set of robustness checks to understand whether the salience effect in option returns stems from any potential analytical shortfalls. Specifically, we examine the robustness of our results by holding call options until maturity, applying delta-hedged put option returns, constructing salience theory values via separately informational sources, considering different subperiods, employing alternative state space specifications, exploring alternative choice contexts, and evaluating alternative salience specifications. The results of these robustness tests unequivocally support our findings that the predictive power of OST is both statistically and economically significant.

Our paper contributes to several important strains of literature. First, our work contributes to the rapidly expanding literature on the impact of salience on decision-making. To the best of our knowledge, we are the first to empirically examine the pricing implications of the salience effect in the equity options market. Pioneered by Bordalo et al. (2012), extensive studies have been conducted to assess the applications of salience theory in understanding consumer choices (Bordalo et al., 2013), judicial decisions (Bordalo, Gennaioli and Shleifer, 2015), and corporate policies (Dessaint and Matray, 2017). Recently, researchers also expanded their focus to the asset pricing implications of salience, covering U.S. stocks (Cosemans and Frehen, 2021), international stocks (Cakici and Zaremba, 2022), corporate bonds (Lin and Zhang, 2022), and cryptocurrencies (Cai and Zhao, 2024). Our paper differs from the aforementioned studies by introducing a novel option-based salience theory value and revealing robust empirical evidence of the OST in predicting future cross-sectional option returns.

Second, our work contributes to the growing literature on the role of investors' behavior biases and heuristics in empirical asset pricing. In addition to the studies above related to the salience theory, recent research has further investigated the asset pricing implications of various behavioral aspects. For example, Bali, Cakici and Whitelaw (2011) present empirical evidence supporting the conjecture that investors prefer lottery-like stocks and examine the role of maximum past returns in negatively predicting future stock returns in the cross-section. Barberis et al. (2016) estimate a prospect theory value based on realized stock past returns together with laboratory-based prospect theory parameters and find robust predictive power to cross-sectional equity returns. Da, Huang and Jin (2021) examine the effect of extrapolation bias in stock returns, demonstrating that consensus ranking predicts ex-post returns more prominently when extrapolation bias is high. Arisoy, Bali and Tang (2024) investigate the role of investor regret in equity pricing and discover a positive relationship in the cross-section of equity returns. While the existing literature has primarily focused on the pricing implications of behavioral biases on cross-sectional equity returns, our contribution extends this line of inquiry to the relatively under-studied area of cross-sectional equity option returns.

Thirdly, we add to an emerging body of literature that explores the cross-sectional predictability of option returns. The majority of extant research centers on the cross-sectional relations between volatility/skewness dynamics and option returns, comprised of variance premium (Goyal and Saretto, 2009) idiosyncratic volatility (Cao and Han, 2013), risk-neutral skewness (Bali and Murray, 2013), option ex-ante total skewness (Boyer and Vorkink, 2014), term structure of implied volatility (Vasquez, 2017), and implied volatility's relationship with equity returns and raw put and call option returns (An et al., 2014; Hu and Jacobs, 2020). Our study stands out by proposing a salience-induced option return predictor that remains robust even after accounting for all existing volatility variables. Recent studies also attempt to identify pronounced option predictor variables on a broader scale. Using four different proxies of short-sale constraints, Ramachandran and Tayal (2021) find a negative relationship between short-sale constraints and delta-hedge returns of put options. Zhan et al. (2022) examine a long list of stock characteristics and document their strong predictability of option returns. Heston et al. (2023) conduct a detailed study on the momentum effect in option straddle returns. Leveraging machine learning technology, Bali et al. (2023) assess 273 option and stock predictor variables and highlight the importance of implied volatility, bid-ask spreads, and industry momentum in predicting option returns. In a more recent study focusing on the FX options market, Zhang, So and Driouchi (2024) propose a three-factor model comprising implied volatility, bid-ask spreads, and momentum that significantly explains the cross-sectional variations of FX option straddle returns. Building on this literature, we propose an option-specific behavioral-based determinant derived from daily option return salience and unveil its strong predictive power for cross-sectional option returns.

Lastly, our work complements the literature on limited investor attention in the options market. Recently, Choy and Wei (2023) presented evidence that investor attention, proxied by ranked winners and losers in major news outlets, explains delta-hedged option returns in the cross-section. While they verify the importance of attention in the formation of the consideration set in the first stage of the choice process by narrowing the list of available stocks and options, we examine the influence of salience on the actual choice between options in the consideration set in the final stage of the decision process, which exerts unique pricing implications that cannot be subsumed by existing attention-grabbing proxies (Barber and Odean, 2008; Choy and Wei, 2023).

The paper is organized as follows. Section 2 describes the data and variables. Section 3 presents the empirical evidence on the relations between option-based salience theory value and cross-sectional future option returns. We also examine the salience effect against limits to arbitrage, investor sentiment, market conditions, and investor attention in this section. Section 4 provides a series of additional robustness tests. Section 5 concludes.

## 2. Data and Variables

This section describes the data sources used in this paper, along with our pre-screening schemes on the data sample. We then define the main variables including delta-hedged option returns and option-based salience theory value, as well as the other stock/option characteristics used in the subsequent analyses. We also describe the summary statistics of our data sample.

### *2.1. Data*

For the sample period from January 1996 to December 2022, we collect U.S. individual stock options and S&P 500 index options data from the Ivy DB database by OptionMetrics, including the daily best bid and ask quotes, trading volume, option interest, implied volatility, delta, and other greeks for each call and put contract. We calculate the option mid-price by taking the average of its bid and ask quotes if both are available. The stock data are obtained from the Center for Research in Security Prices (CRSP), comprised of daily and monthly closing prices, returns, trading volume, shares outstanding, and adjustments for stock splits. The S&P 500 index data are also acquired from the CRSP database. We merge option data with their underlying stock data using the Wharton Research Data Services (WRDS) link table. Moreover, to construct various stock and option variables, we also obtain the accounting data from Compustat, the quarterly institutional holding data from the Refinitiv 13F database, and the analyst coverage data from the I/B/E/S database. The daily and monthly risk-free rates are taken from Kenneth French's website, together with the Fama-French common risk factors.

Following the literature (Cao and Han, 2013; Bali et al., 2023; Choy and Wei, 2023; Vasquez and Xiao, 2023), we apply a number of filters to our option dataset.[4] First, we focus on the options whose underlying stocks are common shares (CRSP share codes 10 or 11) traded on three major US exchanges (NYSE/AMEX/NASDAQ). Second, we exclude options with underlying stocks paying a dividend during the remaining life of the options. Third, we only retain an option if its bid quote is positive and strictly smaller than the ask quote, and its mid-price is higher than $1/8. Fourth, we remove the options whose trading volume is either missing or nonpositive.[5] Fifth, we retain an option only if its moneyness (stock price divided by the strike price) is between 0.8 and 1.2. Sixth, we exclude options that violate obvious no-arbitrage conditions.[6] Finally, we also exclude options with missing option deltas.

After implementing the aforementioned filtering standards, we follow the methodologies of Cao and Han (2013) and Zhan et al. (2022) by selecting a pair of call and put options that are closest to being at-the-money (ATM) and have the shortest maturity among those with at least one month to expire and with the same maturity date as most cross-sectional options. Furthermore, to address the potential illiquidity issues, we remove the options in which the closing price of the underlying stock is smaller than $5 at the end of the previous month when calculating monthly option returns.

### *2.2. Delta-hedged option returns*

In line with previous empirical studies (Cao and Han, 2013; Zhan et al., 2022), we focus on the delta-hedged strategy, which involves longing a call (put) option while simultaneously shorting (longing) delta shares of the underlying stock for a delta-hedged call (put) strategy. We first estimate the delta-hedged option gain $\Pi_{t,t+\tau}$ on a daily rebalancing basis. Specifically, assuming that the long option position is hedged $N$ times discretely over a period of $[t, t+\tau]$ where the hedge is recalanced at each of the days $t = t_0 < \cdots < t_n < \cdots < t_N = t+\tau$, then the delta-hedged option gain over the period $[t, t+\tau]$ can be defined as:

$$\Pi_{t,t+\tau} = O_{t+\tau} - O_t - \sum_{n=0}^{N-1} \Delta_{t_n}\left[S_{t_{n+1}} - S_{t_n}\right] - \sum_{n=0}^{N-1} \frac{a_n r_{t_n}}{365}\left[O_{t_n} - \Delta_{t_n} S_{t_n}\right], \quad (1)$$

[4] To avoid look-ahead bias, we apply the filters only on portfolio formation dates (Choy and Wei, 2023). In addition, our results hold robustly after removing any of the filters.

[5] We apply this filter in calculating the monthly delta-hedged option returns, while releasing this restriction when calculating daily option returns for the estimation of salient theory value. The reasons are to capture the potential salient behaviors from the price adjustments of option market makers even though without active trades made by option investors, and to increase the data coverage for measuring OST value. In unreported analyses, we incorporate this filter when calculating daily option returns and estimating the corresponding ST values and find qualitatively consistent results.

[6] This means a call option must satisfy $S \geq C \geq Max(S - Ke^{-rT}, 0)$ while a put option must satisfy $Ke^{-rT} \geq P \geq Max(Ke^{-rT} - S, 0)$, where S, C, P, K, r, and T refer to underlying stock price, call option price, put option price, option strike price, risk-free interest rate, and time to maturity.

where $S_{t_n}$, $O_{t_n}$, $\Delta_{t_n}$, $r_{t_n}$, and $a_n$ refer to the underlying stock price, option mid-price, option delta, annualized risk-free rate at the date $t_n$, and the number of calendar days between $t_n$ and $t_{n+1}$ respectively. Eq. (1) is applicable for both calls and puts as the stock holding direction is automatically adjusted by the sign of delta (positive for calls and negative for puts). To obtain returns that are comparable among the cross-section, we scale $\Pi_{t,t+\tau}$ by the absolute value of securities involved (i.e., $\Delta_t S_t - O_t$) and compute delta-hedge return as $\frac{\Pi_{t,t+\tau}}{|\Delta_t S_t - O_t|}$. Our main results are reported based on the call options since at-the-money calls have a much higher trading volume and a higher frequency of trading than at-the-money puts (Christoffersen et al., 2018). [7]

[Table 1]

Panel A (Panel B) in Table 1 reports the pooled summary statistics of delta-hedged returns with daily rebalancing for call (put) options. Our dataset contains 291,467 and 218,811 observations for call and put options respectively. We present option returns held both until month-end and option maturity, and our results largely conform to prior literature utilizing the same return methodology (Cao and Han, 2013; Choy and Wei, 2023; Vasquez and Xiao, 2023). [8] On one hand, the average option returns remain negative under all circumstances, and the negativity is more prominent when holding until maturity. On the other hand, delta-hedged option returns are positively skewed. The average moneyness is 98.34% (101.44%) for call (put), which is close to being at-the-money (100%). The average day to maturity is approximately 50 calendar days for both types of options. On average there are 902 and 677 firms respectively in the call and put cross-sections per month, suggesting a sufficient cross-sectional dimensionality for our empirical analysis.

### *2.3. Option-based salience theory measure*

Salience theory posits that individuals are captivated by the most salient and unusual outcomes when making decisions under risk due to their limited cognitive attention. Bordalo et al. (2012) propose a context-specific model that illustrates the decision-making under the salience theory and the transformations of objective probabilities into subjective salience weights. Under their framework, choices made by investors are assumed to be context-dependent, entailing them to evaluate the salience of one outcome by comparing it to other outcomes within a given context. Moreover, investors are assumed to form return expectations based on the transformed salience probability weights rather than the objective ones with the most (less) salient attributes being overweighted (underweighted). Following this mechanism, Cosemans and Frehen

[7] Empirical results for put options are also presented for robustness tests, which are qualitatively consistent with those for call options.
[8] Choy and Wei (2023) apply another contract-rebalancing method to calculate delta-hedged option returns in their main results. Nevertheless, they also calculate option returns using our adopted method and report highly consistent summary statistics in Table A1 of their Internet Appendices.

(2021) construct a stock-market salience theory (SST) value based on U.S. stock market data. They argue that a stock's salient past upsides (downsides) would be overweighted by salient thinkers, leading to overvaluation (undervaluation) of the firm's future performance and subsequent lower (higher) realized returns. Consistent with this hypothesis, they find a significantly negative predictive power of the SST measure toward cross-sectional U.S. stock future returns empirically. More recently, Cakici and Zaremba (2022) offer further insights regarding the SST effect in the international stock markets.

Inspired by the extant evidence in the stock market, we aim to elicit salience information from equity option returns and assess whether the salience effect is also priced in the equity options market. We formulate option-based salience theory (OST) value via the following steps which closely adhere to the theoretic framework of Bordalo et al. (2012) and the empirical design of Cosemans and Frehen (2021).

To begin with, we follow Christoffersen et al. (2018) and Choy and Wei (2023) in computing daily delta-hedged returns as the delta-hedged option gain scaled by the initial option investment:

$$R_{t,t+1}^{DH} = \frac{O_{t+1} - O_t - \Delta_t (S_{t+1} - S_t)}{O_t} + \frac{\Delta_t}{O_t} S_t r_t, \tag{2}$$

where $S$, $O$, $\Delta$, and $r$ refer to the underlying stock price, option mid-price, option delta, and daily risk-free rate respectively, and the last term represents interest income/cost resulting from the stock's position.

In the second step, we measure the salience of individual options' daily delta-hedged returns, where two imperative elements that need to be specified are the measurement period and context choice set. In line with Barberis et al. (2016), we assume that option investors infer a set of future return states from the distribution of past returns when choosing among options. Following Cosemans and Frehen (2021), we employ the daily option delta-hedged returns over the past month as the measurement period by which the state space is formed. Second, the salience theory suggests that the context with respect to which salience is defined coincides with the choice set (Cosemans and Frehen, 2021), and it is common to assume the choice set of a given market consists of all individual assets traded in that market. Herein, we employ the options returns on the S&P 500 index, the most representative and actively traded index options in the U.S. equity options market, as our proxy for the market benchmark against individual equity options.[9] In this case, the salience of daily delta-hedged option return is estimated as follows:

$$\sigma(R_{i,s}^{DH}, R_{SPX,s}^{DH}) = \frac{|R_{i,s}^{DH} - R_{SPX,s}^{DH}|}{|R_{i,s}^{DH}| + |R_{SPX,s}^{DH}| + \theta}, \tag{3}$$

[9] One may argue the S&P500 index consists of only the 500 largest U.S. stocks while does not represent the entire optionable stock universe. To address this concern, we also formulate an alternative market index based on the equal-weighted delta-hedged returns on all options at each trading day. The results using this alternative context are reported in robustness tests and remain qualitatively similar as our main results.

where $R_{i,s}^{DH}$ refers to the delta-hedged return of option $i$ at day $s$ as in Eq. (2), $R_{SPX,s}^{DH}$ represents the delta-hedged return of the S&P 500 index option at day $s$, and $\theta$ is the parameter controlling for the zero salience payoffs which we set as 0.1 following Cosemans and Frehen (2021) and Cakici and Zaremba (2022).

Next, we calculate the salience weights of each option daily return $R_{i,s}^{DH}$ based on its salience determined by Eq. (3). More specifically, a salient thinker is assumed to rank each option return, replace its objective state probability with the salience-weighted probability, and intuitively assign more weights to more salient returns. Regarding the objective probability $\pi_s$, it is equally weighted among all option daily returns with the assumption of $S$ trading days for a given month, that follows $\pi_s = 1/S$ and $\sum_{s=1}^{S} \pi_s = 1$. In terms of salience-weighted probability $\tilde{\pi}_{i,s}$ across different days, it is transformed via the following equation:

$$\tilde{\pi}_{i,s} = \pi_s \times \omega_{i,s}, \tag{4}$$

where $\omega_{i,s}$ is the salience weight given by:

$$\omega_{i,s} = \frac{\delta^{k_{i,s}}}{\sum_{s'} \delta^{k_{i,s'}} \times \pi_{s'}}, \tag{5}$$

The salience weight is established in this way to ensure the salience-weighted probabilities are normalized to sum to 1 ($\sum_{s=1}^{S} \tilde{\pi}_{i,s} = 1$) and so that more subjective weights are attributed to more salient returns. The parameter $\delta$ captures the degree to which the salience distorts the decision, with lower $\delta$ leading to more weights placed on more salient returns. When $\delta = 0$, salience distortion will reach its maximum degree where the investor only considers the most salient payoff when making decisions. Following Bordalo et al. (2012) and Cosemans and Frehen (2021), we set $\delta = 0.7$ in our analyses.[10]

Finally, the OST value for each option at each month's end is computed as the covariance between salience weights ($\omega_{i,s}$) and daily delta-hedged option returns ($R_{i,s}^{DH}$) over the measurement period of the past one month:

$$\begin{aligned} OST = cov\left[\omega_{i,s}, R_{i,s}^{DH}\right] &= \sum_{s}^{S} \tilde{\pi}_{i,s} R_{i,s}^{DH} - \sum_{s}^{S} \pi_s R_{i,s}^{DH} \\ &= \mathbb{E}^{ST}\left[R_{i,s}^{DH}\right] - \bar{R}_{i,s}^{DH}, \end{aligned} \tag{6}$$

OST in Eq. (6) essentially captures the difference between subjective salience-weighted expectation and objective equal-weighted expectation of investors towards future returns. A positive OST value suggests the largest daily winner against the market stands out from other daily outcomes within the measurement period of the past month, attracts the most attention from the option investors, and contributes the most subjective decision weight to the investors' future return expectations. Analogously, a negative OST value indicates that option investors are predominantly driven by the most salient past daily loser when forming

[10] In the robustness test, we also verify the immaterial impacts of alternative parameters on the predictive power of OST.

their mental expectations. We hypothesize that higher (lower) OST value can capture investor's overestimation of the past salient upsides (downsides) and the over-pricing (underpricing) of the option, which will result in lower (higher) subsequent option returns in the cross-section.

[Table 2]

The OST measure used for our main results is constructed by the average daily delta-hedged returns of call and put options. To provide a comprehensive analysis, we also form option salience theory values separately for daily returns by call options ($OST_{Call}$) and put options ($OST_{Put}$), and their empirical results are reported in robustness tests. Descriptive statistics of OST, $OST_{Call}$, $OST_{Put}$ are presented in Table 2, along with 27 other characteristics. Our comprehensive list of 27 stock and option characteristics is drawn from the empirical evidence in prior literature (Goyal and Saretto, 2009; Cao and Han, 2013; Vasquez, 2017; Zhan et al., 2022). In particular, we include the stock-market salience theory value (SST) in our list to examine if it is priced also in the equity option market and test its joint relationship with the OST value. Detailed descriptions of each characteristic are reported in the Internet Appendix Table A1. From Table 2, we observe that the three option-salience-induced measures share comparable time-series average means of about 0.03 and are all positively skewed, while the volatility of OST is slightly lower than that of $OST_{Call}$ and $OST_{Put}$. We also observe the average institutional ownership exceeds 70%, aligning with that of 69% reported by Zhan et al. (2022) and confirming that optionable stocks are predominantly held by institutional investors.

[Table 3]

We further report the pairwise correlation coefficients between the OST measures and other stock and option characteristics in Table 3. Naturally, OST displays a high correlation with $OST_{Call}$ (0.74) and $OST_{Put}$ (0.73). However, OST is not highly correlated with any of the stock- and option-market characteristics, particularly the SST (0.03). The highest correlation related to OST is 0.23 with SMAX(5), the average of the five highest daily returns of the underlying stock in the previous month (Bali et al., 2011). It is interesting to point out that the correlation between SST and stock return reversal is 0.75 which is in line with the 0.65 reported by Cosemans and Frehen (2021) and 0.6013 reported by Cakici and Zaremba (2022) across 49 countries. In contrast to SST, we do not observe a high correlation between OST and $RET_{(-1,0)}$. In consequence, our preliminary analyses already suggest the heterogeneous salience information embedded in directional stock returns and directionless delta-hedged option returns. Another notable point is the correlation between $OST_{Call}$ and $OST_{Put}$ is merely moderate at 0.26, underscoring the potential information heterogeneity embedded in call option and put option returns as well.

# 3. Empirical Results

In this section, we present our main empirical results regarding the relations between delta-hedged call option returns and OST value based on univariate and bivariate portfolio sorting and Fama-Macbeth regressions. We also conduct in-depth examinations to explore the connections between the salience effect in the options market and various factors such as limits to arbitrage, investor sentiment, market conditions, and investor attention.

## *3.1. Option returns sorted on option-based salience value*

Table 4 presents the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW)[11] average monthly excess returns of decile portfolios sorted on OST at the end of each month spanning January 1996 and December 2022. In line with Cao and Han (2013), while we rely on the call option delta-hedged returns as our main results for discussions, our findings are robust also to put options which we will discuss in the next section. Portfolio 1 (low OST) is the portfolio of delta-hedged options with the lowest OST value during the past month and portfolio 10 (high OST) contains delta-hedged options with the highest OST. In addition to the excess returns and HML (high-minus-low OST portfolios) return spreads, we also report the return alphas adjusting for the stock four- and seven-factor models and an option two-factor model. The stock four-factor model (S4F) is based on Fama and French (1993) and Carhart (1997). The stock seven-factor (S7F) model is based on Fama and French (2015) augmented with the liquidity and momentum factors. The option two-factor (O2F) model is based on IVOL (stock idiosyncratic volatility) and Ln(Amihud) (Amihud's (2002) illiquidity measure) factors as in Zhan et al. (2022). We also report the annualized Sharpe ratio (SR) and maximum drawdown (MDD) computed as the maximum percentage of portfolio loss from the portfolio's maximum value in the past.

[Table 4]

As reported in Table 4, the EW return difference between high and low portfolios is -0.57% per month with a corresponding Newey and West (1987) t-statistic of -7.99. Differences in alphas are -0.56% (t-stat = -8.18) accounting for S4F, -0.55% (t-stat = -7.91) for S7F, and -0.55% (t-stat = -7.14) for O2F, unequivocally confirming that the HML portfolio alphas are economically and statistically significant. Portfolio sorting results based on OVW and SVW schemes further confirm that return differences between high and low OST deciles are significant at -0.79% (t-stat=-4.37) and -0.36% (t-stat=-6.11) per month which cannot be accounted for by any factor models.[12] Furthermore, all LMH portfolio returns generate exceptionally high Sharpe ratios, being 1.81 for EW, 1.31 for SVW, and 0.95 for OVW on an annual basis.

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[11] Option-value-weighted scheme derives from open interest and mid-price quote of an option, whereas stock-value-weighted scheme is based on market capitalization of the underlying stock at the end of previous month.

[12] For the analysis in Table 4, we exclude options on stocks that are not listed in the three major exchanges; however, the results are similar using all options. In the Internet Appendix Table A5, we further show that when we restrict the contract initiation rule to include only options with both calls and put at initiation, our results remain consistent.

The relatively lower SR of the OVW portfolio aligns with its higher MDD as well, which is approximately 25% (yet still rather low) compared to only about 5% for EW and SVW portfolios. Our results echo that of Cosemans and Frehen (2021) in that returns are lower for options with salient upsides than for options with salient downsides and suggest that the salience effect is present not only in directional asset returns, such as equity and bond, but also in directionless delta-hedged option returns.

Focusing on the return pattern across deciles, it is clear that the average returns of deciles 1-8 are not uniformly decreasing with increasing OST. The pattern in deciles 1-8 remains more-or-less flat or follows a weak U-shape, while average returns drop dramatically in deciles 9-10. To recall, a similar pattern of pricing effect can also be observed in prior literature, such as Bali et al. (2011). [13] This suggests that the salience effect is most evident in the most salient upside option returns, representing speculative behavior in the options market. More recently in Lin and Zhang (2022), the authors also discover a remarkably similar pattern but towards the most salient downside returns. Our results together with those of Lin and Zhang (2022) jointly highlight a conventional belief that the options market is dominated by speculative behavior while the bond market is considered a safe haven. In particular, option investors are speculative in nature and focus on the upside salience returns while the bondholders are mainly risk-averse and focus on the downside salience returns.

[Table 5]

To understand better the characteristics of firms (and their options) of the high (versus low) OST portfolios, Table 5 reports the mean statistics for options in each decile. As OST increases across the deciles, SMAX(5) significantly increases in the same direction which is not surprising as salience returns are partly related to the magnitude of maximum returns. OST is positively associated with IV, supporting our conjecture that high salience options are overvalued due to increased attention to salient returns. On the other hand, the negative relationship between TSIV and OST further supports such observation. When the OST value is high, overvaluation occurs more strongly for short-term options, resulting in a higher 1-month IV relative to the 6-month IV and a lower TSIV. In addition, OST is associated with some representative proxies to limits to arbitrage, comprising negative trends with stock size and number of analysts on a firm, and positive correlations with stock idiosyncratic volatility and stock illiquidity. The negative relation between OST and institutional ownership, on the other hand, appears not to be very significant. Considering the patterns these characteristics exhibit across the OST deciles, one might have concerns that the predictive power of OST is due to other characteristics or a mix of them. In the next subsections, we test whether the negative relation between OST and cross-sectional option returns holds if we control for different characteristics using bivariate portfolio sorting and Fama-Macbeth (1973) regressions.

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[13] The stock maximum effect examined in Bali et al. (2011) also displays the strongest correlation with our OST value, as discussed in Section 2.3.

### *3.2. Bivariate portfolio sorts*

In this section, we examine the relationship between OST and future option returns after controlling for 27 established stock- and option-based characteristics. Specifically, we first form tercile portfolios based on a controlling characteristic. Then within each tercile, we further sort options into decile portfolios on OST. In Table 6, we report bivariate sorting results based on EW, OVW, and SVW weightings in Panels A, B, and C respectively. For brevity of presentation, we only report the average returns across the three controlling characteristic portfolios. The last two rows in each Panel report the return difference between deciles 10 and 1, and the alpha spreads from the the option two-factor model. Corresponding t-statistics based on Newey and West (1987) are reported in parentheses.

[Table 6]

From Panel A, it is clear that OST remains significant economically and statistically when each of the 27 stock and option characteristics is controlled for, including SMAX(5) which has shown to be the most correlated with OST. Notably, when SST is controlled, return and alpha differences of OST-sorted option portfolios are similar to those reported in Table 4 and remain nearly unchanged. This suggests that there is almost no information overlapped between stock- and option-market measures of salience and indicates that the informational content of salience theory value is domain-specific. When we control for TSIV, return and alpha spreads of OST-sorted portfolios are smaller in magnitude but remain economically large and statistically significant. This seems to support the view that TSIV, which captures investors' expectations of increasing volatility or jump risk, shares some common information about the overvaluation of options with OST in the cross-section.

Turning to Panels B and C of Table 6, we obtain similar findings that OST remains highly significant when each of the stock and option characteristics is controlled through bivariate portfolio sorting using alternative weighting schemes. These results indicate that for both stock- and option-value-weighted portfolios, key characteristics that have been shown to explain cross-sectional option returns cannot explain the low future returns to high OST options.

### *3.3. Firm-level Fama-Macbeth regressions*

Although univariate and bivariate portfolio sorting analyses offer the advantage of being non-parametric, they lack the ability to simultaneously control for multiple characteristics. To address this limitation, we examine the cross-sectional relation between OST and one-month-ahead option returns (in percentages) at the firm level using Fama and MacBeth (1973) regressions.

[Table 7]

Table 7 reports the time-series averages of the slope coefficients from January 1996 to December 2022. All independent variables are standardized to have zero mean and unit variance in each month. The univariate regression in column (1) reveals a negative and statistically significant relation between OST and the cross-section of future option returns. The average slope coefficient of OST is -0.172 with a t-statistic of -8.63. Consistent with the portfolio sorting results, we find that OST strongly and negatively predicts one-month-ahead delta-hedged option returns. A two-standard deviation increase in OST predicts a decrease in next month's option return of 34.4bps. Column (2) again confirms that the stock-based salience theory value does not affect the predictive power of OST, nor significantly predict ex-post option returns itself. Indeed, the magnitude and statistical significance of OST increase when SST is controlled for. In Columns (3) to (4), controlling for size, illiquidity, book-to-market, reversal, and momentum does not change the coefficient of OST. This again confirms our portfolio sorting results and contrasts with Cosemans and Frehen (2021) and Lin and Zhang (2022) who find a significant decline in salience theory value's coefficients when the reversal effect is controlled in the equity and bond market setups. When SMAX(5) is augmented in Column (5), we see a slight decline in the magnitude of the OST coefficient to -0.132. Interestingly, the controls of other characteristics in Columns (6)-(15) have no negative impact on the OST coefficient and indeed increase the magnitude of the OST coefficient from -0.132 in Column (5) to -0.204 in Column (15). This again confirms the predictive power of OST to option returns in the cross-section and highlights an interesting fact that predictability strengthens when other priced effects are controlled for. Lastly, it is important to note that all t-statistics of OST coefficients in Table 7 are above 5 and comfortably exceed the hurdle of 3 proposed by Harvey, Liu and Zhu (2016) regarding cross-sectional pricing.

Based on the portfolio-level bivariate sorting and firm-level regression analyses insofar, a clear conclusion we obtain is the existence of an economically and statistically significant relation between OST and future options returns, which supports our conjecture that the salience effect exists prominently in the equity options market. Moreover, OST is also verified to encompass fundamentally heterogeneous salience information against that observed in the underlying stock market, revealing the uniqueness of our study.

### *3.4. The role of limits to arbitrage*

In the previous subsections, we learn that investors' salience of upside returns leads to the overvaluation of options and subsequently lower returns when arbitrage forces the prices to normalize.[14] In the presence of limits to arbitrage, mispricing caused by salience investors cannot be quickly corrected. In line with Cosemans and Frehen (2021), we expect the salience effect to be stronger when limits to arbitrage (LTA) are more pronounced. To capture information about LTA, we employ variables such as size, illiquidity, idiosyncratic volatility, and analyst coverage as our proxies for LTA. In general, arbitrage tends to be more expensive or challenging to execute with small and illiquid stocks, as well as with stocks characterized by elevated idiosyncratic volatility (Brav, Heaton and Li, 2010). Stocks with low analyst coverage are also

[14] As in Cosemans and Frehen (2021), salience-driven demand for stocks will be correlated across investors and can exert pressure on prices, given limits to arbitrage that prevent rational investors from correcting mispricing.

considered to have higher arbitrage risk due to limited information availability which leads to information and valuation uncertainty (Zhang, 2006; Lam and Wei, 2011). As outlined in Section 3.1, we have also observed strong correlations between the movements of OST and these LTA proxies. We do not include institutional ownership as the option market is dominated by institutional investors and we do not observe much heterogeneity in IO in our option sample in previous subsections.

We examine the impacts of LTA on OST value by detailed bivariate sorting analyses. Specifically, We first sort options into tercile portfolios according to each of the LTA measures, and then within each tercile portfolio, we further sort options into deciles according to OST. Table 8 reports the average monthly returns across all 30 portfolios. From Panel A of Table 8, OST-sorted returns are significantly more pronounced for firms with smaller sizes, higher illiquidity, higher idiosyncratic volatility, and lower analyst coverage. These results corroborate our hypothesis that the salience effect is stronger with greater limits to arbitrage. Similar results are obtained in Panels B and C when the portfolio returns are option- and stock-value-weighted respectively.

[Table 8]

### *3.5. Salience and investor sentiment*

Motivated by the study of Stambaugh, Yu and Yuan (2012) who find pricing anomalies are in general stronger when sentiment is high, we investigate potentially different salience effects during different sentiment regimes. Specifically, Cosemans and Frehen (2021) also investigate the salience effect in high- and low-sentiment regimes and find a stronger salience effect in high-sentiment regimes. In line with these findings, we expect an increased effect of salience on option returns during periods of high sentiment. Based on the investor's sentiment indices of Baker and Wurgler (2006), a period is defined as low-sentiment (high-sentiment) when sentiment is below (above) the median over the index sample period from July 1965 to June 2022.[15] In addition to the ordinary sentiment index, we also employ their orthogonalized sentiment index for robustness. Results in Table 9 confirm our hypothesis that the salience effect is more pronounced during periods of high sentiment. Considering the investor's sentiment index in Panel A, the monthly EW option returns difference is -0.73% (t-stat=-7.05) following high sentiment and -0.41% (t-stat=-5.34) following low sentiment. The spread between EW HML portfolio returns during high and low sentiment regimes is -0.32% per month (t-stat -2.71). The statistical significance of the return difference is generally weaker when portfolios are option- and stock-value-weighted but the pattern persists. We also obtain similar findings when the orthogonalized version of the investor's sentiment index is employed. Findings from Table 9 are again consistent with our anticipation that the salience effect is stronger when sentiment is high.

[15] In an unreported test, we also apply the median value over our sample period from January 1996 to June 2022. The results remain consistent and are available upon request.

[Table 9]

### 3.6. The impact of market condition

Cakici and Zaremba (2022) examine the salience effect under different market conditions regarding volatility and short-term market returns and find that the salience effect is stronger under extreme market conditions (i.e. when volatility is high and recent return is low). [16] To validate if such a tendency also applies to the salience effect in the options market, we perform a subperiod analysis based on the levels of the CBOE volatility index (VIX) and past market returns. [17] Specifically, we split the sample into two equal sub-sample by the median of VIX and past market returns and report the results in Table 10. In Panel A of Table 10, we find that the salience effect is indeed stronger when volatility is high. The difference between high and low OST-sorted EW portfolio alphas is -42 bps per month with a t-statistic of -2.49. Patterns in OVW and SVW portfolios are similar and support the findings from EW portfolios that the salience effect in the options market is stronger when volatility is high.

Turning to Panel B of Table 10 regarding bull versus bear markets, we do not find any statistically significant difference between the alphas of high-low portfolios realized during high versus low regimes of market returns. This result is in contrast to Cakici and Zaremba (2022) but not surprising, as delta-hedged option portfolios take away the directional risk which means directional market movement does not necessarily play a role in determining the strength of the salience effect in delta-hedged options returns.

[Table 10]

### 3.6. Salience and investor attention

In the framework of Bordalo et al. (2012), agents' salience is considered a form of attention given to salient outcomes. To investigate if OST contains similar information as in other attention-based measures, we consider a number of investor attention proxies. In line with Cosemans and Frehen (2021), we first consider the following four abnormal returns- and volume-based measures according to Gervais, Kaniel and Mingelgrin (2001) and Barber and Odean (2008): i) maximum absolute abnormal daily return within the month (ABNRETD); ii) absolute abnormal monthly return (ABNRETM); iii) maximum abnormal daily trading volume within the month (ABNVOLD); and iv) abnormal monthly trading volume (ABNVOLM). We define abnormal returns as the deviation of individual stock returns from the market index. A stock's abnormal volume is computed by comparing the volume to its average over the past year. Second, we consider the investor attention measures of Choy and Wei (2023). In Choy and Wei (2023), the authors consider four dummy-variable-based measures as proxies for investor attention. Analogous to their measures, the $I_W$ ($I_L$) of a stock is 1 if the stock is among the top (bottom) 80 winners (losers) at least once

[16] Cakici and Zaremba (2022) also find that salience effect exists predominantly in micro-cap. We do not find the existence of such phenomenon. This is likely due to the fact that optionable stocks tend to be non-micro-cap stocks.
[17] The VIX index is acquired from Bloomberg.

but never becomes the losers (winners) during the month and 0 otherwise. The $I_{WL}$ of a stock is 1 if the stock has been both a winner and a loser at least once in the month. $I_{Never}$ of a stock is 1 if the stock has never been a winner nor a loser during the month.[18]

[Table 11]

To control for abnormal return and volume measures, we employ the bivariate sorting method and report the results in Panels A to C in Table 11 for equal-, option-value-, and stock-value-weighted portfolio return and alpha spreads respectively. We also report the Fama-Macbeth regression results for abnormal return and volume measures with and without controls respectively in Panels D and E of Table 11. For dummy-variable-based measures, since portfolio formation is not applicable, we control for investor attention effect using Fama-Macbeth regressions and report the results with and without controls respectively in Panels F and G of Table 11. From Panel A, the high-low equal-weighted return difference of OST remains significant when each of the abnormal returns and volume is controlled for in the bivariate sortings. The magnitude of the return difference decreases in the case of ABNRETD but remains statistically significant. Results based on other weighted schemes remain largely consistent as well. Turning to Panels D and E, in line with the results based on bivariate sorting, the magnitude of the OST coefficient decreases when ABNRETD is controlled for while remaining significant. Results in columns (2) to (4) further confirm that OST contains unique information when compared to abnormal return- and volume-based attention measures.

When the investor attention measures of Choy and Wei (2023) are controlled in Panels F and G, OST remains significant in all four cases. Our results confirm that OST does not share much overlapping information with daily high/low-based attention. In summary, we find that the negative predictability of OST value on future delta-hedged options returns is robust to controlling for various proxies for investor attention from the literature. The findings in this subsection also provide supportive evidence of the disparate information that the salience effect captures during the decision-making process of investors. While stock visibility such as the appearance of newspapers or other attention-grabbling news plays an important role in the first stage of investors' choice process by determining their choice set, option salience distorts investors' expectations of future returns and thus affects the second stage of investors' decision process by determining which assets to choose due to their salience against others within the choice set.

## 4. Robustness Tests

Having established that the salience effect plays an important role in cross-sectional option pricing, we carry out a battery of robustness tests to understand if the results we obtained in the previous section are consistent with holding until maturity, the use of delta-hedged put options, alternative constructions of

[18] More detailed definitions of these investor attention characteristics can be found in Panel C of Internet Appendix A1.

option salience theory value, different subperiods, alternative state space specifications, alternative choice context and salience parameters, and accounting for transaction costs.

### 4.1. *Holding until maturity*

In the preceding section, portfolio sorting results are based on the assumption that delta-hedged option positions are closed after a one-month holding period at the following month-end. In this subsection, we examine if our results remain robust when the delta-hedged option exposures are held until maturity. For the economy of space, we report the results based on holding until maturity in the Internet Appendix Table A2. We find that the predictive power of OST has indeed increased when the delta-hedge option positions are held until maturity. Return differences for EW, OVW, and SVW strategies are -0.74%, -0.96%, and -0.49% per month with corresponding t-statistics of -7.94, -4.28, and -7.52 respectively. All alphas are also highly significant with absolute t-statistics exceeding 4.15 and comfortably surpassing the threshold of 3 proposed by Harvey et al. (2016).

### 4.2. *OST and delta-hedged put option returns*

One potential concern may arise regarding whether the return predictability of OST on delta-hedged call options, as documented thus far, is predominantly steered by the underlying stock return predictability. If so, the pricing direction of OST would be the opposite for call and put options. To address this concern, in this subsection, we assess the predictive power of our OST value on delta-hedged put option returns in the cross-section. Applying the same method as outlined in Section 3.1, we repeat the univariate portfolio-level analysis on put options with results reported in the Internet Appendix Table A3. The outcomes unequivocally reveal the OST-sorted put option portfolio return differences retain significantly negative across all three weighting schemes and adjusted for all factor models, as well as generate rather high annualized SRs and low MDDs. These findings align closely with those reported for call options in Table 4, confirming that the OST pricing effect applies to both types of options and is not solely driven by directional stock returns.

### 4.3. *Alternative constructions of option salience theory value*

Our analyses and discussions insofar have primarily centered on OST which is constructed by the average daily returns on both call and put options. In this subsection, we investigate if such pricing effect would persist when we form salience theory value based solely on call option ($OST_{Call}$) or put options ($OST_{Put}$). This investigation is not redundant, given the merely moderate correlation of 0.26 between $OST_{Call}$ and $OST_{Put}$, as detailed in Table 3. To align the informational source with the pricing cross-section, we report univariate results of delta-hedged call option returns sorted by $OST_{Call}$ in Panel A and those of put options ranked by $OST_{Put}$ in Panel B of Internet Appendix Table A4. We find consistent and sometimes even more pronounced predictability of $OST_{Call}$ and $OST_{Put}$ in their corresponding option returns across all three weighted schemes. These findings confirm that the salience effect we observe in cross-sectional option returns is not subject to the use of matched call and put option pairs as a signal source.

### *4.4. Subperiod analysis*

Next, we compare the predictive power of OST during different periods. Specifically, we divide the sample into two periods that are mainly before (1996-2008) and after (2009-2022) the 2008 Great Financial Crisis (GFC). We also specify a subperiod (2000-2022) that excludes the 1999 dot-com bubble, during which a considerable amount of attention was drawn to high-tech stocks. Additionally, we specify three subperiods based on the exclusion of the 1999 dot-com bubble, 2008 GFC, and both. Subperiod portfolio sorting results are reported in Panels A to C in Table 12 for EW, OVW, and SVW portfolios. We also report univariate and multivariate Fama-Macbeth regression results in Panels D and E of Table 12 respectively. We discover that the salience effect is relatively weaker in the post-2008 era when compared to the period before. Excluding the crisis years almost has no effect on the magnitude of the option-market salience effect. Fama-Macbeth regression results in Panels D and E also confirm such patterns with and without control variables. Overall, our results suggest that the OST effect on option return does not appear to be time-specific or driven by certain periods of time.

[Table 12]

### *4.5. Alternative state space specifications*

Another possible doubt regarding the estimation of OST pertains to the state space on which the OST measure is constructed. In our main results, we chose a relatively short time window in constructing our OST measure as we agree with Cosemans and Frehen (2021)'s view that salient thinkers tend to recall only the most recent returns. This phenomenon is also supported by Greenwood and Shleifer (2014) who argue that investors overly rely on recent realization of returns when extrapolating to form expectations of future returns. While we expect the salience effect to be weaker when OST is constructed using a state space further back into history, doing so will allow us to understand if the salience effect is conditional on constructing the OST measures using a short time window. To investigate this, we construct alternative OST measures based on different windows of one month, one quarter, six months, and one year of daily returns. As emphasized by Cakici and Zaremba (2022), including the last day in the sample seems to play an important role in determining the informational content of stock-market salience theory value. For robustness, for each window size, we also estimate OST by dropping the last day in the sample.

[Table 13]

Portfolio sorting results based on alternative OST constructed using different state space specifications are reported in Table 13. Through univariate portfolio sorting results presented In Panels A to C of Table 13, we observe two interesting trends: i) the salience effect is generally slightly weaker when the last day of the sample is dropped; ii) the return difference generally decreases when the window size in estimation increases. Observation i) is in line with the intuition of Cakici and Zaremba (2022) but instead of the stock market, we offer the empirical evidence supporting their claim in the option market. The decreases in return differences with increasing window size echo the view of Greenwood and Shleifer (2014) and Cosemans and Frehen (2021) suggesting that investors tend to recall only more recent returns and support the choice of a short estimation window for OST. Nevertheless, OST-sorted option portfolio return differences and alphas remain consistent throughout. Fama-Macbeth regression results in Panels D and E of Table 13 are also generally in line with the above observations.

### *4.6. Alternative choice context and salience specifications*

In the estimation of OST using Eqs. (3) to (5), two key assumptions we take are that i) option investors pay attention to index option returns and compare their returns accordingly; and ii) option market investors share similar salience formation characteristics, captured by parameters $\theta$ and $\delta$, when compared to laboratory subjects. To understand how the choice context and parameters affect the predictive power of OST, we estimate alternative OST measures based on different benchmark returns and parameters. First, instead of using S&P 500 index option returns, we use equal-weighted delta-hedged option daily returns for all optionable stocks as an alternative benchmark and report the results under the label "EW DHR" in Table 14. Second, we also present results sorted by OST formed via different parameter values of $\theta$ and $\delta$. In columns 2 and 3, we set $\theta$ to 0.05 and 0.15 separately, while keeping $\delta$ fixed at 0.7 as in baseline. In columns 4 and 5, we set $\delta$ equal to 0.6 and 0.8 respectively while maintaining $\theta$ the default value of 0.1. Univariate portfolio sorting results are reported in Panels A to C in Table 14 across different weighting schemes. Corresponding Fama-Macbeth regression results are summarized in Panels D and E. From Panels A to C, it is evident that OST-sorted return and alpha differences remain highly significant when the equal-weighted delta-hedged return is used as the benchmark. Moreover, the pricing implications of alternative OST formed on EW DHR appear to be slightly weaker, suggesting the S&P500 index option to be indeed a more representative benchmark for equity option investors. Switching $\theta$ and $\delta$ parameters also does not affect the significance of OST results. Fama-Macbeth regression results in Panels D and E further confirm that the salience effect we discover in the options market is robust to using alternative choice context and parameters in estimation.

[Table 14]

### *4.7. Impact of transaction costs*

As pointed out by Heston et al. (2023), options traders commonly use limit orders, and the utilization of complex order books enables them to post limit orders for multileg strategies that offer better prices than taking bids or asks of each leg separately. It is thus difficult to realistically account for transaction costs for options strategies. It is also crucial to highlight that end-of-day quoted spreads tend to overestimate the bid-ask spread a trader faces during the active trading session (Muravyev and Pearson, 2020). Importantly, incorporating transaction costs by applying a percentage of the end-of-day quoted spread in a simplistic manner only provides insights into the strategy's viability when the signal is traded in isolation. Bearing these in mind, Table 15 reports the delta-hedged options returns for the salience strategy after adjusting for transaction costs. We report the strategy returns for a range of effective spread (ESPR) to quoted spread (QSPR) ratios from 0% to 30%. Results in Table 15 suggest that the EW strategy can withstand a 10% ESPR/QSPR before becoming marginally insignificant at 15%. On the other hand, OVW (SVW) exhibits relatively greater resilience, enduring an ESPR/QSPR ratio of up to 30% (25%). These results suggest that the OST strategy remains profitable for "algo" traders, as defined in Muravyev and Pearson (2020), who generally trade at around 20% of the quoted spread.

[Table 15]

# 5. Conclusion

Motivated by the recent empirical evidence documenting that the salience effect exists in various asset classes' cross-sectional returns, we examine the asset pricing implications of investors' salience in the options market. Based on the model of Bordalo et al. (2013) and the empirical implementation of Cosemans and Frehen (2021), we estimate the option's salience theory value OST and find its robust and negative predictive power to future delta-hedged option returns. The return spread between the high- and low-salience deciles is economically and statistically significant, and cannot be explained by common risk factors from stock and option markets. Bivariate sorting results controlling for a comprehensive list of 27 firm-specific stock- and option-based characteristics also yield consistent findings. Firm-level Fama-Macbeth regression further supports the findings obtained from portfolio sorting analysis. All analyses unequivocally support our conjecture that the investors' salience effect is present in the options market.

We find that the salience effect is stronger when investor sentiment is high, limits to arbitrage are high, and volatility is high. Our analysis also suggests that the salience effect is different from investor attention proxied by abnormal return, abnormal volume, and daily high/low ranking of firms. Furthermore, our findings shed new light on the presence of heterogeneous salience information embedded in directional stock returns and directionless delta-hedged option returns. While the stock salience effect is not priced in the equity options market, the option salience effect is a prominent behavioral determinant of cross-sectional option returns. This highlights the unique contributions and implications of our study. Our work not only demonstrates the importance of salience in cross-sectional option pricing but also advocates for the consideration of other decision-making theories in the empirical pricing of options. We leave this for future research.

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**Table 1**
**Pooled summary statistics of option returns.**
Panel A (B) reports the pooled summary of delta-hedged long call (put) strategy returns with daily rebalancing. The first two rows in each panel present the returns of positions held for 1 month and until option maturity. Moneyness is the ratio of stock price to option strike price. Days to maturity is the number of calendar days until the option expires. Scaled Vega is the option vega scaled by the stock price. Option bid-ask spread is the ratio of the difference between the ask and bid quotes of the option to the midpoint of the bid and ask quotes at the end of each month. The sample period is January 1996 to December 2022.

| | Mean | Std. | P10 | P25 | Median | P75 | P90 | Skew | No. Firms |
|---|---|---|---|---|---|---|---|---|---|
| | | | | ***Panel A: Pooled summary of returns to daliy rebalanced delta-hedged long call (291467 Obs.)*** | | | | | |
| **Option return until month-end (%)** | -0.35 | 5.83 | -5.01 | -2.44 | -0.59 | 1.24 | 4.19 | 6.50 | 902 |
| **Option return until maturity (%)** | -0.63 | 7.23 | -6.55 | -3.14 | -0.74 | 1.44 | 4.93 | 11.91 | 902 |
| **Moneyness = S/K (%)** | 98.34 | 5.88 | 90.83 | 95.29 | 98.85 | 101.35 | 104.67 | -0.04 | 902 |
| **Days to maturity** | 49.58 | 2.17 | 46.00 | 49.00 | 50.00 | 51.00 | 52.00 | -0.70 | 902 |
| **Scaled Vega** | 0.14 | 0.01 | 0.12 | 0.13 | 0.14 | 0.15 | 0.15 | -2.82 | 902 |
| **Option bid-ask spread (%)** | 19.67 | 22.53 | 4.26 | 7.27 | 12.50 | 22.22 | 40.41 | 3.34 | 902 |
| | | | | ***Panel B: Pooled summary of returns to daliy rebalanced delta-hedged long put (218811 Obs.)*** | | | | | |
| **Option return until month-end (%)** | -0.21 | 4.55 | -4.04 | -2.09 | -0.57 | 1.03 | 3.63 | 3.54 | 677 |
| **Option return until maturity (%)** | -0.38 | 5.52 | -5.22 | -2.67 | -0.74 | 1.24 | 4.43 | 2.83 | 677 |
| **Moneyness = S/K (%)** | 101.44 | 6.07 | 94.97 | 98.40 | 100.85 | 104.37 | 109.38 | 0.16 | 677 |
| **Days to maturity** | 49.53 | 2.18 | 46.00 | 49.00 | 50.00 | 51.00 | 52.00 | -0.68 | 677 |
| **Scaled Vega** | 0.14 | 0.02 | 0.11 | 0.13 | 0.14 | 0.15 | 0.15 | -2.40 | 677 |
| **Option bid-ask spread (%)** | 17.27 | 20.60 | 3.73 | 6.45 | 11.11 | 19.61 | 35.62 | 3.72 | 677 |

**Table 2**
**Equity & option characteristics.**
This table reports the time-series average of cross-sectional statistics of equity and option characteristics (winsorized each month at the 0.5% level) used to predict delta-hedged option returns. OST is the option-market salience theory value estimated by the average of daily returns to delta-hedged call and put strategies. $OST_{Call}$ and $OST_{Put}$ are the OST values extracted respectively by daily returns to delta-hedged call and delta-hedged put. SST is the stock-market salience theory value from stock returns as in Cosemans and Frehen (2021). Ln(ME) represents the logarithm of market capitalization in millions of U.S. dollars. Ln(Amihud) is the natural logarithm of Amihud (2002) illiquidity measure. Ln(BM) is the logarithm of the book-to-market ratio. RET(-1,0) is the 1-month-lagged stock return. RET(-12, -2) is the cumulative stock returns from 12 months ago until 1 month ago. SMAX(5) is the average of the five highest daily returns of the underlying stock in the previous month, as in Bali et al. (2011). IO refers to the percentage of common stocks owned by institutions in the previous quarter. NOA is the number of analysts covering the firm in the previous month. IVOL is the annualized idiosyncratic volatility based on daily return observations over the past 12 months, as in Ang et al. (2006). IV is the average implied volatility of 30-day at-the-money call and put options. VOLDEV is the log difference between the realized volatility and the Black-Scholes implied volatility for at-the-money options at the end of last month, as in Goyal and Saretto (2009). PBAS is the ratio of the difference between ask and bid quotes of option to the midpoint of the bid and ask quotes at the end of each month. IVSPD is the spread between IVs of call and put options. TSIV is the term structure of IV defined as the difference between IVs of options with 6-month and 1-month to maturity as in Vasquez (2017). RNS and RNK are the risk-neutral skewness and kurtosis of stock returns respectively, as in Bakshi, Kapadia and Madan (2003), that are inferred from a cross-section of out-of-the-money calls and puts. ODP is the log difference between the market values of all options and the market value of underlying stocks at the end of last month, as in Zhan et al. (2022). CFV is cash flow variance as in Haugen and Baker (1996). CH is the cash-to-assets ratio as in Palazzo (2012). DISP is the analyst earnings forecast dispersion, as in Diether, Malloy and Scherbina (2002). $ISSUE_{5Y}$ means 5-year new issues as in Daniel and Titman (2006). PM is profit margin as in Soliman (2008). ln(PRICE) is the log of the underlying stock price at the end of last month. PROFIT is the profitability as in Fama and French (2006). TEF is total external finance as in Bradshaw, Richardson and Sloan (2006). ZS is the z-score as in Dichev (1998). The sample period is January 1996 to December 2022.

| | Sample Obs. | Mean | Std. | P10 | P25 | Median | P75 | P90 | Skew | No. Firms |
|---|---|---|---|---|---|---|---|---|---|---|
| **OST** | 290860 | 0.03 | 0.07 | -0.01 | 0.00 | 0.01 | 0.04 | 0.07 | 5.29 | 900 |
| **$OST_{Call}$** | 290861 | 0.03 | 0.09 | -0.02 | -0.01 | 0.01 | 0.04 | 0.08 | 6.00 | 900 |
| **$OST_{Put}$** | 290861 | 0.03 | 0.09 | -0.02 | 0.00 | 0.01 | 0.04 | 0.08 | 3.29 | 900 |
| **SST** | 291242 | 0.01 | 0.03 | -0.02 | -0.01 | 0.00 | 0.02 | 0.03 | 0.89 | 902 |
| **Ln(ME)** | 291388 | 7.96 | 1.52 | 6.07 | 6.84 | 7.84 | 8.99 | 10.02 | 0.34 | 902 |
| **Ln(Amihud)** | 291242 | -7.29 | 1.67 | -9.41 | -8.49 | -7.31 | -6.13 | -5.11 | 0.08 | 902 |
| **Ln(BM)** | 233268 | -1.13 | 0.89 | -2.21 | -1.64 | -1.06 | -0.52 | -0.10 | -0.86 | 722 |
| **$RET_{(-1,0)}$** | 291104 | 0.02 | 0.14 | -0.13 | -0.05 | 0.01 | 0.09 | 0.17 | 1.50 | 901 |
| **$RET_{(-12,-2)}$** | 281546 | 0.27 | 0.77 | -0.32 | -0.11 | 0.13 | 0.44 | 0.92 | 4.44 | 872 |
| **SMAX(5)** | 291321 | 0.04 | 0.02 | 0.02 | 0.02 | 0.03 | 0.05 | 0.06 | 2.27 | 902 |
| **IO** | 222814 | 0.71 | 0.19 | 0.44 | 0.61 | 0.75 | 0.85 | 0.91 | -1.07 | 690 |
| **NOA** | 243309 | 4.04 | 0.72 | 3.09 | 3.62 | 4.14 | 4.57 | 4.87 | -0.81 | 753 |
| **IVOL** | 284422 | 0.42 | 0.21 | 0.20 | 0.27 | 0.38 | 0.52 | 0.67 | 2.59 | 881 |
| **IV** | 291464 | 0.48 | 0.21 | 0.26 | 0.33 | 0.45 | 0.60 | 0.75 | 1.17 | 902 |
| **VOLDEV** | 280885 | 0.11 | 0.65 | -0.72 | -0.32 | 0.12 | 0.55 | 0.93 | 0.04 | 870 |
| **PBAS** | 291467 | 0.19 | 0.19 | 0.05 | 0.08 | 0.13 | 0.23 | 0.41 | 2.66 | 902 |
| **IVSPD** | 291464 | -0.01 | 0.06 | -0.05 | -0.02 | 0.00 | 0.01 | 0.03 | -1.62 | 902 |
| **TSIV** | 245152 | -0.02 | 0.07 | -0.07 | -0.03 | -0.01 | 0.01 | 0.03 | -1.65 | 759 |
| **RNS** | 240709 | -0.08 | 12.72 | -1.49 | -0.82 | -0.33 | 0.02 | 0.39 | 0.58 | 745 |
| **RNK** | 240707 | 3.20 | 7.13 | 0.44 | 1.19 | 2.31 | 3.93 | 6.99 | 3.54 | 745 |
| **ODP** | 274466 | -2.37 | 2.00 | -4.99 | -3.69 | -2.29 | -0.97 | 0.16 | -0.19 | 850 |
| **CFV** | 211955 | 0.23 | 3.37 | 0.01 | 0.02 | 0.03 | 0.07 | 0.18 | 14.15 | 656 |
| **CH** | 266469 | 0.15 | 0.17 | 0.01 | 0.03 | 0.09 | 0.20 | 0.36 | 1.97 | 825 |
| **DISP** | 238322 | 0.14 | 2.29 | 0.00 | 0.03 | 0.07 | 0.17 | 0.38 | 1.13 | 738 |
| **$ISSUE_{5Y}$** | 232785 | 0.21 | 0.45 | -0.14 | -0.03 | 0.10 | 0.32 | 0.68 | 3.23 | 721 |
| **PM** | 265026 | -0.34 | 3.69 | -0.22 | 0.03 | 0.11 | 0.19 | 0.31 | -13.25 | 821 |
| **Ln(PRICE)** | 291388 | 3.42 | 0.79 | 2.34 | 2.86 | 3.46 | 3.99 | 4.41 | -0.07 | 902 |
| **PROFIT** | 227490 | 0.07 | 0.23 | -0.17 | 0.02 | 0.10 | 0.18 | 0.27 | -1.19 | 704 |
| **TEF** | 227550 | 0.05 | 0.21 | -0.11 | -0.05 | 0.00 | 0.07 | 0.27 | 2.83 | 704 |
| **ZS** | 242482 | 1.57 | 1.68 | -0.07 | 0.44 | 1.35 | 2.53 | 3.74 | -1.49 | 751 |

**Table 3**

**Time-series average of cross-sectional characteristic correlations.**

The table reports the cross-sectional correlations between option-market salience theory value (OST) and other equity/option characteristics. The variables are described in Table 2 and are winsorized each month at the 0.5% level. We compute the cross-sectional correlations each month and report the time-series averages. The sample period is January 1996 to December 2022.

| | OST | OST$_{Call}$ | OST$_{Put}$ | SST | Ln(ME) | Ln(Amihud) | Ln(BM) | RET$_{(-1,0)}$ | RET$_{(-12,-2)}$ | SMAX(5) | IO | NOA | IVOL | IV | VOLDEV | PBAS | IVSPD | TSIV | RNS | RNK | ODP | CFV | CH | DISP | ISSUE$_{5Y}$ | PM | Ln(PRICE) | PROFIT | TEF | ZS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OST | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OST$_{Call}$ | 0.74 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OST$_{Put}$ | 0.73 | 0.26 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SST | 0.03 | 0.01 | 0.04 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ln(ME) | -0.11 | -0.08 | -0.12 | -0.08 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ln(Amihud) | 0.12 | 0.09 | 0.12 | 0.11 | -0.93 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | |
| Ln(BM) | 0.03 | 0.03 | 0.02 | 0.00 | -0.09 | 0.10 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | |
| RET$_{(-1,0)}$ | 0.03 | 0.01 | 0.03 | 0.75 | -0.01 | 0.05 | 0.03 | 1.00 | | | | | | | | | | | | | | | | | | | | | | |
| RET$_{(-12,-2)}$ | -0.01 | -0.01 | -0.01 | -0.02 | 0.00 | -0.03 | -0.01 | 0.00 | 1.00 | | | | | | | | | | | | | | | | | | | | | |
| SMAX(5) | 0.23 | 0.16 | 0.19 | 0.57 | -0.42 | 0.40 | -0.06 | 0.45 | 0.06 | 1.00 | | | | | | | | | | | | | | | | | | | | |
| IO | -0.04 | -0.04 | -0.03 | -0.08 | 0.13 | -0.22 | 0.04 | -0.04 | -0.02 | -0.19 | 1.00 | | | | | | | | | | | | | | | | | | | |
| NOA | -0.09 | -0.08 | -0.09 | -0.08 | 0.63 | -0.67 | -0.13 | -0.06 | -0.13 | -0.23 | 0.24 | 1.00 | | | | | | | | | | | | | | | | | | |
| IVOL | 0.09 | 0.06 | 0.09 | 0.17 | -0.58 | 0.50 | -0.12 | 0.07 | 0.18 | 0.64 | -0.23 | -0.32 | 1.00 | | | | | | | | | | | | | | | | | |
| IV | 0.12 | 0.08 | 0.11 | 0.11 | -0.62 | 0.55 | -0.11 | -0.01 | 0.08 | 0.65 | -0.25 | -0.32 | 0.79 | 1.00 | | | | | | | | | | | | | | | | |
| VOLDEV | 0.04 | 0.02 | 0.04 | 0.09 | -0.36 | 0.31 | -0.05 | 0.03 | 0.07 | 0.40 | -0.09 | -0.17 | 0.55 | 0.49 | 1.00 | | | | | | | | | | | | | | | |
| PBAS | 0.12 | 0.11 | 0.12 | -0.01 | -0.34 | 0.41 | 0.11 | -0.02 | -0.06 | 0.01 | -0.09 | -0.29 | 0.05 | 0.06 | 0.01 | 1.00 | | | | | | | | | | | | | | |
| IVSPD | -0.02 | 0.02 | -0.05 | -0.06 | 0.09 | -0.09 | 0.02 | -0.06 | -0.01 | -0.12 | 0.12 | 0.07 | -0.13 | -0.14 | -0.06 | -0.02 | 1.00 | | | | | | | | | | | | | |
| TSIV | -0.18 | -0.14 | -0.14 | -0.01 | 0.13 | -0.12 | -0.02 | 0.04 | 0.02 | -0.15 | 0.04 | 0.08 | -0.13 | -0.40 | -0.07 | -0.04 | 0.03 | 1.00 | | | | | | | | | | | | |
| RNS | 0.01 | 0.02 | 0.00 | -0.03 | -0.13 | 0.11 | 0.03 | -0.07 | -0.03 | 0.08 | -0.06 | -0.04 | 0.13 | 0.15 | 0.08 | 0.00 | 0.04 | -0.04 | 1.00 | | | | | | | | | | | |
| RNK | 0.00 | 0.01 | -0.01 | -0.01 | 0.13 | -0.14 | -0.06 | 0.01 | 0.04 | -0.06 | 0.06 | 0.06 | -0.09 | -0.10 | -0.05 | -0.04 | 0.02 | 0.02 | -0.03 | 1.00 | | | | | | | | | | |
| ODP | 0.05 | 0.03 | 0.05 | 0.11 | -0.31 | 0.21 | -0.05 | 0.08 | 0.04 | 0.32 | -0.11 | -0.13 | 0.38 | 0.41 | 0.25 | -0.18 | -0.07 | -0.10 | 0.06 | -0.03 | 1.00 | | | | | | | | | |
| CFV | 0.00 | 0.00 | 0.01 | 0.05 | -0.14 | 0.12 | 0.08 | 0.03 | 0.08 | 0.14 | -0.07 | -0.14 | 0.20 | 0.18 | 0.11 | 0.02 | -0.03 | -0.03 | 0.04 | -0.05 | 0.10 | 1.00 | | | | | | | | |
| CH | 0.02 | 0.00 | 0.02 | 0.07 | -0.28 | 0.25 | -0.33 | 0.02 | 0.08 | 0.28 | -0.12 | -0.12 | 0.39 | 0.40 | 0.23 | 0.01 | -0.06 | -0.04 | 0.06 | -0.03 | 0.20 | 0.04 | 1.00 | | | | | | | |
| DISP | 0.00 | 0.00 | 0.00 | 0.01 | -0.03 | 0.02 | 0.00 | 0.00 | -0.01 | 0.03 | -0.01 | 0.00 | 0.04 | 0.04 | 0.02 | 0.00 | -0.01 | 0.00 | 0.01 | 0.00 | 0.02 | 0.01 | 0.03 | 1.00 | | | | | | |
| ISSUE$_{5Y}$ | 0.02 | 0.02 | 0.02 | 0.06 | -0.20 | 0.19 | 0.01 | 0.02 | 0.08 | 0.25 | -0.13 | -0.11 | 0.34 | 0.34 | 0.19 | 0.04 | -0.06 | -0.03 | 0.06 | -0.04 | 0.16 | 0.30 | 0.16 | 0.03 | 1.00 | | | | | |
| PM | -0.01 | -0.01 | -0.01 | -0.04 | 0.13 | -0.13 | 0.09 | -0.02 | -0.04 | -0.14 | 0.10 | 0.09 | -0.20 | -0.22 | -0.10 | -0.03 | 0.05 | 0.03 | -0.03 | 0.02 | -0.09 | -0.06 | -0.20 | -0.03 | -0.18 | 1.00 | | | | |
| Ln(PRICE) | -0.10 | -0.08 | -0.09 | -0.04 | 0.64 | -0.64 | -0.16 | 0.06 | 0.17 | -0.35 | 0.28 | 0.35 | -0.49 | -0.56 | -0.31 | -0.29 | 0.07 | 0.12 | -0.21 | 0.24 | -0.24 | -0.18 | -0.18 | -0.03 | -0.25 | 0.12 | 1.00 | | | |
| PROFIT | -0.03 | -0.02 | -0.04 | -0.09 | 0.28 | -0.28 | -0.14 | -0.05 | -0.09 | -0.28 | 0.11 | 0.16 | -0.38 | -0.39 | -0.20 | -0.09 | 0.04 | 0.06 | -0.07 | 0.07 | -0.15 | -0.14 | -0.19 | -0.04 | -0.32 | 0.30 | 0.32 | 1.00 | | |
| TEF | 0.02 | 0.01 | 0.03 | 0.06 | -0.24 | 0.23 | -0.11 | 0.01 | 0.04 | 0.28 | -0.17 | -0.12 | 0.37 | 0.39 | 0.20 | 0.04 | -0.08 | -0.05 | 0.05 | -0.03 | 0.15 | 0.05 | 0.36 | 0.04 | 0.35 | -0.28 | -0.18 | -0.39 | 1.00 | |
| ZS | 0.02 | 0.01 | 0.03 | 0.05 | -0.32 | 0.27 | -0.23 | 0.01 | 0.03 | 0.25 | -0.05 | -0.15 | 0.36 | 0.37 | 0.24 | 0.04 | -0.02 | -0.03 | 0.05 | -0.02 | 0.19 | -0.01 | 0.57 | 0.03 | 0.12 | -0.19 | -0.17 | -0.22 | 0.24 | 1.00 |

**Table 4**
**Month-end option returns on OST-sorted delta-hedged call options portfolios.**
This table reports the option returns and alphas for decile portfolios formed on the option-based salience theory value OST. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts and held for one month. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are sorted based on the value of OST. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly excess return. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). SR is the annualized Sharpe ratio and MDD is the maximum drawdown of the portfolio. The last row reports differences in returns and alphas between deciles 10 (high OST) and 1 (low OST). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

| | | EW Portfolios | | | | | | OVW Portfolios | | | | | | SVW Portfolios | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **OST** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** |
| **Low OST** | -0.03 | -0.45 | -0.32 | -0.33 | -0.22 | -0.93 | -78.84% | -0.56 | -0.45 | -0.47 | -0.29 | -1.03 | -84.45% | -0.19 | -0.06 | -0.07 | -0.11 | -0.41 | -54.22% |
| | | (-4.15) | (-3.07) | (-3.26) | (-2.16) | | | (-4.73) | (-4.15) | (-4.14) | (-2.26) | | | (-1.73) | (-0.55) | (-0.67) | (-1.08) | | |
| **2** | -0.01 | -0.44 | -0.30 | -0.29 | -0.25 | -0.94 | -77.84% | -0.48 | -0.36 | -0.39 | -0.37 | -0.89 | -82.10% | -0.14 | -0.01 | -0.01 | -0.10 | -0.30 | -44.77% |
| | | (-4.14) | (-2.94) | (-2.88) | (-2.29) | | | (-4.05) | (-3.09) | (-3.61) | (-2.91) | | | (-1.38) | (-0.11) | (-0.06) | (-0.93) | | |
| **3** | 0.00 | -0.48 | -0.34 | -0.34 | -0.26 | -0.98 | -79.99% | -0.41 | -0.27 | -0.28 | -0.23 | -0.60 | -77.22% | -0.19 | -0.07 | -0.06 | -0.15 | -0.43 | -53.95% |
| | | (-4.58) | (-3.27) | (-3.43) | (-2.41) | | | (-2.99) | (-2.03) | (-2.12) | (-1.48) | | | (-2.00) | (-0.64) | (-0.57) | (-1.53) | | |
| **4** | 0.00 | -0.44 | -0.30 | -0.31 | -0.22 | -0.88 | -77.50% | -0.52 | -0.41 | -0.39 | -0.35 | -0.99 | -82.98% | -0.25 | -0.14 | -0.14 | -0.18 | -0.61 | -60.67% |
| | | (-3.92) | (-2.71) | (-2.91) | (-1.99) | | | (-4.79) | (-3.94) | (-3.62) | (-2.93) | | | (-2.78) | (-1.51) | (-1.63) | (-1.86) | | |
| **5** | 0.01 | -0.37 | -0.23 | -0.23 | -0.15 | -0.75 | -71.39% | -0.28 | -0.13 | -0.13 | -0.07 | -0.39 | -68.96% | -0.14 | -0.03 | 0.00 | -0.08 | -0.32 | -49.44% |
| | | (-3.53) | (-2.23) | (-2.34) | (-1.35) | | | (-1.79) | (-0.82) | (-0.84) | (-0.48) | | | (-1.42) | (-0.26) | (-0.03) | (-0.73) | | |
| **6** | 0.02 | -0.36 | -0.23 | -0.24 | -0.12 | -0.74 | -70.59% | -0.51 | -0.38 | -0.41 | -0.34 | -0.96 | -81.92% | -0.17 | -0.05 | -0.03 | -0.11 | -0.38 | -51.15% |
| | | (-3.28) | (-2.17) | (-2.39) | (-1.17) | | | (-4.57) | (-3.16) | (-3.68) | (-3.45) | | | (-1.61) | (-0.46) | (-0.31) | (-1.00) | | |
| **7** | 0.02 | -0.39 | -0.26 | -0.26 | -0.14 | -0.75 | -74.80% | -0.53 | -0.42 | -0.43 | -0.32 | -1.01 | -83.59% | -0.23 | -0.11 | -0.11 | -0.17 | -0.53 | -59.65% |
| | | (-3.27) | (-2.22) | (-2.35) | (-1.24) | | | (-4.61) | (-4.11) | (-3.99) | (-2.79) | | | (-2.29) | (-1.02) | (-1.16) | (-1.68) | | |
| **8** | 0.04 | -0.46 | -0.31 | -0.32 | -0.18 | -0.88 | -78.55% | -0.62 | -0.47 | -0.51 | -0.40 | -1.02 | -87.85% | -0.22 | -0.08 | -0.08 | -0.13 | -0.48 | -56.30% |
| | | (-3.82) | (-2.69) | (-2.89) | (-1.54) | | | (-4.43) | (-3.73) | (-4.08) | (-2.90) | | | (-2.05) | (-0.76) | (-0.83) | (-1.18) | | |
| **9** | 0.06 | -0.61 | -0.47 | -0.47 | -0.36 | -1.14 | -86.96% | -0.72 | -0.50 | -0.55 | -0.41 | -0.73 | -92.21% | -0.30 | -0.18 | -0.18 | -0.22 | -0.66 | -65.01% |
| | | (-5.05) | (-4.06) | (-4.29) | (-2.89) | | | (-3.94) | (-2.26) | (-2.64) | (-1.41) | | | (-2.87) | (-1.68) | (-1.76) | (-2.04) | | |
| **High OST** | 0.16 | -1.02 | -0.88 | -0.88 | -0.77 | -1.88 | -96.58% | -1.35 | -1.22 | -1.25 | -1.15 | -1.51 | -99.08% | -0.55 | -0.42 | -0.44 | -0.49 | -1.15 | -84.06% |
| | | (-7.66) | (-7.33) | (-7.28) | (-6.00) | | | (-6.36) | (-7.19) | (-7.65) | (-5.83) | | | (-4.81) | (-3.88) | (-4.14) | (-4.16) | | |
| **High-Low** | | -0.57 | -0.56 | -0.55 | -0.55 | 1.86 | -5.08% | -0.79 | -0.78 | -0.79 | -0.86 | 0.95 | -25.77% | -0.36 | -0.36 | -0.37 | -0.38 | 1.31 | -5.73% |
| | | (-7.99) | (-8.18) | (-7.91) | (-7.14) | | | (-4.37) | (-4.69) | (-5.24) | (-4.56) | | | (-6.11) | (-5.58) | (-6.01) | (-5.54) | | |

**Table 5**
**Characteristics of OST-sorted portfolios.**
This table reports the characteristics of decile portfolios formed on the option-based salience theory value OST. The characteristics are described in Table 2. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts. Options are sorted based on the value of OST. For each characteristic, we report its time-series average value of the cross-sectional mean among each OST-sorted decile. The last two columns report differences in characteristics between deciles 10 (high OST) and 1 (low OST), and the corresponding t-statistics in parentheses based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

| | Low OST | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | High OST | HML | t(HML) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SST** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | (2.23) |
| **Ln(ME)** | 7.72 | 8.07 | 8.16 | 8.19 | 8.19 | 8.18 | 8.09 | 7.98 | 7.74 | 7.33 | -0.39 | (-12.96) |
| **Ln(Amihud)** | -7.03 | -7.43 | -7.53 | -7.56 | -7.55 | -7.52 | -7.42 | -7.29 | -7.01 | -6.58 | 0.45 | (11.62) |
| **Ln(BM)** | -1.12 | -1.15 | -1.16 | -1.16 | -1.15 | -1.15 | -1.13 | -1.12 | -1.09 | -1.05 | 0.07 | (5.81) |
| **$RET_{(-1,0)}$** | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 | 0.04 | 0.03 | 0.01 | (2.01) |
| **$RET_{(-12,-2)}$** | 0.25 | 0.27 | 0.27 | 0.29 | 0.28 | 0.29 | 0.29 | 0.29 | 0.28 | 0.24 | -0.01 | (-1.12) |
| **SMAX(5)** | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.02 | (24.10) |
| **IO** | 0.69 | 0.71 | 0.72 | 0.72 | 0.72 | 0.72 | 0.72 | 0.71 | 0.69 | 0.68 | -0.01 | (-3.86) |
| **NOA** | 3.95 | 4.08 | 4.11 | 4.14 | 4.12 | 4.12 | 4.10 | 4.05 | 3.96 | 3.79 | -0.15 | (-10.18) |
| **IVOL** | 0.43 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.41 | 0.42 | 0.44 | 0.47 | 0.05 | (13.95) |
| **IV** | 0.47 | 0.46 | 0.46 | 0.46 | 0.47 | 0.47 | 0.48 | 0.50 | 0.52 | 0.56 | 0.09 | (17.75) |
| **VOLDEV** | 0.13 | 0.09 | 0.08 | 0.09 | 0.09 | 0.09 | 0.10 | 0.12 | 0.15 | 0.20 | 0.07 | (9.52) |
| **PBAS** | 0.23 | 0.18 | 0.16 | 0.16 | 0.16 | 0.16 | 0.17 | 0.19 | 0.22 | 0.29 | 0.05 | (5.68) |
| **IVSPD** | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | 0.00 | (-0.77) |
| **TSIV** | 0.00 | 0.00 | -0.01 | -0.01 | -0.01 | -0.01 | -0.02 | -0.02 | -0.03 | -0.04 | -0.05 | (-26.01) |
| **RNS** | -0.39 | -0.05 | -0.46 | 2.25 | -0.57 | -0.43 | -0.52 | -0.53 | -0.45 | 0.02 | 0.42 | (1.20) |
| **RNK** | 3.18 | 3.22 | 3.26 | 3.33 | 3.38 | 3.29 | 3.26 | 3.27 | 2.98 | 2.82 | -0.36 | (-2.12) |
| **ODP** | -2.29 | -2.49 | -2.55 | -2.57 | -2.53 | -2.47 | -2.35 | -2.27 | -2.12 | -2.00 | 0.29 | (9.96) |
| **CFV** | 0.39 | 0.12 | 0.10 | 0.11 | 0.22 | 0.19 | 0.28 | 0.11 | 0.40 | 0.35 | -0.04 | (-0.19) |
| **CH** | 0.16 | 0.15 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.15 | 0.15 | 0.16 | 0.01 | (2.07) |
| **DISP** | 0.13 | 0.13 | 0.17 | 0.12 | 0.13 | 0.12 | 0.15 | 0.12 | 0.15 | 0.16 | 0.03 | (1.21) |
| **$ISSUE_{5Y}$** | 0.24 | 0.20 | 0.19 | 0.19 | 0.19 | 0.20 | 0.20 | 0.22 | 0.24 | 0.25 | 0.01 | (1.85) |
| **PM** | -0.50 | -0.30 | -0.29 | -0.20 | -0.25 | -0.24 | -0.27 | -0.30 | -0.47 | -0.57 | -0.07 | (-1.25) |
| **Ln(PRICE)** | 3.27 | 3.47 | 3.55 | 3.57 | 3.55 | 3.53 | 3.49 | 3.42 | 3.29 | 3.12 | -0.15 | (-6.39) |
| **PROFIT** | 0.06 | 0.08 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | -0.01 | (-3.23) |
| **TEF** | 0.05 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.05 | 0.06 | 0.01 | (2.90) |
| **ZS** | 1.65 | 1.56 | 1.54 | 1.52 | 1.52 | 1.51 | 1.53 | 1.55 | 1.60 | 1.73 | 0.08 | (2.50) |

**Table 6**

**Return spreads on double-sorted OST delta-hedged call options portfolios.**

This table reports option returns and alphas for double-sorted portfolios formed on option-based salience theory value (OST) controlled for other control variables. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are first sorted into 3 portfolios based on the control variables defined in Table 2, and then within each portfolio, options are further ranked into deciles based on OST, amounting to 30 portfolios in total. The option excess returns of the OST-sorted deciles over the next month are averaged across the 3 control variable portfolios. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) monthly returns in Panels A, B, and C respectively. Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). The last row reports differences in returns and alphas between deciles 10 (high OST) and 1 (low OST). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

*Panel A: EW portfolios*

| Decile | SST | Ln(ME) | Ln(Amihud) | Ln(BM) | $RET_{(-1,0)}$ | $RET_{(-12,-2)}$ | SMAX(5) | IO | NOA | IVOL | IV | VOLDEV | PBAS | IVSPD | TSIV | RNS | RNK | ODP | CFV | CH | DISP | $ISSUE_{5Y}$ | PM | Ln(PRICE) | PROFIT | TEF | ZS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low OST** | -0.47 | -0.38 | -0.40 | -0.43 | -0.45 | -0.44 | -0.48 | -0.43 | -0.42 | -0.41 | -0.45 | -0.43 | -0.42 | -0.46 | -0.55 | -0.48 | -0.47 | -0.46 | -0.39 | -0.44 | -0.41 | -0.38 | -0.38 | -0.36 | -0.39 | -0.41 | -0.49 |
| | (-4.30) | (-3.63) | (-3.81) | (-4.04) | (-4.08) | (-4.06) | (-4.31) | (-3.82) | (-3.84) | (-3.91) | (-4.14) | (-4.02) | (-3.89) | (-4.20) | (-5.17) | (-4.34) | (-4.20) | (-4.28) | (-3.61) | (-4.02) | (-3.84) | (-3.47) | (-3.48) | (-3.55) | (-3.81) | (-3.93) | (-4.70) |
| **2** | -0.47 | -0.49 | -0.48 | -0.41 | -0.43 | -0.43 | -0.47 | -0.44 | -0.41 | -0.47 | -0.50 | -0.44 | -0.50 | -0.47 | -0.43 | -0.44 | -0.44 | -0.44 | -0.35 | -0.42 | -0.41 | -0.41 | -0.38 | -0.48 | -0.42 | -0.46 | -0.45 |
| | (-4.42) | (-4.45) | (-4.38) | (-3.79) | (-4.04) | (-4.06) | (-4.20) | (-4.15) | (-3.73) | (-4.36) | (-4.45) | (-3.99) | (-4.68) | (-4.39) | (-3.84) | (-3.96) | (-4.17) | (-4.14) | (-3.13) | (-3.84) | (-3.95) | (-3.65) | (-3.46) | (-4.39) | (-3.85) | (-4.03) | (-4.07) |
| **3** | -0.45 | -0.52 | -0.52 | -0.50 | -0.46 | -0.49 | -0.50 | -0.46 | -0.48 | -0.48 | -0.51 | -0.50 | -0.47 | -0.49 | -0.47 | -0.49 | -0.49 | -0.51 | -0.48 | -0.51 | -0.41 | -0.44 | -0.46 | -0.53 | -0.46 | -0.46 | -0.56 |
| | (-3.95) | (-4.85) | (-4.79) | (-4.74) | (-4.16) | (-4.47) | (-4.41) | (-4.29) | (-4.66) | (-4.47) | (-4.67) | (-4.63) | (-4.53) | (-4.75) | (-4.51) | (-4.58) | (-4.70) | (-4.80) | (-4.67) | (-4.68) | (-3.77) | (-4.12) | (-4.57) | (-4.95) | (-4.28) | (-4.16) | (-5.08) |
| **4** | -0.47 | -0.42 | -0.41 | -0.38 | -0.45 | -0.42 | -0.40 | -0.42 | -0.38 | -0.42 | -0.43 | -0.40 | -0.42 | -0.44 | -0.43 | -0.40 | -0.37 | -0.44 | -0.37 | -0.38 | -0.40 | -0.44 | -0.38 | -0.45 | -0.37 | -0.40 | -0.38 |
| | (-4.41) | (-3.82) | (-3.73) | (-3.37) | (-4.22) | (-3.79) | (-3.52) | (-3.80) | (-3.37) | (-3.85) | (-3.97) | (-3.66) | (-3.66) | (-3.84) | (-3.91) | (-3.72) | (-3.42) | (-3.90) | (-3.54) | (-3.51) | (-3.61) | (-4.26) | (-3.35) | (-4.07) | (-3.30) | (-3.59) | (-3.39) |
| **5** | -0.34 | -0.41 | -0.44 | -0.36 | -0.38 | -0.35 | -0.44 | -0.37 | -0.40 | -0.38 | -0.40 | -0.37 | -0.42 | -0.39 | -0.44 | -0.38 | -0.41 | -0.41 | -0.35 | -0.37 | -0.34 | -0.37 | -0.34 | -0.43 | -0.36 | -0.37 | -0.41 |
| | (-3.14) | (-3.76) | (-3.99) | (-3.30) | (-3.51) | (-3.19) | (-4.08) | (-3.36) | (-3.82) | (-3.54) | (-3.67) | (-3.45) | (-3.85) | (-3.71) | (-4.11) | (-3.60) | (-3.91) | (-3.91) | (-3.23) | (-3.48) | (-3.22) | (-3.68) | (-3.13) | (-3.80) | (-3.27) | (-3.41) | (-3.75) |
| **6** | -0.40 | -0.39 | -0.34 | -0.37 | -0.39 | -0.40 | -0.42 | -0.41 | -0.35 | -0.40 | -0.43 | -0.38 | -0.38 | -0.38 | -0.42 | -0.35 | -0.34 | -0.37 | -0.34 | -0.37 | -0.33 | -0.31 | -0.38 | -0.41 | -0.36 | -0.37 | -0.45 |
| | (-3.50) | (-3.30) | (-2.87) | (-3.04) | (-3.35) | (-3.74) | (-3.72) | (-3.82) | (-3.16) | (-3.50) | (-3.74) | (-3.45) | (-3.24) | (-3.36) | (-3.57) | (-3.25) | (-2.96) | (-3.24) | (-3.00) | (-3.24) | (-2.97) | (-2.98) | (-3.27) | (-3.62) | (-3.06) | (-3.28) | (-4.03) |
| **7** | -0.42 | -0.43 | -0.43 | -0.35 | -0.39 | -0.41 | -0.37 | -0.38 | -0.37 | -0.41 | -0.42 | -0.39 | -0.40 | -0.36 | -0.37 | -0.37 | -0.36 | -0.46 | -0.38 | -0.40 | -0.34 | -0.43 | -0.35 | -0.42 | -0.29 | -0.35 | -0.42 |
| | (-3.79) | (-3.77) | (-3.85) | (-2.96) | (-3.40) | (-3.46) | (-3.15) | (-3.28) | (-3.21) | (-3.33) | (-3.49) | (-3.33) | (-3.42) | (-3.13) | (-3.21) | (-3.09) | (-3.15) | (-4.20) | (-3.30) | (-3.57) | (-2.86) | (-3.63) | (-2.98) | (-3.70) | (-2.47) | (-2.88) | (-3.68) |
| **8** | -0.41 | -0.51 | -0.49 | -0.44 | -0.45 | -0.48 | -0.45 | -0.49 | -0.48 | -0.50 | -0.50 | -0.46 | -0.47 | -0.50 | -0.52 | -0.42 | -0.42 | -0.48 | -0.41 | -0.41 | -0.47 | -0.45 | -0.38 | -0.49 | -0.37 | -0.45 | -0.43 |
| | (-3.33) | (-4.33) | (-4.20) | (-3.57) | (-3.88) | (-4.05) | (-3.81) | (-4.08) | (-4.31) | (-4.39) | (-4.25) | (-3.90) | (-4.06) | (-4.06) | (-4.75) | (-3.39) | (-3.42) | (-3.91) | (-3.32) | (-3.38) | (-4.13) | (-3.71) | (-3.20) | (-4.31) | (-2.99) | (-3.70) | (-3.59) |
| **9** | -0.58 | -0.55 | -0.56 | -0.56 | -0.57 | -0.58 | -0.56 | -0.53 | -0.52 | -0.57 | -0.53 | -0.59 | -0.55 | -0.55 | -0.61 | -0.62 | -0.60 | -0.51 | -0.52 | -0.63 | -0.56 | -0.52 | -0.57 | -0.54 | -0.56 | -0.52 | -0.66 |
| | (-4.84) | (-4.63) | (-4.59) | (-4.66) | (-4.66) | (-4.63) | (-4.82) | (-4.20) | (-4.16) | (-4.61) | (-4.48) | (-4.73) | (-4.42) | (-4.48) | (-5.22) | (-5.04) | (-4.73) | (-4.15) | (-4.25) | (-5.18) | (-4.62) | (-4.21) | (-4.53) | (-4.24) | (-4.62) | (-4.17) | (-5.49) |
| **High OST** | -1.01 | -0.93 | -0.96 | -1.04 | -1.06 | -1.02 | -0.96 | -0.96 | -0.95 | -0.93 | -0.87 | -1.01 | -1.01 | -1.00 | -0.76 | -0.97 | -0.99 | -1.01 | -0.89 | -1.02 | -0.96 | -0.94 | -0.94 | -0.91 | -0.95 | -1.01 | -1.07 |
| | (-7.87) | (-7.36) | (-7.54) | (-7.67) | (-8.29) | (-7.67) | (-7.73) | (-7.48) | (-7.30) | (-7.29) | (-7.08) | (-7.74) | (-7.74) | (-7.84) | (-6.28) | (-7.12) | (-7.56) | (-7.80) | (-7.04) | (-7.61) | (-7.32) | (-7.21) | (-7.27) | (-7.32) | (-7.34) | (-7.74) | (-8.07) |
| **High-Low** | **-0.54** | **-0.55** | **-0.56** | **-0.60** | **-0.61** | **-0.58** | **-0.48** | **-0.53** | **-0.53** | **-0.52** | **-0.42** | **-0.58** | **-0.60** | **-0.54** | **-0.21** | **-0.48** | **-0.52** | **-0.55** | **-0.50** | **-0.58** | **-0.54** | **-0.56** | **-0.56** | **-0.54** | **-0.56** | **-0.60** | **-0.57** |
| | **(-7.75)** | **(-8.51)** | **(-8.45)** | **(-7.52)** | **(-9.00)** | **(-7.89)** | **(-6.80)** | **(-7.47)** | **(-8.04)** | **(-7.22)** | **(-6.52)** | **(-8.09)** | **(-8.64)** | **(-7.91)** | **(-3.92)** | **(-6.41)** | **(-7.70)** | **(-7.42)** | **(-6.62)** | **(-8.20)** | **(-7.33)** | **(-7.38)** | **(-8.62)** | **(-8.60)** | **(-8.28)** | **(-7.34)** | **(-7.78)** |
| **High-Low O2F α** | -0.55 | -0.55 | -0.56 | -0.58 | -0.62 | -0.54 | -0.53 | -0.51 | -0.52 | -0.52 | -0.46 | -0.58 | -0.58 | -0.53 | -0.23 | -0.40 | -0.45 | -0.51 | -0.45 | -0.54 | -0.52 | -0.52 | -0.54 | -0.54 | -0.54 | -0.55 | -0.56 |
| | (-7.29) | (-7.87) | (-7.84) | (-6.49) | (-7.89) | (-7.22) | (-6.70) | (-6.76) | (-7.08) | (-6.58) | (-6.47) | (-7.05) | (-7.68) | (-6.80) | (-3.69) | (-4.82) | (-6.21) | (-6.71) | (-5.45) | (-7.07) | (-6.60) | (-6.45) | (-7.74) | (-7.84) | (-7.24) | (-6.79) | (-6.79) |

*Panel B: OVW portfolios*

| Decile | SST | Ln(ME) | Ln(Amihud) | Ln(BM) | $RET_{(-1,0)}$ | $RET_{(-12,-2)}$ | SMAX(5) | IO | NOA | IVOL | IV | VOLDEV | PBAS | IVSPD | TSIV | RNS | RNK | ODP | CFV | CH | DISP | $ISSUE_{5Y}$ | PM | Ln(PRICE) | PROFIT | TEF | ZS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low OST** | -0.55 | -0.69 | -0.70 | -0.46 | -0.58 | -0.53 | -0.58 | -0.51 | -0.60 | -0.53 | -0.60 | -0.49 | -0.56 | -0.53 | -0.61 | -0.55 | -0.53 | -0.34 | -0.47 | -0.52 | -0.45 | -0.48 | -0.45 | -0.54 | -0.43 | -0.49 | -0.54 |
| | (-4.73) | (-5.75) | (-5.51) | (-4.06) | (-5.22) | (-4.21) | (-4.84) | (-4.36) | (-5.76) | (-4.13) | (-5.02) | (-4.13) | (-4.44) | (-4.65) | (-5.28) | (-4.47) | (-4.23) | (-3.21) | (-3.99) | (-4.60) | (-4.12) | (-4.36) | (-3.80) | (-4.85) | (-3.52) | (-4.32) | (-4.75) |
| **2** | -0.54 | -0.88 | -0.82 | -0.45 | -0.49 | -0.57 | -0.58 | -0.47 | -0.64 | -0.57 | -0.65 | -0.50 | -0.69 | -0.53 | -0.52 | -0.57 | -0.55 | -0.31 | -0.48 | -0.48 | -0.47 | -0.45 | -0.43 | -0.70 | -0.44 | -0.39 | -0.50 |
| | (-4.79) | (-6.94) | (-6.66) | (-4.30) | (-4.11) | (-5.05) | (-4.93) | (-4.16) | (-5.56) | (-5.04) | (-5.41) | (-4.42) | (-6.51) | (-4.62) | (-4.00) | (-5.35) | (-5.06) | (-3.23) | (-4.16) | (-4.19) | (-4.65) | (-4.12) | (-3.67) | (-6.03) | (-3.72) | (-3.54) | (-3.98) |
| **3** | -0.45 | -0.65 | -0.67 | -0.40 | -0.39 | -0.37 | -0.47 | -0.39 | -0.49 | -0.43 | -0.51 | -0.42 | -0.48 | -0.47 | -0.48 | -0.44 | -0.37 | -0.29 | -0.43 | -0.45 | -0.42 | -0.39 | -0.42 | -0.53 | -0.42 | -0.39 | -0.40 |
| | (-3.85) | (-4.07) | (-3.68) | (-3.69) | (-3.59) | (-3.08) | (-3.81) | (-3.28) | (-2.89) | (-3.06) | (-3.54) | (-3.62) | (-4.03) | (-4.08) | (-3.99) | (-3.88) | (-3.34) | (-2.88) | (-3.84) | (-3.70) | (-3.63) | (-3.55) | (-4.29) | (-3.99) | (-3.38) | (-3.27) | (-2.74) |
| **4** | -0.45 | -0.60 | -0.68 | -0.48 | -0.42 | -0.40 | -0.46 | -0.45 | -0.55 | -0.44 | -0.50 | -0.40 | -0.44 | -0.47 | -0.43 | -0.47 | -0.42 | -0.29 | -0.37 | -0.36 | -0.36 | -0.45 | -0.42 | -0.57 | -0.38 | -0.43 | -0.42 |
| | (-3.65) | (-4.52) | (-5.57) | (-4.60) | (-3.20) | (-3.76) | (-3.69) | (-4.25) | (-4.50) | (-3.43) | (-3.92) | (-3.70) | (-3.05) | (-4.07) | (-3.76) | (-4.68) | (-3.80) | (-2.66) | (-2.97) | (-2.95) | (-3.04) | (-3.71) | (-3.41) | (-4.73) | (-3.25) | (-3.81) | (-3.57) |
| **5** | -0.37 | -0.63 | -0.77 | -0.42 | -0.49 | -0.41 | -0.45 | -0.35 | -0.51 | -0.45 | -0.46 | -0.43 | -0.57 | -0.43 | -0.50 | -0.41 | -0.45 | -0.32 | -0.41 | -0.46 | -0.36 | -0.42 | -0.45 | -0.55 | -0.48 | -0.44 | -0.46 |
| | (-3.33) | (-5.28) | (-6.72) | (-3.19) | (-4.55) | (-3.33) | (-4.13) | (-2.92) | (-3.90) | (-3.78) | (-4.14) | (-3.51) | (-5.31) | (-3.54) | (-4.69) | (-3.26) | (-3.57) | (-3.05) | (-3.55) | (-4.34) | (-3.23) | (-3.72) | (-3.73) | (-4.18) | (-4.23) | (-3.77) | (-3.79) |
| **6** | -0.41 | -0.85 | -0.66 | -0.45 | -0.34 | -0.51 | -0.54 | -0.50 | -0.63 | -0.46 | -0.57 | -0.40 | -0.56 | -0.45 | -0.49 | -0.48 | -0.47 | -0.30 | -0.41 | -0.41 | -0.41 | -0.42 | -0.38 | -0.60 | -0.44 | -0.45 | -0.44 |
| | (-3.49) | (-5.91) | (-4.21) | (-4.23) | (-2.58) | (-4.66) | (-5.03) | (-4.44) | (-5.46) | (-3.79) | (-4.48) | (-3.50) | (-4.85) | (-3.69) | (-4.01) | (-4.34) | (-4.27) | (-2.75) | (-3.77) | (-3.52) | (-3.53) | (-4.11) | (-3.44) | (-4.96) | (-3.40) | (-3.78) | (-3.69) |
| **7** | -0.60 | -0.84 | -0.77 | -0.46 | -0.47 | -0.50 | -0.55 | -0.47 | -0.40 | -0.62 | -0.60 | -0.55 | -0.70 | -0.58 | -0.53 | -0.47 | -0.43 | -0.40 | -0.54 | -0.51 | -0.44 | -0.56 | -0.39 | -0.63 | -0.39 | -0.41 | -0.54 |
| | (-5.36) | (-6.41) | (-4.26) | (-3.98) | (-3.55) | (-4.06) | (-4.29) | (-3.87) | (-2.00) | (-4.93) | (-5.22) | (-4.83) | (-5.84) | (-5.26) | (-4.53) | (-3.80) | (-3.53) | (-4.07) | (-4.32) | (-4.07) | (-3.64) | (-4.85) | (-2.96) | (-5.08) | (-2.99) | (-3.13) | (-4.65) |
| **8** | -0.47 | -0.85 | -1.08 | -0.47 | -0.61 | -0.66 | -0.50 | -0.61 | -0.81 | -0.62 | -0.63 | -0.57 | -0.70 | -0.59 | -0.67 | -0.54 | -0.47 | -0.43 | -0.61 | -0.60 | -0.59 | -0.62 | -0.62 | -0.86 | -0.51 | -0.67 | -0.62 |
| | (-3.12) | (-5.98) | (-8.50) | (-3.23) | (-4.78) | (-5.24) | (-3.29) | (-4.95) | (-6.55) | (-3.60) | (-3.74) | (-4.00) | (-5.94) | (-3.52) | (-4.92) | (-3.98) | (-4.04) | (-3.71) | (-5.29) | (-4.29) | (-4.96) | (-4.52) | (-5.16) | (-8.17) | (-3.61) | (-5.06) | (-4.40) |
| **9** | -0.68 | -1.00 | -0.97 | -0.83 | -0.79 | -0.67 | -0.72 | -0.61 | -0.90 | -0.81 | -0.79 | -0.77 | -0.82 | -0.67 | -0.75 | -0.72 | -0.73 | -0.37 | -0.64 | -0.73 | -0.74 | -0.72 | -0.66 | -0.90 | -0.79 | -0.70 | -0.90 |
| | (-4.39) | (-5.40) | (-5.71) | (-5.95) | (-5.07) | (-4.50) | (-5.75) | (-3.28) | (-6.06) | (-5.73) | (-5.24) | (-5.32) | (-5.69) | (-4.37) | (-5.06) | (-5.10) | (-4.64) | (-2.67) | (-4.21) | (-4.93) | (-5.65) | (-4.95) | (-3.69) | (-6.17) | (-5.60) | (-4.45) | (-5.89) |
| **High OST** | -1.33 | -1.53 | -1.52 | -1.29 | -1.28 | -1.37 | -1.08 | -1.23 | -1.34 | -1.21 | -1.18 | -1.37 | -1.32 | -1.33 | -0.98 | -1.26 | -1.31 | -0.87 | -1.13 | -1.29 | -1.25 | -1.17 | -1.25 | -1.48 | -1.13 | -1.30 | -1.35 |
| | (-8.39) | (-7.84) | (-7.52) | (-6.63) | (-7.55) | (-8.85) | (-6.44) | (-7.45) | (-7.08) | (-6.78) | (-7.43) | (-7.76) | (-7.62) | (-7.25) | (-5.87) | (-6.96) | (-7.79) | (-6.32) | (-8.15) | (-7.98) | (-7.42) | (-7.71) | (-8.55) | (-7.78) | (-6.37) | (-8.44) | (-7.60) |
| **High-Low** | **-0.79** | **-0.84** | **-0.82** | **-0.83** | **-0.70** | **-0.84** | **-0.49** | **-0.72** | **-0.74** | **-0.68** | **-0.58** | **-0.88** | **-0.76** | **-0.79** | **-0.37** | **-0.70** | **-0.78** | **-0.53** | **-0.66** | **-0.77** | **-0.80** | **-0.68** | **-0.80** | **-0.94** | **-0.70** | **-0.81** | **-0.81** |
| | **(-6.23)** | **(-4.77)** | **(-4.39)** | **(-4.87)** | **(-5.10)** | **(-6.22)** | **(-3.25)** | **(-5.20)** | **(-4.38)** | **(-4.39)** | **(-4.28)** | **(-6.05)** | **(-5.21)** | **(-4.85)** | **(-2.68)** | **(-4.29)** | **(-5.48)** | **(-5.61)** | **(-5.86)** | **(-5.62)** | **(-5.34)** | **(-5.56)** | **(-6.63)** | **(-5.99)** | **(-4.36)** | **(-6.32)** | **(-4.97)** |
| **High-Low O2F α** | -0.84 | -0.79 | -0.80 | -0.83 | -0.80 | -0.91 | -0.57 | -0.75 | -0.76 | -0.69 | -0.67 | -0.93 | -0.75 | -0.87 | -0.42 | -0.72 | -0.79 | -0.51 | -0.67 | -0.75 | -0.80 | -0.70 | -0.80 | -0.98 | -0.77 | -0.82 | -0.82 |
| | (-6.09) | (-4.44) | (-4.35) | (-4.90) | (-5.79) | (-6.02) | (-3.71) | (-5.01) | (-4.64) | (-4.23) | (-4.51) | (-5.99) | (-5.02) | (-5.29) | (-2.66) | (-4.13) | (-5.30) | (-5.34) | (-5.70) | (-5.45) | (-5.37) | (-5.51) | (-6.31) | (-6.36) | (-5.11) | (-6.28) | (-4.98) |

## Table 6 (continued)

*Panel C: SVW portfolios*

| Decile | SST | Ln(ME) | Ln(Amihud) | Ln(BM) | $RET_{(-1,0)}$ | $RET_{(-12,-2)}$ | SMAX(5) | IO | NOA | IVOL | IV | VOLDEV | PBAS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low OST** | -0.22 | -0.33 | -0.30 | -0.19 | -0.17 | -0.18 | -0.27 | -0.21 | -0.24 | -0.29 | -0.39 | -0.20 | -0.19 |
| | (-2.10) | (-3.18) | (-2.81) | (-1.72) | (-1.52) | (-1.65) | (-2.43) | (-1.86) | (-2.34) | (-2.48) | (-3.32) | (-1.81) | (-1.78) |
| **2** | -0.16 | -0.42 | -0.39 | -0.19 | -0.14 | -0.14 | -0.22 | -0.16 | -0.23 | -0.24 | -0.35 | -0.17 | -0.20 |
| | (-1.43) | (-3.98) | (-3.68) | (-1.91) | (-1.29) | (-1.30) | (-1.95) | (-1.55) | (-2.12) | (-2.08) | (-2.88) | (-1.60) | (-1.89) |
| **3** | -0.22 | -0.46 | -0.39 | -0.21 | -0.16 | -0.21 | -0.22 | -0.21 | -0.31 | -0.32 | -0.38 | -0.20 | -0.20 |
| | (-2.23) | (-4.47) | (-3.60) | (-2.38) | (-1.62) | (-2.30) | (-1.95) | (-2.17) | (-3.24) | (-3.04) | (-3.50) | (-2.11) | (-1.92) |
| **4** | -0.27 | -0.39 | -0.32 | -0.20 | -0.21 | -0.23 | -0.20 | -0.22 | -0.24 | -0.27 | -0.34 | -0.21 | -0.21 |
| | (-2.65) | (-3.72) | (-3.19) | (-1.99) | (-2.03) | (-2.30) | (-1.79) | (-2.27) | (-2.27) | (-2.45) | (-2.70) | (-2.08) | (-2.13) |
| **5** | -0.18 | -0.36 | -0.38 | -0.17 | -0.16 | -0.12 | -0.25 | -0.14 | -0.28 | -0.23 | -0.28 | -0.17 | -0.22 |
| | (-1.67) | (-3.41) | (-3.62) | (-1.62) | (-1.54) | (-1.15) | (-2.29) | (-1.32) | (-2.68) | (-1.92) | (-2.39) | (-1.49) | (-2.28) |
| **6** | -0.15 | -0.32 | -0.24 | -0.19 | -0.16 | -0.21 | -0.21 | -0.20 | -0.23 | -0.28 | -0.34 | -0.21 | -0.20 |
| | (-1.37) | (-2.69) | (-1.96) | (-1.73) | (-1.47) | (-1.95) | (-1.89) | (-1.81) | (-2.18) | (-2.43) | (-2.77) | (-1.88) | (-1.81) |
| **7** | -0.26 | -0.36 | -0.33 | -0.24 | -0.23 | -0.24 | -0.22 | -0.26 | -0.28 | -0.33 | -0.41 | -0.22 | -0.25 |
| | (-2.54) | (-3.30) | (-3.11) | (-2.33) | (-2.08) | (-2.37) | (-2.01) | (-2.53) | (-2.56) | (-2.72) | (-3.37) | (-1.99) | (-2.46) |
| **8** | -0.23 | -0.42 | -0.36 | -0.20 | -0.21 | -0.22 | -0.29 | -0.30 | -0.37 | -0.37 | -0.47 | -0.25 | -0.26 |
| | (-2.07) | (-3.64) | (-3.28) | (-1.83) | (-1.98) | (-1.89) | (-2.51) | (-2.94) | (-3.68) | (-2.84) | (-3.69) | (-2.11) | (-2.49) |
| **9** | -0.30 | -0.50 | -0.42 | -0.33 | -0.30 | -0.30 | -0.33 | -0.36 | -0.36 | -0.43 | -0.55 | -0.38 | -0.33 |
| | (-2.76) | (-4.38) | (-3.69) | (-3.26) | (-2.64) | (-2.63) | (-3.02) | (-3.28) | (-3.23) | (-3.37) | (-4.30) | (-3.41) | (-3.07) |
| **High OST** | -0.58 | -0.85 | -0.76 | -0.60 | -0.59 | -0.59 | -0.55 | -0.58 | -0.67 | -0.74 | -0.82 | -0.62 | -0.56 |
| | (-5.32) | (-7.04) | (-6.31) | (-5.30) | (-5.19) | (-5.10) | (-4.72) | (-4.89) | (-5.46) | (-5.57) | (-5.81) | (-4.96) | (-5.09) |
| **High-Low** | **-0.36** | **-0.51** | **-0.45** | **-0.42** | **-0.42** | **-0.41** | **-0.27** | **-0.37** | **-0.43** | **-0.45** | **-0.43** | **-0.43** | **-0.37** |
| | **(-6.43)** | **(-8.29)** | **(-7.53)** | **(-6.88)** | **(-7.59)** | **(-6.09)** | **(-4.40)** | **(-6.96)** | **(-7.49)** | **(-6.21)** | **(-6.17)** | **(-6.26)** | **(-7.93)** |
| **High-Low O2F α** | -0.43 | -0.49 | -0.41 | -0.44 | -0.45 | -0.41 | -0.34 | -0.37 | -0.44 | -0.45 | -0.47 | -0.43 | -0.39 |
| | (-7.00) | (-7.42) | (-6.57) | (-6.92) | (-7.26) | (-6.40) | (-5.13) | (-6.67) | (-5.70) | (-5.65) | (-6.01) | (-6.03) | (-7.33) |

| Decile | IVSPD | TSIV | RNS | RNK | ODP | CFV | CH | DISP | $ISSUE_{5Y}$ | PM | Ln(PRICE) | PROFIT | TEF | ZS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low OST** | -0.17 | -0.31 | -0.24 | -0.19 | -0.28 | -0.23 | -0.23 | -0.22 | -0.19 | -0.20 | -0.24 | -0.24 | -0.18 | -0.23 |
| | (-1.52) | (-3.00) | (-2.33) | (-1.81) | (-2.67) | (-2.16) | (-2.11) | (-2.10) | (-1.75) | (-1.84) | (-2.29) | (-2.23) | (-1.64) | (-2.31) |
| **2** | -0.14 | -0.16 | -0.20 | -0.22 | -0.19 | -0.20 | -0.15 | -0.16 | -0.16 | -0.19 | -0.29 | -0.18 | -0.15 | -0.17 |
| | (-1.33) | (-1.48) | (-2.01) | (-2.18) | (-1.95) | (-1.90) | (-1.37) | (-1.55) | (-1.52) | (-1.89) | (-2.82) | (-1.68) | (-1.41) | (-1.55) |
| **3** | -0.17 | -0.27 | -0.23 | -0.19 | -0.23 | -0.22 | -0.22 | -0.24 | -0.19 | -0.23 | -0.33 | -0.26 | -0.22 | -0.28 |
| | (-1.74) | (-2.67) | (-2.44) | (-2.05) | (-2.41) | (-2.38) | (-2.17) | (-2.46) | (-1.89) | (-2.35) | (-3.36) | (-2.84) | (-2.17) | (-2.91) |
| **4** | -0.22 | -0.25 | -0.27 | -0.20 | -0.26 | -0.23 | -0.18 | -0.17 | -0.27 | -0.22 | -0.33 | -0.18 | -0.20 | -0.13 |
| | (-2.22) | (-2.33) | (-3.09) | (-2.16) | (-2.67) | (-2.51) | (-1.73) | (-1.75) | (-3.05) | (-2.16) | (-3.36) | (-1.73) | (-2.06) | (-1.28) |
| **5** | -0.12 | -0.27 | -0.15 | -0.14 | -0.23 | -0.20 | -0.16 | -0.17 | -0.16 | -0.17 | -0.28 | -0.19 | -0.16 | -0.21 |
| | (-1.11) | (-2.75) | (-1.36) | (-1.35) | (-2.24) | (-1.96) | (-1.52) | (-1.64) | (-1.52) | (-1.62) | (-2.49) | (-1.71) | (-1.45) | (-2.00) |
| **6** | -0.17 | -0.20 | -0.22 | -0.21 | -0.21 | -0.21 | -0.18 | -0.17 | -0.21 | -0.23 | -0.28 | -0.18 | -0.22 | -0.23 |
| | (-1.70) | (-1.85) | (-2.22) | (-2.08) | (-1.96) | (-2.09) | (-1.70) | (-1.59) | (-2.07) | (-2.21) | (-2.42) | (-1.61) | (-1.96) | (-2.05) |
| **7** | -0.20 | -0.25 | -0.27 | -0.19 | -0.30 | -0.22 | -0.23 | -0.25 | -0.26 | -0.24 | -0.35 | -0.25 | -0.23 | -0.22 |
| | (-1.87) | (-2.41) | (-2.42) | (-1.82) | (-2.90) | (-1.97) | (-2.22) | (-2.34) | (-2.47) | (-2.38) | (-3.33) | (-2.33) | (-2.06) | (-2.19) |
| **8** | -0.23 | -0.32 | -0.26 | -0.23 | -0.30 | -0.28 | -0.21 | -0.27 | -0.24 | -0.23 | -0.34 | -0.19 | -0.24 | -0.22 |
| | (-2.04) | (-2.93) | (-2.34) | (-2.08) | (-2.88) | (-2.78) | (-1.90) | (-2.60) | (-2.19) | (-2.17) | (-3.25) | (-1.64) | (-1.99) | (-2.00) |
| **9** | -0.30 | -0.45 | -0.32 | -0.32 | -0.31 | -0.33 | -0.33 | -0.33 | -0.30 | -0.34 | -0.45 | -0.35 | -0.30 | -0.37 |
| | (-2.68) | (-4.15) | (-2.75) | (-2.81) | (-2.70) | (-2.84) | (-2.88) | (-2.98) | (-2.56) | (-2.85) | (-3.78) | (-3.13) | (-2.39) | (-3.37) |
| **High OST** | -0.58 | -0.46 | -0.61 | -0.58 | -0.65 | -0.58 | -0.61 | -0.60 | -0.57 | -0.61 | -0.76 | -0.60 | -0.58 | -0.72 |
| | (-4.81) | (-3.82) | (-5.21) | (-4.89) | (-5.45) | (-4.61) | (-5.21) | (-5.34) | (-4.82) | (-5.20) | (-6.72) | (-5.44) | (-4.83) | (-6.11) |
| **High-Low** | **-0.41** | **-0.15** | **-0.37** | **-0.39** | **-0.37** | **-0.35** | **-0.39** | **-0.38** | **-0.38** | **-0.41** | **-0.52** | **-0.36** | **-0.40** | **-0.48** |
| | **(-6.89)** | **(-2.42)** | **(-6.41)** | **(-6.50)** | **(-6.06)** | **(-5.02)** | **(-6.19)** | **(-6.27)** | **(-5.98)** | **(-5.96)** | **(-8.34)** | **(-6.78)** | **(-6.73)** | **(-7.75)** |
| **High-Low O2F α** | -0.41 | -0.15 | -0.35 | -0.38 | -0.38 | -0.34 | -0.39 | -0.37 | -0.39 | -0.39 | -0.53 | -0.40 | -0.41 | -0.49 |
| | (-7.55) | (-2.29) | (-5.84) | (-5.68) | (-5.91) | (-4.36) | (-5.84) | (-5.97) | (-6.16) | (-5.93) | (-8.39) | (-7.20) | (-5.94) | (-7.64) |

**Table 7**
**Firm-level Fama-Macbeth regressions.**
This table reports time-series averages of the slope coefficients of Fama-Macbeth cross-sectional regressions from the one-month-ahead daily rebalanced delta-hedged call option returns (in percentages) on option-based salience theory value (OST), along with a collection of control variables defined in Table 2. All independent variables are standardized to have zero mean and unit variance in each month. Newey-West adjusted t-statistics are presented in parentheses. The sample ranges from January 1996 to December 2022.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **OST** | -0.172 | -0.177 | -0.168 | -0.170 | -0.132 | -0.137 | -0.151 | -0.190 | -0.178 | -0.190 | -0.234 | -0.230 | -0.202 | -0.208 | -0.204 |
| | (-8.63) | (-9.33) | (-8.62) | (-8.90) | (-5.87) | (-5.14) | (-5.87) | (-6.53) | (-6.39) | (-6.18) | (-6.30) | (-6.12) | (-5.90) | (-5.45) | (-5.41) |
| **SST** | | -0.051 | -0.008 | -0.163 | -0.038 | 0.002 | -0.025 | -0.195 | -0.166 | -0.181 | -0.214 | -0.223 | -0.199 | -0.196 | -0.146 |
| | | (-1.69) | (-0.26) | (-4.37) | (-1.38) | (0.07) | (-0.79) | (-5.50) | (-4.82) | (-4.80) | (-5.16) | (-5.30) | (-4.86) | (-4.46) | (-3.36) |
| **Ln(ME)** | | | 0.390 | 0.387 | 0.275 | 0.314 | 0.124 | -0.289 | -0.254 | -0.255 | -0.291 | -0.275 | -0.152 | -0.200 | -0.184 |
| | | | (5.25) | (5.80) | (4.71) | (4.63) | (1.91) | (-3.79) | (-3.40) | (-3.45) | (-3.55) | (-3.27) | (-1.69) | (-2.02) | (-1.76) |
| **Ln(Amihud** | | | 0.108 | 0.108 | 0.092 | 0.251 | 0.155 | 0.093 | 0.176 | 0.182 | 0.130 | 0.134 | 0.135 | 0.126 | 0.141 |
| | | | (1.38) | (1.54) | (1.41) | (3.65) | (2.31) | (1.21) | (2.22) | (2.22) | (1.50) | (1.51) | (1.45) | (1.25) | (1.26) |
| **Ln(BM)** | | | 0.109 | 0.099 | 0.094 | 0.085 | 0.067 | -0.004 | 0.002 | 0.007 | 0.003 | 0.002 | 0.022 | 0.025 | -0.021 |
| | | | (3.92) | (4.12) | (4.50) | (4.05) | (3.26) | (-0.19) | (0.09) | (0.31) | (0.11) | (0.08) | (0.68) | (0.62) | (-0.43) |
| **$RET_{(-1,0)}$** | | | | 0.192 | 0.280 | 0.249 | 0.225 | -0.081 | -0.135 | -0.145 | -0.135 | -0.114 | -0.138 | -0.160 | -0.156 |
| | | | | (4.60) | (5.83) | (5.35) | (4.90) | (-1.30) | (-2.16) | (-2.29) | (-1.89) | (-1.61) | (-2.04) | (-2.32) | (-2.17) |
| **$RET_{(-12,-2)}$** | | | | -0.045 | -0.013 | 0.038 | 0.085 | 0.057 | 0.065 | 0.060 | 0.055 | 0.059 | 0.057 | 0.046 | 0.067 |
| | | | | (-1.35) | (-0.40) | (1.02) | (2.31) | (1.37) | (1.60) | (1.45) | (1.31) | (1.43) | (1.20) | (0.99) | (1.39) |
| **SMAX(5)** | | | | | -0.313 | -0.314 | -0.156 | 0.529 | 0.516 | 0.537 | 0.545 | 0.539 | 0.483 | 0.503 | 0.473 |
| | | | | | (-4.75) | (-4.77) | (-2.43) | (5.48) | (5.33) | (5.18) | (5.08) | (4.98) | (4.76) | (4.64) | (4.37) |
| **IO** | | | | | | 0.114 | 0.078 | -0.010 | 0.019 | 0.014 | 0.015 | 0.015 | -0.001 | -0.019 | 0.007 |
| | | | | | | (4.45) | (3.09) | (-0.45) | (0.91) | (0.70) | (0.68) | (0.70) | (-0.04) | (-0.65) | (0.21) |
| **NOA** | | | | | | 0.113 | 0.129 | 0.166 | 0.180 | 0.185 | 0.196 | 0.201 | 0.159 | 0.181 | 0.174 |
| | | | | | | (3.11) | (3.64) | (5.76) | (6.25) | (5.94) | (5.37) | (5.51) | (4.16) | (4.52) | (3.97) |
| **IVOL** | | | | | | | -0.266 | 0.521 | 0.483 | 0.505 | 0.524 | 0.501 | 0.635 | 0.600 | 0.617 |
| | | | | | | | (-5.08) | (5.63) | (5.39) | (6.14) | (5.54) | (5.33) | (5.18) | (4.24) | (4.11) |
| **IV** | | | | | | | | -1.787 | -1.837 | -1.879 | -1.912 | -1.866 | -1.740 | -1.690 | -1.789 |
| | | | | | | | | (-12.31) | (-12.68) | (-13.58) | (-11.57) | (-11.32) | (-9.45) | (-8.49) | (-8.67) |
| **VOLDEV** | | | | | | | | | 0.052 | 0.059 | 0.064 | 0.071 | 0.041 | 0.031 | 0.020 |
| | | | | | | | | | (2.74) | (3.20) | (3.40) | (3.57) | (2.24) | (1.37) | (0.87) |
| **PBAS** | | | | | | | | | -0.076 | -0.094 | -0.085 | -0.070 | -0.035 | -0.010 | -0.003 |
| | | | | | | | | | (-2.94) | (-3.16) | (-1.91) | (-1.52) | (-0.68) | (-0.16) | (-0.04) |
| **IVSPD** | | | | | | | | | -0.587 | -0.563 | -0.562 | -0.565 | -0.525 | -0.509 | -0.553 |
| | | | | | | | | | (-11.37) | (-11.14) | (-10.29) | (-9.80) | (-7.95) | (-7.42) | (-7.50) |
| **TSIV** | | | | | | | | | | -0.103 | -0.131 | -0.103 | -0.087 | -0.091 | -0.154 |
| | | | | | | | | | | (-3.17) | (-3.33) | (-2.50) | (-1.38) | (-1.30) | (-2.08) |
| **RNS** | | | | | | | | | | | -1.504 | -2.421 | 0.374 | -5.170 | -6.310 |
| | | | | | | | | | | | (-1.32) | (-1.21) | (0.52) | (-1.11) | (-1.07) |
| **RNK** | | | | | | | | | | | 0.023 | 0.042 | 0.051 | 0.042 | 0.075 |
| | | | | | | | | | | | (0.49) | (0.80) | (0.74) | (0.50) | (0.94) |
| **ODP** | | | | | | | | | | | | -0.003 | 0.010 | 0.009 | 0.012 |
| | | | | | | | | | | | | (-0.16) | (0.47) | (0.38) | (0.48) |
| **CFV** | | | | | | | | | | | | | -1.465 | -4.464 | -1.549 |
| | | | | | | | | | | | | | (-1.14) | (-1.61) | (-0.50) |
| **CH** | | | | | | | | | | | | | 0.062 | 0.032 | 0.035 |
| | | | | | | | | | | | | | (1.69) | (0.92) | (0.84) |
| **PM** | | | | | | | | | | | | | -0.071 | 0.058 | -0.244 |
| | | | | | | | | | | | | | (-0.41) | (0.17) | (-0.52) |
| **PROFIT** | | | | | | | | | | | | | -0.000 | -0.012 | -0.006 |
| | | | | | | | | | | | | | (-0.01) | (-0.28) | (-0.13) |
| **TEF** | | | | | | | | | | | | | | 0.026 | -0.008 |
| | | | | | | | | | | | | | | (0.60) | (-0.16) |
| **Ln(PRICE)** | | | | | | | | | | | | | | 0.056 | 0.025 |
| | | | | | | | | | | | | | | (1.03) | (0.45) |
| **DISP** | | | | | | | | | | | | | | | 0.169 |
| | | | | | | | | | | | | | | | (0.63) |
| **$ISSUE_{5Y}$** | | | | | | | | | | | | | | | 0.021 |
| | | | | | | | | | | | | | | | (0.49) |
| **ZS** | | | | | | | | | | | | | | | 0.064 |
| | | | | | | | | | | | | | | | (1.04) |

**Table 8**

**Options salience effect and limits to arbitrage.**

This table reports the delta-hedged call options portfolio returns and alphas for decile portfolios formed on OST sorted based on limits to arbitrage proxies terciles. We employ Ln(ME), Ln(Amihud), IVOL, and NOA as proxies of limits to arbitrage. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts. The strategy is daily rebalanced to ensure delta-neutrality and delta-hedged option return is computed based on Eq. (1). Options are first sorted based on the value of limits to arbitrage measures into tercile portfolios and then further sorted into decile portfolios of OST within each tercile portfolio. We report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly excess return in Panels A, B, and C respectively. The last rows report differences in excess returns and alphas. Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample period is January 1996 to December 2022.

*Panel A: EW portfolios*

| | Ln(ME) | | | | Ln(Amihud) | | | | IVOL | | | | NOA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** |
| **Low OST** | -0.71 | -0.30 | -0.14 | 0.56 | -0.18 | -0.31 | -0.71 | -0.54 | -0.11 | -0.34 | -0.80 | -0.69 | -0.58 | -0.46 | -0.22 | 0.35 |
| | (-5.37) | (-2.73) | (-1.28) | (5.29) | (-1.70) | (-2.86) | (-5.26) | (-4.96) | (-1.03) | (-2.96) | (-5.45) | (-5.31) | (-4.50) | (-4.00) | (-1.79) | (3.41) |
| **2** | -0.98 | -0.32 | -0.16 | 0.82 | -0.17 | -0.35 | -0.92 | -0.75 | -0.20 | -0.39 | -0.84 | -0.64 | -0.75 | -0.30 | -0.16 | 0.59 |
| | (-6.53) | (-2.89) | (-1.55) | (7.24) | (-1.70) | (-3.00) | (-6.09) | (-6.27) | (-2.06) | (-3.47) | (-5.58) | (-5.72) | (-5.57) | (-2.34) | (-1.48) | (5.06) |
| **3** | -0.98 | -0.40 | -0.16 | 0.82 | -0.21 | -0.35 | -0.99 | -0.77 | -0.23 | -0.34 | -0.86 | -0.63 | -0.76 | -0.39 | -0.29 | 0.47 |
| | (-6.51) | (-3.80) | (-1.63) | (6.50) | (-2.20) | (-3.06) | (-6.42) | (-5.96) | (-2.38) | (-2.92) | (-6.03) | (-5.73) | (-5.87) | (-3.21) | (-2.82) | (4.25) |
| **4** | -0.78 | -0.32 | -0.16 | 0.61 | -0.19 | -0.32 | -0.71 | -0.52 | -0.21 | -0.35 | -0.70 | -0.49 | -0.60 | -0.35 | -0.18 | 0.42 |
| | (-5.53) | (-2.59) | (-1.67) | (5.57) | (-1.94) | (-2.57) | (-5.22) | (-4.82) | (-2.20) | (-3.07) | (-4.68) | (-4.30) | (-4.44) | (-2.79) | (-1.61) | (4.20) |
| **5** | -0.79 | -0.26 | -0.17 | 0.61 | -0.17 | -0.33 | -0.83 | -0.66 | -0.18 | -0.29 | -0.67 | -0.49 | -0.68 | -0.35 | -0.16 | 0.51 |
| | (-5.17) | (-2.43) | (-1.59) | (4.75) | (-1.56) | (-2.93) | (-5.65) | (-6.02) | (-1.88) | (-2.53) | (-4.87) | (-5.28) | (-5.34) | (-2.82) | (-1.56) | (4.62) |
| **6** | -0.71 | -0.32 | -0.15 | 0.56 | -0.14 | -0.27 | -0.61 | -0.47 | -0.19 | -0.25 | -0.76 | -0.57 | -0.57 | -0.34 | -0.15 | 0.42 |
| | (-4.53) | (-2.74) | (-1.30) | (5.08) | (-1.24) | (-2.28) | (-3.92) | (-4.48) | (-1.98) | (-1.99) | (-4.85) | (-4.77) | (-3.97) | (-3.28) | (-1.29) | (4.17) |
| **7** | -0.77 | -0.32 | -0.19 | 0.58 | -0.18 | -0.39 | -0.73 | -0.54 | -0.21 | -0.27 | -0.73 | -0.52 | -0.64 | -0.28 | -0.19 | 0.46 |
| | (-4.99) | (-2.69) | (-1.91) | (5.03) | (-1.81) | (-3.33) | (-4.74) | (-4.56) | (-2.12) | (-2.20) | (-4.20) | (-4.17) | (-4.45) | (-2.23) | (-1.72) | (4.65) |
| **8** | -0.93 | -0.36 | -0.23 | 0.69 | -0.23 | -0.38 | -0.85 | -0.62 | -0.22 | -0.35 | -0.94 | -0.72 | -0.77 | -0.39 | -0.28 | 0.49 |
| | (-5.95) | (-2.95) | (-2.09) | (5.92) | (-2.02) | (-3.18) | (-5.84) | (-5.96) | (-2.28) | (-2.96) | (-5.35) | (-4.91) | (-5.71) | (-3.10) | (-2.32) | (4.29) |
| **9** | -0.93 | -0.50 | -0.22 | 0.71 | -0.30 | -0.49 | -0.89 | -0.58 | -0.18 | -0.45 | -1.07 | -0.89 | -0.68 | -0.57 | -0.30 | 0.38 |
| | (-6.04) | (-3.86) | (-1.98) | (6.03) | (-2.62) | (-3.84) | (-5.68) | (-5.12) | (-1.66) | (-3.57) | (-6.05) | (-6.30) | (-4.32) | (-4.26) | (-2.38) | (3.17) |
| **High OST** | -1.54 | -0.86 | -0.40 | 1.14 | -0.46 | -1.01 | -1.41 | -0.96 | -0.43 | -0.83 | -1.54 | -1.11 | -1.29 | -0.97 | -0.60 | 0.69 |
| | (-8.89) | (-6.59) | (-3.52) | (8.63) | (-3.86) | (-7.72) | (-8.32) | (-7.44) | (-4.12) | (-6.24) | (-7.95) | (-6.79) | (-7.80) | (-6.57) | (-4.80) | (5.57) |
| **High-Low** | -0.84 | -0.56 | -0.26 | **0.58** | -0.28 | -0.69 | -0.70 | **-0.42** | -0.32 | -0.49 | -0.74 | **-0.42** | -0.71 | -0.51 | -0.37 | **0.34** |
| | (-5.78) | (-7.29) | (-5.86) | **(3.89)** | (-5.96) | (-8.74) | (-5.06) | **(-2.93)** | (-5.41) | (-5.54) | (-5.05) | **(-2.81)** | (-5.73) | (-5.29) | (-5.29) | **(2.43)** |
| **High-low O2F α** | -0.80 | -0.55 | -0.29 | **0.51** | -0.32 | -0.71 | -0.65 | **-0.32** | -0.38 | -0.53 | -0.66 | **-0.28** | -0.73 | -0.45 | -0.37 | **0.37** |
| | (-5.29) | (-6.02) | (-5.98) | **(3.21)** | (-5.39) | (-8.24) | (-4.48) | **(-2.15)** | (-5.37) | (-5.30) | (-3.83) | **(-1.52)** | (-4.87) | (-4.12) | (-4.62) | **(2.25)** |

*Panel B: OVW portfolios*

| | Ln(ME) | | | | Ln(Amihud) | | | | IVOL | | | | NOA | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** |
| **Low OST** | -1.26 | -0.56 | -0.24 | 1.03 | -0.26 | -0.46 | -1.37 | -1.11 | -0.23 | -0.43 | -0.93 | -0.70 | -0.84 | -0.68 | -0.28 | 0.57 |
| | (-6.91) | (-3.98) | (-1.85) | (5.71) | (-2.14) | (-3.09) | (-6.93) | (-6.02) | (-2.03) | (-3.14) | (-4.31) | (-3.50) | (-5.31) | (-5.04) | (-2.22) | (3.23) |
| **2** | -1.89 | -0.43 | -0.30 | 1.59 | -0.40 | -0.46 | -1.61 | -1.21 | -0.23 | -0.48 | -1.01 | -0.77 | -1.12 | -0.54 | -0.27 | 0.85 |
| | (-8.24) | (-3.25) | (-2.59) | (7.22) | (-3.96) | (-2.45) | (-7.56) | (-5.76) | (-2.12) | (-3.72) | (-4.56) | (-3.44) | (-6.26) | (-3.23) | (-2.50) | (5.03) |
| **3** | -1.09 | -0.63 | -0.23 | 0.87 | -0.30 | -0.45 | -1.27 | -0.96 | -0.23 | -0.47 | -0.59 | -0.36 | -0.85 | -0.32 | -0.29 | 0.55 |
| | (-2.95) | (-4.69) | (-1.99) | (2.39) | (-2.68) | (-2.74) | (-3.05) | (-2.37) | (-2.34) | (-4.28) | (-1.86) | (-1.19) | (-2.28) | (-1.76) | (-2.28) | (1.53) |
| **4** | -0.94 | -0.57 | -0.30 | 0.63 | -0.33 | -0.59 | -1.13 | -0.80 | -0.23 | -0.47 | -0.61 | -0.38 | -0.77 | -0.54 | -0.34 | 0.44 |
| | (-4.26) | (-3.11) | (-3.11) | (3.15) | (-3.02) | (-3.39) | (-5.27) | (-3.78) | (-2.26) | (-3.81) | (-2.74) | (-2.08) | (-3.87) | (-3.79) | (-2.75) | (2.25) |
| **5** | -1.32 | -0.46 | -0.11 | 1.21 | -0.23 | -0.62 | -1.47 | -1.24 | -0.26 | -0.33 | -0.76 | -0.50 | -1.08 | -0.37 | -0.08 | 1.00 |
| | (-5.77) | (-3.53) | (-0.63) | (4.45) | (-1.79) | (-4.60) | (-6.14) | (-4.51) | (-2.44) | (-2.63) | (-4.25) | (-3.64) | (-5.60) | (-2.37) | (-0.48) | (4.56) |
| **6** | -1.54 | -0.82 | -0.19 | 1.36 | -0.29 | -0.49 | -1.19 | -0.90 | -0.26 | -0.32 | -0.81 | -0.55 | -1.19 | -0.48 | -0.23 | 0.96 |
| | (-5.79) | (-4.87) | (-1.55) | (5.35) | (-2.39) | (-2.30) | (-4.87) | (-4.58) | (-2.55) | (-2.10) | (-3.85) | (-2.73) | (-6.65) | (-3.73) | (-1.76) | (5.55) |
| **7** | -1.65 | -0.63 | -0.23 | 1.42 | -0.25 | -0.80 | -1.27 | -1.02 | -0.30 | -0.33 | -1.22 | -0.93 | -0.63 | -0.29 | -0.27 | 0.36 |
| | (-6.33) | (-4.33) | (-1.80) | (5.19) | (-1.88) | (-5.36) | (-2.75) | (-2.15) | (-2.52) | (-1.98) | (-6.67) | (-5.14) | (-1.19) | (-1.99) | (-2.10) | (0.69) |
| **8** | -1.67 | -0.54 | -0.34 | 1.33 | -0.31 | -0.86 | -2.06 | -1.74 | -0.24 | -0.52 | -1.08 | -0.84 | -1.45 | -0.60 | -0.37 | 1.08 |
| | (-7.16) | (-2.62) | (-2.61) | (5.73) | (-2.38) | (-5.42) | (-9.14) | (-8.27) | (-2.56) | (-3.64) | (-2.49) | (-1.90) | (-7.09) | (-3.94) | (-2.86) | (5.22) |
| **9** | -2.00 | -0.64 | -0.36 | 1.65 | -0.44 | -0.56 | -1.90 | -1.46 | -0.29 | -0.64 | -1.51 | -1.22 | -1.51 | -0.64 | -0.55 | 0.96 |
| | (-6.19) | (-1.96) | (-2.82) | (5.30) | (-3.36) | (-1.90) | (-8.01) | (-6.46) | (-2.63) | (-3.72) | (-6.09) | (-5.48) | (-7.35) | (-2.29) | (-3.87) | (4.71) |
| **High OST** | -2.44 | -1.46 | -0.68 | 1.76 | -0.78 | -1.41 | -2.37 | -1.59 | -0.54 | -1.12 | -1.96 | -1.42 | -1.96 | -1.33 | -0.75 | 1.21 |
| | (-6.31) | (-7.60) | (-5.00) | (4.96) | (-5.39) | (-6.55) | (-6.12) | (-4.56) | (-5.30) | (-7.82) | (-4.85) | (-3.64) | (-5.65) | (-6.48) | (-5.72) | (3.89) |
| **High-Low** | -1.18 | -0.90 | -0.45 | **0.73** | -0.52 | -0.95 | -1.00 | **-0.48** | -0.31 | -0.69 | -1.03 | **-0.72** | -1.11 | -0.65 | -0.47 | **0.64** |
| | (-2.91) | (-4.97) | (-4.14) | **(1.82)** | (-5.59) | (-4.37) | (-2.41) | **(-1.21)** | (-2.63) | (-5.35) | (-2.56) | **(-1.65)** | (-3.42) | (-3.03) | (-4.53) | **(2.05)** |
| **High-low O2F α** | -0.96 | -0.85 | -0.55 | **0.41** | -0.62 | -0.96 | -0.82 | **-0.19** | -0.30 | -0.88 | -0.89 | **-0.59** | -1.11 | -0.68 | -0.50 | **0.61** |
| | (-2.25) | (-4.60) | (-5.15) | **(0.93)** | (-5.57) | (-4.45) | (-1.93) | **(-0.46)** | (-2.53) | (-6.33) | (-2.08) | **(-1.27)** | (-3.62) | (-3.00) | (-4.22) | **(2.00)** |

## Table 8 (continued)

| Panel C: SVW portfolios | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Ln(ME)** | | | | **Ln(Amihud)** | | | | **IVOL** | | | | **NOA** | | | |
| **Decile** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** | **Low** | **Medium** | **High** | **High-Low** |
| **Low OST** | -0.59 | -0.30 | -0.11 | 0.48 | -0.12 | -0.25 | -0.54 | -0.41 | -0.13 | -0.24 | -0.49 | -0.36 | -0.34 | -0.20 | -0.18 | 0.16 |
| | (-4.57) | (-2.71) | (-1.03) | (4.60) | (-1.18) | (-2.14) | (-4.17) | (-4.51) | (-1.18) | (-1.84) | (-3.01) | (-2.37) | (-2.93) | (-1.82) | (-1.60) | (1.76) |
| **2** | -0.80 | -0.31 | -0.16 | 0.64 | -0.17 | -0.30 | -0.70 | -0.53 | -0.11 | -0.32 | -0.29 | -0.18 | -0.41 | -0.11 | -0.17 | 0.24 |
| | (-5.80) | (-2.84) | (-1.56) | (6.40) | (-1.68) | (-2.46) | (-5.46) | (-5.69) | (-1.09) | (-2.79) | (-1.67) | (-1.36) | (-3.31) | (-0.80) | (-1.67) | (2.75) |
| **3** | -0.83 | -0.38 | -0.18 | 0.65 | -0.18 | -0.22 | -0.77 | -0.59 | -0.15 | -0.25 | -0.57 | -0.41 | -0.50 | -0.19 | -0.24 | 0.26 |
| | (-5.74) | (-3.62) | (-1.95) | (5.77) | (-1.95) | (-1.86) | (-5.10) | (-4.90) | (-1.62) | (-2.10) | (-3.72) | (-3.06) | (-3.97) | (-1.85) | (-2.73) | (3.01) |
| **4** | -0.65 | -0.32 | -0.20 | 0.45 | -0.18 | -0.25 | -0.54 | -0.37 | -0.19 | -0.30 | -0.34 | -0.14 | -0.37 | -0.19 | -0.17 | 0.20 |
| | (-4.69) | (-2.55) | (-2.26) | (3.96) | (-1.99) | (-2.01) | (-4.26) | (-3.44) | (-2.08) | (-2.60) | (-1.98) | (-1.04) | (-2.83) | (-1.54) | (-1.67) | (1.90) |
| **5** | -0.69 | -0.26 | -0.12 | 0.57 | -0.14 | -0.31 | -0.69 | -0.55 | -0.09 | -0.18 | -0.41 | -0.31 | -0.50 | -0.21 | -0.12 | 0.38 |
| | (-4.92) | (-2.44) | (-1.16) | (4.91) | (-1.32) | (-2.90) | (-5.29) | (-6.04) | (-0.88) | (-1.46) | (-2.54) | (-2.66) | (-4.06) | (-2.06) | (-1.11) | (4.47) |
| **6** | -0.54 | -0.31 | -0.11 | 0.42 | -0.11 | -0.25 | -0.35 | -0.24 | -0.13 | -0.29 | -0.42 | -0.29 | -0.28 | -0.30 | -0.11 | 0.17 |
| | (-3.26) | (-2.68) | (-1.03) | (3.46) | (-1.01) | (-2.07) | (-2.13) | (-2.06) | (-1.26) | (-2.34) | (-2.55) | (-2.12) | (-2.09) | (-2.99) | (-1.01) | (1.96) |
| **7** | -0.58 | -0.31 | -0.20 | 0.38 | -0.18 | -0.34 | -0.48 | -0.30 | -0.20 | -0.28 | -0.51 | -0.30 | -0.48 | -0.14 | -0.21 | 0.27 |
| | (-3.85) | (-2.74) | (-2.00) | (3.44) | (-1.84) | (-3.06) | (-3.29) | (-2.72) | (-2.06) | (-2.29) | (-2.83) | (-2.28) | (-3.43) | (-1.23) | (-1.91) | (2.48) |
| **8** | -0.72 | -0.35 | -0.20 | 0.52 | -0.22 | -0.32 | -0.54 | -0.33 | -0.18 | -0.29 | -0.65 | -0.47 | -0.59 | -0.24 | -0.28 | 0.31 |
| | (-4.55) | (-2.83) | (-1.84) | (4.22) | (-2.05) | (-2.87) | (-3.78) | (-3.20) | (-1.84) | (-2.15) | (-3.18) | (-2.84) | (-5.27) | (-1.99) | (-2.66) | (3.44) |
| **9** | -0.83 | -0.48 | -0.20 | 0.63 | -0.22 | -0.37 | -0.67 | -0.45 | -0.17 | -0.40 | -0.72 | -0.55 | -0.49 | -0.35 | -0.24 | 0.25 |
| | (-5.72) | (-3.72) | (-1.83) | (5.81) | (-2.00) | (-3.09) | (-4.69) | (-4.38) | (-1.66) | (-3.12) | (-3.76) | (-3.67) | (-3.36) | (-3.27) | (-2.08) | (2.59) |
| **High OST** | -1.33 | -0.83 | -0.38 | 0.94 | -0.39 | -0.84 | -1.04 | -0.65 | -0.34 | -0.64 | -1.24 | -0.90 | -0.94 | -0.68 | -0.40 | 0.54 |
| | (-8.19) | (-6.29) | (-3.71) | (7.41) | (-3.73) | (-6.83) | (-6.36) | (-5.53) | (-3.53) | (-4.37) | (-5.92) | (-5.01) | (-5.38) | (-5.61) | (-3.61) | (4.15) |
| **High-Low** | -0.74 | -0.53 | -0.27 | **0.47** | -0.27 | -0.59 | -0.51 | **-0.24** | -0.21 | -0.40 | -0.75 | **-0.55** | -0.59 | -0.49 | -0.21 | **0.38** |
| | (-5.44) | (-7.02) | (-5.08) | **(3.14)** | (-4.77) | (-9.16) | (-3.91) | **(-1.72)** | (-2.98) | (-4.68) | (-4.30) | **(-2.90)** | (-4.67) | (-7.35) | (-3.16) | **(2.49)** |
| **High-low O2F α** | -0.69 | -0.51 | -0.28 | **0.40** | -0.26 | -0.58 | -0.38 | **-0.12** | -0.19 | -0.50 | -0.66 | **-0.46** | -0.64 | -0.49 | -0.18 | **0.46** |
| | (-4.75) | (-5.88) | (-5.13) | **(2.58)** | (-4.43) | (-8.78) | (-2.73) | **(-0.77)** | (-2.68) | (-5.50) | (-3.32) | **(-2.12)** | (-3.70) | (-5.94) | (-2.91) | **(2.49)** |

**Table 9**
**Options salience effect and investor sentiment.**

This table reports the option returns and alphas for decile portfolios formed on OST during periods of high and low sentiment. The sample period is January 1996 to June 2022, as the latest available sentiment index is as of June 2022. High-sentiment (low-sentiment) months are defined as those in which the investor sentiment index of Baker and Wurgler (2006) in the previous month is above (below) the median value for the entire index period (July 1965 to June 2022). Panel A employs the sentiment index, while Panel B applies the orthogonalized sentiment index. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are sorted based on the value of OST. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly return. The last rows report differences in excess returns, alphas, and annualized Sharpe ratios between deciles 10 (high OST) and 1 (low OST). Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). Differences in returns, alphas, and annualized Sharpe ratios on the high-low OST portfolio between periods of high and low sentiment are shown in bold. Corresponding t-statistics in parentheses are based on Newey and West (1987).

***Panel A: Sentiment Index***

| | EW Portfolios | | | OVW Portfolios | | | SVW Portfolios | | |
|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **High SENT** | **Low SENT** | **High-low SENT** | **High SENT** | **Low SENT** | **High-low SENT** | **High SENT** | **Low SENT** | **High-low SENT** |
| **Low OST** | -0.40 | -0.51 | 0.11 | -0.44 | -0.65 | 0.21 | -0.07 | -0.31 | 0.24 |
| | (-2.70) | (-3.98) | (0.57) | (-2.64) | (-4.65) | (0.98) | (-0.44) | (-2.86) | (1.34) |
| **2** | -0.44 | -0.45 | 0.02 | -0.37 | -0.59 | 0.22 | -0.04 | -0.24 | 0.20 |
| | (-2.60) | (-3.81) | (0.10) | (-1.96) | (-4.87) | (1.07) | (-0.23) | (-2.48) | (1.13) |
| **3** | -0.53 | -0.43 | -0.10 | -0.41 | -0.40 | -0.02 | -0.08 | -0.31 | 0.23 |
| | (-3.29) | (-3.63) | (-0.53) | (-2.77) | (-1.77) | (-0.06) | (-0.55) | (-3.28) | (1.31) |
| **4** | -0.45 | -0.43 | -0.02 | -0.39 | -0.62 | 0.23 | -0.16 | -0.35 | 0.19 |
| | (-2.56) | (-3.58) | (-0.10) | (-2.25) | (-4.78) | (1.12) | (-1.16) | (-3.41) | (1.20) |
| **5** | -0.32 | -0.42 | 0.10 | -0.21 | -0.34 | 0.13 | -0.01 | -0.29 | 0.28 |
| | (-1.94) | (-3.64) | (0.51) | (-1.11) | (-1.81) | (0.49) | (-0.05) | (-2.96) | (1.62) |
| **6** | -0.33 | -0.38 | 0.05 | -0.40 | -0.63 | 0.23 | -0.08 | -0.26 | 0.18 |
| | (-1.98) | (-3.06) | (0.25) | (-2.11) | (-5.25) | (1.13) | (-0.48) | (-2.29) | (1.05) |
| **7** | -0.42 | -0.38 | -0.04 | -0.54 | -0.49 | -0.05 | -0.13 | -0.35 | 0.21 |
| | (-2.34) | (-2.89) | (-0.19) | (-2.98) | (-4.08) | (-0.24) | (-0.87) | (-3.12) | (1.24) |
| **8** | -0.44 | -0.48 | 0.04 | -0.51 | -0.71 | 0.20 | -0.12 | -0.31 | 0.19 |
| | (-2.42) | (-3.68) | (0.19) | (-2.54) | (-4.10) | (0.85) | (-0.73) | (-2.96) | (1.07) |
| **9** | -0.54 | -0.70 | 0.16 | -0.75 | -0.73 | -0.01 | -0.22 | -0.39 | 0.17 |
| | (-3.19) | (-4.84) | (0.75) | (-4.07) | (-2.37) | (-0.03) | (-1.44) | (-3.51) | (0.96) |
| **High OST** | -1.13 | -0.92 | -0.21 | -1.47 | -1.28 | -0.19 | -0.54 | -0.57 | 0.03 |
| | (-5.66) | (-6.64) | (-1.00) | (-4.17) | (-7.35) | (-0.56) | (-3.24) | (-4.62) | (0.17) |
| **High-Low** | -0.73 | -0.41 | **-0.32** | -1.02 | -0.62 | **-0.40** | -0.47 | -0.26 | **-0.21** |
| | (-7.05) | (-5.34) | **(-2.71)** | (-3.40) | (-3.61) | **(-1.24)** | (-5.35) | (-3.63) | **(-1.95)** |
| **High-low O2F α** | -0.70 | -0.37 | **-0.33** | -1.15 | -0.63 | **-0.52** | -0.48 | -0.29 | **-0.19** |
| | (-5.07) | (-4.29) | **(-2.01)** | (-3.44) | (-3.07) | **(-1.32)** | (-4.81) | (-3.20) | **(-1.44)** |
| **Annualized SR** | 2.12 | 1.57 | **0.55** | 1.00 | 1.08 | **-0.07** | 1.54 | 1.04 | **0.51** |

***Panel B: Sentiment Index (orthogonalized)***

| | EW Portfolios | | | OVW Portfolios | | | SVW Portfolios | | |
|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **High SENT** | **Low SENT** | **High-low SENT** | **High SENT** | **Low SENT** | **High-low SENT** | **High SENT** | **Low SENT** | **High-low SENT** |
| **Low OST** | -0.33 | -0.59 | 0.26 | -0.39 | -0.71 | 0.32 | -0.04 | -0.35 | 0.31 |
| | (-1.94) | (-3.95) | (1.38) | (-2.19) | (-4.35) | (1.51) | (-0.22) | (-2.41) | (1.72) |
| **2** | -0.41 | -0.48 | 0.07 | -0.35 | -0.62 | 0.27 | -0.05 | -0.23 | 0.18 |
| | (-2.47) | (-3.46) | (0.36) | (-1.85) | (-4.76) | (1.32) | (-0.30) | (-1.90) | (1.01) |
| **3** | -0.44 | -0.52 | 0.08 | -0.36 | -0.46 | 0.10 | -0.05 | -0.34 | 0.29 |
| | (-2.61) | (-3.70) | (-0.41) | (-2.46) | (-1.91) | (-0.37) | (-0.31) | (-3.14) | (1.71) |
| **4** | -0.41 | -0.48 | 0.07 | -0.39 | -0.62 | 0.23 | -0.15 | -0.36 | 0.21 |
| | (-2.24) | (-3.21) | (-0.36) | (-2.37) | (-4.25) | (1.15) | (-1.10) | (-2.95) | (1.30) |
| **5** | -0.31 | -0.44 | 0.13 | -0.07 | -0.48 | 0.41 | -0.01 | -0.29 | 0.29 |
| | (-1.78) | (-3.17) | (0.67) | (-0.29) | (-2.93) | (1.49) | (-0.03) | (-2.19) | (1.67) |
| **6** | -0.29 | -0.43 | 0.14 | -0.33 | -0.70 | 0.37 | -0.07 | -0.28 | 0.21 |
| | (-1.71) | (-2.99) | (0.73) | (-1.84) | (-5.52) | (1.79) | (-0.43) | (-1.89) | (1.17) |
| **7** | -0.37 | -0.44 | 0.07 | -0.52 | -0.51 | -0.02 | -0.16 | -0.32 | 0.16 |
| | (-1.91) | (-2.78) | (-0.32) | (-2.97) | (-3.49) | (-0.09) | (-1.07) | (-2.40) | (0.90) |
| **8** | -0.35 | -0.57 | 0.22 | -0.47 | -0.76 | 0.29 | -0.11 | -0.33 | 0.22 |
| | (-1.78) | (-3.99) | (1.11) | (-2.14) | (-4.33) | (1.21) | (-0.62) | (-2.59) | (1.29) |
| **9** | -0.50 | -0.74 | 0.24 | -0.76 | -0.72 | -0.04 | -0.23 | -0.38 | 0.15 |
| | (-2.71) | (-4.53) | (1.16) | (-3.93) | (-2.21) | (-0.10) | (-1.51) | (-2.58) | (0.81) |
| **High OST** | -1.07 | -0.98 | -0.09 | -1.43 | -1.32 | -0.11 | -0.52 | -0.59 | 0.07 |
| | (-5.05) | (-5.96) | (-0.42) | (-3.95) | (-6.83) | (-0.33) | (-2.94) | (-3.83) | (0.40) |
| **High-Low** | -0.74 | -0.39 | **-0.35** | -1.04 | -0.61 | **-0.43** | -0.48 | -0.24 | **-0.24** |
| | (-7.17) | (-5.16) | **(-2.97)** | (-3.42) | (-3.88) | **(-1.35)** | (-5.53) | (-3.22) | **(-2.21)** |
| **High-low O2F α** | -0.73 | -0.35 | **-0.38** | -1.21 | -0.61 | **-0.60** | -0.49 | -0.29 | **-0.19** |
| | (-5.30) | (-4.34) | **(-2.40)** | (-3.31) | (-3.17) | **(-1.45)** | (-4.97) | (-3.03) | **(-1.39)** |
| **Annualized SR** | 2.15 | 1.53 | **0.62** | 0.99 | 1.17 | **-0.18** | 1.63 | 0.94 | **0.69** |

**Table 10**
**Option market salience effect in different market states.**

This table reports the option returns and alphas for decile portfolios formed on OST during periods of high and low volatility and past stock market returns. VIX is the CBOE volatility index based on the S&P 500 index options. Short-term past market return is a three-month backward-looking window. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are sorted based on the value of OST. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly return. The last rows report differences in excess returns, alphas, and annualized Sharpe ratios between deciles 10 (high OST) and 1 (low OST). Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). Differences in returns, alphas, and annualized Sharpe ratios on the high-low OST portfolio between periods of high and low market conditions are shown in bold. Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample period is January 1996 to December 2022.

***Panel A: Volatile versus stable markets (VIX)***

| | EW Portfolios | | | OVW Portfolios | | | SVW Portfolios | | |
|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **High VIX** | **Low VIX** | **High-low VIX** | **High VIX** | **Low VIX** | **High-low VIX** | **High VIX** | **Low VIX** | **High-low VIX** |
| **Low OST** | -0.28 | -0.55 | 0.27 | -0.29 | -0.64 | 0.34 | -0.04 | -0.25 | 0.20 |
| | (-1.29) | (-6.25) | (1.29) | (-1.11) | (-5.04) | (1.37) | (-0.22) | (-3.32) | (1.06) |
| **2** | -0.15 | -0.37 | 0.23 | -0.40 | -0.51 | 0.11 | -0.09 | -0.12 | 0.02 |
| | (-0.74) | (-3.90) | (1.10) | (-2.16) | (-3.05) | (0.47) | (-0.50) | (-1.30) | (0.11) |
| **3** | -0.33 | -0.34 | 0.01 | -0.45 | -0.24 | -0.21 | -0.19 | -0.18 | -0.01 |
| | (-1.70) | (-3.67) | (0.03) | (-2.09) | (-1.45) | (-0.84) | (-1.11) | (-2.67) | (-0.04) |
| **4** | -0.30 | -0.23 | -0.08 | -0.67 | -0.29 | -0.37 | -0.25 | -0.18 | -0.07 |
| | (-1.46) | (-2.62) | (-0.35) | (-3.32) | (-2.94) | (-1.57) | (-1.48) | (-2.37) | (-0.39) |
| **5** | -0.21 | -0.31 | 0.11 | -0.21 | -0.39 | 0.18 | -0.07 | -0.14 | 0.07 |
| | (-0.99) | (-3.70) | (0.53) | (-0.86) | (-3.68) | (0.74) | (-0.35) | (-1.91) | (0.39) |
| **6** | -0.21 | -0.34 | 0.13 | -0.52 | -0.45 | -0.07 | -0.12 | -0.20 | 0.08 |
| | (-1.06) | (-3.40) | (0.66) | (-2.55) | (-4.09) | (-0.28) | (-0.59) | (-2.46) | (0.42) |
| **7** | -0.32 | -0.40 | 0.09 | -0.41 | -0.60 | 0.19 | -0.21 | -0.25 | 0.04 |
| | (-1.42) | (-4.00) | (0.38) | (-2.02) | (-6.09) | (0.84) | (-1.09) | (-3.12) | (0.20) |
| **8** | -0.30 | -0.50 | 0.20 | -0.42 | -0.51 | 0.09 | -0.13 | -0.26 | 0.13 |
| | (-1.26) | (-4.26) | (0.87) | (-1.74) | (-4.08) | (0.38) | (-0.67) | (-3.47) | (0.69) |
| **9** | -0.43 | -0.54 | 0.10 | -0.77 | -0.43 | -0.34 | -0.18 | -0.36 | 0.17 |
| | (-1.82) | (-5.20) | (0.44) | (-3.02) | (-1.44) | (-0.82) | (-0.85) | (-4.44) | (0.86) |
| **High OST** | -1.06 | -0.98 | -0.08 | -1.29 | -1.22 | -0.07 | -0.51 | -0.52 | 0.02 |
| | (-4.04) | (-8.48) | (-0.34) | (-3.29) | (-8.67) | (-0.19) | (-2.25) | (-6.70) | (0.08) |
| **High-Low** | -0.78 | -0.43 | **-0.35** | -1.00 | -0.58 | **-0.41** | -0.46 | -0.27 | **-0.19** |
| | (-5.73) | (-5.72) | **(-2.35)** | (-2.98) | (-3.69) | **(-1.17)** | (-4.28) | (-4.36) | **(-1.52)** |
| **High-low O2F α** | -0.74 | -0.32 | **-0.42** | -1.27 | -0.40 | **-0.87** | -0.53 | -0.26 | **-0.26** |
| | (-5.23) | (-3.66) | **(-2.49)** | (-3.84) | (-1.90) | **(-2.21)** | (-5.15) | (-4.09) | **(-2.17)** |
| **Annualized SR** | 1.76 | 1.59 | **0.17** | 0.89 | 1.06 | **-0.17** | 1.22 | 1.30 | **-0.09** |

***Panel B: Bull versus bear markets***

| | EW Portfolios | | | OVW Portfolios | | | SVW Portfolios | | |
|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **High MktRet** | **Low MktRet** | **High-low MktRet** | **High MktRet** | **Low MktRet** | **Iigh-low MktRet** | **High MktRet** | **Low MktRet** | **High-low MktRet** |
| **Low OST** | -0.71 | -0.11 | -0.60 | -0.78 | -0.17 | -0.61 | -0.36 | 0.07 | -0.42 |
| | (-5.75) | (-0.60) | (-3.05) | (-4.90) | (-0.78) | (-2.53) | (-3.55) | (0.40) | (-2.29) |
| **2** | -0.52 | -0.02 | -0.49 | -0.70 | -0.20 | -0.50 | -0.23 | 0.00 | -0.23 |
| | (-4.36) | (-0.14) | (-2.52) | (-4.66) | (-1.00) | (-2.25) | (-2.32) | (0.01) | (-1.24) |
| **3** | -0.56 | -0.17 | -0.40 | -0.46 | -0.19 | -0.27 | -0.30 | -0.03 | -0.27 |
| | (-5.50) | (-1.01) | (-1.99) | (-2.66) | (-1.10) | (-1.13) | (-3.45) | (-0.21) | (-1.55) |
| **4** | -0.49 | -0.05 | -0.44 | -0.48 | -0.45 | -0.03 | -0.36 | -0.06 | -0.29 |
| | (-4.59) | (-0.29) | (-2.14) | (-3.65) | (-2.69) | (-0.14) | (-4.29) | (-0.42) | (-1.70) |
| **5** | -0.52 | -0.04 | -0.48 | -0.54 | -0.10 | -0.44 | -0.26 | 0.03 | -0.29 |
| | (-4.42) | (-0.25) | (-2.44) | (-4.26) | (-0.47) | (-1.93) | (-2.68) | (0.19) | (-1.60) |
| **6** | -0.52 | -0.05 | -0.47 | -0.60 | -0.29 | -0.32 | -0.34 | 0.02 | -0.37 |
| | (-4.67) | (-0.28) | (-2.42) | (-5.30) | (-1.39) | (-1.31) | (-3.78) | (0.13) | (-2.01) |
| **7** | -0.56 | -0.14 | -0.42 | -0.72 | -0.30 | -0.42 | -0.34 | -0.13 | -0.22 |
| | (-4.50) | (-0.71) | (-1.91) | (-5.62) | (-1.57) | (-1.87) | (-3.63) | (-0.72) | (-1.15) |
| **8** | -0.67 | -0.14 | -0.53 | -0.77 | -0.22 | -0.55 | -0.36 | -0.05 | -0.30 |
| | (-5.02) | (-0.68) | (-2.39) | (-4.61) | (-1.06) | (-2.48) | (-3.43) | (-0.30) | (-1.64) |
| **9** | -0.83 | -0.14 | -0.69 | -1.04 | -0.19 | -0.85 | -0.53 | 0.00 | -0.53 |
| | (-6.56) | (-0.71) | (-3.04) | (-6.91) | (-0.52) | (-2.04) | (-5.77) | (-0.02) | (-2.70) |
| **High OST** | -1.34 | -0.75 | -0.60 | -1.70 | -0.82 | -0.88 | -0.76 | -0.29 | -0.48 |
| | (-7.55) | (-4.33) | (-2.65) | (-7.89) | (-3.82) | (-2.58) | (-6.58) | (-1.56) | (-2.40) |
| **High-Low** | -0.64 | -0.64 | **0.00** | -0.93 | -0.65 | **-0.28** | -0.41 | -0.35 | **-0.05** |
| | (-5.91) | (-5.71) | **(0.03)** | (-4.86) | (-2.93) | **(-0.83)** | (-4.70) | (-3.91) | **(-0.46)** |
| **High-low O2F α** | -0.43 | -0.66 | **0.22** | -0.87 | -0.91 | **0.05** | -0.47 | -0.39 | **-0.07** |
| | (-4.27) | (-5.11) | **(1.36)** | (-4.35) | (-3.89) | **(0.15)** | (-5.48) | (-4.19) | **(-0.59)** |
| **Annualized SR** | 1.80 | 1.60 | **0.20** | 1.44 | 0.61 | **0.83** | 1.52 | 1.04 | **0.49** |

**Table 11**
**Salience effect and investor attention.**
This table reports the results of bivariate portfolio analyses and firm-level Fama-Macbeth analyses of the relation between OST and future delta-hedged call option returns controlling for various measures of investors' attention. In Panels A to E, we consider four proxies of attention based on Barber and Odean (2008): i) the maximum absolute abnormal daily return within each month (ABNRETD), ii) the absolute abnormal monthly return (ABNRETM), iii) the maximum abnormal daily volume within each month (ABNVOLD), and iv) the abnormal monthly trading volume (ABNVOLM) in the past year. In Panels F and G, we consider four proxies of attention based on Choy and Wei (2023): i) $I_W$ of a stock is 1 if the stock is among the top 80 winners at least once but never be a loser during the month and 0 otherwise, ii) $I_L$ of a stock is 1 if the stock is among the bottom 80 losers at least once but never be a winner during the month and 0 otherwise, iii) $I_{WL}$ of a stock is 1 if the stock has been a winner and a loser at least once in the month, and iv) $I_{Never}$ of a stock is 1 if the stock has never been a winner or a loser during the month. Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample period is January 1996 to December 2022.

*Panel A: Portfolio sorts EW*

| | ABNRETD | ABNRETM | ABNVOLD | ABNVOLM |
|---|---|---|---|---|
| **High-Low** | -0.35 | -0.56 | -0.45 | -0.55 |
| | (-5.70) | (-7.81) | (-5.95) | (-7.14) |
| **High-low O2F α** | -0.46 | -0.59 | -0.44 | -0.53 |
| | (-6.30) | (-7.63) | (-5.09) | (-6.02) |

*Panel B: Portfolio sorts OVW*

| | ABNRETD | ABNRETM | ABNVOLD | ABNVOLM |
|---|---|---|---|---|
| **High-Low** | -0.43 | -0.59 | -0.64 | -0.89 |
| | (-3.76) | (-4.63) | (-5.13) | (-6.81) |
| **High-low O2F α** | -0.56 | -0.70 | -0.67 | -0.93 |
| | (-4.19) | (-5.26) | (-4.77) | (-6.32) |

*Panel C: Portfolio sorts SVW*

| | ABNRETD | ABNRETM | ABNVOLD | ABNVOLM |
|---|---|---|---|---|
| **High-Low** | -0.24 | -0.38 | -0.20 | -0.33 |
| | (-3.35) | (-6.68) | (-3.34) | (-5.19) |
| **High-low O2F α** | -0.38 | -0.43 | -0.22 | -0.34 |
| | (-4.71) | (-7.33) | (-3.16) | (-4.65) |

*Panel D: Univariate Fama-MacBeth regressions on abnormal variables*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **OST** | -0.046 | -0.167 | -0.134 | -0.163 |
| | (-2.05) | (-8.12) | (-6.95) | (-8.32) |
| **ABNRETD** | -0.315 | | | |
| | (-7.40) | | | |
| **ABNRETM** | | -0.027 | | |
| | | (-0.72) | | |
| **ABNVOLD** | | | -0.155 | |
| | | | (-5.66) | |
| **ABNVOLM** | | | | -0.075 |
| | | | | (-2.01) |
| **Controls** | No | No | No | No |

*Panel E: Multivariate Fama-MacBeth regressions on abnormal variables*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **OST** | -0.095 | -0.226 | -0.156 | -0.197 |
| | (-2.40) | (-5.71) | (-3.98) | (-4.94) |
| **ABNRETD** | -0.448 | | | |
| | (-5.16) | | | |
| **ABNRETM** | | 0.118 | | |
| | | (1.96) | | |
| **ABNVOLD** | | | -0.555 | |
| | | | (-2.81) | |
| **ABNVOLM** | | | | -0.379 |
| | | | | (-2.58) |
| **Controls** | Yes | Yes | Yes | Yes |

*Panel F: Univariate Fama-MacBeth regressions on daily winners / losers*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **OST** | -0.163 | -0.156 | -0.144 | -0.105 |
| | (-8.12) | (-7.67) | (-7.54) | (-5.28) |
| $I_W$ | -0.079 | | | |
| | (-5.44) | | | |
| $I_L$ | | -0.116 | | |
| | | (-4.99) | | |
| $I_{WL}$ | | | -0.213 | |
| | | | (-7.43) | |
| $I_{Never}$ | | | | 0.254 |
| | | | | (7.73) |
| **Controls** | No | No | No | No |

*Panel G: Multivariate Fama-MacBeth regressions on daily winners / losers*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **OST** | -0.202 | -0.174 | -0.205 | -0.156 |
| | (-5.27) | (-4.36) | (-5.34) | (-4.08) |
| $I_W$ | -0.018 | | | |
| | (-0.57) | | | |
| $I_L$ | | -0.110 | | |
| | | (-2.58) | | |
| $I_{WL}$ | | | -0.118 | |
| | | | (-3.45) | |
| $I_{Never}$ | | | | 0.166 |
| | | | | (3.55) |
| **Controls** | Yes | Yes | Yes | Yes |

**Table 12**
**Options salience effect in different subperiods.**
This table reports the subperiod analysis results. Panels A to C report the OST-sorted portfolio differences for different subperiods for equal-, option-value- and stock-value-weighted portfolios respectively. Panels D and E report the slope coefficients and corresponding t-statistics (in parentheses) of OST with and without controls respectively in Fama-Macbeth regressions based on different subperiods. In Panel E, all 27 controls as in Column 15 of Table 7 are included. Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample period is January 1996 to December 2022.

*Panel A: Portfolio sorts EW*

| Subperiods | 1996/01 - 2008/12 | 2009/01 - 2022/12 | 2000/01 - 2022/12 | Excl. 1999/2000 | Excl. 2008/2009 | Excl. 99/00/08/09 |
|---|---|---|---|---|---|---|
| High-Low | -0.77 | -0.39 | -0.49 | -0.58 | -0.58 | -0.59 |
| | (-9.33) | (-3.93) | (-6.87) | (-7.72) | (-7.69) | (-7.41) |
| High-low S4F α | -0.79 | -0.34 | -0.48 | -0.55 | -0.58 | -0.57 |
| | (-9.90) | (-4.05) | (-6.94) | (-7.89) | (-8.29) | (-7.74) |
| High-low S7F α | -0.81 | -0.34 | -0.46 | -0.54 | -0.57 | -0.55 |
| | (-9.34) | (-4.18) | (-6.85) | (-7.66) | (-7.80) | (-7.39) |
| High-low O2F α | -0.70 | -0.38 | -0.49 | -0.59 | -0.56 | -0.61 |
| | (-6.36) | (-3.48) | (-6.41) | (-6.98) | (-6.76) | (-6.72) |
| Annualized SR | 2.56 | 1.27 | 1.65 | 1.91 | 1.88 | 1.93 |

*Panel B: Portfolio sorts OVW*

| Subperiods | 1996/01 - 2008/12 | 2009/01 - 2022/12 | 2000/01 - 2022/12 | Excl. 1999/2000 | Excl. 2008/2009 | Excl. 99/00/08/09 |
|---|---|---|---|---|---|---|
| High-Low | -0.87 | -0.71 | -0.75 | -0.79 | -0.80 | -0.80 |
| | (-6.99) | (-2.23) | (-3.57) | (-4.10) | (-4.14) | (-3.86) |
| High-low S4F α | -0.91 | -0.69 | -0.72 | -0.79 | -0.84 | -0.88 |
| | (-6.99) | (-2.64) | (-3.82) | (-4.43) | (-4.81) | (-4.63) |
| High-low S7F α | -1.00 | -0.72 | -0.73 | -0.77 | -0.82 | -0.83 |
| | (-8.42) | (-3.17) | (-4.38) | (-4.86) | (-4.94) | (-4.66) |
| High-low O2F α | -0.91 | -0.85 | -0.81 | -0.86 | -0.87 | -0.88 |
| | (-6.29) | (-2.48) | (-3.77) | (-4.26) | (-4.30) | (-4.06) |
| Annualized SR | 1.56 | 0.70 | 0.86 | 0.94 | 0.93 | 0.92 |

*Panel C: Portfolio sorts SVW*

| Subperiods | 1996/01 - 2008/12 | 2009/01 - 2022/12 | 2000/01 - 2022/12 | Excl. 1999/2000 | Excl. 2008/2009 | Excl. 99/00/08/09 |
|---|---|---|---|---|---|---|
| High-Low | -0.42 | -0.31 | -0.35 | -0.35 | -0.37 | -0.35 |
| | (-4.87) | (-4.08) | (-5.51) | (-5.96) | (-6.03) | (-5.89) |
| High-low S4F α | -0.45 | -0.30 | -0.35 | -0.34 | -0.38 | -0.36 |
| | (-4.71) | (-3.86) | (-5.01) | (-5.66) | (-6.00) | (-6.21) |
| High-low S7F α | -0.49 | -0.28 | -0.35 | -0.34 | -0.37 | -0.35 |
| | (-5.31) | (-3.83) | (-5.49) | (-5.79) | (-5.79) | (-5.79) |
| High-low O2F α | -0.42 | -0.33 | -0.36 | -0.34 | -0.38 | -0.35 |
| | (-4.19) | (-4.15) | (-5.06) | (-5.59) | (-5.40) | (-5.65) |
| Annualized SR | 1.36 | 1.26 | 1.30 | 1.34 | 1.35 | 1.39 |

*Panel D: Univariate Fama-MacBeth regressions*

| Subperiods | 1996/01 - 2008/12 | 2009/01 - 2022/12 | 2000/01 - 2022/12 | Excl. 1999/2000 | Excl. 2008/2009 | Excl. 99/00/08/09 |
|---|---|---|---|---|---|---|
| OST | -0.193 | -0.154 | -0.165 | -0.173 | -0.177 | -0.178 |
| | (-8.24) | (-4.92) | (-7.51) | (-8.36) | (-8.53) | (-8.25) |
| Controls | No | No | No | No | No | No |

*Panel E: Multivariate Fama-MacBeth regressions*

| Subperiods | 1996/01 - 2008/12 | 2009/01 - 2022/12 | 2000/01 - 2022/12 | Excl. 1999/2000 | Excl. 2008/2009 | Excl. 99/00/08/09 |
|---|---|---|---|---|---|---|
| OST | -0.230 | -0.179 | -0.218 | -0.194 | -0.189 | -0.178 |
| | (-3.42) | (-4.95) | (-6.14) | (-5.39) | (-4.77) | (-4.70) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 13**
**Alternative state space specifications.**
This table reports the option returns, alphas, and annualized Sharpe ratios for decile portfolios formed on OST based on alternative state space specifications. Alternative OST measures are estimated based on one month of daily, one quarter of daily, six months of daily, and one year of daily observations. Further variations based on dropping the end-day of the estimation window are also specified. Options are sorted based on the value of OST. For each state space specification, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) high-low return difference and alphas. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample period is January 1996 to December 2022.

*Panel A: Portfolio sorts EW*

| Window Frequency | Month Daily (Benchmark) | Month Daily (Drop end-day) | Quarter Daily | Quarter Daily (Drop end-day) | Semi-annual Daily | Semi-annual Daily (Drop end-day) | Annual Daily | Annual Daily (Drop end-day) |
|---|---|---|---|---|---|---|---|---|
| **High-Low** | -0.57 | -0.48 | -0.41 | -0.35 | -0.42 | -0.39 | -0.42 | -0.40 |
| | (-7.99) | (-7.12) | (-6.19) | (-5.28) | (-5.90) | (-5.62) | (-6.04) | (-5.68) |
| **High-low S4F α** | -0.56 | -0.47 | -0.40 | -0.33 | -0.43 | -0.40 | -0.43 | -0.41 |
| | (-8.18) | (-7.04) | (-6.34) | (-5.29) | (-5.63) | (-5.36) | (-5.90) | (-5.58) |
| **High-low S7F α** | -0.55 | -0.47 | -0.39 | -0.32 | -0.41 | -0.38 | -0.42 | -0.40 |
| | (-7.91) | (-6.85) | (-5.63) | (-4.67) | (-4.86) | (-4.70) | (-5.77) | (-5.48) |
| **High-low O2F α** | -0.55 | -0.43 | -0.36 | -0.27 | -0.36 | -0.33 | -0.31 | -0.30 |
| | (-7.14) | (-5.99) | (-5.66) | (-4.31) | (-4.73) | (-4.44) | (-4.80) | (-4.64) |
| **Annualized SR** | 1.86 | 1.60 | 1.38 | 1.17 | 1.37 | 1.27 | 1.38 | 1.30 |

*Panel B: Portfolio sorts OVW*

| Window Frequency | Month Daily (Benchmark) | Month Daily (Drop end-day) | Quarter Daily | Quarter Daily (Drop end-day) | Semi-annual Daily | Semi-annual Daily (Drop end-day) | Annual Daily | Annual Daily (Drop end-day) |
|---|---|---|---|---|---|---|---|---|
| **High-Low** | -0.79 | -0.71 | -0.58 | -0.63 | -0.81 | -0.80 | -0.98 | -0.95 |
| | (-4.37) | (-3.97) | (-4.25) | (-3.99) | (-4.18) | (-4.09) | (-5.31) | (-5.23) |
| **High-low S4F α** | -0.78 | -0.70 | -0.64 | -0.67 | -0.95 | -0.94 | -1.11 | -1.07 |
| | (-4.69) | (-4.05) | (-4.30) | (-3.89) | (-3.90) | (-3.89) | (-5.27) | (-5.08) |
| **High-low S7F α** | -0.79 | -0.73 | -0.64 | -0.66 | -0.98 | -0.97 | -1.11 | -1.08 |
| | (-5.24) | (-4.70) | (-4.26) | (-3.80) | (-4.13) | (-4.12) | (-5.47) | (-5.29) |
| **High-low O2F α** | -0.86 | -0.78 | -0.69 | -0.75 | -0.91 | -0.91 | -1.02 | -0.99 |
| | (-4.56) | (-4.18) | (-4.33) | (-4.03) | (-2.88) | (-2.87) | (-3.76) | (-3.68) |
| **Annualized SR** | 0.95 | 0.87 | 0.75 | 0.76 | 0.75 | 0.73 | 1.04 | 1.02 |

*Panel C: Portfolio sorts SVW*

| Window Frequency | Month Daily (Benchmark) | Month Daily (Drop end-day) | Quarter Daily | Quarter Daily (Drop end-day) | Semi-annual Daily | Semi-annual Daily (Drop end-day) | Annual Daily | Annual Daily (Drop end-day) |
|---|---|---|---|---|---|---|---|---|
| **High-Low** | -0.36 | -0.34 | -0.25 | -0.21 | -0.27 | -0.26 | -0.26 | -0.25 |
| | (-6.11) | (-6.45) | (-3.86) | (-3.29) | (-4.50) | (-4.24) | (-4.85) | (-4.78) |
| **High-low S4F α** | -0.36 | -0.34 | -0.25 | -0.21 | -0.27 | -0.25 | -0.26 | -0.25 |
| | (-5.58) | (-5.67) | (-3.58) | (-3.06) | (-4.38) | (-4.15) | (-4.46) | (-4.36) |
| **High-low S7F α** | -0.37 | -0.35 | -0.25 | -0.20 | -0.28 | -0.27 | -0.26 | -0.26 |
| | (-6.01) | (-5.90) | (-3.61) | (-2.95) | (-4.31) | (-4.27) | (-4.86) | (-4.72) |
| **High-low O2F α** | -0.38 | -0.34 | -0.21 | -0.15 | -0.19 | -0.17 | -0.19 | -0.19 |
| | (-5.54) | (-6.03) | (-2.90) | (-2.12) | (-2.66) | (-2.34) | (-3.09) | (-3.08) |
| **Annualized SR** | 1.31 | 1.31 | 0.83 | 0.69 | 0.82 | 0.76 | 0.88 | 0.86 |

*Panel D: Univariate Fama-MacBeth regressions*

| Window Frequency | Month Daily (Benchmark) | Month Daily (Drop end-day) | Quarter Daily | Quarter Daily (Drop end-day) | Semi-annual Daily | Semi-annual Daily (Drop end-day) | Annual Daily | Annual Daily (Drop end-day) |
|---|---|---|---|---|---|---|---|---|
| **OST** | -0.172 | -0.144 | -0.133 | -0.118 | -0.123 | -0.113 | -0.127 | -0.121 |
| | (-8.63) | (-7.40) | (-6.02) | (-5.34) | (-5.79) | (-5.32) | (-5.93) | (-5.68) |
| **Number of groups** | 323 | 323 | 321 | 321 | 318 | 318 | 312 | 312 |
| **Controls** | No | No | No | No | No | No | No | No |

*Panel E: Multivariate Fama-MacBeth regressions*

| Window Frequency | Month Daily (Benchmark) | Month Daily (Drop end-day) | Quarter Daily | Quarter Daily (Drop end-day) | Semi-annual Daily | Semi-annual Daily (Drop end-day) | Annual Daily | Annual Daily (Drop end-day) |
|---|---|---|---|---|---|---|---|---|
| **OST** | -0.204 | -0.177 | -0.173 | -0.153 | -0.154 | -0.139 | -0.325 | -0.320 |
| | (-5.41) | (-4.73) | (-3.97) | (-3.80) | (-4.60) | (-4.10) | (-1.90) | (-1.84) |
| **Number of groups** | 323 | 323 | 321 | 321 | 318 | 318 | 312 | 312 |
| **Controls** | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

**Table 14**
**Alternative choice context and salience specifications.**
This table reports the option returns, alphas, and annualized Sharpe ratios for decile portfolios formed on OST based on alternative choice context and salience specifications in Panels A to C, and corresponding Fama-Macbeth regression results in Panels D and E. The column "EW DHR" represents return difference and alphas based on OST estimated using the equal-weighted delta-hedged options daily returns as the market benchmark. The remaining columns report the results based on different θ and δ parameters in Eqs. (3)-(5). Options are sorted based on the value of OST. For each specification, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) high-low return difference and alphas. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample period is January 1996 to December 2022.

***Panel A: Portfolio sorts EW***

| Specification | EW DHR | $\theta = 0.05$ | $\theta = 0.15$ | $\delta = 0.6$ | $\delta = 0.8$ |
|---|---|---|---|---|---|
| **High-Low** | -0.58 | -0.56 | -0.57 | -0.56 | -0.59 |
| | (-7.43) | (-7.94) | (-8.01) | (-8.04) | (-8.17) |
| **High-low S4F α** | -0.57 | -0.55 | -0.56 | -0.56 | -0.57 |
| | (-7.36) | (-8.15) | (-8.03) | (-8.27) | (-8.49) |
| **High-low S7F α** | -0.56 | -0.53 | -0.55 | -0.54 | -0.56 |
| | (-7.30) | (-7.76) | (-7.76) | (-7.95) | (-8.17) |
| **High-low O2F α** | -0.53 | -0.52 | -0.54 | -0.54 | -0.55 |
| | (-6.36) | (-6.93) | (-7.22) | (-7.29) | (-7.43) |
| **Annualized SR** | 1.77 | 1.77 | 1.85 | 1.85 | 1.86 |

***Panel B: Portfolio sorts OVW***

| Specification | EW DHR | $\theta = 0.05$ | $\theta = 0.15$ | $\delta = 0.6$ | $\delta = 0.8$ |
|---|---|---|---|---|---|
| **High-Low** | -0.61 | -0.79 | -0.80 | -0.75 | -0.84 |
| | (-3.56) | (-4.50) | (-4.60) | (-4.22) | (-4.69) |
| **High-low S4F α** | -0.58 | -0.79 | -0.79 | -0.75 | -0.83 |
| | (-3.58) | (-4.89) | (-4.81) | (-4.44) | (-4.89) |
| **High-low S7F α** | -0.63 | -0.78 | -0.80 | -0.78 | -0.84 |
| | (-4.20) | (-5.50) | (-5.17) | (-5.36) | (-5.33) |
| **High-low O2F α** | -0.62 | -0.84 | -0.87 | -0.76 | -0.90 |
| | (-3.50) | (-4.71) | (-4.95) | (-4.36) | (-4.90) |
| **Annualized SR** | 0.77 | 0.94 | 0.97 | 0.93 | 1.03 |

***Panel C: Portfolio sorts SVW***

| Specification | EW DHR | $\theta = 0.05$ | $\theta = 0.15$ | $\delta = 0.6$ | $\delta = 0.8$ |
|---|---|---|---|---|---|
| **High-Low** | -0.30 | -0.36 | -0.36 | -0.33 | -0.37 |
| | (-4.77) | (-5.61) | (-6.38) | (-5.59) | (-6.13) |
| **High-low S4F α** | -0.28 | -0.35 | -0.36 | -0.33 | -0.36 |
| | (-4.11) | (-5.02) | (-6.11) | (-5.14) | (-5.66) |
| **High-low S7F α** | -0.30 | -0.35 | -0.36 | -0.33 | -0.38 |
| | (-4.76) | (-4.89) | (-6.29) | (-5.34) | (-6.01) |
| **High-low O2F α** | -0.29 | -0.36 | -0.37 | -0.33 | -0.36 |
| | (-3.63) | (-4.81) | (-5.96) | (-5.07) | (-5.76) |
| **Annualized SR** | 1.07 | 1.25 | 1.30 | 1.23 | 1.28 |

***Panel D: Univariate Fama-MacBeth regressions***

| Specification | EW DHR | $\theta = 0.05$ | $\theta = 0.15$ | $\delta = 0.6$ | $\delta = 0.8$ |
|---|---|---|---|---|---|
| **OST** | -0.168 | -0.169 | -0.173 | -0.171 | -0.173 |
| | (-8.11) | (-8.61) | (-8.51) | (-8.69) | (-8.55) |
| **Number of groups** | 323 | 323 | 323 | 323 | 323 |
| **Controls** | No | No | No | No | No |

***Panel E: Multivariate Fama-MacBeth regressions***

| Specification | EW DHR | $\theta = 0.05$ | $\theta = 0.15$ | $\delta = 0.6$ | $\delta = 0.8$ |
|---|---|---|---|---|---|
| **OST** | -0.202 | -0.196 | -0.200 | -0.201 | -0.206 |
| | (-5.70) | (-5.45) | (-5.16) | (-5.26) | (-5.55) |
| **Number of groups** | 323 | 323 | 323 | 323 | 323 |
| **Controls** | Yes | Yes | Yes | Yes | Yes |

**Table 15**
**Transaction cost analysis on OST-based option trading strategy.**
This table presents the impact of option transaction costs (bid-ask spreads) on the profitability of long-short delta-hedged call option strategy formed by option-based salience theory value (OST) and held until maturity. For the column "0%" we assume the options are transacted at the midpoint of the bid and ask quotes (i.e., the effective spread is zero). The other columns correspond to different assumptions on the ratio of effective bid-ask spread (ESPR) to the quoted bid-ask spread (QSPR) from 5% to 30%. We report the equal-weighted (EW), option value-weighted (OVW), and stock value-weighted (SVW) monthly return spreads. Option two-factor (O2F) alpha is based on option return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

| | ***ESPR / QSPR*** | | | | | | |
|---|---|---|---|---|---|---|---|
| **Weight** | **0%** | **5%** | **10%** | **15%** | **20%** | **25%** | **30%** |
| **EW** | -0.74 | -0.55 | -0.35 | -0.16 | 0.04 | 0.23 | 0.43 |
| | (-7.94) | (-5.88) | (-3.73) | (-1.61) | (0.38) | (2.18) | (3.75) |
| **EW O2F α** | -0.71 | -0.52 | -0.33 | -0.14 | 0.05 | 0.24 | 0.43 |
| | (-7.53) | (-5.59) | (-3.54) | (-1.47) | (0.54) | (2.42) | (4.12) |
| **OVW** | -0.96 | -0.87 | -0.77 | -0.68 | -0.58 | -0.49 | -0.40 |
| | (-4.28) | (-3.88) | (-3.48) | (-3.07) | (-2.65) | (-2.23) | (-1.81) |
| **OVW O2F α** | -1.01 | -0.92 | -0.83 | -0.74 | -0.65 | -0.56 | -0.47 |
| | (-4.15) | (-3.80) | (-3.44) | (-3.08) | (-2.71) | (-2.34) | (-1.97) |
| **SVW** | -0.49 | -0.42 | -0.34 | -0.27 | -0.19 | -0.12 | -0.04 |
| | (-7.52) | (-6.53) | (-5.45) | (-4.30) | (-3.10) | (-1.88) | (-0.66) |
| **SVW O2F α** | -0.51 | -0.43 | -0.36 | -0.29 | -0.21 | -0.14 | -0.07 |
| | (-6.45) | (-5.60) | (-4.69) | (-3.76) | (-2.80) | (-1.83) | (-0.85) |

# Internet Appendix

**Table A1**
**Variable definitions.**

| | |
|---|---|
| | ***Panel A. Option-based salience theory values as predictors of option returns*** |
| **OST** | Option-based salience theory value constructed based on the average daily delta-hedged returns of call and put options. |
| **$OST_{Call}$** | Option-based salience theory value constructed based on the daily delta-hedged returns of call options only. |
| **$OST_{Put}$** | Option-based salience theory value constructed based on the daily delta-hedged returns of put options only. |
| | ***Panel B. Stock and option characteristics as control variables*** |
| **SST** | Stock-market salience theory value from stock returns as in Cosemans and Frehen (2021). |
| **Ln(ME)** | The logarithm of market capitalization in millions of U.S. dollars. |
| **Ln(Amihud)** | The natural logarithm of Amihud (2002) illiquidity measure. |
| **Ln(BM)** | The logarithm of the book-to-market ratio. |
| **$RET_{(-1,0)}$** | The 1-month-lagged stock return. |
| **$RET_{(-12,-2)}$** | The cumulative stock returns from 12 months ago until 1 month ago. |
| **SMAX(5)** | The average of five highest daily returns of underlying stock in the previous month, as in Bali et al. (2011). |
| **IO** | The percentage of common stocks owned by institutions in the previous quarter. |
| **NOA** | The number of analysts covering the firm in the previous month. |
| **IVOL** | The annualized idiosyncratic volatility based on daily return observations over the past 12 months, as in Ang et al. (2006). |
| **IV** | The average implied volatility of 30-day at-the-money call and put options. |
| **VOLDEV** | The log difference between realized volatility and the Black-Scholes implied volatility for at-the-money options at the end of last month, as in Goyal and Saretto (2009). |
| **PBAS** | The ratio of the difference between ask and bid quotes of option to the midpoint of the bid and ask quotes at the end of each month. |
| **IVSPD** | The spread between IVs of call and put option. |
| **TSIV** | The term structure of IV defined as the difference between IVs of options with 6-month and 1-month to maturity as in Vasquez (2017). |
| **RNS** | The risk-neutral skewness of stock returns respectively, as in Bakshi, Kapadia and Madan (2003). |
| **RNK** | The risk-neutral kurtosis of stock returns respectively, as in Bakshi, Kapadia and Madan (2003). |
| **ODP** | The log difference between the market values of all options and the market value of underlying stocks at the end of last month, as in Zhan et al. (2022). |
| **CFV** | Cash flow variance as in Haugen and Baker (1996). |
| **CH** | The cash-to-assets ratio as in Palazzo (2012). |
| **DISP** | The analyst earnings forecast dispersion, as in Diether, Malloy and Scherbina (2002). |
| **$ISSUE_{5Y}$** | 5-year new issues as in Daniel and Titman (2006). |
| **PM** | Profit margin as in Soliman (2008). |
| **Ln(PRICE)** | The log of the underlying stock price at the end of last month. |
| **PROFIT** | The profitability as in Fama and French (2006). |
| **TEF** | The total external finance as in Bradshaw, Richardson, and Sloan (2006). |
| **ZS** | The z-score as in Dichev (1998). |
| | ***Panel C. Additional characteristics of investor attention*** |
| **ABNRETD** | The maximum absolute abnormal daily return within each month, where abnormal return is defined as the difference between a stock's return and the market return. |
| **ABNRETM** | The absolute abnormal monthly return, where abnormal return is defined as the difference between a stock's return and the market return. |
| **ABNVOLD** | The maximum abnormal daily trading volume within each month, where abnormal daily volume is calculated as a stock's daily dollar trading volume divided by its average daily dollar volume over the previous one year. |
| **ABNVOLM** | The abnormal monthly trading volume, calculated as a stock's monthly dollar trading volume divided by its average monthly dollar volume over the previous one year. |
| **$I_W$** | Indicator variable that is one when a stock was a daily winner, but not a daily loser last month. A day's top 80 (bottom 80) stocks of CRSP's NYSE/AMEX/NASDAQ universe are defined as daily winner (loser). |
| **$I_L$** | Indicator variable that is one when a stock was a daily loser, but not a daily winner last month. A day's top 80 (bottom 80) stocks of CRSP's NYSE/AMEX/NASDAQ universe are defined as daily winner (loser). |
| **$I_{WL}$** | Indicator variable that is one when a stock was both, a daily winner and a daily loser last month. A day's top 80 (bottom 80) stocks of CRSP's NYSE/AMEX/NASDAQ universe are defined as daily winner (loser). |
| **$I_{Never}$** | Indicator variable that is one when a stock was never a daily winner nor a daily loser last month. A day's top 80 (bottom 80) stocks of CRSP's NYSE/AMEX/NASDAQ universe are defined as daily winner (loser). |

**Table A2**

**Hold-until-maturity option returns on OST-sorted delta-hedged call option portfolios.**

This table reports the option returns and alphas for decile portfolios formed on the option-based salience theory value OST. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts and held until maturity. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are sorted based on the value of OST. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly excess return. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). SR is the annualized Sharpe ratio and MDD is the maximum drawdown of the portfolio. The last row reports differences in returns and alphas between deciles 10 (high OST) and 1 (low OST). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

| | | **EW Portfolios** | | | | | | **OVW Portfolios** | | | | | | **SVW Portfolios** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **OST** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** |
| **Low OST** | -0.03 | -0.69 | -0.59 | -0.59 | -0.48 | -1.21 | -90.71% | -0.83 | -0.75 | -0.75 | -0.61 | -1.33 | -93.71% | -0.27 | -0.16 | -0.17 | -0.20 | -0.51 | -68.32% |
| | | (-5.05) | (-4.40) | (-4.23) | (-3.72) | | | (-5.91) | (-5.72) | (-5.42) | (-4.34) | | | (-1.94) | (-1.13) | (-1.20) | (-1.66) | | |
| **2** | -0.01 | -0.70 | -0.58 | -0.57 | -0.53 | -1.28 | -90.72% | -0.74 | -0.64 | -0.66 | -0.66 | -1.24 | -92.71% | -0.20 | -0.09 | -0.08 | -0.16 | -0.37 | -58.58% |
| | | (-5.28) | (-4.49) | (-4.21) | (-3.75) | | | (-5.40) | (-4.86) | (-5.29) | (-4.42) | | | (-1.53) | (-0.69) | (-0.59) | (-1.20) | | |
| **3** | 0.00 | -0.73 | -0.61 | -0.60 | -0.54 | -1.30 | -91.41% | -0.65 | -0.54 | -0.55 | -0.43 | -0.79 | -90.83% | -0.22 | -0.11 | -0.08 | -0.20 | -0.42 | -66.15% |
| | | (-5.52) | (-4.61) | (-4.58) | (-3.79) | | | (-3.67) | (-3.20) | (-3.05) | (-2.26) | | | (-1.70) | (-0.81) | (-0.55) | (-1.49) | | |
| **4** | 0.00 | -0.67 | -0.53 | -0.53 | -0.44 | -1.14 | -89.31% | -0.77 | -0.67 | -0.66 | -0.62 | -1.29 | -92.20% | -0.33 | -0.23 | -0.23 | -0.25 | -0.69 | -69.61% |
| | | (-4.67) | (-3.68) | (-3.76) | (-3.08) | | | (-5.71) | (-5.16) | (-4.84) | (-4.34) | | | (-2.81) | (-1.94) | (-1.96) | (-2.06) | | |
| **5** | 0.01 | -0.59 | -0.46 | -0.44 | -0.39 | -1.05 | -86.23% | -0.45 | -0.30 | -0.30 | -0.27 | -0.54 | -82.39% | -0.21 | -0.11 | -0.07 | -0.14 | -0.39 | -63.25% |
| | | (-4.41) | (-3.46) | (-3.32) | (-2.78) | | | (-2.32) | (-1.50) | (-1.42) | (-1.44) | | | (-1.55) | (-0.77) | (-0.47) | (-1.04) | | |
| **6** | 0.02 | -0.57 | -0.48 | -0.48 | -0.33 | -1.04 | -86.01% | -0.70 | -0.60 | -0.65 | -0.55 | -1.17 | -91.01% | -0.24 | -0.15 | -0.14 | -0.19 | -0.47 | -63.74% |
| | | (-4.24) | (-3.59) | (-3.69) | (-2.50) | | | (-5.07) | (-4.32) | (-4.86) | (-4.56) | | | (-1.80) | (-1.09) | (-1.03) | (-1.40) | | |
| **7** | 0.02 | -0.67 | -0.56 | -0.54 | -0.42 | -1.10 | -89.95% | -0.77 | -0.69 | -0.68 | -0.57 | -1.18 | -92.34% | -0.30 | -0.20 | -0.18 | -0.24 | -0.58 | -71.55% |
| | | (-4.49) | (-3.83) | (-3.66) | (-2.84) | | | (-5.00) | (-4.87) | (-4.28) | (-3.72) | | | (-2.24) | (-1.42) | (-1.26) | (-1.78) | | |
| **8** | 0.04 | -0.74 | -0.60 | -0.60 | -0.46 | -1.26 | -91.50% | -0.86 | -0.73 | -0.76 | -0.66 | -1.19 | -94.44% | -0.30 | -0.19 | -0.18 | -0.23 | -0.58 | -71.35% |
| | | (-5.02) | (-4.17) | (-4.18) | (-3.33) | | | (-4.95) | (-4.52) | (-4.61) | (-3.78) | | | (-2.16) | (-1.32) | (-1.27) | (-1.57) | | |
| **9** | 0.06 | -0.95 | -0.82 | -0.82 | -0.70 | -1.60 | -95.74% | -0.98 | -0.78 | -0.83 | -0.67 | -0.94 | -96.80% | -0.41 | -0.29 | -0.30 | -0.31 | -0.77 | -76.98% |
| | | (-6.43) | (-5.70) | (-5.77) | (-4.50) | | | (-4.75) | (-3.26) | (-3.61) | (-2.21) | | | (-2.93) | (-2.03) | (-2.09) | (-2.24) | | |
| **High OST** | 0.16 | -1.43 | -1.31 | -1.31 | -1.19 | -2.35 | -99.11% | -1.79 | -1.69 | -1.69 | -1.62 | -1.73 | -99.79% | -0.76 | -0.65 | -0.66 | -0.71 | -1.41 | -92.04% |
| | | (-9.16) | (-9.04) | (-8.82) | (-7.85) | | | (-6.95) | (-7.90) | (-8.25) | (-6.54) | | | (-5.67) | (-4.93) | (-4.97) | (-5.08) | | |
| **High-Low** | | -0.74 | -0.72 | -0.72 | -0.71 | 1.79 | -3.49% | -0.96 | -0.94 | -0.95 | -1.01 | 0.99 | -29.52% | -0.49 | -0.48 | -0.49 | -0.51 | 1.52 | -5.11% |
| | | (-7.94) | (-8.10) | (-7.34) | (-7.53) | | | (-4.28) | (-4.72) | (-5.20) | (-4.15) | | | (-7.52) | (-6.93) | (-7.26) | (-6.45) | | |

**Table A3**
**Month-end option returns on OST-sorted delta-hedged put options portfolios.**

This table reports the option returns and alphas for decile portfolios formed on the option-based salience theory value OST. At the end of each month, a delta-hedged long put strategy is formed on selected option contracts and held for one month. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are sorted based on the value of OST. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly excess return. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). SR is the annualized Sharpe ratio and MDD is the maximum drawdown of the portfolio. The last row reports differences in returns and alphas between deciles 10 (high OST) and 1 (low OST). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

| | | EW Portfolios | | | | | | OVW Portfolios | | | | | | SVW Portfolios | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **OST** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** |
| **Low OST** | -0.03 | -0.36 | -0.22 | -0.24 | -0.21 | -0.73 | -71.18% | -0.62 | -0.53 | -0.54 | -0.43 | -1.11 | -86.94% | -0.24 | -0.11 | -0.11 | -0.18 | -0.51 | -61.08% |
| | | (-3.22) | (-1.95) | (-2.11) | (-1.90) | | | (-5.84) | (-5.29) | (-5.13) | (-3.89) | | | (-2.19) | (-0.96) | (-1.02) | (-1.66) | | |
| **2** | -0.01 | -0.30 | -0.16 | -0.17 | -0.15 | -0.64 | -64.86% | -0.47 | -0.34 | -0.34 | -0.34 | -0.85 | -80.36% | -0.17 | -0.05 | -0.04 | -0.14 | -0.37 | -51.58% |
| | | (-2.81) | (-1.51) | (-1.57) | (-1.36) | | | (-3.79) | (-2.66) | (-2.99) | (-2.86) | | | (-1.68) | (-0.50) | (-0.38) | (-1.41) | | |
| **3** | 0.00 | -0.35 | -0.22 | -0.20 | -0.21 | -0.75 | -69.72% | -0.30 | -0.16 | -0.14 | -0.19 | -0.53 | -68.23% | -0.22 | -0.10 | -0.08 | -0.18 | -0.50 | -60.54% |
| | | (-3.24) | (-1.97) | (-1.94) | (-1.86) | | | (-2.37) | (-1.28) | (-1.15) | (-1.52) | | | (-2.16) | (-0.88) | (-0.79) | (-1.60) | | |
| **4** | 0.00 | -0.25 | -0.11 | -0.10 | -0.10 | -0.51 | -59.57% | -0.27 | -0.17 | -0.17 | -0.17 | -0.49 | -66.89% | -0.23 | -0.11 | -0.12 | -0.17 | -0.55 | -59.73% |
| | | (-2.27) | (-0.96) | (-0.93) | (-0.90) | | | (-2.32) | (-1.40) | (-1.42) | (-1.43) | | | (-2.41) | (-1.15) | (-1.24) | (-1.73) | | |
| **5** | 0.01 | -0.24 | -0.10 | -0.08 | -0.07 | -0.48 | -57.40% | -0.38 | -0.23 | -0.22 | -0.26 | -0.70 | -72.73% | -0.18 | -0.05 | -0.03 | -0.12 | -0.39 | -53.20% |
| | | (-2.14) | (-0.84) | (-0.71) | (-0.60) | | | (-3.37) | (-1.99) | (-1.92) | (-2.17) | | | (-1.69) | (-0.48) | (-0.25) | (-1.02) | | |
| **6** | 0.02 | -0.21 | -0.07 | -0.07 | -0.06 | -0.43 | -57.67% | -0.27 | -0.15 | -0.14 | -0.16 | -0.52 | -69.19% | -0.18 | -0.07 | -0.05 | -0.14 | -0.41 | -53.32% |
| | | (-1.89) | (-0.66) | (-0.65) | (-0.54) | | | (-2.42) | (-1.22) | (-1.27) | (-1.69) | | | (-1.85) | (-0.66) | (-0.47) | (-1.49) | | |
| **7** | 0.02 | -0.25 | -0.12 | -0.11 | -0.08 | -0.50 | -63.76% | -0.40 | -0.28 | -0.25 | -0.23 | -0.68 | -76.13% | -0.24 | -0.12 | -0.11 | -0.22 | -0.52 | -61.68% |
| | | (-2.21) | (-1.06) | (-1.00) | (-0.71) | | | (-3.15) | (-2.38) | (-2.03) | (-1.61) | | | (-2.27) | (-1.02) | (-1.05) | (-2.06) | | |
| **8** | 0.03 | -0.29 | -0.14 | -0.17 | -0.12 | -0.57 | -63.47% | -0.48 | -0.35 | -0.38 | -0.30 | -0.88 | -80.03% | -0.25 | -0.12 | -0.12 | -0.19 | -0.55 | -60.32% |
| | | (-2.52) | (-1.21) | (-1.44) | (-1.03) | | | (-3.79) | (-2.70) | (-2.83) | (-2.37) | | | (-2.34) | (-1.07) | (-1.12) | (-1.72) | | |
| **9** | 0.05 | -0.46 | -0.33 | -0.33 | -0.31 | -0.91 | -78.34% | -0.80 | -0.66 | -0.70 | -0.69 | -1.37 | -92.77% | -0.35 | -0.22 | -0.21 | -0.31 | -0.76 | -69.39% |
| | | (-4.00) | (-2.79) | (-2.88) | (-2.60) | | | (-6.25) | (-5.40) | (-6.17) | (-5.25) | | | (-3.17) | (-1.94) | (-1.81) | (-2.61) | | |
| **High OST** | 0.16 | -0.79 | -0.66 | -0.69 | -0.61 | -1.55 | -92.82% | -1.19 | -1.09 | -1.11 | -1.12 | -1.74 | -98.11% | -0.55 | -0.42 | -0.43 | -0.51 | -1.17 | -83.69% |
| | | (-6.60) | (-6.07) | (-6.17) | (-5.14) | | | (-7.84) | (-8.76) | (-8.66) | (-7.63) | | | (-5.10) | (-3.97) | (-4.09) | (-4.72) | | |
| **High-Low** | | -0.43 | -0.44 | -0.45 | -0.39 | 1.56 | -6.23% | -0.57 | -0.56 | -0.57 | -0.69 | 0.77 | -18.51% | -0.31 | -0.31 | -0.32 | -0.33 | 1.03 | -6.94% |
| | | (-7.53) | (-7.49) | (-7.19) | (-7.73) | | | (-3.81) | (-4.21) | (-4.31) | (-4.84) | | | (-5.82) | (-5.14) | (-5.46) | (-4.92) | | |

**Table A4**

**Month-end option returns on $OST_{Call}$- and $OST_{Put}$- sorted delta-hedged options portfolios.**

This table reports the option returns and alphas for decile portfolios formed on the option-based salience theory value based on calls ($OST_{Call}$) and puts ($OST_{Put}$). At the end of each month, a delta-hedged long call (put) strategy is formed on selected option contracts and held for one month. The strategy is daily rebalanced to ensure the delta-neutrality and the delta-hedged option return is computed based on Eq. (1). In Panel A (B), call (put) options are sorted based on the value of $OST_{Call}$ ($OST_{Put}$). For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly excess return. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). SR is the annualized Sharpe ratio and MDD is the maximum drawdown of the portfolio. The last row reports differences in returns and alphas between deciles 10 (high OST) and 1 (low OST). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. The sample period is January 1996 to December 2022.

**Panel A: $OST_{Call}$-sorted Call Option Returns**

| | | EW Portfolios | | | | | | OVW Portfolios | | | | | | SVW Portfolios | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **$OST_{Call}$** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** |
| **Low OST** | -0.05 | -0.34 | -0.20 | -0.21 | -0.07 | -0.65 | -70.53% | -0.58 | -0.48 | -0.51 | -0.32 | -1.10 | -85.47% | -0.12 | 0.01 | 0.01 | -0.05 | -0.25 | -46.26% |
| | | (-2.98) | (-1.88) | (-1.94) | (-0.64) | | | (-4.87) | (-4.37) | (-4.72) | (-2.46) | | | (-1.11) | (-0.06) | (-0.12) | (-0.50) | | |
| **2** | -0.02 | -0.44 | -0.30 | -0.29 | -0.22 | -0.93 | -77.70% | -0.40 | -0.26 | -0.27 | -0.21 | -0.73 | -75.86% | -0.08 | 0.04 | 0.06 | -0.02 | -0.17 | -42.30% |
| | | (-4.26) | (-3.01) | (-2.90) | (-2.16) | | | (-3.29) | (-2.02) | (-2.24) | (-1.68) | | | (-0.77) | (-0.37) | (-0.57) | (-0.20) | | |
| **3** | -0.01 | -0.43 | -0.29 | -0.31 | -0.20 | -0.86 | -76.33% | -0.44 | -0.31 | -0.33 | -0.30 | -0.76 | -76.75% | -0.18 | -0.06 | -0.06 | -0.13 | -0.43 | -50.84% |
| | | (-3.89) | (-2.55) | (-2.77) | (-1.90) | | | (-3.99) | (-2.74) | (-3.13) | (-2.67) | | | (-1.90) | (-0.60) | (-0.60) | (-1.28) | | |
| **4** | 0.00 | -0.40 | -0.25 | -0.26 | -0.17 | -0.83 | -74.71% | -0.43 | -0.28 | -0.29 | -0.30 | -0.82 | -76.99% | -0.17 | -0.04 | -0.04 | -0.10 | -0.38 | -49.19% |
| | | (-3.64) | (-2.42) | (-2.61) | (-1.52) | | | (-3.83) | (-2.61) | (-2.58) | (-2.51) | | | (-1.61) | (-0.37) | (-0.35) | (-1.01) | | |
| **5** | 0.01 | -0.47 | -0.33 | -0.34 | -0.25 | -0.95 | -79.65% | -0.48 | -0.36 | -0.38 | -0.24 | -0.66 | -82.56% | -0.22 | -0.10 | -0.11 | -0.16 | -0.53 | -58.27% |
| | | (-4.35) | (-3.12) | (-3.43) | (-2.35) | | | (-2.97) | (-2.27) | (-2.39) | (-1.56) | | | (-2.44) | (-1.07) | (-1.20) | (-1.67) | | |
| **6** | 0.02 | -0.42 | -0.29 | -0.28 | -0.21 | -0.88 | -75.64% | -0.51 | -0.39 | -0.37 | -0.34 | -0.96 | -83.50% | -0.23 | -0.11 | -0.10 | -0.18 | -0.54 | -58.80% |
| | | (-3.80) | (-2.61) | (-2.74) | (-1.98) | | | (-4.55) | (-3.19) | (-3.24) | (-3.08) | | | (-2.43) | (-1.12) | (-1.01) | (-1.88) | | |
| **7** | 0.02 | -0.41 | -0.28 | -0.28 | -0.18 | -0.84 | -74.72% | -0.50 | -0.39 | -0.42 | -0.30 | -0.84 | -81.93% | -0.22 | -0.11 | -0.10 | -0.14 | -0.49 | -56.45% |
| | | (-3.74) | (-2.82) | (-2.92) | (-1.62) | | | (-3.74) | (-3.06) | (-3.39) | (-1.93) | | | (-2.10) | (-1.08) | (-1.01) | (-1.30) | | |
| **8** | 0.04 | -0.47 | -0.32 | -0.32 | -0.19 | -0.88 | -79.57% | -0.48 | -0.26 | -0.29 | -0.08 | -0.43 | -82.77% | -0.23 | -0.09 | -0.10 | -0.14 | -0.52 | -57.98% |
| | | (-3.91) | (-2.72) | (-2.92) | (-1.60) | | | (-2.23) | (-0.97) | (-1.14) | (-0.22) | | | (-2.26) | (-0.86) | (-0.98) | (-1.40) | | |
| **9** | 0.06 | -0.65 | -0.52 | -0.54 | -0.42 | -1.20 | -88.42% | -0.89 | -0.72 | -0.77 | -0.72 | -1.40 | -94.94% | -0.33 | -0.20 | -0.21 | -0.27 | -0.68 | -66.63% |
| | | (-5.10) | (-4.11) | (-4.43) | (-3.35) | | | (-6.16) | (-5.36) | (-5.75) | (-4.93) | | | (-2.87) | (-1.63) | (-1.86) | (-2.46) | | |
| **High OST** | 0.19 | -1.00 | -0.86 | -0.85 | -0.76 | -1.88 | -96.35% | -1.25 | -1.18 | -1.19 | -1.05 | -1.36 | -98.83% | -0.45 | -0.32 | -0.32 | -0.39 | -1.00 | -78.07% |
| | | (-7.70) | (-7.45) | (-7.38) | (-5.95) | | | (-5.75) | (-6.73) | (-7.33) | (-5.13) | | | (-4.20) | (-3.31) | (-3.43) | (-3.49) | | |
| **High-Low** | | -0.66 | -0.65 | -0.64 | -0.68 | 2.07 | -2.52% | -0.67 | -0.70 | -0.68 | -0.73 | 0.76 | -27.85% | -0.33 | -0.33 | -0.34 | -0.33 | 1.20 | -5.07% |
| | | (-9.11) | (-9.63) | (-9.13) | (-8.61) | | | (-3.62) | (-4.26) | (-4.51) | (-3.94) | | | (-5.80) | (-5.44) | (-5.20) | (-6.34) | | |

**Table A4 (continued)**
**Panel B: $OST_{Put}$-sorted Put Option Returns**

| | | EW Portfolios | | | | | | OVW Portfolios | | | | | | SVW Portfolios | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **$OST_{Put}$** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** |
| **Low OST** | -0.05 | -0.28 | -0.14 | -0.13 | -0.15 | -0.58 | -63.47% | -0.50 | -0.40 | -0.38 | -0.34 | -0.90 | -82.69% | -0.16 | -0.04 | -0.02 | -0.11 | -0.33 | -55.83% |
| | | (-2.55) | (-1.29) | (-1.20) | (-1.39) | | | (-4.73) | (-3.88) | (-4.01) | (-2.98) | | | (-1.49) | (-0.32) | (-0.16) | (-0.83) | | |
| **2** | -0.01 | -0.27 | -0.14 | -0.14 | -0.10 | -0.55 | -63.22% | -0.35 | -0.21 | -0.19 | -0.17 | -0.66 | -70.51% | -0.16 | -0.03 | -0.02 | -0.10 | -0.35 | -52.00% |
| | | (-2.38) | (-1.16) | (-1.20) | (-0.91) | | | (-2.90) | (-1.80) | (-1.62) | (-1.31) | | | (-1.46) | (-0.29) | (-0.15) | (-0.86) | | |
| **3** | 0.00 | -0.30 | -0.15 | -0.16 | -0.14 | -0.59 | -63.75% | -0.33 | -0.21 | -0.24 | -0.22 | -0.55 | -70.88% | -0.21 | -0.08 | -0.09 | -0.20 | -0.47 | -56.50% |
| | | (-2.76) | (-1.38) | (-1.50) | (-1.31) | | | (-2.59) | (-1.58) | (-1.99) | (-1.48) | | | (-2.17) | (-0.75) | (-0.82) | (-2.19) | | |
| **4** | 0.00 | -0.28 | -0.14 | -0.13 | -0.09 | -0.55 | -62.74% | -0.27 | -0.15 | -0.16 | -0.16 | -0.49 | -65.37% | -0.24 | -0.14 | -0.13 | -0.19 | -0.57 | -61.08% |
| | | (-2.35) | (-1.18) | (-1.25) | (-0.76) | | | (-2.35) | (-1.25) | (-1.36) | (-1.32) | | | (-2.53) | (-1.34) | (-1.36) | (-2.04) | | |
| **5** | 0.01 | -0.33 | -0.18 | -0.19 | -0.17 | -0.66 | -66.83% | -0.39 | -0.28 | -0.26 | -0.27 | -0.76 | -74.50% | -0.22 | -0.10 | -0.09 | -0.18 | -0.48 | -57.13% |
| | | (-2.98) | (-1.63) | (-1.78) | (-1.36) | | | (-3.76) | (-2.67) | (-2.63) | (-2.36) | | | (-2.17) | (-0.90) | (-0.85) | (-1.64) | | |
| **6** | 0.01 | -0.24 | -0.09 | -0.10 | -0.06 | -0.47 | -59.42% | -0.37 | -0.24 | -0.24 | -0.24 | -0.61 | -73.73% | -0.24 | -0.10 | -0.08 | -0.17 | -0.53 | -61.19% |
| | | (-2.05) | (-0.75) | (-0.81) | (-0.54) | | | (-2.67) | (-1.69) | (-1.57) | (-1.71) | | | (-2.22) | (-0.88) | (-0.74) | (-1.55) | | |
| **7** | 0.02 | -0.29 | -0.17 | -0.16 | -0.12 | -0.60 | -64.60% | -0.42 | -0.32 | -0.30 | -0.27 | -0.76 | -79.09% | -0.24 | -0.12 | -0.10 | -0.18 | -0.53 | -58.44% |
| | | (-2.74) | (-1.57) | (-1.48) | (-1.11) | | | (-3.40) | (-2.69) | (-2.55) | (-2.24) | | | (-2.30) | (-1.16) | (-0.98) | (-1.68) | | |
| **8** | 0.03 | -0.32 | -0.19 | -0.18 | -0.17 | -0.63 | -68.66% | -0.52 | -0.40 | -0.42 | -0.32 | -0.89 | -82.35% | -0.26 | -0.14 | -0.13 | -0.20 | -0.57 | -63.61% |
| | | (-2.68) | (-1.60) | (-1.60) | (-1.41) | | | (-4.08) | (-3.10) | (-3.17) | (-2.66) | | | (-2.34) | (-1.22) | (-1.21) | (-1.81) | | |
| **9** | 0.06 | -0.49 | -0.34 | -0.36 | -0.37 | -0.97 | -80.54% | -0.67 | -0.55 | -0.56 | -0.62 | -1.12 | -90.89% | -0.36 | -0.24 | -0.23 | -0.35 | -0.82 | -69.99% |
| | | (-4.29) | (-2.88) | (-3.10) | (-3.19) | | | (-4.88) | (-4.32) | (-4.57) | (-4.66) | | | (-3.56) | (-2.21) | (-2.20) | (-3.60) | | |
| **High OST** | 0.17 | -0.74 | -0.61 | -0.61 | -0.55 | -1.47 | -91.32% | -1.22 | -1.10 | -1.09 | -1.13 | -1.91 | -98.21% | -0.55 | -0.41 | -0.41 | -0.51 | -1.17 | -83.59% |
| | | (-6.09) | (-5.58) | (-5.45) | (-4.58) | | | (-8.47) | (-8.65) | (-8.29) | (-8.36) | | | (-5.14) | (-3.79) | (-3.78) | (-4.54) | | |
| **High-Low** | | -0.46 | -0.47 | -0.48 | -0.40 | 1.69 | -4.57% | -0.71 | -0.71 | -0.71 | -0.79 | 1.09 | -12.99% | -0.38 | -0.37 | -0.40 | -0.40 | 1.19 | -9.04% |
| | | (-8.25) | (-8.09) | (-7.86) | (-6.48) | | | (-5.12) | (-5.18) | (-5.00) | (-6.12) | | | (-5.69) | (-4.78) | (-5.38) | (-3.37) | | |

**Table A5**

**Month-end option returns on OST-sorted delta-hedged call option portfolios by excluding non-paired options.**

This table reports the option returns and alphas for decile portfolios formed on the option-based salience theory value OST. At the end of each month, a delta-hedged long call strategy is formed on selected option contracts and held for one month. The strategy is daily rebalanced to ensure the delta-neutrality, and delta-hedged option return is computed based on Eq. (1). Options are sorted based on the value of OST. For each decile portfolio, we report the equal-weighted (EW), option-value-weighted (OVW), and stock-value-weighted (SVW) average monthly excess return. Stock four-factor (S4F) alpha is based on Carhart (1997). Stock seven-factor (S7F) is based on Fama and French (2015) augmented with liquidity and momentum factors. Option two-factor (O2F) alpha is based on return spreads of IVOL and Ln(Amihud) as in Zhan et al. (2022). SR is the annualized Sharpe ratio and MDD is the maximum drawdown of the portfolio. The last row reports differences in returns and alphas between deciles 10 (high OST) and 1 (low OST). Corresponding t-statistics in parentheses are based on Newey and West (1987). The sample includes options written on common stocks listed on the NYSE, Amex, and Nasdaq with the underlying stock price above $5 a share at portfolio formation. Option positions will only initiate when call and put options are available on the initiation dates. The sample period is January 1996 to December 2022.

| | | EW Portfolios | | | | | | OVW Portfolios | | | | | | SVW Portfolios | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Decile** | **OST** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** | **RET-RF** | **S4F** | **S7F** | **O2F** | **SR** | **MDD** |
| **Low OST** | -0.03 | -0.43 | -0.29 | -0.31 | -0.20 | -0.86 | -76.80% | -0.50 | -0.35 | -0.39 | -0.18 | -0.82 | -82.88% | -0.16 | -0.03 | -0.05 | -0.10 | -0.35 | -51.71% |
| | | (-3.68) | (-2.68) | (-2.83) | (-1.81) | | | (-3.51) | (-2.72) | (-2.90) | (-1.28) | | | (-1.48) | (-0.27) | (-0.46) | (-0.89) | | |
| **2** | -0.01 | -0.29 | -0.16 | -0.17 | -0.08 | -0.58 | -64.18% | -0.47 | -0.37 | -0.39 | -0.38 | -0.81 | -81.69% | -0.13 | 0.00 | 0.01 | -0.09 | -0.27 | -45.78% |
| | | (-2.57) | (-1.40) | (-1.50) | (-0.71) | | | (-3.99) | (-3.26) | (-3.33) | (-3.02) | | | (-1.20) | (-0.03) | (0.08) | (-0.81) | | |
| **3** | 0.00 | -0.38 | -0.25 | -0.24 | -0.15 | -0.76 | -73.07% | -0.34 | -0.20 | -0.19 | -0.16 | -0.55 | -70.94% | -0.18 | -0.06 | -0.05 | -0.14 | -0.41 | -52.27% |
| | | (-3.52) | (-2.39) | (-2.37) | (-1.32) | | | (-2.57) | (-1.59) | (-1.57) | (-0.98) | | | (-1.93) | (-0.63) | (-0.53) | (-1.48) | | |
| **4** | 0.01 | -0.29 | -0.15 | -0.16 | -0.09 | -0.56 | -63.74% | -0.46 | -0.36 | -0.32 | -0.34 | -0.81 | -81.17% | -0.22 | -0.12 | -0.12 | -0.19 | -0.52 | -58.25% |
| | | (-2.62) | (-1.36) | (-1.47) | (-0.81) | | | (-4.27) | (-3.28) | (-2.77) | (-2.86) | | | (-2.45) | (-1.24) | (-1.40) | (-2.02) | | |
| **5** | 0.01 | -0.30 | -0.16 | -0.16 | -0.09 | -0.60 | -63.94% | -0.34 | -0.17 | -0.17 | -0.16 | -0.57 | -71.47% | -0.12 | 0.00 | 0.03 | -0.06 | -0.28 | -44.65% |
| | | (-2.71) | (-1.48) | (-1.56) | (-0.75) | | | (-2.61) | (-1.29) | (-1.36) | (-1.17) | | | (-1.19) | (0.04) | (0.27) | (-0.56) | | |
| **6** | 0.02 | -0.30 | -0.17 | -0.18 | -0.07 | -0.61 | -64.46% | -0.46 | -0.34 | -0.37 | -0.26 | -0.76 | -78.75% | -0.18 | -0.06 | -0.03 | -0.12 | -0.39 | -52.09% |
| | | (-2.70) | (-1.53) | (-1.72) | (-0.63) | | | (-3.85) | (-2.52) | (-2.85) | (-2.41) | | | (-1.60) | (-0.50) | (-0.31) | (-1.10) | | |
| **7** | 0.02 | -0.37 | -0.23 | -0.24 | -0.10 | -0.66 | -72.71% | -0.53 | -0.44 | -0.48 | -0.31 | -0.95 | -85.19% | -0.24 | -0.12 | -0.13 | -0.20 | -0.52 | -61.32% |
| | | (-2.99) | (-1.89) | (-2.20) | (-0.85) | | | (-4.45) | (-3.98) | (-4.24) | (-2.66) | | | (-2.32) | (-1.07) | (-1.22) | (-1.83) | | |
| **8** | 0.03 | -0.42 | -0.27 | -0.28 | -0.08 | -0.76 | -77.06% | -0.51 | -0.37 | -0.42 | -0.33 | -0.89 | -82.19% | -0.22 | -0.09 | -0.10 | -0.12 | -0.47 | -57.77% |
| | | (-3.22) | (-2.07) | (-2.26) | (-0.61) | | | (-3.72) | (-2.78) | (-3.28) | (-2.43) | | | (-2.04) | (-0.80) | (-0.99) | (-1.13) | | |
| **9** | 0.05 | -0.51 | -0.36 | -0.37 | -0.22 | -0.89 | -82.43% | -0.65 | -0.40 | -0.46 | -0.31 | -0.64 | -90.34% | -0.29 | -0.15 | -0.16 | -0.22 | -0.59 | -64.84% |
| | | (-4.11) | (-2.91) | (-3.19) | (-1.78) | | | (-3.55) | (-1.84) | (-2.23) | (-1.06) | | | (-2.50) | (-1.26) | (-1.41) | (-1.77) | | |
| **High OST** | 0.14 | -1.07 | -0.94 | -0.95 | -0.77 | -1.82 | -97.10% | -1.30 | -1.19 | -1.24 | -1.13 | -1.46 | -98.83% | -0.54 | -0.41 | -0.43 | -0.52 | -1.05 | -83.87% |
| | | (-7.40) | (-7.35) | (-7.28) | (-5.82) | | | (-5.92) | (-6.67) | (-7.19) | (-5.68) | | | (-4.50) | (-3.36) | (-3.63) | (-4.35) | | |
| **High-Low** | | -0.64 | -0.65 | -0.64 | -0.57 | 1.70 | -3.96% | -0.80 | -0.84 | -0.85 | -0.95 | 0.93 | -26.52% | -0.38 | -0.38 | -0.38 | -0.43 | 1.26 | -8.08% |
| | | (-7.76) | (-7.68) | (-7.52) | (-6.82) | | | (-4.29) | (-4.78) | (-5.29) | (-5.03) | | | (-6.06) | (-5.40) | (-5.21) | (-6.53) | | |