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Behavioral Aspects of Covered Call Writing: An Empirical Investigation

Arvid O. I. Hoffmann and E. Tobias S. Fischer
Maastricht University

Various explanations for the popularity of covered call option strategies have been explored in the literature. According to Shefrin and Statman [1993], framing and risk aversion can help justify its attractiveness to investors. Applying prospect theory and hedonic framing, these authors predict that in a world of frame dependence an investor that is sufficiently risk averse in the domain of gains will prefer a covered call position over a stock only position and that certain covered call designs will be preferred despite identical cash flows. To date, the relationship among framing, risk aversion, and covered call writing has not been empirically tested. We gather empirical evidence to complete this gap in the literature. We find highly significant empirical evidence for a pronounced framing effect with respect to different covered call designs with equal net cash flows as well as covered calls in general. We find only scarce empirical evidence for a relationship between risk aversion in the domain of gains and a preference for covered calls. In order to observe a positive relationship between risk aversion and covered call writing, investors with above average risk aversion seem to be required.

Keywords: Behavioral finance, Covered call writing, Risk aversion, Framing, Options

INTRODUCTION

Few trading strategies have been as popular and as controversial as the covered call option strategy.[1] Covered call writing has been the most popular option trading strategy since options became listed in 1973, accounting for a large percentage of all calls written (Lakonishok, Lee, Pearson and Poteshman [2007]). The use of the covered call strategy is actively promoted by options markets such as the Chicago Board of Options Exchange (CBOE) and the London International Futures and Options Exchange (LIFFE) that issue indices that simulate a covered call strategy on selected market indices.[2]

According to investment professionals and individual investors, covered call writing is a relatively safe and conservative trading strategy that generates extra income (Tergesen [2001]) while partially hedging downside equity risk (Crawford [2005]). The notion behind this claim is that the additional cash that one receives in the form of the option premium acts as extra return and at the same time provides a cushion against small drops in the stock price.

Yet according to standard financial theory, writers of covered calls merely receive compensation for giving up the upside potential of their long stock positions. In a mean-variance framework (Markowitz [1952]) this can only be profitable if the writer can somehow predict better than the rest of the market that the stock price will not move out of a certain bandwidth (Reilly and Brown [1997]) or if the buyer of the option constantly overpays (Black [1975]). Both cases, however, would represent market inefficiencies. Binnewies [1992] further predicts that eventually the bid-ask spread will create a disadvantage to both parties in the deal, the buyer and the seller of the call option. Hence, in efficient markets covered calls should not only have lower return variance but consequently also lower mean returns. Many of the early empirical studies confirm this perspective (e.g., Merton, Scholes and Gladstein [1978], Bookstaber and Clarke [1984], Booth, Tehranain and Trennephol [1985]).

More recent studies, however, find that mean-variance performance can in fact be improved by writing covered calls (e.g., Morard and Naciri [1990], Whaley [2002], McIntyre and Jackson [2007]), possibly due to overpricing of call

Address correspondence to Arvid O. I. Hoffmann, Department of Finance, School of Business and Economics, Maastricht University, P.O. Box 616, Maastricht 6200, MD, The Netherlands. E-mail: a.hoffmann@maastrichtuniversity.nl

options. In fact, Constantinides, Jackwerth, Czerwonko and Perrakis [2008] find strong evidence for such overpricing.

Behavioral finance offers yet another explanation for the popularity of the covered call option strategy. It acknowledges that most investors do not base their decisions only on risk and return considerations but are also influenced by heuristics and frames, often resulting in market inefficiencies (Shefrin [2002]). Shefrin and Statman [1993] accordingly apply prospect theory (Kahneman and Tversky [1979]) and hedonic framing (Thaler [1985]) to covered call writing, concluding that covered call writing will be preferred by a prospect theory investor that is sufficiently risk averse in the domain of gains (i.e., sure gains are preferred over gambles, even if the expected payoff is equal or higher). Furthermore, they predict that a prospect theory investor will prefer particular covered call designs over others, despite equal net cash flows.

This paper uses a survey amongst actual individual investors to empirically test the propositions of Shefrin and Statman [1993] that behavioral aspects, especially prospect theory (Kahneman and Tversky [1979]) and hedonic framing (Thaler [1985]), can explain the popularity of covered calls.

THEORETICAL BACKGROUND AND HYPOTHESES

Literature Review

Mean-variance performance

According to the efficient market hypothesis (Fama [1970]) and Black and Scholes' [1972] option pricing theory, covered call writing cannot enhance performance in a mean-variance framework. In standard financial theory, the call option premium simply reflects the upside potential of the stock such that there is a direct trade-off between risk and return. Studying the facts and fantasies of option strategies, Black [1975, p. 39] proclaims that "it is not correct to say that an investor can increase his rate of return by writing call options against his stocks. In fact, he reduces his 'expected return' because he creates a position [. . .] in which he will come out ahead only if the stock doesn't move very much." Black also states that covered call writing is only rational if calls are overpriced, just like buying underpriced calls is rational. So according to standard financial theory, the covered call strategy is unprofitable unless options are overpriced or the investor can somehow know for sure that the stock price will stay within a rather narrow bandwidth. If the stock price increases strongly, the stock-only position would have been preferred, and if the stock price decreases strongly, a protective put would have been the preferred choice (Reilly and Brown [1997]).

Early studies on the mean-variance performance of covered calls provide confirming evidence. Merton et al. [1978], for instance, study a fully hedged covered call strategy based on a portfolio of all the 136 U.S. stocks on which listed options were available in December 1975. They rebalance the portfolio every six months and employ the Black and Scholes [1972] option formula to calculate option prices. They find that the covered call strategy reduces variance as well as mean return of the portfolios at hand. Bookstaber and Clarke [1984] as well as Booth et al. [1985] come to similar conclusions.

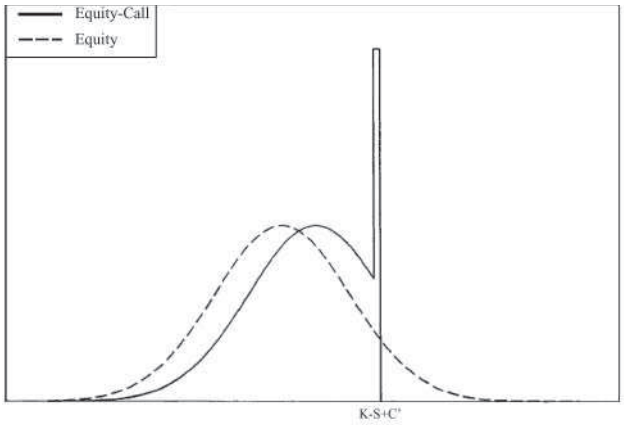
More recent studies, however, suggest that even in a mean-variance framework, significant risk-adjusted performance improvements are possible with covered call writing. Using actual market data of option prices for 22 U.S. stocks, Morard and Naciri [1990] study the performance of a covered call strategy by comparing stock only and option strategy efficient frontiers. Both in a mean-variance and stochastic dominance framework they find that the use of covered calls can improve portfolio performance.

Already in 1988, Standard & Poor commissioned Professor Robert Whaley and the Chicago Board of Options Exchange to develop the CBOE S&P 500 BuyWrite index (BXM) as a benchmark for covered call strategies.[3] Later, Whaley [2002] studies the performance of the BXM and finds that this passive buy-write strategy not only had a considerably lower risk level but also outperformed the S&P 500. Two follow up studies by Feldman and Roy [2004] and Callan Associates, Inc. [2006] reinforce these findings. The latter, looking now at data from the last 18 years, add that in addition to the risk-adjusted return improvements, the BXM offers some diversification potential due to its less-than-perfect correlation with domestic and international equity markets. McIntyre and Jackson [2007] find similar evidence of enhanced risk-adjusted performance using data of the FT-SE 100 for the period 1994–1999.

Again, if markets were efficient and options priced correctly, the risk-adjusted return of an option strategy, such as the covered call strategy, should be the same as the risk-adjusted return of the underlying instruments. Continuing their previous works, Constantinides et al. [2008], however, find strong evidence for overpricing of call options, especially for the period 1983–2006. This evidence seems to indicate that due to the mispricing of options over the last years, strategies such as the covered call have in fact improved mean-variance performance.

Alternative measures of performance

Some researchers doubt whether the mean-variance framework is adequate when analyzing portfolios that include options. Bookstaber and Clarke [1984] compare the distributions of portfolios with stock-only and portfolios with stocks and options using mathematical algorithms and conclude that adding call options to a portfolio leads to an asymmetric return distribution due to the truncation of the possible return at the strike price of the option (i.e., the total return



From: Board, J., C. Sutcliffe and E. Patrinos. "The Performance of Covered Calls." (p. 3), The European Journal of Finance, 6(1), (2000), p. 3.

FIGURE 1 Payoff distribution for equity and a fully covered call.

cannot exceed the sum of the option premium and the proceedings from selling the option at the predetermined strike price). Figure 1 illustrates this matter.

Therefore, Booth et al. [1985] also employ alternative performance measures such as mean-semivariance, mean-skewness and stochastic dominance for their analysis of 3,003 randomly created portfolios, some with and some without options. The portfolios and the performance measurements are based on real time data of 103 U.S. stocks from July 1963 to December 1978. From the 3,003 random portfolios, they draw efficient portfolios and find a disproportionate number of option strategies in the efficient set. Hence, they conclude that option strategies must have some importance for maximizing investor utility.

Leggio and Lien [2000], on the other hand, employ the Sharpe ratio (Sharpe [1994]), the Sortino ratio[4] (Sortino and Forsey [1996]), and the Upside Potential Ratio[5] (UPR) (Sortino, van der Meer and Plantinga [1999]) to compare an index portfolio to a covered call portfolio. Over the nine-year period from February 1987 to December 1995, they find that the UPR favors the index portfolio in every considered scenario. They conclude that the covered call strategy is no adequate investment strategy. Instead, investors should buy the market index.

Ultimately, alternative performance measures lead to varying conclusions, depending on the construction of the measure and what it exactly measures. The UPR, for instance, prefers the market index over the covered call because the upside potential is limited in the latter.

Behavioral aspects

As an alternative school of thought, behavioral finance posits that the expected utility theorem (von Neumann and Morgenstern [1947]) is insufficient to adequately describe the actual needs and preferences of the typical investor. Behavioral finance acknowledges, in contrast to standard financial theory, that most investors do not base their decisions merely on risk-return considerations but are also influenced by heuristics and frames (Shefrin [2002]). Prospect theory (Kahneman and Tversky [1979]) is central to behavioral finance. Its S-shaped value function is based on the premise that typically people are risk averse in the domain of gains and risk seeking in the domain of losses. These findings are based on a number of single choice experiments. Toland and O'Neill [1983] report similar findings using multiperiod game situations. Prospect theory further distinguishes between the editing phase and the evaluation phase in the decision process. The first may consist of coding, combination, segregation, cancellation and simplification in order to create mental accounts. Framing effects influence the outcome of the editing phase which will be evaluated in the second phase according to its subjective value relative to some reference point (often the purchase price) and its decision weight. Prospect theory thus acknowledges that frames matter as they determine how we subsequently evaluate our choices. McNeil, Pauker, Sox and Tversky [1982], for instance, report how a group of physicians evaluated the effectiveness of surgery and radiation as a cancer treatment quite differently depending on the framing of the results: 84% evaluated surgery more effective when given survival probabilities, but only 50% did so when given probabilities of mortality.

Shefrin and Statman [1984] employ prospect theory (Kahneman and Tversky [1979]) and the theory of self-control (Thaler and Shefrin [1981]) to explain investor preference for cash dividends. In standard financial theory, cash dividends and capital gains are perfect substitutes for each other if taxes and transaction costs, but also frames, are ignored. In fact, if we consider that most investors pay lower taxes on capital gains than on cash dividends, we should observe a preference for capital gains. Nonetheless, as Shefrin and Statman report, a strong preference for cash dividends exists among investors. They argue that this preference can be explained by issues of self-control and the fact that most investors see cash dividends as an increase in income while a capital gain is seen as an increase in savings. As such, the latter is not meant to be used for current consumption. In addition, investors like cash dividends due to their desire to segregate, as also explained by Thaler [1985]. Hence, in a world of frame dependence, cash dividends and capital gains cannot be treated as perfect substitutes.

Thaler [1985] presents the concept of hedonic framing. In this concept, gains and losses can be either integrated in order to be valued jointly or segregated to be valued separately. Whether outcomes are integrated or segregated depends on the sum of its prospect theory values. For instance, multiple gains are preferred to be segregated to savor the gains separately while multiple losses are preferred to be integrated in order to ease the pain of the loss. Mixed outcomes are integrated in order to cancel out the losses when there is a net gain or only a small net loss. However, mixed outcomes

in the form of a large loss and a small gain are segregated so that the small gain (e.g., cash dividends) can function as a "silver lining" (Thaler [1985, p. 202]).

Tversky and Kahneman [1991] stress the relative impact of loss aversion on decision-making and valuation. Loss aversion implies that "losses and disadvantages have greater impact on preferences than gains and advantages" (Tversky and Kahneman [1991, p. 1039]). Acknowledging the limitations of their original prospect theory (Kahneman and Tversky [1979]) which does not always satisfy stochastic dominance and cannot be extended to prospects with a large number of outcomes, Kahneman and Tversky [1992] introduce cumulative prospect theory. Cumulative prospect theory extends prospect theory to uncertain and risky prospects with any number of outcomes without violating its original features.

Behavioral portfolio theory (Shefrin and Statman [2000]) is developed on the foundation of prospect (Kahneman and Tversky [1979]) and SP/A theory (Lopes [1987]). Its efficient frontier deviates from the mean-variance efficient frontier, and its optimal portfolios differ from optimal CAPM portfolios. Statman [2002] explains that according to behavioral portfolio theory, portfolios are constructed as layered pyramids with a bottom layer for downside protection, a top layer for upside potential and layers in between to satisfy other needs.

Shefrin and Statman [1993] apply the original prospect theory (Kahneman and Tversky [1979]) and hedonic framing (Thaler [1985]) to the design and marketing of covered calls. Based on data from the 1976 Louis Harris survey of investors in the listed options market and a number of one-period binominal examples, they predict that due to framing a prospect theory investor that is sufficiently risk averse in the domain of gains will prefer the covered call position over the stock-only position.[6] They also predict that a prospect theory investor will, despite identical cash flows, prefer fully covered calls over partially covered calls, out-of-the-money covered calls over in-the-money covered calls and will be reluctant to repurchase the call when it is about to be exercised. The latter predictions are based entirely on the effects of framing, as investors should be indifferent about these choices in a world of frame independence due to their identical risk-return characteristics.

De Groot and Dijkstra [1996] theoretically test some of Shefrin and Statman's [1993] hypotheses by applying cumulative prospect theory (Tversky and Kahneman [1992]) and its given risk aversion parameters. They confirm Shefrin and Statman's theory that a sufficiently risk averse investor will prefer a covered call over a stock only position but state that this would require an investor with above average risk aversion. Otherwise the status quo (i.e., neither invest in a stock-only position nor a covered call position) is preferred as the applied risk aversion parameters yield negative prospective values. Further, they simulate the prospective values of a one-year covered call positions based on real time data from the MSCI Dutch Equity Index from January 1978 to June 1994. Again, they find that the covered call position is only preferred by investors with above average risk parameters and over a relatively short expiration time.

Board, Sutcliffe and Patrinos [2000] examine different strategies for writing call options on the FT-SE 100 using four alternative utility functions with varying absolute and relative risk aversion parameters over a 36-month period from 1992 to 1995. The examined strategies include a fully covered strategy using European index options and four partially covered strategies using American index options with varying stock selection criteria. They find no dominance between the partially and the fully covered strategies. However, the covered call strategy as such is preferred over the market index for all four alternative utility functions.

Leggio and Lien [2002] re-examine some of the alternative utility functions that Board et al. [2000] employed. They explicitly apply cumulative prospect theory (Tversky and Kahneman [1992]) with its applicable risk parameter estimates to the period from February 1987 to December 1995. They find that under the assumptions of prospect theory, covered call writing can significantly improve investor utility, especially over a one-month investing period. Therefore they conclude that the covered call strategy is the preferred strategy for a typical prospect theory investor.

Studying the popularity of discount reverse convertibles (DRCs) and reverse convertible bonds (RCBs), Breuer and Perst [2007] apply cumulative prospect theory (Kahneman and Tversky [1992]) and hedonic framing (Thaler [1985]).[7] They conclude that only in a world of frame dependence the popularity of DRCs and RCBs could be justified.

Ter Horst and Veld [2008] find significant evidence that bank-issued call warrants are strongly overpriced. They believe that this overvaluation is due to a combination of active financial marketing by the banks as well as framing.

Kumar and Lim [2008] study the effect of narrow framing (i.e., adopting simple heuristics and intuitive decision making) on the disposition effect (Shefrin and Statman [1985]) and underdiversification and conclude that framing significantly influences investment decisions.

Overall, behavioral aspects seem to justify the popularity of the covered call option strategy. However, existing studies are based only on theory and casual observation. To date, no study has empirically tested the direct relationship among risk aversion, framing and covered call preferences using actual investor data. Our paper extends and completes Shefrin and Statman's [1993] theoretical framework as well as more recent conceptual and theoretical follow-up research by testing the hypothesized effects using an empirical survey amongst a sample of individual investors.

Hypotheses development

Shefrin and Statman [1993] employ a binomial numerical example to compare a covered call position with a stock-only

position. In their example, a certain stock can be purchased for $20. A year later the stock price has either decreased in value to $10 or it has increased to $40, with equal probabilities.[8] A call option can be sold on this stock for $1.67 with an exercise price of $35. Shefrin and Statman argue that due to hedonic framing (Thaler [1985]) the covered call position will be preferred over the stock only position by a prospect theory investor (Kahneman and Tversky [1979]). In the loss situation, a higher prospect value can be achieved by segregating the gain from the call premium from the loss on the stock. Similarly, in the win situation a higher prospect theory value can be achieved by segregation, savoring the gains separately. However, the two choices do not only differ in frames but also in the underlying cash flow and risk, as in this example the investor could either win $20 (lose $10) with the stock-only position while with the covered call position the investor could either win $16.67 (lose $8.33). Shefrin and Statman therefore proclaim that a prospect theory investor will prefer a covered call position over a stock-only position if the investor is sufficiently risk averse in the domain of gains. Shefrin and Statman's original argument can be interpreted in terms of a "switching point" in risk aversion after which investors prefer one position over the other. We extend their exposition by positing that investors' *level* of preference for one position over the other is related to their *level* of risk aversion. Hence, we hypothesize:

H_1: There is a positive relationship between risk aversion in the domain of gains and the preference for covered calls.

In order to separate the effects of framing from the effects of risk aversion, Shefrin and Statman [1993] predict that certain covered call designs will be preferred over others despite identical cash flows and risk. Building on their previous example, they compare a covered call position that is set up by buying one stock and selling one out-of-the-money call option with an exercise price of $35 to a covered call position set up by buying five stocks and selling five in-the-money call options with an exercise price of $15. The two examples have identical net cash flows, though the in-the-money covered call means realizing a loss on the stock no matter whether the stock price will increase or decrease, leading to a lower prospect theory value. Shefrin and Statman predict that the out-of-the-money covered call is preferred by a prospect theory investor (Kahneman and Tversky [1979]). The corresponding evidence from the media and literature, however, is mixed. In an article published in *The Wall Street Journal*, Tracy [2008b] recommends selling out-of-the-money calls hoping that the options will expire without being executed. In *Futures* magazine, Radoll [2001] advises writing covered calls close-to-the-money. And the CBOE S&P 500 BuyWrite index (BMX), which according to Crawford [2005] is a key driver for the ongoing popularity of covered calls, is actually calculated with at-the-money call options (Callan Associates, Inc. [2006]). To empirically test the effects of framing with respect to the exercise price of the options used for covered call writing we employ the following hypothesis as put forward by Shefrin and Statman [1993]:

H_2: More covered call positions are formed with out of-the-money calls than with in-the-money calls.

Further, Shefrin and Statman [1993] compare a fully covered call position, identical to the out-of-the-money covered call from the previous example, to a covered call that is only partially covered. The partially covered call position is set up by purchasing 1.25 stocks and writing 2.5 call options on these stocks. Again, both choices yield identical net cash flows but vary in their respective prospect theory value. Empirical evidence reports that about 85% of all options written are covered (Merton et al. [1978]). In line with Shefrin and Statman [1993] we suggest the following hypothesis:

H_3: More covered call positions are fully covered than partially covered.

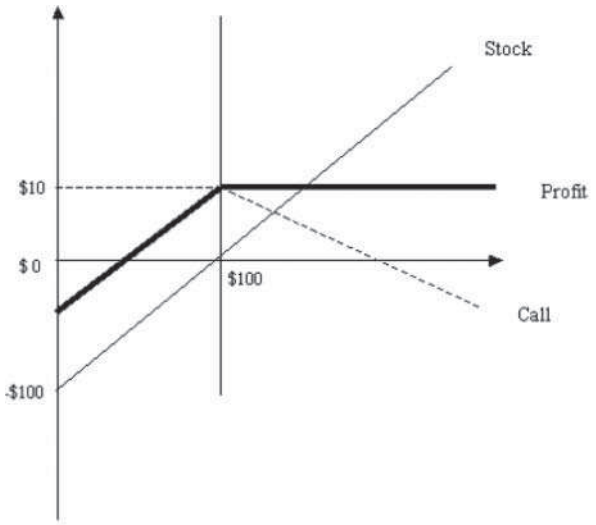
Shefrin and Statman's [1993] final example of framing with respect to covered call writing consists of the decision that investors have to take when the call option is in-the-money upon expiration. The investor could either let the call get exercised and sell the stock or buy back the option to prevent selling the stock. The first choice means realizing a gain on the stock while the second choice means realizing a loss on the call option. Nonetheless, the two choices have identical net cash flows. Shefrin and Statman predict that due to framing effects the first choice yields a higher prospect theory value. They offer the following hypothesis:

H_4: Relative to the prescriptions of standard finance, investors with covered call positions are reluctant to repurchase the call when the purchase entails the realization of a loss.

The effects of framing are not limited to different covered call designs with equal cash flows. Figure 2 shows that the pay-off structure of at-the-money covered calls, such as used as a base for the calculation of the BMX, and at-the-money naked puts are also mathematically identical (Shirvani and Wilbratte [2003]).

Nonetheless, Baldwin [2002] reports that in general the covered call strategy is seen as conservative and safe while the naked put strategy is considered risky. We argue that this bias is due to framing and expect that because of the perceived riskiness of naked puts investors will prefer the at-the-money covered call option over the at-the-money naked put. Hence, we hypothesize:

H_5: Due to differences in perceived riskiness, an at-the-money covered call is preferred over an at-the-money naked put.



From: Shirvani, H. and B. Wilbratte. "A Pedagogical Note on the Derivation of Option Profit Lines." *Journal of Economics and Finance Education*, 2(2), Winter, (2003), p. 20.

FIGURE 2 Short covered call.

METHOD

Data Collection

We used a survey approach to collect data from individual investors and test the previously described hypotheses. An online questionnaire was developed and pretested among 52 undergraduate students. The pretest confirmed that all questions were clear in terms of wording and layout and was used to make a selection of questions to include in the final version of the questionnaire. An expert panel consisting of behavioral finance scholars with experience in survey design was consulted before finalizing the survey.

The empirical data were subsequently collected through an online questionnaire targeting visitors of a well-known Dutch investment-related website. The call to participate provided a summary of the purpose of the study and a link to the online questionnaire. Potential participants were informed about the possibility to enter a lottery for an Apple iPod Shuffle when participating in the study. Deutskens, De Ruyter, Wetzels and Oosterveld [2004] test different incentives and conclude that lotteries are the most effective reward with respect to maximizing response rate. The final sample was carefully checked for duplicates using respondents' IP address and contact details. Respondents were told that their responses would remain anonymous and that all data would be treated confidentially.

Measures

The final questionnaire was split into three parts probing investment preferences, risk aversion and background information, respectively. First, to find out the participants' investment preferences, they were asked to choose between various one-period binominal choices based on Shefrin and Statman [1993] as well as to indicate on a five-point Likert scale to what extent they agreed or disagreed with a selection of common statements about covered call investing (see, e.g., Binnewies [1992], Tergesen [2001], Radoll, [2001], Baldwin [2002], Crawford [2005], Clary [2007], Weber [2007], Tracy [2008a, 2008b]). They were also asked to choose between an at-the-money covered call and an at-the-money naked put and to indicate on a five-point Likert scale to what extent they agreed or disagreed to the statement that an at-the-money naked put is riskier than an at-the-money covered call.

Second, to determine the participants' risk aversion there were asked to indicate on a scale from 0 to 10 how their best friend would judge them as a risk taker (0 = being a real risk avoider and 10 = being a real risk taker). Dorn and Huberman [2005] show that this type of self-reported risk aversion is strongly correlated with actual portfolio diversification and turnover and is a good proxy for general risk aversion. Further, the participants are asked to choose between a sure gain (loss) and a gamble for a higher gain (loss) or no gain (loss) in the form that Kahneman and Tversky [1979] used in their prospect theory research. Finally, the participants are asked to indicate on a 11-point scale how much the sure gain (loss) would have to be so that they are indifferent between this sure gain (loss) and a 50% chance of winning (loosing) €100, €1,000 and €10,000, respectively.

Third, background information consisting of descriptive statistics about gender, age, primary investing purpose, highest completed educational degree, knowledge of investing in general, experience with covered calls and average portfolio size were collected.

Sample

The net sample consists of 198 investors with an average age of 48 years (SD = 17.58). Of the respondents, 15.7% are women and about 87% have obtained at least an undergraduate degree. Most participants describe themselves as highly knowledgeable regarding their general investment knowledge and above average regarding their covered call knowledge (though only one-fourth of the participants have actually written covered calls before). The mean portfolio size is about €81,643 with a median of €40,000.

To investigate potential selection bias, we compared these sample characteristics to the characteristics of the general population of investors with direct investments in the Dutch stock market (VEB [2002]). Our respondents have the same average age, though they are more likely to be men (84.3% compared to 71%). The modal portfolio size of our respondents is lower (€25,000 compared to €50,000). However, the mean portfolio size of our respondents (€81,643) is larger than the €70,000 estimated by the Dutch National Bank [2006], as well as the €35,000 of another Dutch sample (Bauer, Cosemans and Eichholtz [2009]). Overall, our

TABLE 1
Descriptive Statistics

	N	Percentage (%)	Mean	Median	SD
Male	163	84.3			
Female	31	15.7			
Age (years)	198		47.92	51	17.58
Educational background	198		3.48	4	.89
General investment knowledge	198		2.69	3	.54
Covered call knowledge	198		6.95	7	2.47
Portfolio size (€)	105		81,643	40,000	101,846

Note. This table presents the descriptive statistics for a sample of 198 respondents to an online survey. The variables are defined as follows: *Male* and *Female* depict the gender distribution. *Age* gives the respondents' age in years. *Educational background* refers to the highest degree achieved (1 = secondary education, 2 = vocational education, 3 = undergraduate studies, 4 = graduate studies). *General investment knowledge* refers to how the respondents rate their own investment knowledge (1 = minimal knowledge, 2 = somewhat knowledgeable, 3 = highly knowledgeable). *Covered call knowledge* refers to the respondents prior experience with covered calls on a scale from 1 to 10 (1 = never heard of it, . . . , 10 = already written covered calls). *Portfolio size* gives the respondents portfolio size in Euro (voluntary).

sample appears similar to the overall population of Dutch investors with respect to these general characteristics, though we note that our respondents are on average highly educated (see Table 1 for descriptive characteristics of respondents).

RESULTS

Risk Aversion and Covered Calls

We find that 60.6% of the respondents prefer the covered call position over the stock-only position when the respective pay-offs are described in a text and framed according to Shefrin and Statman's [1993] binominal example (Table 2). As the covered call and the stock-only position differ in their respective cash flows and underlying risk, Shefrin and Statman stipulate that the covered call position will be preferred by a prospect theory investor (i.e., prone to framing) that is sufficiently risk averse in the domain of gains. In order to test H_1 we calculate the Pearson correlation coefficient between risk aversion in the domain of gains (measured with a magnitude of €100, €1,000 and €10,000 at risk, respectively) and the preference for covered calls (Table 3) but find no significant evidence for such a correlation, regardless of the magnitude of the risk.

When the respective payoffs are shown in a graph (Figure 3) instead of a text, we observe a marginally significant correlation between risk aversion in the domain of gains of a magnitude of €10,000 and the preference for covered calls ($r[198] = 0.129$, $p = 0.07$).

In conclusion, we find no significant evidence for a relationship between risk aversion in the domain of gains and a preference for covered calls when framed according to Shefrin and Statman [1993] and therefore have to reject H_1. We do, however, find modest empirical evidence for a positive relationship between risk aversion and a covered call preference when the profit lines of the covered call and the stock only position are shown in a graph.

TABLE 2
Covered Call Preferences

		N	Percentage (%)
Covered call preference (Graph)	**Stock-only**	119	60.1
	Covered call	79	39.9
Covered call preference (Text)	**Stock-only**	78	39.4
	Covered call	120	60.6
Fully vs. partially covered call	**Fully**	138	69.7
	Partially	60	30.3
Out vs. in the money	**Out**	173	87.4
	In	25	12.6
Buy back vs. sell upon expiry	**Buy back**	99	50
	Sell	99	50
Covered call vs. naked put	**Covered call**	157	79.3
	Naked put	41	20.7

Note. This table presents the distribution of preferences between the different option strategy designs. The variables are defined as follows: C*overed call preference (Graph)* depicts the results for the choice between the profit line of a covered call position (=1) and a stock-only position (=0), graphically depicted. C*overed call preference (Text)* depicts the results for the choice between the description of a covered call (=1) and a stock-only position (=0), using only text to describe. *Fully vs. partially covered call* gives the preferences for the choice between a fully covered call (=1) and a partially covered call (=0). *Out vs. in the money* gives the preferences for the choice between setting up a covered call with an out-of-the-money call option (=1) or with an in-the-money call option (=0). *Buy back vs. sell upon expiry* gives the preferences for the choice between buying back the call option if in the money upon expiry (=0) or letting the call option get executed, hence selling the stock option (=1). *Covered call vs. naked put* gives the preferences for the choice between an at-the-money covered call (=1) and an at-the-money naked put (=0). E.g. *60.1* means that 60.1% of the respondents prefer the stock only position over the covered call position when the two positions are depicted graphically.

Framing and Covered Calls

Shefrin and Statman [1993] also offer three testable hypotheses regarding different covered call designs in order to separate the effects of framing from the effects of risk aversion. In a world of frame independence, all three covered call designs should have a mean preference of 0.5 as a result of a standard normal distribution because they entail exactly similar cash flows and underlying risk properties. In order to test H_2 - H_4 we therefore conduct a series of one-sample t-tests with a test value of 0.5 (Table 4).

Out-of-the-money covered calls vs. in-the-money covered calls

As for the choice between out-of-the-money covered calls and in-the-money-covered calls, our respondents demonstrate a significant preference for setting up a covered call strategy with out-of-the-money call options ($t[15.8] = 0.37$,

TABLE 3
Correlations Between Covered Call Preference and Risk Aversion

		Covered call preference (Graph)	Covered call preference (Text)	Risk aversion (100)	Risk aversion (1,000)	Risk aversion (10,000)
Covered call preference (Graph)	Correlation Sig. (2-tailed) N	1 – 198	.129 .070 198	−.106 .136 198	−.096 .179 198	−.118 .097 198
Covered call preference (Text)	Correlation Sig. (2-tailed) N	.129 .070 198	1 – 198	.025 .728 198	−.013 .853 198	.003 .963 198

Note. This table reports the Pearson correlation coefficients for covered call preference and risk aversion in the domain of gains in different magnitudes for a sample of 198 respondents to an online survey. The variables are defined as follows: C*overed call preference (Graph)* depicts the results for the choice between the profit line of a covered call position (=1) and a stock only position (=0), graphically depicted. C*overed call preference (Text)* depicts the results for the choice between the description of a covered call (=1) and a stock only position (=0), using only text to describe. *Risk aversion (100)* gives the respondents choice between a sure gain of €100 and a 50% gamble to win a certain sum (1 = €25, . . . , 6 = €50, . . . , 11 = €75) or win nothing. *Risk aversion (1,000)* and *Risk aversion (10,000)* follow the same principle for a larger magnitude of gain (1,000 and 10,000, respectively). Essentially, 1–5 represent risk aversion, 6 represents risk indifference, and 7–11 represent risk seeking.

$p < 0.001$). This supports H_2 in that more covered call positions are formed with out of-the-money calls than with in-the-money calls.

Fully covered calls vs. partially covered calls

Similarly, we find that our respondents significantly prefer fully covered calls over partially covered calls ($t[6.02] = 0.197, p < 0.001$), providing support for H_3 that more covered call positions are fully covered than partially covered.

Buy back vs. selling the stock

Finally, we find that exactly half of respondents prefer to let the call option get exercised if in the money upon expiration and to consequently sell the stock, thereby realizing a gain on the stock. The other half prefers buying back the call option, thereby realizing a loss on the call option. Therefore, we have to reject H_4 that covered call investors are reluctant to repurchase the call when the purchase entails the realization of a loss due to lack of statistical evidence.

Relationship between perceived riskiness of naked puts and preference for covered calls

In order to test H_5 we split the sample in two groups. The respondents that agreed or totally agreed to the statement that an at-the-money naked put is riskier than an at-the-money covered call form one group; those indecisive or disagreeing form another (Table 5). The 120 respondents in the first group ($M = 0.90$, $SD = 0.30$) and the 78 respondents in

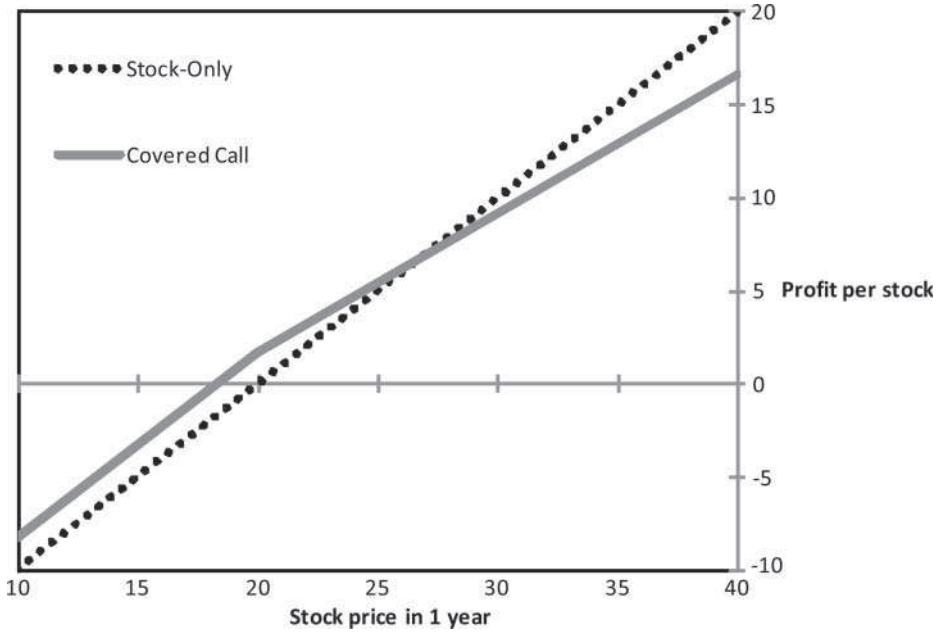


FIGURE 3 Cash flow comparison of covered call and stock-only position.

TABLE 4
One-Sample T-Tests of Covered Call Preferences

	Test Value = 0.5					
					95% Confidence Interval of the Difference	
	T Lower	DF Upper	Significance (2-tailed) Lower	Mean Difference Upper	Lower	Upper
Covered call preference (Graph)	−2.895	197	.004	−.10101(*)	−.1698	−.0322
Covered call preference (Text)	3.047	197	.003	.10606(*)	.0374	.1747
Fully vs. Partially	6.016	197	.000	.19697(**)	.1324	.2615
Out vs. In	15.793	197	.000	.37374(**)	.3271	.4204
Buy back vs. Sell	0	197	1	0	−.0703	.0703
Covered call vs. Naked put	10.147	197	.000	.29293(**)	.2360	.3499

*Significant at the 0.05 level.
**Significant at the 0.01 level.

Note. This table gives the results of one-sample t-tests of the different covered call designs with a test value of 0.5. This means that our findings regarding the preference of certain designs are compared to an exactly equal distribution between the different designs that one could expect in a world of frame independence. The variables are defined as follows: C*overed call preference (Graph)* depicts the results for the choice between the profit line of a covered call position (=1) and a stock only position (=0), as graphically depicted. C*overed call preference (Text)* depicts the results for the choice between the description of a covered call (=1) and a stock only position (=0), using only text to describe. *Fully vs. partially covered call* gives the preferences for the choice between a fully covered call (=1) and a partially covered call (=0). *Out vs. in the money* gives the preferences for the choice between setting up a covered call with an out-of-the-money call option (=1) or with an in-the-money call option (=0). *Buy back vs. sell upon expiry* gives the preferences for the choice between buying back the call option if in the money upon expiry (=0) or letting the call option get executed, hence selling the stock option (=1). *Covered call vs. naked put* gives the preferences for the choice between an at-the-money covered call (=1) and an at-the-money naked put (=0).

the second group ($M = 0.63$, $SD = 0.49$) demonstrate a significant difference in their preference of an at-the-money covered call over an at-the-money naked put ($t[4.42] = 0.27$, $p < 0.001$). Further, there is a significant positive correlation between perceived riskiness of naked puts and a preference of an at-the-money covered call over an at-the-money naked put ($r[198] = 0.267$, $p < 0.001$) (Table 6). This supports H_5 that an at-the-money covered call is preferred over an at-the-money naked put because the latter is perceived as riskier.

Overall, these results provide significant empirical evidence for the presence of framing effects with respect to covered calls. Due to their identical net cash flows and risk characteristics there is no apparent reason for a standard finance investor to prefer out-of-the-money covered calls over in-the-money covered calls, fully covered calls over partially covered calls, or at-the-money covered calls over at-the-money naked puts. All these choices, however, differ in their frames, causing a prospect theory investor to value some design more than others.

TABLE 5
Independent Samples T-Test of Covered Call Preference vs. Naked Put

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F Lower	Sig. Upper	t Lower	df Upper	Sig. (2-tailed) Lower	Mean Difference Upper	Std. Error Difference Lower	95% Confidence Interval of the Difference Upper	Lower
Covered call preference	Equal variances assumed	94.190	.000	4.857	196	.000	.27179(**)	.05596	.16143	.38216
	Equal variances not assumed			4.415	115.537	.000	.27179(**)	.06156	.14486	.39373

Note. **Significant at the 0.01 level.

This table reports the results of an independent samples test for the preference for the choice between an at-the-money covered call (=1) and an at-the-money naked put (=0). Therefore we split the sample in two groups. The respondents that agreed or totally agreed (> = 4) to the statement that an at-the-money naked put is riskier than an at-the-money covered call form one group (N = 120, M = 0.90, SD = 0.30). Those indecisive or disagreeing (<4) form the other group (N = 78, M = 0.63, SD = 0.49).

TABLE 6
Correlations Between Covered Call Preference and Naked Put Statement

		"Naked put riskier than covered call"
Covered call vs. Naked put	Correlation	.267(**)
	Sig. (2-tailed) N	.000 198

Note. **Correlation is significant at the 0.01 level (2-tailed).

This table reports the Pearson correlation coefficients for a preference for the choice between an at-the-money covered call (=1) and an at-the-money naked put (=0) and the statement that the naked put is riskier than the covered call. The respondents' (dis)agreement with the statements was measured on a 5-point Likert scale (1 = totally disagree, . . . , 3 = independent, . . . , 5 = totally agree).

DISCUSSION AND CONCLUSION

Discussion of Results

Extant literature tried to explain the popularity of covered call strategies, which in an efficient market (Fama [1970]) cannot yield any risk-adjusted return improvement over stock-only positions (e.g., Black [1975]). Although recent studies find that it is in fact possible to obtain risk-adjusted return improvements using covered call strategies instead of stock-only positions (e.g., Whaley [2002]), covered call writing has been popular long before academic studies found favorable economic evidence in support of this popularity. Furthermore, Whaley can not explain why certain covered call designs are favored over others and why the covered call strategy is seen as conservative and safe while the naked put strategy is seen as fairly risky (Baldwin [2002]).

Shefrin and Statman [1993] refer to behavioral finance and proclaim that especially hedonic framing (Thaler [1985]) and prospect theory (Kahneman and Tversky [1979]) can explain the popularity of covered call strategies besides the more recently found economic reasons. As a covered call and a stock-only position yield different net cash flows and therefore differ in their risk characteristics, Shefrin and Statman state that a prospect theory investor that is sufficiently risk averse in the domain of gains will prefer the frame of a covered call over the frame of a naked stock position.

De Groot and Dijkstra [1996] state that a prospect theory investor would need above average risk aversion in the domain of gains in order to prefer the covered call in Shefrin and Statman's [1993] example. In fact, they conclude that the prospect value of the covered call as well as the stock-only position will be negative for an investor with average risk aversion and that the status quo will be preferred.

Though the respondents of our survey do prefer the covered call position over the stock only position as described according to Shefrin and Statman's [1993] example, we find no significant evidence that risk aversion in the domain of gains is correlated with this choice. We do, however, find marginally significant evidence that risk aversion in the domain of gains is positively correlated with a covered call as described by a figure illustrating the profit line of a covered call and the profit line of a stock only position. We also find that despite describing exactly the same two choices, the graphical and the written display of the respective payoffs yield different results and are only marginally positively correlated ($r(198) = 0.129$, $p = 0.070$) (Table 3). In fact, only 39.9% of the respondents prefer the covered call over the stock-only position when the respective pay offs are shown in a graph, compared to 60.6% when described in a text (Table 2). We offer the following explanation.

Scott and Vargas [2007] study the responses to advertising images and find that visual presentations have a higher capability to communicate information than plain text. Our graphical display of the respective payoffs reveals the upside potential of the stock in comparison to the limited upside potential of the covered call. In the text, on the other hand, the limited upside potential of the covered call is not explicitly mentioned as this feature is innate to this strategy. Instead, the immediate profit in form of the option premium is emphasized. As the profit lines in the graphical display were not labeled as covered call and stock-only, it is possible that the respondents did not realize that the choice between the two profit lines and the choice between the two text descriptions were actually identical.

In order to separate the effects of framing from the effects of risk aversion, Shefrin and Statman [1993] also compare covered call designs with identical net cash flows and hypothesize that a systematic preference for a certain design over another must be due to framing. Similarly, at-the-money covered calls and at-the-money naked puts yield the same cash flows and have the same underlying risk. We argue that there is no reason why one should be preferred over another in a mean-variance framework (Baldwin [2002]) and hypothesize that due to framing there is a systematic preference for at-the-money covered calls. We find highly significant evidence in favor of these hypotheses. Fully covered calls are preferred over partially covered calls, out-of-the-money covered calls are preferred over in-the-money covered calls, investors are reluctant to repurchase the call option if in the money upon expiration, and at-the-money covered calls are preferred over at-the-money naked puts. This is compelling evidence that form matters when it comes to the design and characteristics of financial products such as covered calls.

Affection may also influence how we frame different choices. For instance, Cooper, Dimitrov and Rau [2001] and Cooper, Khorana, Osobov, Patel and Rau [2005] show how the stock markets first reacted positively to the inclusion of dot.com into the corporate title during the boom of Internet companies and how the stock markets later reacted positively to the erasure of that dot.com in the corporate title during the subsequent downturn of Internet companies. In a related study, Statman, Fisher and Anginer [2008] study the impact of affect on the return of stocks and find that the

TABLE 7
Mean and One-Sample T-Test of Covered Call Statements

	Test Value = 3					
					95% Confidence Interval of the Difference	
	Mean	t	Sig. (2-tailed) Lower	Mean Difference Upper	Lower	Upper
"Covered calls enhance return"	3.60	7.638	.000	.60101(**)	.4458	.7562
"Premium is a mere compensation"	3.03	.374	.709	.03030	−.1294	.1900
"Covered calls reduce risk"	3.59	6.855	.000	.59091(**)	.4209	.7609
"Premium is third source of income"	3.66	7.882	.000	.65657(**)	.4923	.8208
"Only profitable when overpriced or with inside information"	2.53	−5.695	.000	−.46970(**)	−.6323	−.3071
"Naked put riskier than Covered call"	3.60	7.050	.000	.60101(**)	.4329	.7691

Note. **Significant at the 0.01 level.

This table gives the means and the results of one-sample t-tests with a test value of 3 for different covered call statements. This means that we compare the (dis)agreement of our respondents to a state of total independent between the different statements. The respondents' (dis)agreement with the statements was measured on a 5-point Likert scale (1 = totally disagree, . . . , 3 = independent, . . . , 5 = totally agree).

stocks of companies that are admired yield lower returns than the stocks of companies that are despised.

In order to check for the role of affect we also asked the respondents to state their (dis)agreement with a number of common statements about covered call investing (Table 7). We find that, on average, the respondents significantly agree that covered calls can enhance returns, reduce risk, and that the covered call premium can be seen as a third source of income. At the same time, the respondents significantly disagree with the statement that covered calls can only be profitable when call options are overpriced or investors have inside information. Table 8 shows the Pearson correlation coefficients for the covered call statements as well as the covered call preference based on the text description of the respective pay-offs. We find that a preference for covered calls is significantly positive correlated with agreeing that covered calls enhance return ($r[198] = 0.23$, $p = 0.001$). At the same time, agreeing that covered calls can only be profitable if options are overpriced or investors have inside information has a significant negative correlation with a preference for covered calls ($r(198) = -0.25$, $p < 0.001$). This supports the theory that affect is an important criteria in the choice of investment strategies.

In conclusion, the extend to which the covered call strategy is seen as a reasonable investment decision by an investor seems to depend more on the frames used for evaluation than on his or her level of risk aversion.

Implications for Management and Public Policy

This research has several important implications for (marketing) managers in the investment industry and public policy makers. In particular, by elaborating on the influence of framing on investment decisions, it can help marketers to better promote such products to their clients.

Specifically, the individual investors in our sample seem to be more influenced by the frame of a financial product than by their level of risk aversion. These individuals will therefore be more responsive to types of advertising that show the promoted product in a favorable frame which leads to a higher prospect value.

Another important implication is that affect can influence the way investors evaluate the frame of a certain product. As for the promotion of covered calls, there should be emphasis on the enhancement of investment returns. The hedging potential and the extra source of income are not significant

TABLE 8
Correlations Between Covered Call Preference and Covered Call Statements

		"Covered calls enhance return"	*"Premium is a mere compensation"*	*"Covered calls reduce risk"*	*"Premium is third source of income"*	*"Only profitable when overpriced or with inside information"*
Covered call preference (Text)	Correlation	.233(**)	−.115	.035	.126	−.247(**)
	Sig. (2-tailed)	.001	.107	.625	.078	.000
	N	198	198	198	198	198

Note. **Correlation is significant at the 0.01 level (2-tailed).

This table reports the Pearson correlation coefficients for a preference for covered calls, defined as the choice between the description of a covered call (=1) and a stock only position (=0), using only text to describe and the different covered call statements. The respondents' (dis)agreement with the statements was measured on a 5-point Likert scale (1 = totally disagree, . . . , 3 = independent, . . . , 5 = totally agree).

drivers of covered call preference. A graphical comparison of the covered call profit line and the stock only profit line should be used with caution as this may highlight the limited upside potential and may decrease affect, resulting in an unfavorable frame for the covered call option strategy.

Public policy makers should recognize the impact that marketing can have on the framing of certain types of investment products and provide unbiased information and facts to anticipate misselling allegations and its consequences to the image of the financial sector in general and the investment industry in particular.

Limitations and Future Research

Our study contains several limitations that provide interesting paths for future research. First, following Shefrin and Statman [1993], our investigation was limited to the concavity of the value function in the domain of gains as main driver of investors' preference for covered calls as compared to stock-only positions. However, our study only found a relatively weak relationship between risk aversion in the domain of gains and investors' preferences for covered calls. As subcertainty (Kahneman and Tversky [1979]) may also be of importance, future research may want to investigate the joint effect of these two drivers on investors' preferences for covered calls over stock-only positions.

Second, as a general problem of (online) questionnaires, the people who have access to and voluntarily complete them are not necessarily representative for the entire population. Elder and more conservative people are typically underrepresented in online surveys (Blumberg, Cooper and Schindler [2005]), while especially elder return-orientated investors employ covered call strategies to generate extra income (Shefrin & Statman [1993]). However, the age composition of our respondents is in line with the more general population of Dutch investors. It should be noted though that only 24% of our respondents have actually written covered calls themselves at the time of our study and that our sample consists on average of highly educated individuals. Additional research is called for to ensure the generalizability of our findings across other geographical regions and respondent types.

Third, the complexity and resulting length of our questionnaire may have negatively influenced the response rate, though Deutskens et al. [2004] show that if properly rewarded it is possible to conduct complex and lengthy surveys via the internet without resulting in bias or inaccurate responses. Nevertheless, it should be noted that our sample is relatively small and that follow-up research may investigate the robustness of our results with larger samples.

Fourth, it remains somewhat unsolved why the covered call strategy is preferred when the pay-offs are explained by a text while the stock position is preferred when the payoffs are showed in a graph.[9] Future research could further investigate this phenomenon and provide insights on how graphical frames influence prospect evaluation.

Despite these limitations, this research contributes to the literature on covered call writing in particular and behavioral finance in general. It provides investors with a better understanding of what may influence their investment decision, allows practitioners and marketers to adjust their promotion in order to set the right framing for their products and shows public policy makers why unbiased information on investment products can be important for individual investors.

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NOTES

1. The term covered call generally refers to overwrites, i.e. to short a call option on a stock that one already owns, as well as buy-writes, that is, to first buy a stock and then to short a call option on this stock (Figlewski, Silber and Subrahmanyam [1990]).
2. For more information about these products, see www.cboe.com or www.euronext.com.
3. The BMX is a hypothetical buy-write strategy that entails the simultaneous purchase of the S&P 500 and the shorting of an at-the-money S&P 500 Index call option (ww.cboe.com).
4. While the Sharpe ratio measures return relative to upside and downside variability, the Sortino ratio measures return only relative to its downside variability. It is used as a measure of risk-adjusted return (Sortino and Forsey [1996]).
5. The Upside Potential Ratio is defined as the upside potential over the downside risk measure. As such, it is used to identify strategies with stable growth for a given minimum return (Sortino, van der Meer and Plantinga [1999]).
6. We thank an anonymous reviewer for noting that besides concavity of the value function in the domain of gains, subcertainty (Kahneman and Tversky [1979]) may also drive investors' preference for covered calls over stock-only positions. We concur, but an investigation of this effect is beyond the current study's scope.
7. DRCs and RCBs are similar to a combination of zero-coupon bonds or regular bonds with a short put option on stocks (Breuer and Perst [2007]).
8. We thank an anonymous reviewer for noting that in case probabilities are small, not 50–50 as in Shefrin and Statman [1993] and here, investors may exhibit risk seeking in the domain of gains, even with concave utility.

9. We thank an anonymous reviewer for noting that our graphical display of the binominal case used by Shefrin and Statman [1993] may mask the true payoff pattern of covered calls (e.g., Figure 2). Future research should employ more realistic examples that also include intermediate payoffs.

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