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Source: *Financial Management*, Vol. 22, No. 2 (Summer, 1993), pp. 123-134
Published by: Wiley on behalf of the Financial Management Association International
Stable URL: http://www.jstor.org/stable/3665864
Accessed: 17-01-2018 11:13 UTC

Behavioral Aspects of the Design and Marketing of Financial Products

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■ The design of financial products is guided by many considerations. The list includes alleviation of managerial entrenchment, catering to tax clienteles, and differences in preferences and endowments.[1] While these considerations vary, they are all within the standard finance world of frame invariance where investors care about cash flows, but are indifferent among frames of cash flows.

The pricing of options is a good example of frame invariance. The price of a call option on a stock is determined by the fact that the cash flows of the option can be replicated by the cash flows of a particular dynamic combination of a bond and the underlying stock. The fact that in the first case cash flows are described in terms of options, while in the second cash flows are described in terms of bonds and stocks is irrelevant to investors in a world of frame invariance.

We thank Paul Adair, Franklin Allen, Melanie Austin, Fischer Black, Mervyn King, Joseph Levin, Barry Schachter, Larry Siegel, Joseph Stefanelli, Lawrence Summers, and three anonymous referees for helpful remarks. We acknowledge support from NSF Grant SES 8813624, and a Presidential Research Grant from Santa Clara University.

Although the literature of standard finance has no relevant role for framing in the design of financial products, the behavioral literature is replete with studies on the effects of frames on choice (see Tversky and Kahneman [47]). We suggest that investors are not indifferent to the frames of cash flows and propose a behaviorally based framework for the design of financial products.

In this paper, we describe the role of four behavioral elements in the design of some financial products. The elements are prospect theory (Kahneman and Tversky [21]), hedonic framing (Thaler [44]), behavioral life cycle theory (Shefrin and Thaler [41]), and cognitive errors

[1] A more complete list includes managerial remuneration to mitigate agency problems (Hart and Holmstrom [18]); signalling quality to avoid adverse selection (Nachman and Noe [31]); the allocation of control rights to increase efficiency (Aghion and Bolton [1]); corporate considerations to alleviate managerial entrenchment (Grossman and Hart [15], Harris and Raviv [16], [17]); catering to tax clienteles (Miller [29], Dybvig and Ross [12]); catering to differences in preferences and endowments (Allen and Gale [2]); and catering to differences in individual state prices (Madan and Soubra [25]).

(Kahneman, Slovic, and Tversky [19A]). However, we want to emphasize that a behavioral framework for the design of financial products extends beyond these four elements.

All financial products are bundles of state primitives, securities that pay $1 if a particular state occurs. Some financial products, such as stocks, are bundled by corporations; some, such as listed stock options, are bundled by exchanges; and some, such as covered calls, are bundled by investors, typically with the help of brokers. Bundling cash flows, like designing and bundling the features of products, is part of marketing. As Allen and Gale [2], Ross [35], and Madan and Soubra [25] emphasize, marketing considerations are important because financial products must appeal to sufficiently large clienteles if they are to be viable.

We use covered calls as a vehicle for our exposition of the design of financial products. We focus on "explicit" covered calls constructed by buying shares and selling calls. But the discussion also applies to implicit covered calls, such as "option income" mutual funds, "primes" and callable bonds.[2] Moreover, the framework applies to financial products beyond covered calls.

We suggest that behavioral considerations are indispensable in the design of financial products. For example, a covered call can be designed with an in-the-money call or an out-of-the-money call; it can be designed as fully covered or as partially covered; and it can be designed so that the investor sells shares if the call is in-the-money at expiration or repurchases the call. We shall argue that some of these design features are preferable to alternatives with identical cash flows.

The remainder of the paper is organized as follows. Section I describes the use of covered calls. Section II describes prospect theory and mental accounts. Section III describes the framing of covered calls. Section IV describes the application of behavioral life cycle theory to covered calls. Section V outlines some extensions of behavioral framework beyond the design of covered calls. Section VI concludes.

[2]Primes and scores are derivative securities with a five-year maturity, which were written on twenty-six common stocks by the Americus Shareholder Corporation in 1985-1987. A share of stock in a company, say AT&T, represents a unit of ownership in an Americus trust. The holder of a prime on AT&T is entitled to all dividends during the five years of the trust, as well as any appreciation in the price of AT&T stock up to the exercise price. The holder of a score on AT&T is entitled to any appreciation in the price of AT&T beyond the exercise price. In effect, a score is a call option on AT&T and a prime is a covered call option on AT&T.

I. The Use of Covered Calls

Covered calls are frequently promoted by brokers and other investment advisors.[3] For example, the Research Institute of America, Inc., (RIA) provides the following advice in its *Personal Money Guide* [34]:

> An investment strategy that can make you extra money is writing calls on securities you already own .... When you sell a call on stock you own, you receive a premium. Think of these premiums as extra dividends. By careful selection of stocks and timing of writing calls, you have the opportunity to earn annual rates of return of 11% to 19%: regular dividends of 4% to 9% and premium "dividends" of 7% to 10%.

The Philadelphia Stock Exchange conducted a survey of the attitudes and behavior of brokers and investors towards stock options [32]. The survey reveals that covered call writing is the most important objective of investors who use options. The authors of the survey note that:

> Brokers see their options investing clients primarily as speculators. In reality, those investors that do invest in options are more interested in covered writing and hedging. Speculation is certainly important, but not as important as assumed by brokers.

The Louis Harris 1976 Survey [23] of options users is more detailed than the Philadelphia Stock Exchange Survey [32], although it is not as recent. The Louis Harris Survey [23] found that covered calls are particularly attractive to older investors who consider current income an important investment objective. Sixty-eight percent of the over-50 age group were selling covered calls, while only 49% of the under-50 group did so. Forty-four percent of the over-50 group rated current income as very important, while only 33% of the under-50 group did so [23, p. 10].

[3]Systematic data on the use of options are scarce. We have been told by CBOE and AMEX officials that, among public customers, individual investors account for 70 to 80% of the volume of stock options. Institutional investors account for the remaining 20 to 30%. However, we do not know if the use of stock options by individual investors is different from the use of stock options by institutional investors. Indeed, option holdings by institutional investors might reflect preferences of individual investors. For example, call options are sold by Dean Witter, an institution, in operating its Option Income Trust. The trust holds covered calls and it is likely that its customers are individual investors.

The Options Industry Council is an organization sponsored by the American Stock Exchange, the Chicago Board of Options Exchange, NYSE Options, the Pacific Stock Exchange, the Philadelphia Stock Exchange and the Options Clearing Corporation. In October 1992, the Council promoted options through advertisements in the *Wall Street Journal* and other media. The advertisement offered a video and printed materials. A substantial portion of the video is devoted to promoting covered calls.

We hasten to note that the data of the Louis Harris Survey are open to several interpretations and that we consider them useful for the formation of testable hypotheses but not for significant tests of these hypotheses. For example, one of the hypotheses that we will present later relates to investors who are consuming from their portfolios. While it is likely that a higher proportion of people in the over-50 age group are consuming from their portfolios than in the under-50 age group, classification by age group might well be different from classification by the rate of consumption from one's portfolio.

The Louis Harris Survey [23] indicates that sellers of covered calls prefer full coverage (i.e., hedge ratio of one) over partial coverage. Fifty-six percent of sellers sold fully covered calls while only 19% sold partially covered calls [23, p. 108]. This Louis Harris finding is supported by Merton, Scholes, and Gladstein [27, p. 200] who noted that, according to the CBOE, only 15% (approximately) of all options written are uncovered.

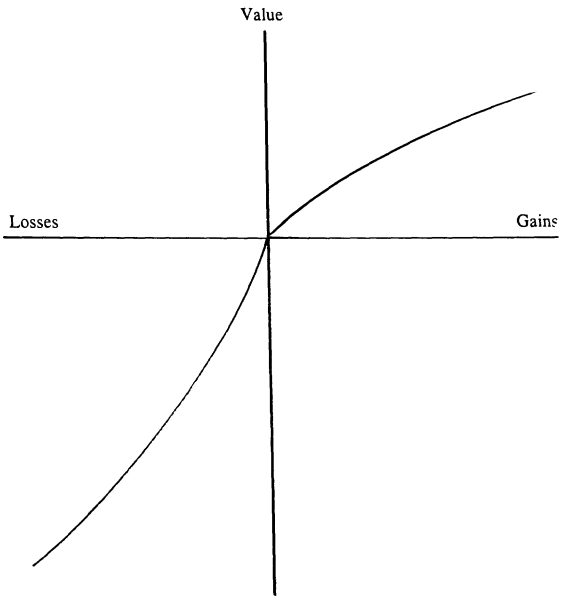
Finally, the Louis Harris Survey indicates that sellers of covered calls prefer out-of-the-money calls over in-the-money calls. Four times as many covered call positions were constructed with out-of-the-money calls as with in-the-money calls [23, pp. 142, 143].

We suggest that these characteristics of investor preference are not independent and that investors in covered calls belong to two overlapping clienteles, one consisting of investors who are highly risk-averse in gains and highly risk-seeking in losses, and the other consisting of investors who consume from their portfolios. We begin our discussion with prospect theory and the attraction of covered calls to the clientele of investors who are highly risk-averse in gains and highly risk-seeking in losses.

II. Prospect Theory and Mental Accounts

The best portfolio of financial products maximizes an objective function, such as expected utility. Investors' objective function in prospect theory differs from its standard counterpart in several ways. Prospect theory investors evaluate their choices in terms of the potential gains and losses relative to some reference point ρ, while standard investors focus only on the net cash flow x. Moreover, while standard investors are always risk-averse, prospect theory investors have an S-shaped value function $v(x-\rho)$ over gains and losses which displays concavity (risk-aversion) in the domain of gains and convexity (risk-seeking) in the domain of losses.[4]

Exhibit 1. The Prospect Theory Value Function



We build a prospect theory model of portfolio framing. To illustrate the effect of framing, we paraphrase an experiment reported in Kahneman and Tversky [21]. The following two problems were presented to two different groups of subjects:

> In addition to whatever you own, you have been given $1,000. You are now asked to decide whether to accept a sure $500 gain or play a gamble. The gamble features a 50-50 chance of winning $1,000 more or nothing more.

> In addition to whatever you own, you have been given $2,000. You are now asked to decide whether to accept a sure $500 loss or play a gamble. The gamble features a 50-50 chance of losing $1,000 or nothing.

Kahneman and Tversky found that 84% of subjects chose the sure $500 in the first problem, a choice consistent with risk-aversion. Yet, 69% of subjects chose the gamble in the second problem, a choice consistent with risk-seeking. What makes this result intriguing is that the two problems are identical in net cash flows. Both involve a

[4]Prospect theory involves issues of probability weighting in addition to the S-shaped value function and framing. For simplicity, we ignore probability weighting in this paper. One place where probability weightings matter is the decision to buy call options. Overweighting of low probabilities increases the attractiveness of out-of-the-money calls.

choice between a sure $500 and a 50-50 gamble with outcomes of $1,000 or $2,000.

Prospect theory postulates that two distinct cognitive operations lead to this choice, and that these two operations are sequential. First is the creation of mental accounts. Second is the application of specific decision rules to the accounts. The creation of mental accounts involves a framing operation that specifies the particular accounts that are created (i.e., their labels and boundaries).[5]

The first problem is described in terms of gains and the concave portion of the prospect theory value function v leads to a choice consistent with risk-aversion. The second problem is described in terms of losses and the convex portion of the value function leads to a choice consistent with risk-seeking.

The experiment described above and many others suggest that the framing of alternatives exerts a crucial effect on the choices of many investors. Equally important is the observation that people are not always aware of the frames that influence their choices (Fischhoff [13] and Tversky and Kahneman [46]).

Can proper framing be discovered and taught? This question has special relevance in the field of options. Up until 1973, most people did not have the insight that a call option can be framed as a dynamic combination of a stock and a bond. That framing insight is an important part of the contribution of Black and Scholes [7]. Options traders now make extensive use of option pricing formulae that are based on the framing insights of Black and Scholes. This indicates that proper framing can be discovered and taught.

But the evidence on the effectiveness of teaching proper framing is mixed. In 1975, Black [5] tried to teach investors that the framing that makes covered calls seem like a free lunch is faulty. He wrote:

> It is sometimes said, for example, that covered option writers almost always gain more than they lose by writing options. This statement focuses on the premium income, and downplays the possible loss of appreciation on the stock if the option is exercised. In fact, careful study shows that an investor who writes call options against his stock will often end up with a worse position than the one he started with. [5, p. 36]

Merton, Scholes, and Gladstein [27] made the effort in 1978:

> Even for long-term investors who plan "never" to sell their stocks, the premiums received from writing options against these stocks cannot be treated as simply extra income to be added to the normal return on the stocks, as some of the advertising in the options industry seems to suggest. [27, p. 214]

And Binnewies [4] suggests in a 1992 article that:

> Many people believe the yield enhancement produced by covered options writing is the trading world's version of a free lunch . . . . The writer of the call option agrees to sell a portion of the future upside appreciation of a long stock position; in exchange, the writer gains a one-time cash receipt of the option's premium. The only way the seller of the call option can gain from this deal is for a buyer to pay more than the option is worth consistently. However, common sense says this can't always happen.
>
> More believable is that, over the long term, the transaction price is not really an advantage to either the buyer or the seller. In actuality, the bid-ask spread creates a *disadvantage* to both the buyer and the seller. [4, p. 32]

The persistence of the belief that covered calls offer a free lunch suggests that learning to frame properly is not easy. Besides, it is safe to say that brokers teach more investors than finance professors do, and it is sometimes in the interest of brokers to reinforce faulty framing rather than remedy it.

A. Hedonic Framing

A second component of our behaviorally based framework derives from Thaler [44], who discussed hedonic framing in terms of the psychological costs and benefits which accrue to alternative frames of mental accounts. In Thaler's formulation, each account is evaluated separately, and the total prospect theory value v is computed as the sum of individual accounts. A decision-maker who maximizes v prefers to segregate a total gain of g over two accounts rather than combine the gain into one account. To see why, notice that if the gain were evenly divided between two accounts, their total prospect theory value v

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[5] In the experiment described above, three mental accounts are created. Mental account #1 registers the initial amount ($1,000 in the first problem and $2,000 in the second). Mental account #2 registers the amount of the sure payment, if the decision is made to accept the sure payment; otherwise it registers zero. Mental account #3 registers the outcome of the gamble, if the gamble is selected; otherwise, the account registers zero. In this example, all accounts have zero reference points.

In prospect theory, the choice between the sure amount and the gamble involves an evaluation of the second and third accounts alone. Kahneman and Tversky [21] term this the isolation effect. The first account can be isolated since it is invariant to the person's choice. The choice between the sure amount and the gamble can then be made by applying the evaluation criteria to each account and choosing the alternative which maximizes the objective function.

would be $2v(g/2)$, rather than $v(g)$. Since v is concave in the gains region, $2v(g/2)$ is greater than $v(g)$. Thaler refers to this effect as "savoring of gains separately." For losses, the reverse is true: since v is convex in the domain of losses, $v(l)$ is greater than $2v(l/2)$. Therefore, it is preferable to integrate losses. Finally, when l is a large loss and g is a small gain, it is preferable to segregate the gain from the loss as a "silver lining" rather than integrate it and face a slightly lower loss: the sum of $v(g)$ and $v(l)$ is greater than $v(g + l)$.[6]

III. The Framing of Covered Calls

We have discussed the elements of prospect theory and hedonic framing, and we turn now to the application of these elements to the mental accounting structure of covered calls. To set the stage, consider the way stockbrokers market covered calls to investors. The following is taken from a manual for stockbrokers by Gross [14]:

> Joe Salesman: "You have told me that you have not been too pleased with the results of your stock market investments."
>
> John Prospect: "That's right. I am dissatisfied with the return, or lack of it, on my stock portfolio."
>
> Joe Salesman: "Starting tomorrow, how would you like to have three sources of profit every time you buy a common stock?"
>
> John Prospect: "Three profit sources? What are they?"
>
> Joe Salesman: "First, you could collect a lot of dollars — maybe hundreds, sometimes thousands — for simply agreeing to sell your just-bought stock at a higher price than you paid. This agreement money is paid to you right away, on the very next business day — money that's yours to keep forever. Your second source of profit could be the cash dividends due you as the owner of the stock. The third source of profit would be in the increase in price of the shares from what you paid, to the agreed selling price."
>
> "By agreeing to sell at a higher price than you bought, all you are giving up is the unknown, unknowable profit possibility above the agreed price. In return, for relinquishing some of the profit potential you collect a handsome amount of cash that you can immediately spend or reinvest, as you choose." [14, p. 166]

Gross [14] frames the cash flow of a covered call into three mental accounts or "three sources of profit," the call premium, the dividend, and the capital gain on the stock. Gross uses a covered call with an out-of-the-money call and he frames the covered call such that the holder of the covered call sells his stock rather than repurchase the call, when the call is in-the-money at expiration. Note also the teaching role of brokers. Brokers sell by framing cash flows as they teach customers about covered calls.

A. A Comparison of Covered Calls With a "Stock-Only" Position

What is the prospect theory value of a covered call in Gross's [14] frame and how does it compare to a "stock-only" position where stock is held but calls are not sold? We investigate this question within a simple numerical example in a binomial world. We use abbreviations in the equations that follow. A glossary of abbreviations is presented in Exhibit 2.

Consider a share of the Alpha Company priced at \$20. A year from now the price per share will be either \$40, if the up state occurs, or \$10, if the down state occurs. Imagine that the probabilities of the up and down states are equal. Consider a call option on a share of Alpha. Assume that the call has an exercise price of \$35, and expires in a year. Assume also that the risk-free rate for borrowing and lending is zero. It is easy to verify that the price of this call is \$1.67, because the call can be replicated by buying 1/6 of a share and borrowing \$1.67 (see Cox, Ross, and Rubinstein [10]). The prospect theory expected value of a "stock-only" position (s) is:

$$E[v(s)] = \tfrac{1}{2}[v(20) + v(-10)] . \qquad (1)$$

The prospect theory expected value of the covered call position (cc) is:

$$E[v(cc)] = v(1.67) + \tfrac{1}{2}[v(15) + v(-10)] . \qquad (2)$$

The prospect theory expected value of the covered call position exceeds that of the stock-only position when:[7]

[6] There is no comprehensive theory of the restrictions that people put on the precise set of mental accounts to which Thaler's hedonic framing rules can be applied. However, it is clear that the rules of segregation and integration are not arbitrary. We suggest that features of similarity play an important role in facilitating integration (see Tversky [45]). People are probably more likely to integrate accounts that are similar than accounts that are different. A call option on a share of the Alpha Company has two primary features, one identifying it as a call option and the other identifying it as relating to the stock of the Alpha Company. We suggest that a mental account containing a call on Alpha is more likely to be integrated with a mental account containing a share of Alpha than it is likely to be integrated with a mental account containing a share of Beta.

[7] The first version of the inequality indicates that the prospect theory value of the call premium exceeds the expected prospect theory value of what

Exhibit 2. A Glossary of Abbreviations

s	=	Stock-only position.
cc	=	Covered call position.
pcc-1	=	Partially covered call position in the first frame.
pcc-2	=	Partially covered call position in the second frame.
fcc	=	Fully covered call position.
fcc-out	=	Covered call position with out-of-the-money calls.
fcc-in	=	Covered call position with in-the-money calls.
ccss	=	Covered call position where the stock is sold when the call is in-the-money at expiration.
ccr	=	Covered call position where the call is repurchased when the call is in-the-money at expiration.

$$v(1.67) > \tfrac{1}{2}[v(20) - v(15)]$$

or in another form

$$v(1.67) + \tfrac{1}{2}v(15) > \tfrac{1}{2}v(20)\,. \qquad (3)$$

The prospect theory expected value of the covered call position exceeds the prospect theory expected value of the stock-only position for investors who are sufficiently risk-averse in the domain of gains.

The above comparison is useful because brokers and investors often compare covered calls to stock-only positions. However, the comparison confounds the effect of framing with the effect of attitudes toward risk. The covered call and stock-only positions differ not only in their prospect theory expected values but also in their underlying cash flows. In particular, a covered call position is less risky than a stock-only position. Thus, one might reasonably argue that covered calls are preferred to stock-only positions because of their lower risk rather than because of their prospect theory properties.

To disentangle framing effects from the effects of attitudes toward risk, we compare covered calls to alternatives with identical cash flows. The covered call position in our example required an initial cash outflow of $18.33 composed of $20 paid for a share of Alpha and $1.67 received for a call on Alpha. The total gain is $16.67 in the up state and the total loss is $8.33 in the down state.

While it is conceivable that standard investors who are sufficiently risk-averse might prefer covered calls over stock-only positions, there is no apparent reason that might lead standard investors to prefer covered calls with out-of-the-money calls over covered calls with in-the-money calls; to prefer fully covered calls over partially covered calls; or to frame covered calls as having a gain on the stock rather than a loss on the option. We suggest that all these preferences are consistent with the preferences of prospect theory investors.

Gross terms the "unknown, unknowable profit opportunity above the agreed price."

B. A Comparison of a Fully Covered to a Partially Covered Call Position

The Louis Harris Survey [23] revealed that most covered call positions are structured as fully covered positions. Compare a fully covered call position consisting of buying one share of Alpha and selling one call on Alpha to a partially covered position consisting of buying 1.25 shares of Alpha and selling 2.5 calls on Alpha. The initial cash outlay for the partially covered call position, $18.33, is identical to the initial cash outlay for the fully covered call position. Also, the net gain in either position in the up state is $16.67 and the net loss in either position in the down state is $8.33.

We examine two ways for framing a partially covered position. The first frame consists of a fully covered position for 1.25 shares and a naked (short) position for the remaining 1.25 calls. In the second frame, the stock and option positions are separated into a stock position of 1.25 shares, and a (short) position of 2.5 calls. Which of these two frames has a higher prospect theory expected value and how do they rank relative to the prospect theory expected value of a fully covered call? The gains and losses of the partially covered call in the two frames are presented in Exhibit 3.

The prospect theory expected value of the partially covered call position in the first frame (*pcc*-1) is

$$\begin{aligned} E[v(pcc{-}1) &= |E[v(1.25\ cc)]| + |E[1.25nc]| \\ &= |v(2.08) + \tfrac{1}{2}[v(18.75) + v(-12.50)]| \\ &\quad + |\tfrac{1}{2}(-4.17) + v(2.08)]|\,. \end{aligned} \qquad (4)$$

The prospect theory expected value of the partially covered call in the second frame (*pcc*-2) is

$$E[v(pcc{-}2)] = \tfrac{1}{2}[v(25) + v(-12.50) + v(-8.33) + v(4.17)]\,. \qquad (5)$$

The prospect theory expected value of the first position exceeds the prospect theory expected value of the second position when the concavity of the value function in the domain of gains and the convexity of the value function in the domain of losses are sufficiently high. In other words, investors who are highly risk-averse in the domain of gains

Exhibit 3. The Framing of Partially Covered Calls in Two Alternative Frames

	Partially Covered Call in the First Frame		Partially Covered Call in the Second Frame	
Mental Subaccounts	Up State	Down State	Up State	Down State
Gain on 1.25 shares	(35 - 20) × 1.25 = $18.75	(10 - 20) × 1.25 = - $12.50	(40 - 20) × 1.25 = $25.00	(10 - 20) × 1.25 = - $12.50
Gain on 1.25 (covered) calls	1.67 × 1.25 = $2.08	1.67 × 1.25 = $2.08		
Gain on 1.25 (naked) calls	(1.67 - 5) × 1.25 = - $4.17	(1.67) × 1.25 = $2.08		
Gain on 2.5 calls			(1.67 - 5) × 2.5 = - $8.33	(1.67 - 5) × 2.5 = $4.17
Total	$16.67	- $8.33	$16.67	- $8.33

and highly risk-seeking in the domain of losses prefer the first frame of the partially covered position over the second.

We focus now on investors who are highly risk-averse in gains and highly risk-seeking in losses and ask if such investors also prefer a fully covered position over the first partially covered position. Recall that the prospect theory expected value of a fully covered call position (*fcc*) is:

$$E[v(fcc)] = v(1.67) + \tfrac{1}{2}[v(15) + v(-10)] . \qquad (6)$$

Comparing the last equation with its first frame counterpart above, we conclude that the prospect theory expected value of a fully covered call exceeds the prospect theory expected value of the partially covered call in the first frame when the concavity of the value function in the domain of gains and the convexity of the value function in the domain of losses are sufficiently high.

We want to emphasize that the preference for fully covered calls over partially covered calls presented here is a preference of investors who are risk-averse, but the preference is not due to a high risk of the partially covered call. Indeed, the cash flows of the fully covered and the partially covered call positions are identical. Therefore, preferences must be attributed to the effects of the framing.

C. A Comparison of Covered Calls With Out-of-the-Money Calls to Covered Calls With In-the-Money Calls

Recall that the covered call position in Gross's [14] sales pitch was structured with an out-of-the-money call, and that the Louis Harris Survey [23] indicates that most investors who use covered calls use them with out-of-the-money calls rather than with in-the-money calls. Note also that "primes" have been constructed as covered calls with out-of-the-money calls. Jarrow and O'Hara [19] reported that the exercise price of primes has generally been set at a 20-25% premium to the price of the underlying stock. Compare a covered call where the call is out-of-the-money (exercise price is $35) to a covered call position where the call is in-the-money (exercise price is $15). The premium of the out-of-the-money call is $1.67, while the premium of the in-the-money call is $8.33. The mental accounts of the two positions are presented in Exhibit 4. The covered call position with the out-of-the-money call involves buying one share for $20 and selling one call for $1.67. The covered call position with the in-the-money call, but with the same cash flows, involves buying five shares for a total of $100, selling five calls at $8.33 each for a total of $41.67 and borrowing $40. The initial cash outflow is $18.33 in both positions; the gain in the up state in both positions is $16.67; and the loss in the down state in both positions is $8.33. The prospect theory expected value of the covered call position with an out-of-the-money call (*fcc-out*) is

$$E[v(fcc\text{–}out)] = v(\$1.67) + \tfrac{1}{2}[v(\$15) + v(-\$10)] . \qquad (7)$$

The prospect theory expected value of the covered call with in-the-money call (*fcc-in*) is

$$E[v(fcc\text{–}in)] = v(\$41.67) + \tfrac{1}{2}[v(\$25) + v(-\$50)] . \qquad (8)$$

The covered call with an out-of-the-money call is preferred over the covered call with an in-the-money call for investors who exhibit sufficiently high risk-aversion in the domain of gains and sufficiently high risk-seeking in the domain of losses.

Exhibit 4. The Framing of Covered Calls With In-the-Money and Out-of-the-Money Calls

	Covered Call With an Out-of-the-Money Call (One Share and One Call With a $35 Exercise Price)		Covered Call With an In-the-Money Call (Five Shares, Five Calls With an Exercise Price of $15 and a Borrowed $40)	
Mental Subaccounts	Up State	Down State	Up State	Down State
Gain on shares	$15.00	-$10.00	-$25.00	-$50.00
Gain on calls	$1.67	$1.67	$41.67	$41.67
Total	$16.67	-$8.33	$16.67	-$8.33

Exhibit 5. The Framing of a Covered Call Where the Stock is Sold and Where the Option is Repurchased

	Up State		Down State
Mental Subaccounts	Stock Sold	Option Repurchased	
Capital gains on the share	$15.00	$20.00	-$10.00
Gain on the call	$1.67	-$3.33	$1.67
Total	$16.67	$16.67	-$8.33

D. A Comparison of Repurchasing Calls and Selling Stock

Do holders of covered calls prefer to frame their positions as selling their shares when the calls are about to be exercised, thereby realizing a gain on the stock, or do they prefer to frame their positions as repurchasing the calls, thereby realizing a loss on the calls? The structure of Gross's [14] sales pitch implies that the stock is sold. The gains and losses associated with the two alternative frames are presented in Exhibit 5. Note, again, that the net cash flows of the covered call in the two frames are identical.

The prospect theory expected value of a covered call where the stock is sold (*ccss*) is:

$$E[v(ccss)] = v(1.67) + \tfrac{1}{2}[v(15) + v(-10)] . \quad (9)$$

The prospect theory expected value of a covered call where the call is repurchased (*ccr*) is:

$$E[v(ccr)] = \tfrac{1}{2}[v(-3.33) + v(1.67)] + \tfrac{1}{2}[v(20) + v(-10)] . \quad (10)$$

The shape of the value function indicates that the prospect theory expected value of a covered call when the stock is sold exceeds the prospect theory expected value of a covered call when the call is repurchased for investors who are sufficiently risk-averse in the domain of gains. It appears that the selling frame masks the loss sustained on the option.

E. Hypotheses

We offer three hypotheses:

(*i*) More covered call positions are formed with out-of-the-money calls than with in-the-money calls.

(*ii*) More covered call positions are fully covered than partially covered.

(*iii*) 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.[8]

IV. Covered Calls and the Behavioral Life Cycle Theory

Recall that Gross [14] frames the cash flows of a covered call into three mental accounts: dividends, option premium and the increase in the price of the stock to the option exercise price. The first two accounts can be labeled as "downside protected" or "bird-in-the-hand" accounts, while the third can be labeled as an "upside potential" account. Gross describes the writing of a covered call as a transfer from an upside potential account (i.e., "unknown, unknowable profit possibility") into a bird-in-the-hand account (i.e., money "paid to you right away, on the very next business day — money that is yours to keep forever").

We have described earlier the prospect theory benefits derived by some investors from framing cash flows into separate mental accounts. We turn now to another use of the separation of cash flows into mental accounts, the regulation of consumption over the life cycle.

[8]To highlight the difference between the predictions of standard finance and behavioral finance, consider the case of no taxes and the same transaction costs for repurchasing the call and selling the stock. Standard finance predicts that an investor is indifferent between the two alternatives. However, because of the convex portion of the value function, behavioral finance predicts that investors will prefer to realize a gain by selling the stock, rather than realize a loss by repurchasing the call. Note that this prediction is sensitive to the zero-tax condition. For taxable investors, repurchasing the call is generally the preferred alternative.

It is a common observation that some investors follow the rule of "don't dip into capital." They feel free to consume from income, such as labor income or dividends, but not from capital. Such behavior makes no sense in a world where people do not care about the frames or labels of cash flows. In Shefrin and Statman [36], we investigated the importance of labeling cash flows as income or capital. We suggested that investors prefer income mental accounts that are downside protected. Both dividends and option premium fall into that category.[9]

The importance that some covered call writers attach to labeling option premium as income is evident in the literature provided by the Chicago Board of Options Exchange (CBOE). The *CBOE Reference Manual* [8] suggests that increased income is the primary motive for writing covered calls. The manual states:

> Covered calls usually appeal to the investor who is willing to assume a limited rate of return in exchange for reduced risk. Incentives for covered writing include the following: *Increased Income.*
>
> A primary incentive for covered call writing is to increase the income from a portfolio. [8, p. H1]

Recall that the RIA *Personal Money Guide* [34] suggests that investors think of call premiums as "premium dividends." Recall also, that Merton, Scholes, and Gladstein [27] tried to educate investors to see that the call premiums are not "extra income to be added to the normal return on the stocks," but a transfer of money from capital.

The central hypothesis of the behavioral life cycle theory is that individuals have varying degrees of self-control difficulties associated with either myopia or weakness-of-will. Myopia and weakness-of-will interfere with the ability to defer gratification in a rational manner. For example, a self-control difficulty may lead people to save less than necessary to finance their rationally determined needs during retirement. People are generally aware of self-control difficulties and take steps to avoid them. For example, the rule of "don't dip into capital" allows consumption from current income, including dividends, but not from past savings that are framed as capital.

Individuals who wish to limit consumption from their portfolios can choose stocks with low dividends. Those who wish to consume more can select stocks with higher dividends. Retirees, who have no regular labor income, are most likely to favor stocks with high dividends. This helps them consume from their wealth without overconsuming. Consequently, dividend yield in the portfolios of individuals can be expected to be higher in the late parts of the life cycle than in the early parts.[10]

We suggest that call premiums play a role that augments the role of dividends. Call premiums that are framed as income allow levels of consumption beyond those feasible with dividends alone and without violating the rule of "don't dip into capital." Our suggestion is consistent with the observation of the CBOE that users of covered calls are motivated by the desire to increase income. Our suggestion is also consistent with the findings in the Louis Harris Survey [23] that older people use covered calls more frequently than younger people, and the RIA [34] suggestion that investors use covered calls to augment income from dividends so as to earn annual returns of 11% to 19%: regular dividends of four percent to nine percent and premium 'dividends' of seven percent to ten percent.

A. Hypotheses

We offer three additional hypotheses:

(*i*) There is a positive correlation between the use of covered calls and the rate of consumption from investors' portfolios.

(*ii*) There is a positive correlation between the use of covered calls and the dividend yields of investors' portfolios.

(*iii*) Covered calls are more likely to be constructed with dividend-paying stocks than with stocks paying no dividends.

V. Security Design Beyond Covered Calls

We have used covered calls as a vehicle for the exposition of three elements of a behavioral framework for the design and marketing of financial products. But the importance of the behavioral framework products extends much beyond covered calls. We mention here a few examples.

We have already noted that dividend-paying stocks are designed to appeal to a clientele of investors who separate cash flows into downside protected dividends and upside

[9]The preference for downside protected income mental accounts is also reflected in the habit formation models. See, for example, Pollak [34] and Constantinides [9].

[10]The preceding comments can be incorporated formally into the model through the prospect theory value function. This involves the addition of other variables to reflect the alternatives for achieving self-control. We forego the formal development here, and refer the reader to Shefrin and Thaler [41].

potential capital gains. Moreover, we argue that the feature that embeds "information content" into dividend changes is the preference for dividends of this clientele. Specifically, dividends have information content because managers set dividend policy with the knowledge that a cut in dividends will anger investors who rely on dividends as a downside protected account. Thus, managers cut dividends only as a last resort, when losses have occurred and are likely to continue (see DeAngelo, DeAngelo, and Skinner [11]). From this perspective, the signalling role of dividends is seen as a by-product of security design. This perspective is quite different from the common perspective in which dividends are designed primarily as a signalling device or the perspective where dividend payments are designed to discipline managers by forcing them to raise money in capital markets.

British premium bonds are another example of a security where cash flows are separated into "downside protected" and "upside potential" mental accounts. In this case, the bond's principal is in the downside protected account and a lottery is in the upside potential account. As Lohr [22] describes:

> The premium bonds pay no interest, but randomly selected bondholders receive monthly prizes ranging from £50 to £250,000, or about $77.50 to $387,500. "The word 'lottery' would never pass from my lips," Mr. Dodsworth explained. [22, p. C1]

Lee Cole, the Options Marketing Manager at Merrill Lynch is not likely to be surprised by the popularity of premium bonds. He observed in 1983 that many investors who held large balances in the Merrill Lynch Cash Management Account (CMA), a money market fund, used the CMA interest to buy call options. Notably, he designed LYONs as a security which would reflect the downside protection of a money market fund with the upside potential of options. LYONs are zero-coupon, convertible, callable and putable bonds. McConnell and Schwartz's [26] description of the origin of LYONs illustrates the importance of designing securities with knowledge of the mental accounting characteristics of the target clientele:

> It takes two sides to make a market. And while Cole had identified what he perceived to be a demand by investors, that demand could not be satisfied by every issuer. The ideal issuer would have to satisfy at least two, and perhaps three, criteria: First, because of the put feature and the downside protection desired by investors, issuers would have to have an investment-grade bond rating — and the higher the rating the better. At the same time, however, the issuer's equity would have to exhibit substantial volatility, otherwise the security would not provide the "play" desired by option investors. These two features were critical. Because the initial target market for the security was to be individuals, a third highly desirable characteristic of the issuer would be broad name recognition. [26, p. 42]

Investors are willing to pay large amounts of money for securities designed to their liking. The underwriter's spread for LYONs is about 2.5% and Merrill Lynch has earned some $248 million since 1985 from the sale of LYONs.

We focus in this paper on four elements of a behavioral framework for the design of financial products: prospect theory, hedonic framing, behavioral life cycle theory, and cognitive errors. The case of LYONs provides an illustration of the role of a fourth element, cognitive errors, and the process by which financial products move through their life cycle from "hot" to "cold." Interest rates have declined over the last year, and LYONs are not as hot now as they used to be. Constance Mitchell [30] wrote in the March 8, 1993 issue of the *Wall Street Journal* that:

> A few years ago, LYONs were one of Wall Street's hottest products. Brokerage firms, led by Merrill Lynch & Co., heavily promoted the hybrid securities — part stock, part bond — to small investors. And even many professionals viewed LYONs, or liquid yield option notes, as a relatively safe way to bet on the future of such promising stocks as Walt Disney Co. and Berkshire Hathaway Co. . . . But today, the market for new LYON issues is shrinking, while issuers are snatching existing LYONs away from investors at a furious clip. . . . With interest rates tumbling, many LYONs owners are getting a rude shock as they realize that LYONs can be "called," or redeemed early, much faster than most bonds. That's just what LYONs issuers are doing; these companies know they can replace their LYONs today by selling ordinary bonds that pay lower interest rates. . . .
>
> Mr. Saretsky says he was stunned to learn last week that his LYON not only is being called, but that he stands to lose $640 on the investment because the price he paid is substantially higher than the price Disney is obligated to pay when it calls its LYONs. Mr. Saretsky paid $5,478 for the LYON; Disney will buy it back for only $4,835.
>
> "I'm furious," said Mr. Saretsky. PaineWebber, which sold him the Disney LYON, declined to comment. [30, p. C1]

It is a common observation that many investors overweight recent performance as they evaluate financial products. Flocking to mutual funds that have done well during the previous year is one example. The tendency to overweight recent performance is a manifestation of represen-

tativeness, a class of cognitive errors. Some of the investors who bought LYONs overestimated the probability that LYONs would not be called, perhaps because LYONs were not called in the recent past. These investors were disappointed when interest rates declined and their LYONs were called. However, once burned, investors tend to be shy for a while. LYONs are no longer hot. Similarly, covered calls were hot when stock prices were flat. But covered calls cooled when increases in stock prices turned Gross's "unknown, unknowable profit possibilities" into known, but foregone, profits.

The willingness of investors to pay for security features they like is also illustrated by the design of money market fund shares to have a constant price of one dollar. By usual mark-to-market accounting, the value of a money market fund portfolio goes up and down as interest rates change, resulting in capital gains or losses. However, after intense lobbying by representatives of money market funds, the SEC allowed them to use amortization accounting such that the value of money market shares remains constant even when interest rates change. We suggest that the request of money market funds for an accounting procedure that keeps share price constant reflects the preferences of investors for money market accounts as "downside protected" funds, funds where no loss can be sustained.[11] Investors pay dearly for that preference. Lyon [24] notes that the use of amortization accounting in place of mark-to-market accounting creates arbitrage opportunities. He estimates that arbitrage profits lowered returns to money market investors by ten basis points per year. That amounts to a loss of $200 million based on the $200 billion invested in money market funds in 1982.[12]

It might well be that many investors who are attracted to premium bonds, LYONs and money market funds are noise traders. But noise traders should not be dismissed as unimportant. Elsewhere (Shefrin and Statman [40]), we show that noise traders are co-dominant with information traders in markets where prices are efficient. If so, it makes sense for designers of financial products to consider the preferences of noise traders. Moreover, not all noise traders are "individual" investors. McConnell and Schwartz [26] note that the proportion of LYONs bought by institutional investors was approximately equal to the proportion bought by individual investors. They suggest that institutional investors like LYONs because of their portfolio insurance property. That explanation is sound, but probably not consistent with standard finance. Benninga and Blume [3] conclude that the demand for portfolio insurance is a puzzle within standard finance.

VI. Conclusion

Standard financial theory is built on the premise that all investors are indifferent among financial products that have identical cash flows. However, we suggest that some investors prefer one financial product over another because of the way identical cash flows are framed. Our model is a behavioral one and in this paper we use four of its elements: prospect theory, hedonic framing, behavioral life cycle theory, and cognitive errors. We use covered calls as a vehicle for exposition and suggest that covered calls are designed for two overlapping clienteles: prospect theory investors who are highly risk-averse in gains and highly risk-seeking in losses, and behavioral life cycle investors who are consuming from their portfolios. We also discuss briefly the features and clienteles of other securities such as premium bonds, LYONs and money market funds. Finally, we want to emphasize that a behavioral framework can offer insights into many other features of security design, such as the design of stocks to have prices within "a trading range," the designation of mutual funds as "growth" and "income" funds and the design of lotteries to have particular combinations of prizes. We will return to these in future work.

[11] Mark-to-market accounting is likely to present a dilemma to investors who use money market funds as equivalents of checking accounts for current living expenses. Consider the case where interest rates increase and the value of the shares falls below the purchase price. An investor faces a choice between realizing a loss by redeeming shares, and postponing consumption. The reluctance to realize losses (see Shefrin and Statman [37]) makes mark-to-market accounts less than ideal for a consumption account. Amortization accounting alleviates the problem since it eliminates capital gains or losses.

[12] We describe in Shefrin and Statman [39] the equilibrium consequences of the interaction between standard mean-variance investors and investors who frame assets into downside protected and upside potential mental accounts. We describe in Shefrin and Statman [39] and Statman [42] the portfolio implications of framing assets into mental accounts.

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