January 19, 2012

Overwriting Observations: a 16-year study

Options Research

Outperforming in a range-bound market

Portfolio manager interest in overwriting has increased dramatically over the past year as equities were range-bound and economic growth expectations declined. We see overwriting as an essential tool for alpha generation as it allows investors to convert the upside exposure of stocks into current yield, reducing the reliance on rising stock prices to generate returns. Our study of 100,000 trades on 800 stocks over 16 years shows that overwriting added to returns and lowered the risk of diversified portfolios. In this report, we discuss historical returns, stock selection and the basics of overwriting.

Overwriting S&P stocks added 360 bp annually 1996-2011

We find that passive overwriting added 360 bp annually to an equally weighted S&P 500 portfolio since 1996 while reducing the standard deviation of monthly returns by 20%. Overwriting boosted the sharp ratio of the stock only portfolio to 0.70 from 0.47.

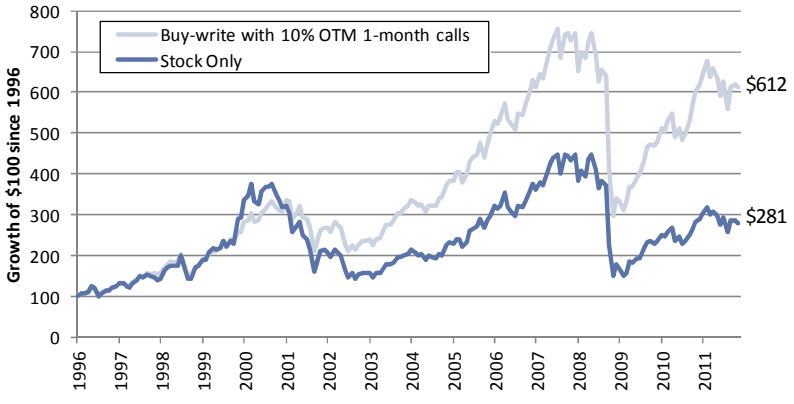
Stock Selection: Seven factors that drove outperformance

We discuss seven essential factors portfolio managers should consider when choosing stocks and strikes to overwrite. "Optimized overwriting," using just the first four factors added 539 bp annually since 1996.

Basics of overwriting: investment process, benefits and risks

We include a 15 page primer on the benefits and risks of overwriting as well as the step-by-step guide to our overwriting investment process.

"Optimized Overwriting" with our four factors added 539 bp annually
estimate of annual performance of overwriting 1996-2011



Goldman Sachs Research estimates.

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All pricing is as of the close on January 18, 2012.

Portfolio manager summary

Portfolio manager interest in overwriting has increased dramatically over the past year as equities were range-bound in 2011 and long-term economic growth expectations declined. We see overwriting as an essential tool for portfolio managers as it allows investors to convert the upside exposure of stocks they own into current yield, reducing the reliance on a rising prices to generate returns. Overwriting also reduces the volatility of their portfolio, important for managers focused on risk-adjusted returns. Our study of 100,000 monthly overwriting trades over the past 16 years shows that overwriting has increased returns and lowered risk of diversified stock portfolios.

In this report, we analyze (1) passive returns from overwriting in an S&P 500 portfolio over the past 16 years, (2) seven factors that influenced overwriting performance, and (3) the basic motivations, benefits and risks of overwriting in an equity portfolio.

(1) Passive overwriting returns (pp 5-14)

Higher returns: Investors collected 1.9% per month on average for selling upside beyond +10% over 1 month and outperformed stock ownership alone by 360 bp annually for S&P 500 stocks over the past 16 years. In this report we quantify the returns and the volatility of returns for passive overwriting programs at various strikes for S&P 500, NDX 100, R1000 Value and R1000 Growth universes of single stocks.

Lower risk: Overwriting lowered the standard deviation of returns to 19.2% from 23.2% for S&P 500 stocks over the past 16 years. For investors concerned with risk-adjusted returns, the volatility reduction can add benefits beyond the additional income generated.

Outperformance in down markets: Overwriting generated its greatest outperformance in months where equity declined on average (139 bp of outperformance in 63 down months).

Liquidity has opened the strategy to a larger number of investors: A 600%+ increase in open interest as a percent of market cap and 50% decline in transaction costs over the past 16 years have contributed to the increasing popularity of overwriting strategies.

(2) Stock/Strike selection: Seven factors drove overwriting performance (pp 15-19)

We analyzed overwriting strategies for different groups of stocks based on several fundamental factors. Seven conclusions emerge:

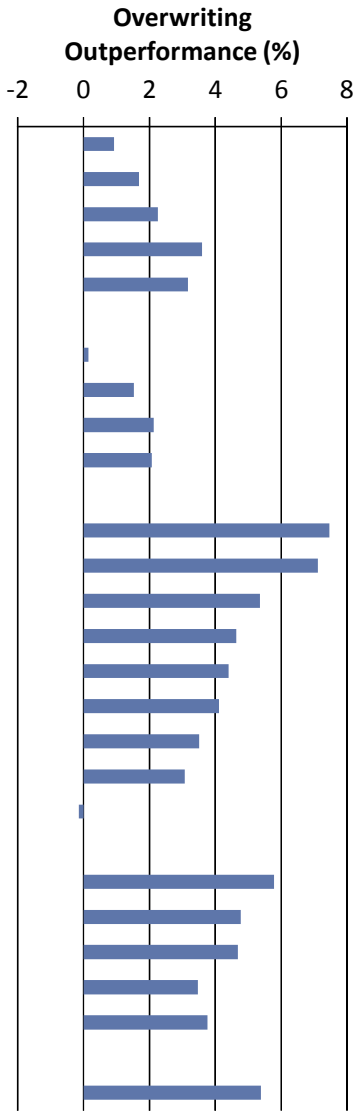
1. Strike price: Overwrite with out-of-the-money options
2. Earnings events: Avoid overwriting in months with earnings events
3. Market Cap: Large-cap stocks make better overwrites than small-cap
4. Implied volatility: Overwrite stocks with high implied volatility
5. Recent performance: Avoid overwriting stocks that have strong momentum
6. Dividends: Moderate dividend paying stocks make better overwrites
7. Sector: Overwriting in defensive sectors outperformed overwriting in cyclical sectors

(3) Basics of Overwriting: Motivations, Benefits and Risks (pp 20-34)

Options should be viewed as a component of the stock exposure and not as an add-on investment. The third part of this report is aimed at helping investors integrate overwriting strategies into equity investing. Overwriting can be used to alter the alpha and/or beta of a portfolio. We focus primarily on stock selection as the "alpha" portion of the overwriting program. We discuss other characteristics of an overwriting program (strike, position size, term) which are generally associated with the "beta" portion of the program. We discuss a step-by-step method for implementing systematically overwriting.

Exhibit 1: Overwriting broadly outperformed over the past 16 years; we highlight overwriting outperformance by strike, sector and fundamental factor
1996-2011 monthly single stock overwriting of stocks that fit the criteria indicated; monthly averages are across all stocks in all months

	Annualized		Monthly data			Outperformance vs Stock
	Compound Return (%)	StdDev	Sharpe Ratio	Avg. Prem (%)	% Months Exercised	Compound Return (%) - Compound Return (%)
All S&P 500 stocks: Specified Moneyness, 1 month calls, all months						
0% OTM	9.4	14.0	0.72	5.0	54%	0.93
2% OTM	10.1	15.2	0.72	4.1	47%	1.68
5% OTM	10.7	17.1	0.69	2.9	34%	2.25
10% OTM	**12.0**	**19.2**	**0.70**	**1.9**	**22%**	**3.60**
15% OTM	11.6	20.5	0.65	1.3	14%	3.17
All S&P 500 stocks: Specified Delta, 1 month calls, all months						
50Delta	8.6	14.8	0.64	4.5	51%	0.15
40Delta	9.9	16.9	0.65	3.1	39%	1.53
30Delta	**10.6**	**19.1**	**0.63**	**2.0**	**27%**	**2.13**
20Delta	10.5	20.5	0.60	1.4	19%	2.07
Overwrite with 10% OTM, 1 month call in non-earnings months						
Defensives (HC, Staples, Utes, Telecom)	**11.7**	**17.6**	**0.73**	**1.8**	**18%**	**7.47**
HealthCare	**11.8**	**20.1**	**0.66**	**1.9**	**18%**	**7.12**
Discretionary	**7.7**	**23.8**	**0.44**	**1.9**	**21%**	**5.35**
Financials	7.7	25.0	0.43	2.0	20%	4.65
Energy	9.2	31.6	0.45	2.2	26%	4.41
Staples	13.0	18.7	0.75	1.3	17%	4.12
Industrials	9.6	21.7	0.54	1.6	21%	3.51
InfoTech	16.5	26.1	0.72	2.8	25%	3.08
Materials	9.2	25.3	0.49	1.9	21%	-0.15
Overwrite with 10% OTM, 1 month call in non-earnings months						
Underperformer vs SPX by >3%	**12.8**	**23.3**	**0.64**	**2.4**	**22%**	**5.79**
Market Cap: Above median	**10.5**	**19.0**	**0.63**	**1.7**	**19%**	**4.78**
S&P stocks in non-earnings months	**10.4**	**20.0**	**0.60**	**1.8**	**21%**	**4.69**
Implied volatility: Above median	**15.5**	**25.0**	**0.71**	**3.0**	**26%**	**3.48**
Dividend yield of 1-4%	**9.4**	**19.3**	**0.57**	**1.6**	**20%**	**3.76**
Overwrite with 10% OTM, 1 month call in non-earnings months, above avg mkt cap, above average implied vol						
Optimized Overwriting	**12.1**	**23.4**	**0.62**	**2.3**	**23%**	**5.39**

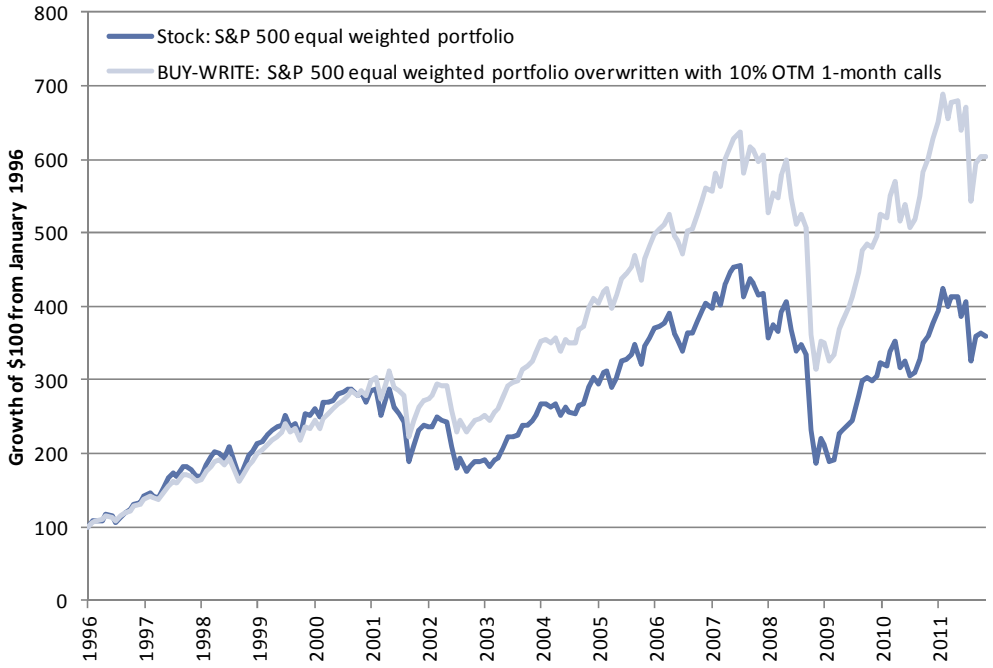


Source: Goldman Sachs Research estimates.

Passive overwriting returns over the past 16 years

We estimate that selling 10% out-of-the-money 1-month covered calls on stocks with liquid options in the S&P 500 generated a compound annual return of 12% over the past 16 years, 360 bp greater than owning the stocks alone. By collecting an average monthly premium of 1.9% we estimate investors outperformed in nearly two-thirds of months.

Exhibit 2: Selling covered calls on S&P 500 stocks outperformed over the past 16 years
Growth of $100 invested in a monthly rebalanced equal weighted portfolio of stocks alone or stocks overwritten with the indicated calls



Source: Goldman Sachs Research estimates.

Passive overwriting strategies have returned an annualized +8.6 to +12.0% over the past 16 years, depending on the strikes chosen. We estimate a compound annual return of 8.6% to 12.0% over the past 15 years for investors that held stock and overwrote all stocks with liquid options in the S&P 500 with 1-month calls. We explored strategies which sold at-the-money options to collect a high premium as well as out-of-the-money options to collect a low premium. In Exhibit 2, we show the results if call strikes are chosen by their percentage above the current stock price (0%, 2%, 5%, 10% and 15% out-of-the-money) or by their sensitivity to stock price moves (50, 40, 30, and 20-delta calls). Within these simple covered call selling studies, 50-delta call targeting achieved the lowest compound annual return of 8.6% while 10% out-of-the-money call targeting achieved the highest return at 12.0% (see column 2 of exhibit 2).

Overwriting has outperformed long stock by 93 to 360 basis points annually depending on the strikes chosen. We estimate these passive overwriting strategies outperformed an equivalent stock only basket by 93 to 360 basis points annually over the past 16 years. High options premiums and moderate equity returns benefited overwriters over the past 16 years. On average, investors collected 1.9% for 10% OTM calls that were only worth 1.7% on average at the end of the month. These additional 20 basis points each

month added up to 360 basis points of annualized outperformance over the 16 year period. While strike selection was important for the size of the outperformance, we found that passive overwriting increased returns for all strikes we tested with the S&P 500 universe.

Overwriting boosted Sharpe Ratios to 0.72 from 0.47. The Sharpe ratio for the portfolio of equal weighted S&P 500 stocks over the period was 0.47 (annualized mean monthly return / standard deviation of monthly returns). We estimate Sharpe ratios of 0.65 to 0.72 for a portfolio of the same stocks overwritten with out-of-the-money calls depending on strikes (see column 4 Exhibit 2). The Sharpe ratio was generally higher for selling close to the money options as these strategies allowed investors to collect the largest cushion (call option premium) in exchange for giving up a greater amount of upside. While much of the reduction in portfolio volatility comes from the foregone upside in positive months, the cushion provided by the collected option premium boosts performance in down months.

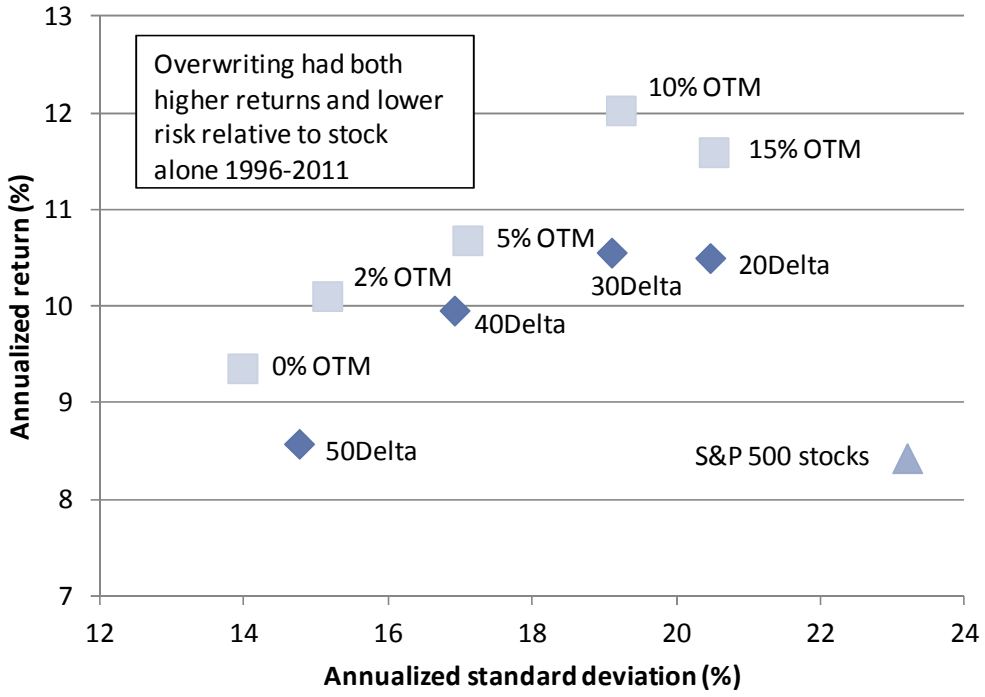
Premiums collected have averaged 22% per year for selling 10% OTM calls. Selling 10% out-of-the-money calls on all the stocks with liquid options in the S&P 500 yielded an average of 1.9% per month (see column "Avg. Prem" in Exhibit below), rolling up to 22.0% annually, over the past 16 years. Investors have had the potential to outperform in the average month by 190 basis points if all stocks remained below their 10% call strike. We estimate current monthly premiums are 1.4% on average, or a 16.8% annual run-rate.

Exhibit 3: Covered call writing strategies outperformed over the past 16 years for stocks in the S&P 500
average returns of a 1 month strategy, equal weight for all stocks with liquid options; same stocks in each portfolio

	Annualized		Monthly Return (%)						Option Statistics				Outperformance vs Stock
	Compound Return (%)	StdDev	Sharpe Ratio	Mean	Median	Min	Max	StdDev	Avg. % OTM	Avg. Prem (%)	% Months Exercised	Avg Bid-Mid Spread (%)	Compound Return (%) - Compound Return (%)
S&P 500 Stocks	8.4	23.2	0.47	0.91	1.68	-31	18	6.7					
Strategy: Specified Moneyness (1 month calls)													
0% OTM	9.4	14.0	0.72	0.83	1.98	-25	9	4.0	0.0	5.0	54%	3.5	0.93
2% OTM	10.1	15.2	0.72	0.91	2.09	-26	10	4.4	1.9	4.1	47%	4.0	1.68
5% OTM	10.7	17.1	0.69	0.98	2.28	-27	11	4.9	5.0	2.9	34%	5.4	2.25
10% OTM	12.0	19.2	0.70	1.11	2.21	-29	12	5.6	8.9	1.9	22%	8.0	3.60
15% OTM	11.6	20.5	0.65	1.10	2.29	-30	13	5.9	13.1	1.3	14%	21.3	3.17
Strategy: Specified Delta (1 month calls)													
50Delta	8.6	14.8	0.64	0.78	1.92	-26	11	4.3	1.0	4.5	51%	3.7	0.15
40Delta	9.9	16.9	0.65	0.92	2.17	-27	13	4.9	4.2	3.1	39%	4.6	1.53
30Delta	10.6	19.1	0.63	1.00	2.23	-29	15	5.5	7.9	2.0	27%	6.5	2.13
20Delta	10.5	20.5	0.60	1.02	2.18	-30	16	5.9	10.8	1.4	19%	8.5	2.07

Source: Goldman Sachs Research estimates.

Exhibit 4: Risk/Reward from overwriting S&P 500 stocks has been favorable
Compound annual return 1996-2011 of equal weighted S&P 500 stocks with liquid options



Source: Goldman Sachs Research estimates.

Overwriting by benchmark: S&P500, NDX100, R1 Value, R1 Growth

We find a varying degree of overwriting outperformance for stocks in the S&P 500, NDX 100, R1000 Value and R1000 Growth. Based on our analysis of the liquidity over the past 16 years in the options market, about 800 companies had liquid options at some point during that period. We used the monthly constituents of each of the indexes to determine the universe of stocks each month to consider in each portfolio (equal weighted). We find that the seven factors of overwriting we outline on pp.14-18 can largely explain the varied performance of overwriting the stocks in these indexes.

NASDAQ 100 and S&P 500 both showed the strongest outperformance for overwriting. We find that overwriting large-cap stocks outperforms small-cap stocks (page 14-15).The large-cap nature of each of these indexes likely contributed to their outperformance. Overwriting with 10% OTM calls would have allowed NASDAQ 100 investors to outperform by 531 basis points annually (1999-2011). Not only did overwriting NASDAQ stocks yield the highest average monthly premium (2.5%), but NASDAQ 100 stocks realized the lowest compound annual return (+3.8%). The NDX results below are not directly comparable as they include only the 1999-2011 time period, but even when compared to like-for-like periods they showed outperformance over overwriting other indexes.

Overwriting in Style: Value vs. Growth. We divided the universe based on the members of the Russell 1000 Growth and Russell 1000 Value indexes to explore the overwriting returns for each style. We found that overwriting stocks in the R1000 Value index added 392 bp to the CAGR of the portfolio while overwriting R1000 Growth names added 379 bp

to the CAGR of the portfolio. Investors collected higher premiums on average for overwriting stocks in the growth universe, but on average growth stocks tended to rise more. Interestingly, we found that avoiding earnings dates was much more important for Growth names than Value names. Overwriting Growth names in earnings months actually detracted 142 bp from the CAGR of the portfolio (not shown).

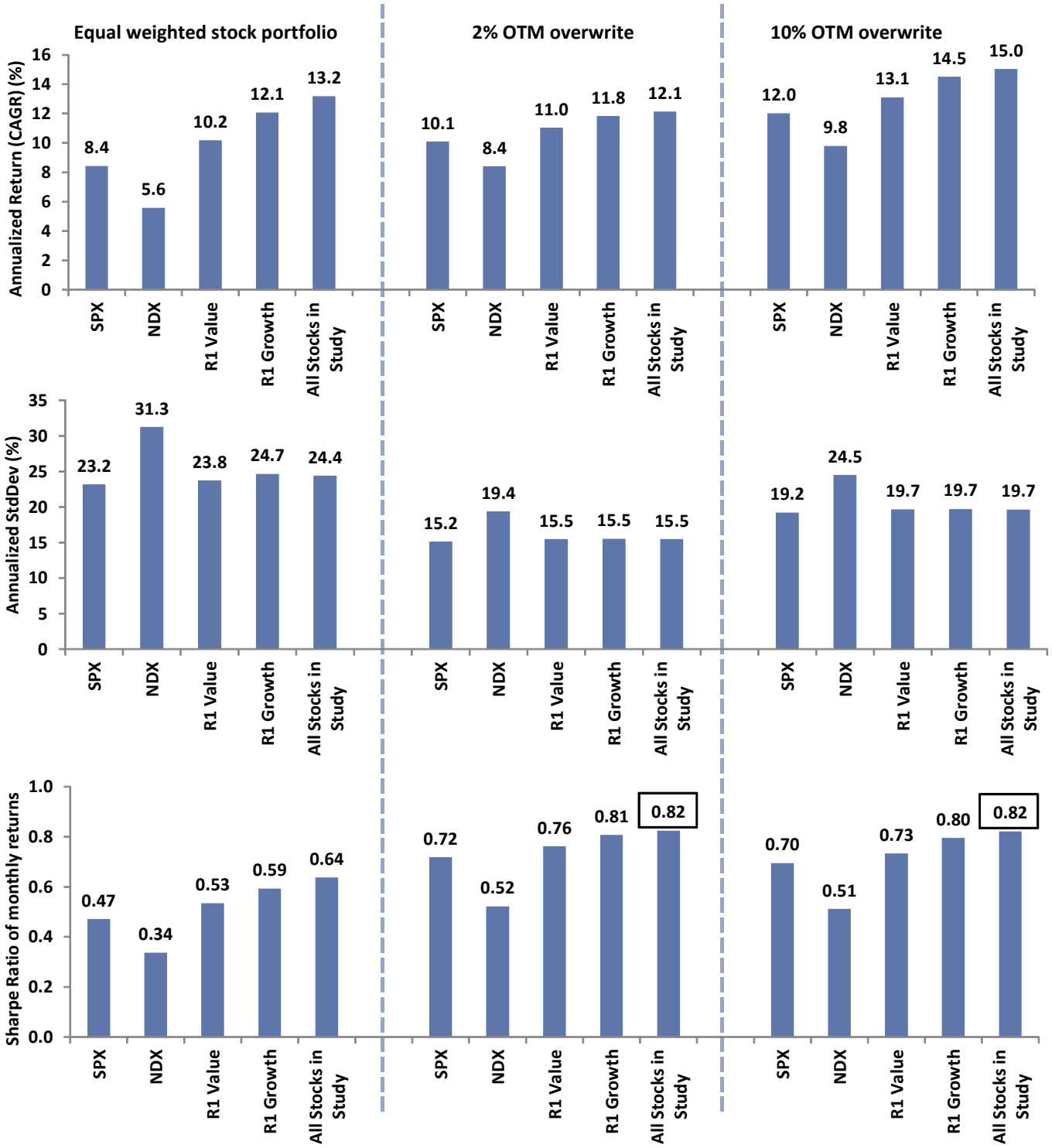
For the analysis below in Exhibit 5, we use only OTM options in non-earnings months. Later in our study (page 16), we discuss why attention to earnings events is generally an important factor in broadly determining overwriting outperformance.

Exhibit 5: Overwriting with OTM calls in non-earnings months added value for a variety of benchmarks
Portfolios of stock vs. stock + 1 month call sales in non-earnings months from 1996-2011

	Annualized		Monthly Return (%)						Option Statistics				Outperformance vs Stock
	Compound Return (%)	StdDev	Sharpe Ratio	Mean	Median	Min	Max	StdDev	Avg. % OTM	Avg. Prem (%)	% Months Exercised	Avg Bid-Mid Spread (%)	Compound Return (%) - Compound Return (%)
All stocks in study													
10% OTM	13.2	20.6	0.71	1.2	2.6	-31	12	5.9	9.1	2.1	23%	7.8	3.10
20-Delta	11.8	22.1	0.62	1.2	2.4	-32	17	6.4	11.5	1.5	19%	8.5	1.71
S&P 500 index members													
10% OTM	10.4	20.0	0.60	1.0	2.1	-30	12	5.8	8.9	1.8	21%	8.1	4.69
20-Delta	8.3	21.2	0.49	0.9	2.0	-31	16	6.1	10.5	1.3	19%	8.5	2.67
NDX 100 index members													
10% OTM	9.1	25.1	0.48	1.0	2.6	-24	23	7.2	9.5	2.5	22%	6.8	5.31
20-Delta	7.4	28.0	0.40	0.9	2.3	-26	22	8.1	9.5	2.5	22%	6.8	3.61
Russell 1000 Value index members													
10% OTM	10.2	20.8	0.58	1.0	2.3	-31	13	6.0	8.7	1.8	21%	8.3	3.92
20-Delta	8.3	21.8	0.48	0.9	2.2	-32	16	6.3	10.3	1.4	19%	8.7	2.00
Russell 1000 Growth index members													
10% OTM	12.2	20.8	0.67	1.2	2.4	-31	12	6.0	9.1	2.1	22%	7.8	3.79
20-Delta	10.9	22.5	0.58	1.1	2.3	-32	16	6.5	11.6	1.5	19%	8.5	2.51

*Source: Goldman Sachs Research estimates; *NDX 100 results reflect 1999 to 2011 due to the availability of index constituents.*

Exhibit 6: Risk-return comparison of overwriting on various universes of stocks
Annualized return (CAGR), standard deviation and Sharpe ratio for stock only, 2% OTM overwriting and 10% overwriting on single stocks in the S&P 500, NDX 100, R1000 Value, R1000 Growth and "All stocks" in our study.

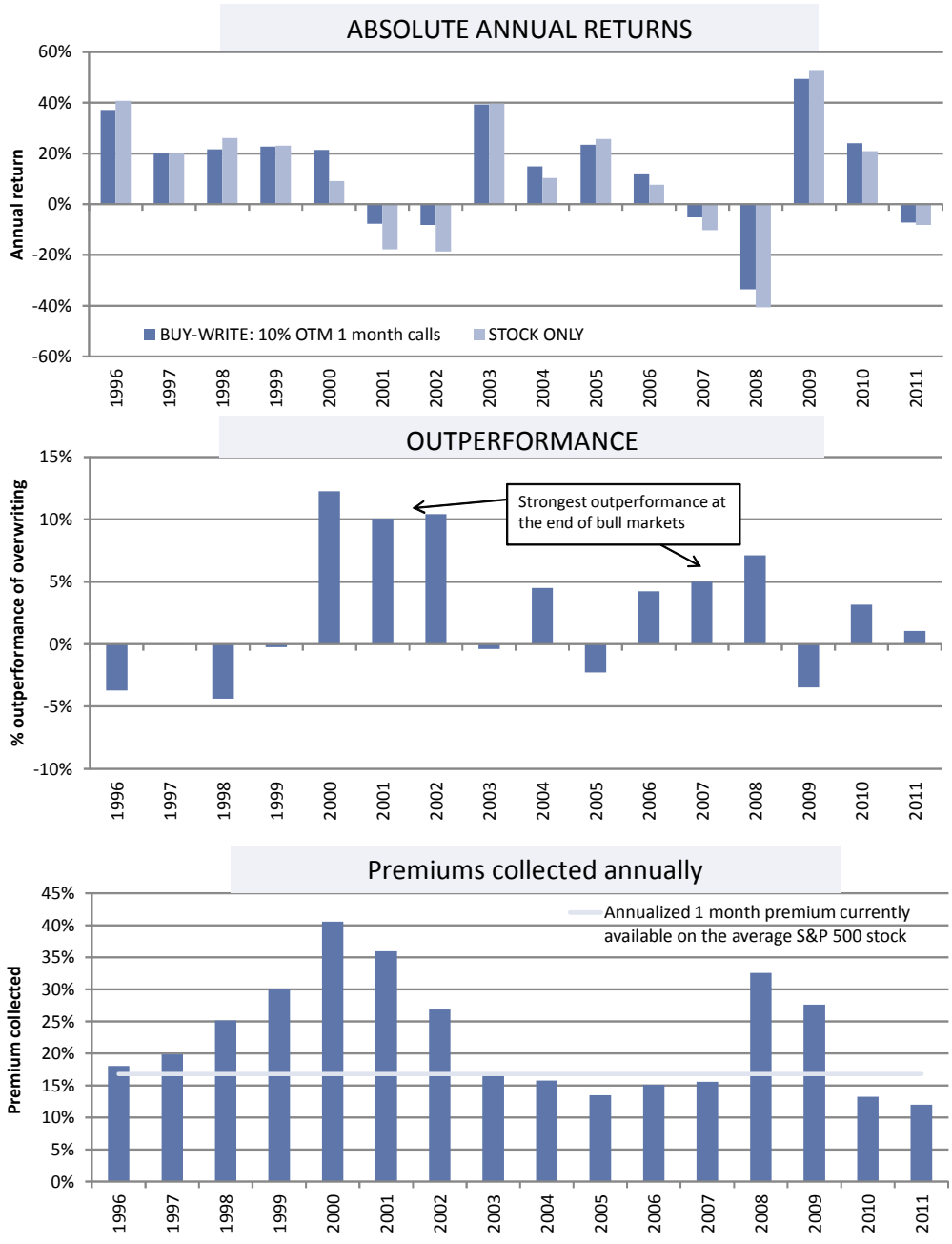


Source: Goldman Sachs Research estimates.

Overwriting performance by market environment

Market environments have varied greatly over the past 16 years, providing rich perspective on the risk/reward for overwriting. Overwriting outperformed in 10 of the 16 years, including the past 12 months. Overwriting outperformance is directly determined by premiums collected at the beginning of the period and subsequent stock returns over the period. Strong equity performance and moderate options prices in the late 1990s led to overwriting underperformance that gave way to strong outperformance in the 2000s. Due to moderate equity performance and high options prices, 2000-2002 and 2006-2008 were the strongest periods of overwriting outperformance over the past 16 years.

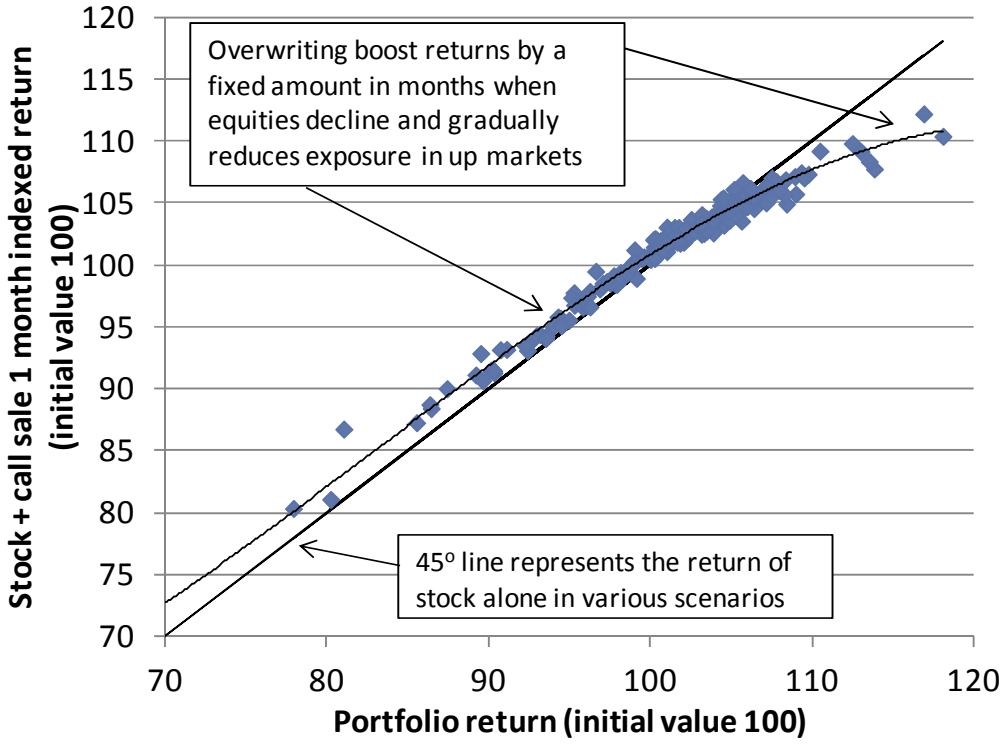
Exhibit 7: Overwriting had positive performance in 11 of the past 16 years
Indexed performance of stock only and stock overwritten with 10% OTM 1 month calls



Source: Goldman Sachs Research estimates; years are calculated from January expiry to January expiry.

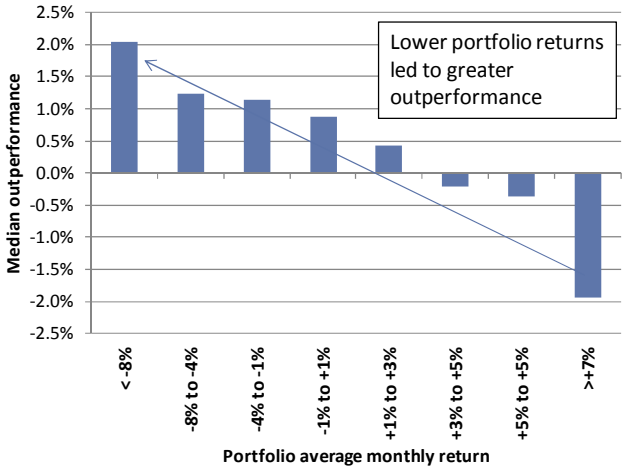
Outperformance of overwriting strategies is a function of option premiums and stock returns: Overwriting adds value to a portfolio by monetizing the premium in the options market in exchange for agreeing to forego upside participation beyond a certain strike price. Over the past 16 years, the options market has overestimated the upside potential for the market on average, leading to outperformance of those investors that chose to sell this upside ahead of time. During periods of weak to moderately positive stock price performance, overwriters tend to outperform. During periods of strong equity performance, overwriters tend to underperform. Ultimately, the decision of whether to overwrite or not, comes down to the assessment of whether the call premiums collected are high enough for the risk of a short term up-move in share prices. Exhibits 8-10 show how overwriting performance has related to stock performance and premium collected on an annual monthly basis.

Exhibit 8: Overwriting portfolio returns are highly correlated with stock portfolio returns
Monthly stock returns vs. overwriting returns 1996 to 2011



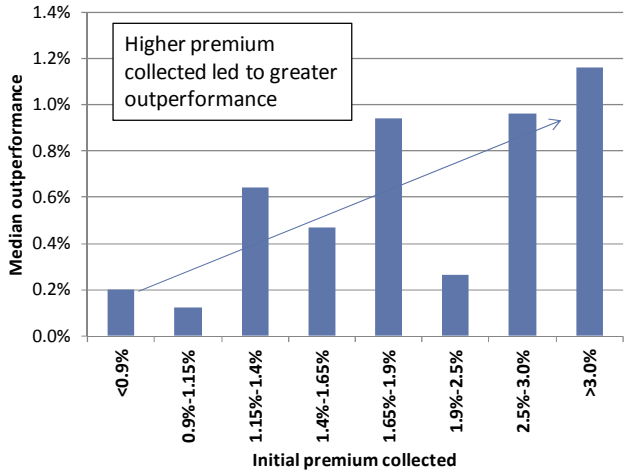
Source: Goldman Sachs Research estimates.

Exhibit 9: Overwriting return outperforms stock in flat to down markets
Monthly stock returns vs. overwriting returns 1996 to 2011



Source: Goldman Sachs Research estimates.

Exhibit 10: Higher premiums drive stronger overwriting outperformance
Median overwriting outperformance relative to initial call premium collected for 1-month option



Source: Goldman Sachs Research estimates.

Methodology in brief

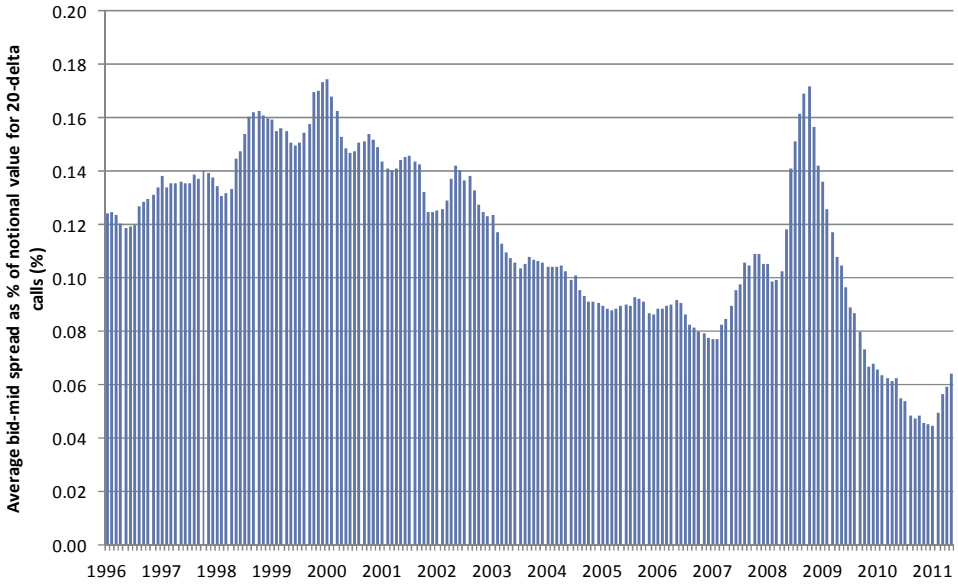
On expiration day each month, we determined the list of stocks that have liquid options based on a bid-ask spread restriction. We simulated buying those stocks with liquid 1-month options and selling a listed call option at the bid price listed on the close (i.e. a buy-write). On expiration, approximately 1 month later, we calculated the intrinsic value of the combined position to determine the return over the period. We assumed that option premiums are held in cash without interest over the period. We assume that no stock is called away prior to expiration. For each strategy, we constructed a time series based on the monthly returns of a portfolio of stocks (or the specific overwriting strategy) and analyzed the compound annual growth of the monthly returns over the full period. We used daily listed options data from OptionMetrics with the goal of achieving an estimate of an overwriting portfolio that could have actually been executed in the market. We believe the use of daily closing bid prices for trade entry is conservative due to the tendency for bid-offer spreads to widen at the close. We assessed the liquidity of the options for each stock in each month independently and exclude those stocks where the bid-mid spread on the option at trade initiation was greater than 15% under the assumption that the wide spread is indicative of low liquidity or prohibitively high trading costs. While this reduces the number of datapoints over the 16 years of the study, we believe it increases the utility of the results. See the appendix for further methodology details.

Transaction costs for options have fallen as liquidity has grown

Over the past three years, there has been a dramatic decline in transaction costs for overwriters. Paying the bid-mid spread was a 14 bp drag on an overwriting portfolio from 1996-2002, but dropped to only a 5 bp drag in 2011. This reduction in drag is driven by lower option premiums for a given strike, as well as sharply tighter spreads. The bid-mid spread began to decline rapidly as a percentage of option premium in 2009.

We view these transaction costs as conservative. The daily close data that underpins our analysis likely overstates transaction costs through time given the tendency for bid-offer spreads to be wider at the close than in the middle of the day. In that context, we view our results (which include these spreads, but not commissions) as conservative.

Exhibit 11: Monthly transaction costs for overwriting S&P 500 stocks over the past 16 years
Trailing 6 month average bid-mid spread as a percent of the stock price on all S&P 500 stocks with liquid options



Source: Goldman Sachs Research estimates.

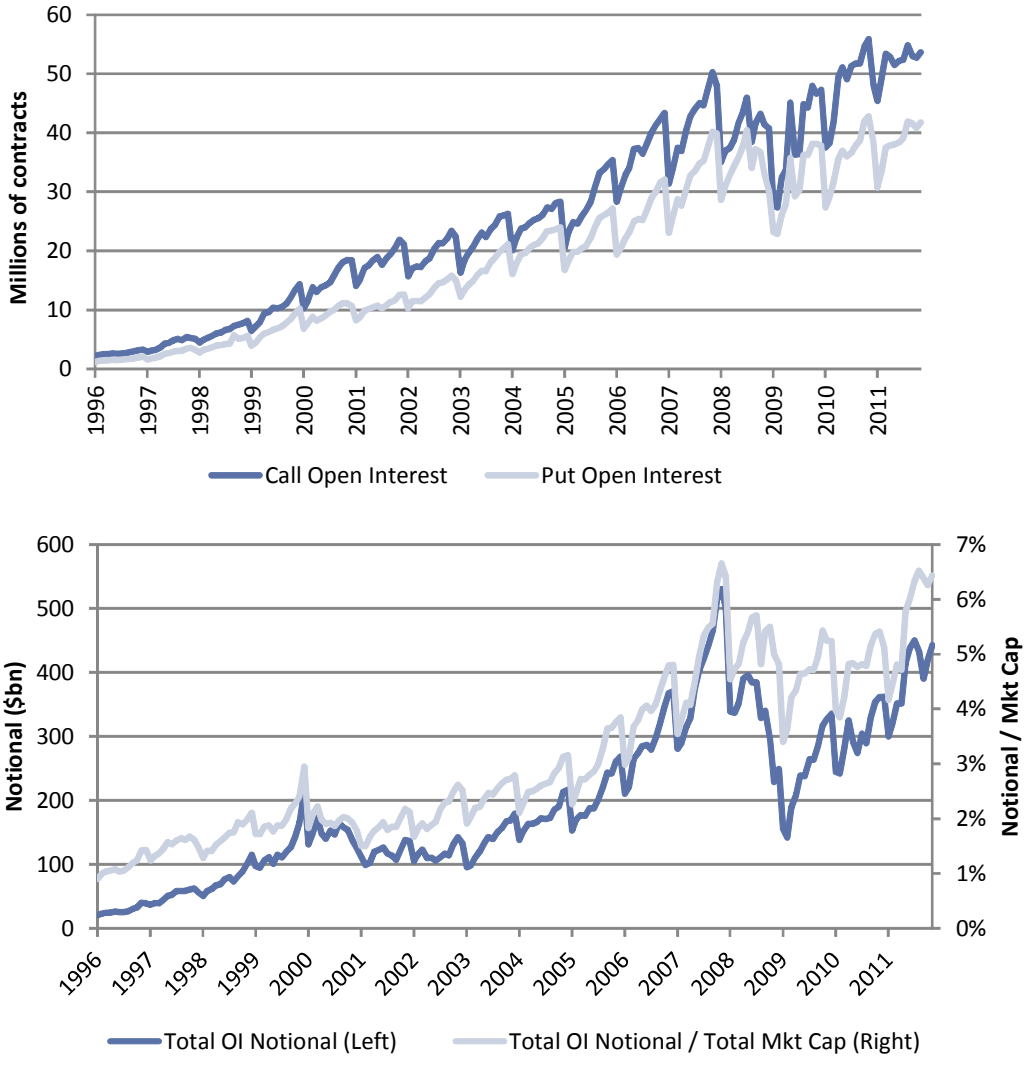
Note: If we included all stocks in our study, regardless of bid-mid spread, the transaction costs trends would be even more dramatic than the chart above. In our study, we screen out all observations where the bid-to-mid spread is greater than 15% of the option premium. While most mid and large-cap stocks meet this criteria today, there were fewer stocks that met this criteria in 1996. This initial filter likely depresses any assessment of transaction costs in the early years of this study.

Options liquidity has grown at least 6 fold since 1996

Options liquidity has grown to a level that even the largest investors can find ample liquidity on a large number of stocks. Total open interest in call options in the top 100 stocks in the S&P 500 has grown from about 3 million in 1996 to over 50 million in 2011.

Options open interest has grown to meaningful levels relative to the market value of their corresponding equities. We estimate that the notional value of open interest on the top 100 stocks has grown from about 1% of equity market cap in 1996 to over 6% in 2011.

Exhibit 12: Options liquidity has grown steadily
Notional value of options contracts outstanding for the largest 100 S&P 500 stocks



Source: Goldman Sachs Research estimates; we estimate notional value of open interest as # of contracts x the spot price of the stock.

Stock selection: Seven factors that drove overwriting performance

We analyzed the patterns of profitability in the 100,000 overwriting trades in our study over the past 16 years. We found several basic attributes that correlated with overwriting outperformance over the period. While it is tough to say that all of the patterns of profitability that we identify will persist, we focus on those where we can identify a logical fundamental reason for their existence. The seven factors are:

1. Strike price: Overwrite with out-of-the-money options

2. Earnings events: Avoid overwriting in months with earnings events

3. Market Cap: Large-cap stocks make better overwrites than small-cap

4. Implied volatility: Overwrite stocks with high implied volatility

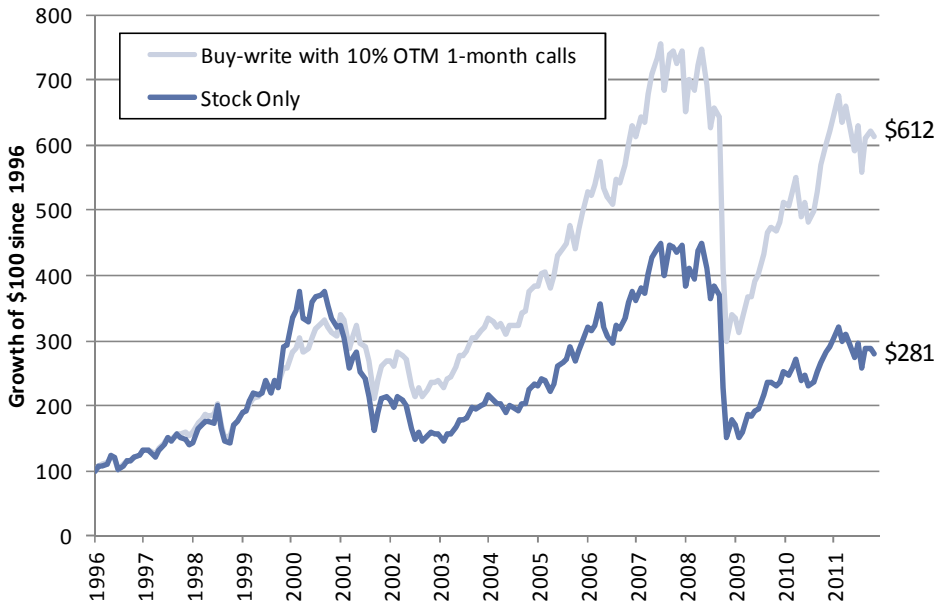
5. Recent performance: Avoid overwriting stocks that have strong momentum

6. Dividends: Overwrite stocks with moderate dividend yields

7. Sector: Overwriting in defensive sectors has outperformed overwriting in cyclicals

We estimate that investors that use the first four of these factors in choosing stocks to overwrite would have outperformed stock alone by 539 bp annually. We simulated selling 10% OTM calls on stocks that did not report earnings, but had above average market caps and above average implied volatility over the past 15 years. We estimate the overwritten portfolio would have grown to $612 from $100 while the stock only portfolio would have only grown to $281 from $100. We believe that simply not overwriting during earnings is the most important factor to follow to enhance yield generation from overwriting.

Exhibit 13: Combining factors 1-4 resulted in dramatic outperformance
Growth of $100 from 1996 to 2011 in stock or overwritten stock



Source: Goldman Sachs Research estimates.

1. Strike price: Out of the money outperformed. We found that selling out-of-the-money calls (OTM) outperformed selling at-the-money (ATM) calls. Whether you measure the strike in terms of percent out of the money or the delta of the option, selling an option with a strike price above the current price was superior to selling an at the money call. We detail results by normalized strike for all stocks in our study on the next page. Overwriting with ATM calls subtracted 191 bp from CAGR, while overwriting with 10% OTM calls added to CAGR by 186 bp. Overwriting with 50-delta calls subtracted 238 bp from CAGR, while overwriting with 20-delta calls added to CAGR by 104 bp. We found the trend in these results were consistent within other stock universes (S&P 500, NASDAQ 100, R1000 Value, R1000 Growth).

2. Earnings dates: Avoid overwriting in months with earnings events. Overwriting added much more to returns during non-earnings months than in earnings months for each specific stock. While overwriters collect more for selling calls in earnings months, it does not compensate investors sufficiently for the tendency for stocks to rise around their earnings dates. Overwriting stocks only in months they did not report earnings added to CAGR by 310 bp, while overwriting in months that did contain earnings events detracted from the CAGR by 172 bp (see Exhibit below). This earnings effect is even more apparent for growth stocks.

Based on our conversations with investors over the years, we believe the majority of systematic covered-call sellers sell calls in both non-earnings and earnings months. While these strategies produce yield on average (186 bp in our "all stocks" universe), they may unduly pressure call prices ahead of earnings. ***We believe our results go against many investors' assumptions that selling options in the days leading up to earnings events is highly profitable.*** Our findings in this study are consistent with our recently published earnings study: "Trading Events: Earnings volatility (part 1)," July 14, 2011, where buying calls 5 days ahead of earnings resulted in a 13% average return for the period. We see call buying on stocks that are expected to report earnings as a good way to balance an overwriting strategy for those overwriters that want to maintain delta neutral and volatility neutral options portfolios.

3. Market Cap: Large-cap stocks make better overwrites than small-cap. We found that overwriting mid-to-large-cap stocks added between 192 to 624 basis points to the CAGR of the portfolio depending on the specific strategy and quintile. Overwriting stocks in the smallest quintile produced outperformance of only 74 to 96 basis points.

For this test, we tracked five portfolios through time. Each month, we divided the liquid overwriting opportunities into quintiles based on their equity market cap. We equally weighted the stocks within each of the five portfolios and calculated the difference between the stock return and the overwritten stock return to estimate the outperformance from overwriting. Due to the clear importance of the first two findings in this section, we incorporate those results as we measure the performance of these portfolios; we analyze overwriting with 10% OTM calls in non-earnings periods as well as 20-delta calls in non-earnings periods.

4. Implied volatility: Overwrite stocks with high implied volatility. Using 1 month implied volatility as a guide when overwriting was modestly helpful. Selling 10% OTM calls on stocks with top quintile implied volatility each month added 464 bp to the CAGR of the portfolio, while selling 10% OTM calls on stocks with bottom quintile implied volatility added only 212 bp to the CAGR of the portfolio.

For this test, we tracked five portfolios through time. Each month, we divided the liquid overwriting opportunities into quintiles based on their 1 month at-the-money implied volatility. We equally weighted the stocks within each of the five portfolios and calculated the difference between the stock return and the overwritten stock return to estimate the outperformance from overwriting. Due to the clear importance of the first two findings in

this section, we incorporate those results as we measure the performance of these portfolios; we analyze overwriting with 10% OTM calls in non-earnings periods as well as 20-delta calls in non-earnings periods.

5. Recent performance: Avoid overwriting stocks with strong momentum. We found that selling 10% OTM calls on the stocks that had underperformed the SPX by more than 3% in the prior month added 579 bp to the CAGR of the portfolio while overwriting stocks that had recently outperformed by 3% only added 158 bp. Option premiums on recent laggards tend to be larger than recent outperformers as nervous investors bought options to hedge. This increase in option premiums for underperformers boosted the premiums collected and eventual outperformance of overwriting the underperformers. ***This finding is against the conventional wisdom that investors should overwrite recent outperformers.***

For this test, we built overwriting portfolios that were based on the stocks' prior month performance vs. the S&P 500. Those stocks that underperformed by more than 3% were put in the first portfolio. Stocks that outperformed by more than 3% were put in the second portfolio and those that were within 3% were put in a third portfolio. Due to the clear importance of the first two findings in this section, we incorporate those results as we measure the performance of these portfolios; we analyze overwriting with 10% OTM calls in non-earnings periods as well as 20-delta calls in non-earnings periods.

6. Dividend yield: Overwrite stocks with moderate dividend yields. We found that overwriting stocks that paid a 1%-4% dividend yield added 251 bp to the CAGR of a stock only portfolio (with 20-delta calls, non-earnings months). Overwriting added only 113 bp for stocks that paid no dividend, and added only 211 bp from those that paid over a 4% dividend yield. For this comparison, we compared only 20-delta calls to help normalize for the effect of the dividend on the forward.

For this test, we divided the observations based on trailing 12 month dividend yield of each stock. We found that those stocks that did not pay dividends (high overlap with growth stocks) had the strongest stock performance and overwriting was therefore only a small boost to performance.

7. Sector: Overwriting in defensive sectors has outperformed overwriting in cyclicals. While average premiums collected are smaller for stocks in the Telecom, Utilities, Staples and Healthcare sectors, the stock have remained more range-bound than cyclical sectors. Bull markets in Technology (late-90's), Energy/Materials (mid-00's) and Financials (early-mid-00's) led to less impressive overwriting performance over the full period.

Investors collected 1.8% in the average non-earnings month for selling 10% OTM calls on Defensive sectors, leading to outperformance of 747 basis points annually. In cyclical sectors, investors collected marginally more (2.1% on average), but only outperformed a stock only portfolio by an average of 348 basis points.

Each month, we divided the liquid overwriting opportunities into 9 portfolios. We equally weighted the stocks within each of the 9 portfolios and calculated the difference between the stock return and the overwritten stock return to estimate the outperformance from overwriting. Due to the clear importance of the first two findings in this section, we incorporate those results as we measure the performance of these portfolios; we analyze overwriting with 10% OTM calls in non-earnings periods as well as 20-delta calls in non-earnings periods. While we included Telecom and Utilities stocks in the "Defensive" portfolio, the low number of stocks and periodic illiquidity in those sectors did not allow the creation of a consistent time series to be analyzed independently.

Exhibit 14: Screening for overwrites based on six stock/option characteristics; right column shows outperformance
average returns of a 1-month strategy, equal weight for all stocks with liquid options

	Annualized		Monthly Return (%)						Option Statistics				Outperformance vs Stock
	Compound Return (%)	StdDev	Sharpe Ratio	Mean	Median	Min	Max	StdDev	Avg. % OTM	Avg. Prem (%)	% Months Exercised	Avg Bid-Mid Spread (%)	Compound Return (%) - Compound Return (%)
1. Strike Price													
Strategy: Specified Moneyness (1 month calls)													
0% OTM	11.3	14.3	0.83	0.99	2.12	-26	10	4.1	0.0	5.4	55%	3.6	-1.91
2% OTM	12.1	15.5	0.82	1.07	2.25	-27	10	4.5	1.8	4.5	48%	4.1	-1.06
5% OTM	13.4	17.4	0.82	1.19	2.57	-28	11	5.0	5.0	3.3	36%	5.3	0.25
10% OTM	15.0	19.7	0.82	1.35	2.53	-30	13	5.7	9.1	2.2	23%	7.7	1.86
15% OTM	15.2	21.1	0.79	1.38	2.50	-31	14	6.1	13.3	1.5	15%	19.6	2.04
Strategy: Specified Delta (1 month calls)													
50Delta	10.9	15.2	0.77	0.97	2.13	-27	11	4.4	1.1	4.8	52%	3.8	-2.28
40Delta	12.9	17.5	0.79	1.15	2.50	-29	13	5.0	4.7	3.4	40%	4.7	-0.30
30Delta	14.1	19.8	0.77	1.28	2.59	-30	15	5.7	8.6	2.1	27%	6.6	0.89
20Delta	14.2	21.2	0.74	1.31	2.42	-31	17	6.1	11.7	1.5	20%	8.5	1.04
2. Earnings events													
Strategy: 10% OTM (1 month Call)													
Non-Earnings	13.2	20.6	0.71	1.23	2.59	-31	12	5.9	9.1	2.1	23%	7.8	3.10
Earnings	18.3	20.0	0.95	1.58	2.37	-25	14	5.8	9.4	2.3	25%	7.4	-1.72
Strategy: 20Delta (1 month Call)													
Non-Earnings	11.8	22.1	0.62	1.15	2.43	-32	17	6.4	11.5	1.5	19%	8.5	1.71
Earnings	19.3	22.2	0.92	1.69	2.28	-26	19	6.4	12.5	1.5	20%	8.4	-0.66
3. Market Cap													
Strategy: 10% OTM (1 month call, non-earnings months)													
Smallest quintile	13.4	24.9	0.64	1.33	2.96	-31	18	7.2	9.3	2.7	26%	7.9	0.92
4th quintile	10.0	23.3	0.54	1.04	2.61	-36	13	6.7	8.9	2.0	24%	8.2	4.10
3rd quintile	6.2	20.7	0.40	0.70	2.01	-33	13	6.0	8.7	1.8	20%	8.2	6.24
2nd quintile	14.4	19.0	0.81	1.29	2.16	-31	12	5.5	8.7	1.6	20%	8.1	4.56
Largest quintile	7.9	19.2	0.50	0.80	1.70	-25	10	5.6	8.8	1.4	17%	8.0	5.73
Strategy: 20Delta (1 month call, non-earnings months)													
Smallest quintile	13.2	27.6	0.60	1.38	3.32	-32	26	8.0	13.0	1.9	21%	9.4	0.74
4th quintile	8.7	24.4	0.47	0.97	2.55	-37	18	7.1	11.0	1.5	21%	8.9	2.81
3rd quintile	5.1	21.8	0.35	0.63	1.59	-34	18	6.3	10.3	1.4	17%	8.6	5.13
2nd quintile	11.8	19.5	0.68	1.10	2.14	-32	14	5.6	9.7	1.2	19%	8.4	1.92
Largest quintile	5.0	19.7	0.35	0.58	1.57	-25	11	5.7	9.2	1.0	17%	7.8	2.89
4. Implied Volatility													
Strategy: 10% OTM (1 month call, non-earnings months)													
Lowest quintile	6.8	15.4	0.51	0.65	1.53	-20	8	4.5	7.6	1.0	18%	9.6	2.12
4th quintile	11.3	19.0	0.67	1.06	2.14	-28	11	5.5	8.8	1.4	19%	8.8	3.77
3rd quintile	11.9	23.4	0.61	1.19	2.93	-35	13	6.7	9.3	1.8	22%	7.9	3.13
2nd quintile	13.7	25.1	0.65	1.36	2.92	-36	17	7.2	9.9	2.5	24%	6.9	4.52
Highest quintile	16.6	29.3	0.68	1.67	3.65	-35	19	8.4	9.9	4.2	30%	5.6	4.64
Strategy: 20Delta (1 month call, non-earnings months)													
Lowest quintile	5.8	15.3	0.45	0.57	1.51	-20	7	4.4	7.1	1.0	19%	8.9	1.16
4th quintile	9.7	19.2	0.58	0.94	2.16	-29	12	5.5	8.9	1.2	19%	8.7	2.12
3rd quintile	10.4	24.2	0.54	1.09	2.93	-35	18	7.0	10.5	1.4	21%	8.5	1.60
2nd quintile	11.7	27.0	0.56	1.26	2.40	-37	19	7.8	13.1	1.7	19%	8.3	2.48
Highest quintile	14.5	35.4	0.57	1.68	3.41	-37	30	10.2	18.6	2.2	19%	8.1	2.49
5. Recent Performance													
Strategy: 10% OTM (1 month call, non-earnings months)													
Underperformance >3%	12.8	23.3	0.64	1.24	2.20	-33	15	6.7	9.6	2.4	22%	7.7	5.79
In-line with S&P 500	9.8	20.4	0.57	0.96	2.30	-29	13	5.9	8.8	1.8	22%	8.3	3.30
Outperformance >3%	14.4	20.4	0.77	1.31	2.71	-29	10	5.9	8.9	2.1	23%	7.7	1.58
Strategy: 20Delta (1 month call, non-earnings months)													
Underperformance >3%	10.8	26.0	0.53	1.16	2.18	-35	23	7.5	13.2	1.5	17%	8.9	3.86
In-line with S&P 500	8.0	21.3	0.47	0.84	2.10	-30	14	6.1	10.3	1.4	19%	8.7	1.48
Outperformance >3%	13.4	21.5	0.70	1.26	2.55	-30	13	6.2	8.2	1.6	21%	8.2	0.57
6. Dividend Yield													
Strategy: 20Delta (1 month call, non-earnings months)													
= 0%	12.3	26.5	0.58	1.28	2.78	-32	19	7.6	13.8	1.7	19%	8.4	1.13
0%-1%	13.9	23.6	0.69	1.35	2.23	-41	19	6.8	10.8	1.4	21%	8.3	1.73
1%-2%	8.7	21.4	0.51	0.91	1.80	-35	15	6.2	9.6	1.3	19%	8.6	1.81
2%-3%	6.6	20.5	0.42	0.72	1.63	-28	16	5.9	9.0	1.2	18%	9.0	3.47
3%-4%	3.8	23.9	0.28	0.55	1.55	-27	16	6.9	9.2	1.2	19%	9.0	2.25
>4%	10.6	22.6	0.57	1.07	2.11	-25	14	6.5	9.8	1.3	20%	8.7	2.11

Source: Goldman Sachs Research estimates.

Exhibit 15: Factor #7: Overwriting results by sector
average returns of a 1 month strategy, equal weight for all stocks with liquid options

	Annualized		Monthly Return (%)						Option Statistics				Outperformance vs Stock
	Compound Return (%)	StdDev	Sharpe Ratio	Mean	Median	Min	Max	StdDev	Avg. % OTM	Avg. Prem (%)	% Months Exercised	Avg Bid-Mid Spread (%)	Compound Return (%) - Compound Return (%)
Strategy: 10% OTM (1 month Call)													
Defensives	11.7	17.6	0.73	1.06	1.97	-22	10	5.1	8.7	1.8	18%	8.7	7.47
Discretionary	7.7	23.8	0.44	0.87	2.13	-32	15	6.9	9.1	1.9	21%	8.2	5.35
Energy	9.2	31.6	0.45	1.19	3.11	-38	19	9.1	9.2	2.2	26%	7.9	4.41
Financials	7.7	25.0	0.43	0.90	2.20	-36	18	7.2	8.4	2.0	20%	8.0	4.65
Industrials	9.6	21.7	0.54	0.97	2.05	-31	12	6.3	8.2	1.6	21%	8.7	3.51
InfoTech	16.5	26.1	0.72	1.58	3.28	-26	21	7.5	9.7	2.8	25%	6.8	3.08
Materials	9.2	25.3	0.49	1.03	2.28	-41	16	7.3	8.9	1.9	21%	7.8	-0.15
HealthCare	11.8	20.1	0.66	1.11	1.94	-22	14	5.8	9.0	1.9	18%	8.5	7.12
Staples	13.0	18.7	0.75	1.17	1.50	-19	13	5.4	8.0	1.3	17%	9.3	4.12
Strategy: 20Delta (1 month Call)													
Defensives	9.2	18.0	0.58	0.87	1.84	-23	13	5.2	10.1	1.3	16%	8.9	4.89
Discretionary	6.9	25.4	0.40	0.85	2.13	-33	26	7.3	11.0	1.5	18%	8.8	4.55
Energy	7.3	33.3	0.40	1.10	3.10	-40	18	9.6	11.6	1.6	22%	8.8	2.46
Financials	5.1	27.0	0.33	0.74	1.85	-41	27	7.8	10.3	1.3	18%	8.4	2.08
Industrials	8.6	22.4	0.49	0.91	2.08	-32	13	6.5	9.3	1.3	20%	9.0	2.58
InfoTech	14.9	29.4	0.63	1.54	2.66	-28	23	8.5	14.2	1.7	20%	8.0	1.47
Materials	7.9	26.8	0.43	0.96	2.12	-43	24	7.7	10.7	1.4	18%	8.5	-1.51
HealthCare	9.8	21.5	0.54	0.98	1.76	-23	18	6.2	10.8	1.4	16%	8.8	5.09
Staples	13.1	19.1	0.74	1.18	1.47	-19	18	5.5	8.3	1.2	16%	9.0	4.17

Source: Goldman Sachs Research estimates; Defensives include Healthcare, Utilities, Telecom and Staples.

Several of the factors that we consider show correlated results as we would expect (i.e. high market cap stocks make good overwrites, as do high dividend yield stocks) given that they identify similar stocks. However, some of the factors do not correlate (i.e. high implied volatility stocks make good overwrites, but high market cap stocks generally have lower implied volatility). Our findings show that there is no one clear answer to the question of "which stock should I overwrite", and a more holistic approach is needed. In Exhibit 14, we show an overwriting index based on our first four findings. The combination of these factors allowed the index to outperform in a diversified context with a large number of observations.

Basics of overwriting: Motivations and investment process

What is overwriting?

Four reasons investors sell covered calls

1. Collect premium/yield
2. Outperform in a large range of scenarios
3. Manage exposures
4. Add macro and micro alpha

Stock selection and investment process in covered call writing

Screening for overwriting candidates: Our methodology

Six decisions to make in an overwriting investment process

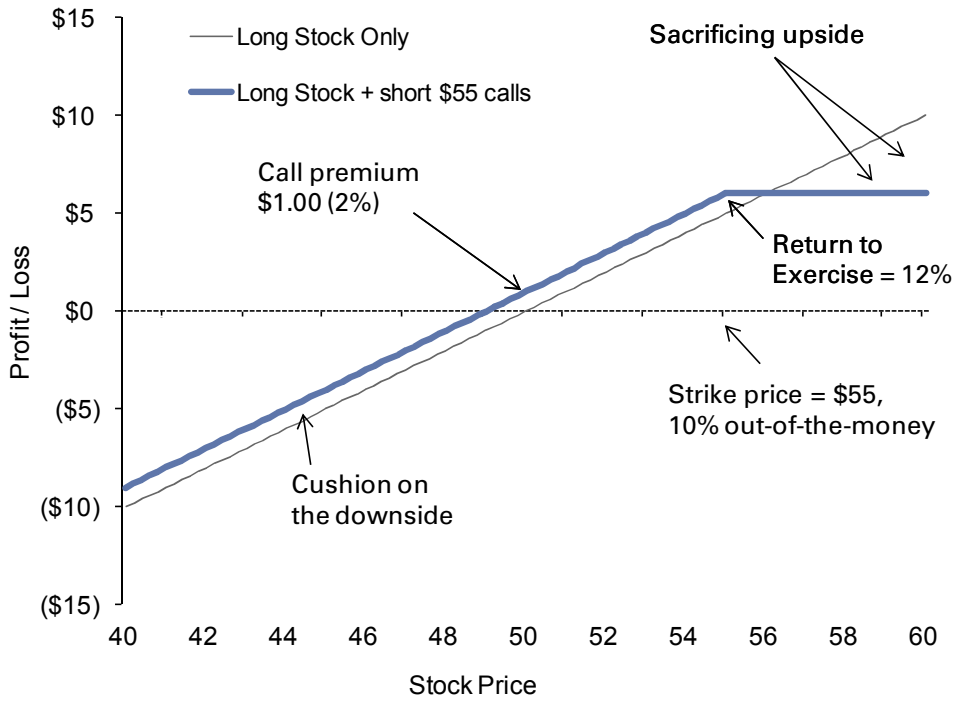
1. Choose the percentage of stocks in the portfolio to overwrite
2. Choose a strike to sell
3. Choose a term to sell
4. Choose a frequency at which to sell options
5. Chose a percentage of holding to overwrite
6. Closing, rolling, hedging or allowing call options to expire

What is overwriting?

Overwriting is selling call options on a stock owned. Options provide asymmetric exposure to moves in the underlying asset. Specifically, call options give the holder the right to buy a stock at a specified price (the "strike") for a specified period of time, but do not obligate the investor to buy if the stock is below the strike. Therefore, investors who overwrite have an obligation to deliver the underlying stock at the strike price if it rises above that level.

The payoff diagram below compares the exposure of an overwritten stock with that of a stock only position. In this example, the investor collects a 2% call premium for selling a 10% out-of-the-money (OTM) call that expires in 1 month. The call is referred to as "out-of-the-money because if it was exercised today, it would be worthless. If the call option were struck below the current stock price, it would be considered an "in-the-money" (ITM) call. If shares rise less than 10%, investors that overwrote the position outperform stock only positions by 2%. The overwriter reaches their maximum return at +12% and stock only investors would outperform if shares rose further.

Exhibit 16: Overwriting outperforms in a wide range of scenarios
Payoff diagram of stock purchase relative to overwriting with a 10% OTM call



Source: Goldman Sachs Research estimates

Key terms:

Strike price: Stock price above/below which option would be valuable at expiration

Premium: Upfront revenue from initiating the sale of an options position. The option premium collected is a function of implied volatility and the forward price of the asset. Higher volatility implied by the options market leads to higher call premiums. The forward price is driven by expected dividends and interest rates. Higher expected dividends drive

down the forward price, reducing the premium collected for a call. Higher interest rates increase the expected forward price of the asset, raising the call premium.

Term/option expiration: Length of time until options expire

Exercise: Converting options into stock at intrinsic value

Return to exercise: Return on the combined stock and option position if shares rise above the strike (includes dividends).

Risks of overwriting

Stock risk: Overwriting caps upside participation, but does not limit downside exposure. The largest risk associated with overwriting is the potential that the underlying stock is called away and future upside participation in the stock is foregone. This reinforces the need to be comfortable with agreeing to sell the stock at the call strike price in the event the call is exercised.

As a general rule of thumb, the best candidates for an overwriting strategy are stocks that a portfolio manager expects to trade in a range near-term. Since the upside participation is capped by the option sale, investors are unlikely to overwrite stocks they expect to have sharp upward moves. On the other hand, since downside exposure is maintained, it may be better to sell the stock rather than overwrite a stock that is likely to drop drastically.

Mark-to-market risk: Investors that sell covered calls take mark-to-market risk based on movements in a number of variables used to determine the time value embedded in an option, including implied volatility, interest rates, and expected dividends. The mark-to-market of a covered call sale can be adversely impacted if (1) implied volatility rises, (2) interest rates fall, and/or (3) expected dividends fall. In 1-month overwriting programs, implied volatility has the most potential to affect the mark to market of the total position. Interest rate sensitivity is minimal and dividend payments are hedged through ownership of the underlying stock.

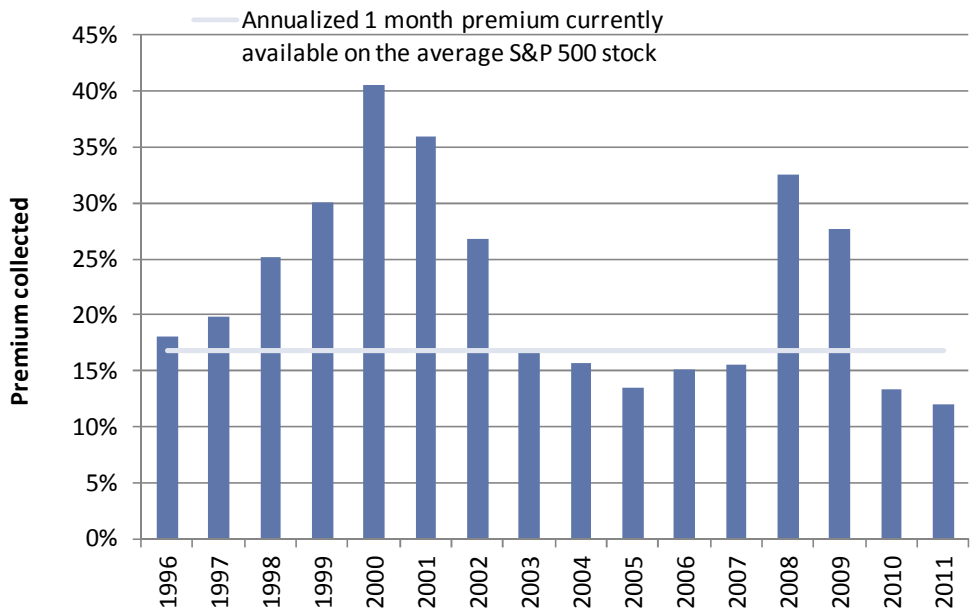
Four reasons investors overwrite

There can be a number of motivations for overwriting, but consistent throughout each is the idea of changing the overall exposure of the position in order to generate a superior risk/return position based on the needs of the investor. By transforming upside exposure into yield, overwriting lowers the volatility of the portfolio and increases the fixed yield that is collected upfront.

Investors overwrite to collect yield

Selling covered calls can add substantial yield to an equity portfolio. This yield is customizable based on the view of the investor and options prices at any given time. On average investors that sold 10% out-of-the-money calls that expired in 1-month collected 1.9% on a monthly basis (22.0% annually) for the average stock in our analysis. In years of high uncertainty investors receive more for selling calls; in 2000, investors received 3.6% monthly (41% for the year) for selling 1-month 10% out-of-the-money calls. Currently, we estimate investors collect 1.4% for selling a 1-month 10% out-of-the-money call on the average stock in our universe, an annual run-rate of 16.8%.

Exhibit 17: Call premiums can add substantial yield to a portfolio
Monthly premium collected for selling a 10% out-of-the-money call on the average stock



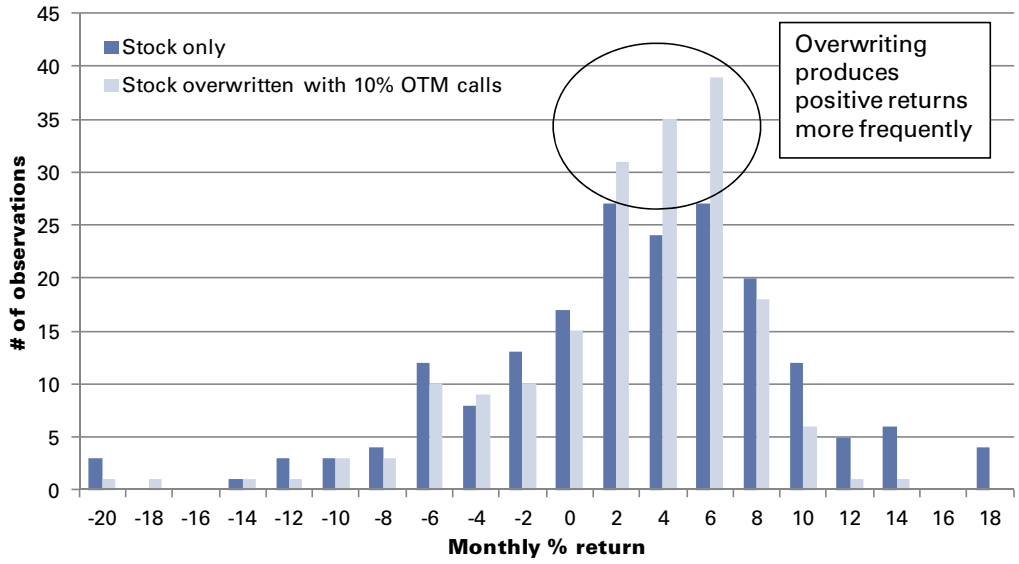
Source: Goldman Sachs Research estimates.

Investors overwrite to outperform in a large range of scenarios

By collecting yield upfront, investors that overwrite tend to outperform equity-only investors in periods where equities fall, or rise only modestly. This yield acts as a cushion for performance on the downside or a boost to performance on the upside unless shares reach the strike price before expiration.

On average, we find that overwriters of 10% out-of-the-money calls outperformed in 64% of the months in our 16 year study. Over the period, our results suggest that single stock call options have overestimated the upside potential for stocks on average.

Exhibit 18: Overwriting produces positive returns more frequently than standalone stock
Histogram of monthly returns of owning stock and selling 10% OTM 1 month calls vs. stock only



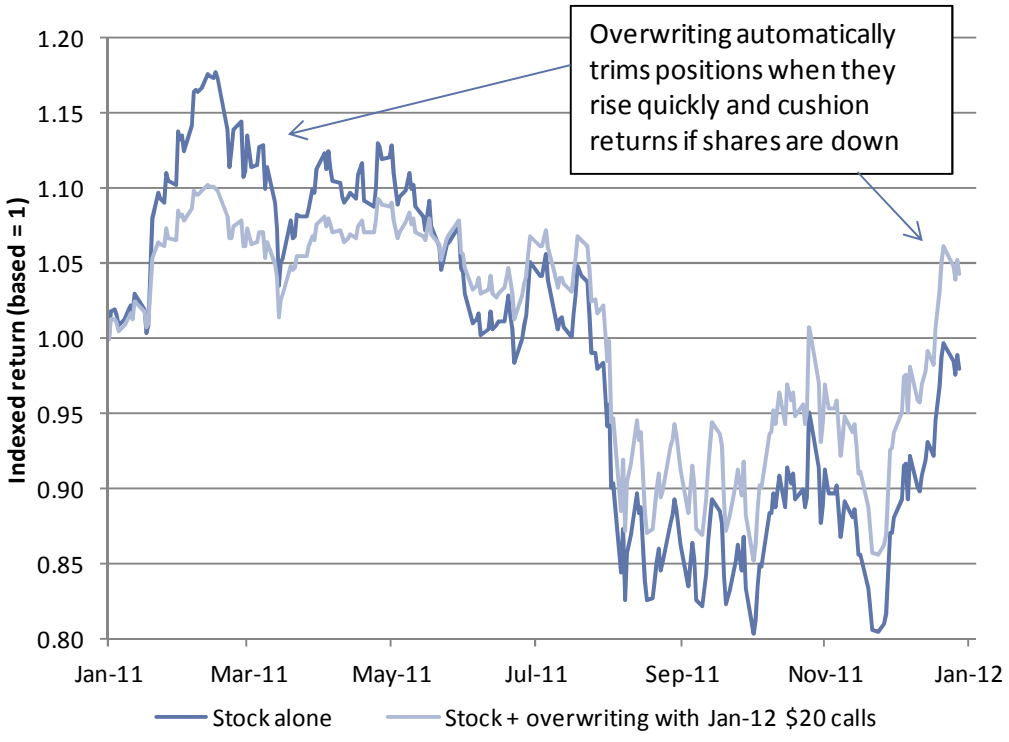
Source: Goldman Sachs Research estimates.

Investors overwrite to manage exposures

Many investors take advantage of overwriting strategies as a way to manage the weights of positions in their portfolio. This can be a particularly advantageous strategy when a portfolio manager has strict position limits (i.e. a single position cannot be more than 5% of the portfolio). If a stock were to rise so quickly that it became 6% of the portfolio, a manager would be forced to sell to reduce the position. By overwriting at that level, an investor can collect premium for committing to do something they would have done anyway.

Case Study: If an investor held GE in their portfolio on January 2, 2011 and would be forced to reduce the position if it rose above $20, an investor can sell January-2012 $20 calls to collect a $2.00 premium upfront (10%). If shares remain below $20, the investor continues to hold GE and keeps the call premium collected. If shares rise above $20, the investor is obligated to sell their stock for $20. On a mark-to-market basis, this reduces the volatility of the position (see below). The investor is better off overwriting the position if the stock remains below $22 through January-2012 expiration.

Exhibit 19: Overwriting can automatically trim exposure on the upside while collecting a yield that can cushion losses
General Electric (GE) shares vs. shares that are overwritten with Jan-12 $20 calls



Source: Goldman Sachs Research estimates.

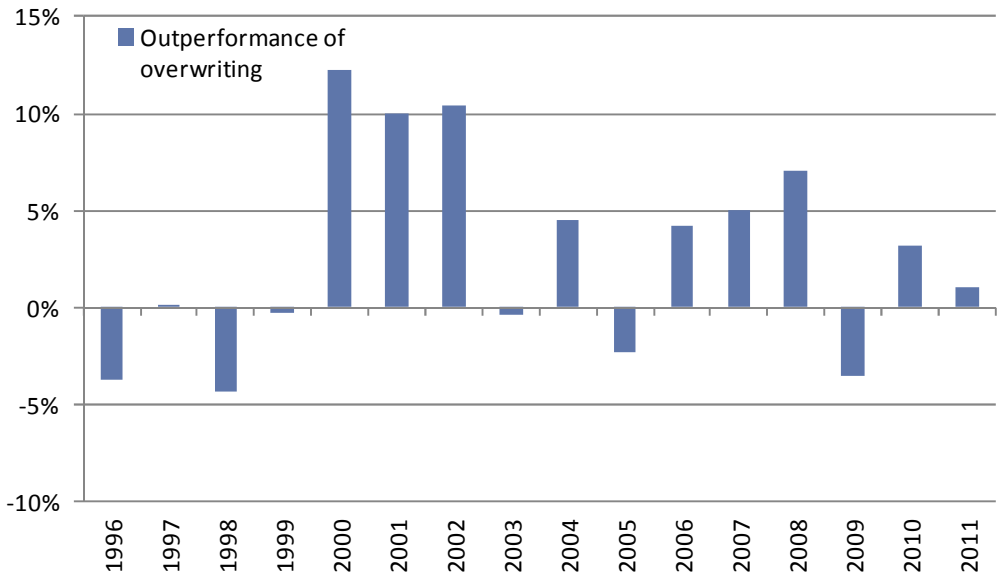
Investors overwrite to add macro and micro alpha

Many investors have views that are beyond just "buy" and "sell". They have views of how likely there is to be a large move up or down in the market. It is possible to monetize these views by using options.

At the micro level, investors can add alpha to their overwriting process by identifying those stocks where the upside expected over the period is low relative to the call premium collected. We discuss our preferred methodologies for identifying the best overwriting candidates throughout this report.

At the macro level, investors can add alpha to their portfolio by overwriting when they see reduced risk of a sharp upside move relative to the prices in the options market. Similarly, investors can outperform by refraining from overwriting when the premium collected from selling calls is not sufficient to compensate the investor for selling away this upside exposure. We use a combination of cross asset metrics to understand when the risk/reward for overwriting is high or low.

Exhibit 20: Significant alpha can be generated by overwriting in moderate return years
Average monthly buy-write performance less stock performance by year, selling 10% OTM calls



Source: Goldman Sachs Research estimates; Universe = S&P 500 stocks.

Overwriting investment process

Implementation of an overwriting strategy does not need to take the exact form of the strategies we analyzed in this report. In fact, we encourage investors to integrate overwriting into their broader fundamental equity investment process rather than setting up a completely separate process that is devoid of fundamental perspective.

Three guidelines underpin our screening and investment process philosophy:

1. Options should be viewed as a component of the stock exposure and not as an add-on investment

2. Call sales should be evaluated in terms of how they impact the "alpha" of the stock or stock portfolio relative to risk, just as decisions to buy or sell stocks.

3. Careful analysis of option strategies requires that investors focus on a horizon of their stock view and an expected likelihood of reaching/exceeding a target price level.

Screening for overwriting candidates: Our methodology

At the conceptual level, overwriters aim to sell calls on stocks at strikes such that the premium collected is likely to be higher than the foregone return. Screening for overwriting candidates can be thought of from either the stock perspective or the volatility perspective. Both have the potential to add alpha.

(1) Stock View: Sell call strikes the stock is unlikely to rise above. We find that many overwriters use price targets as a proxy for upside potential. By overwriting stocks where a high premium is collected for selling upside beyond the price target, investors can add alpha over a passive call selling program. Call prices are determined by quantitative factors such as the log-normal distribution, forward price, implied volatility and skew with no explicit regard for elements such as valuation or growth that affect upside potential.

(2) Volatility View: Sell calls in stocks where implied volatility is too high. Investors with fundamental stock views can generate alpha by selling options on stocks with higher volatility implied by the options market than is justified by the fundamental characteristics of the stocks. Comparing implied volatility to history, peers, and realized volatility can be helpful in this type of analysis. We caution that overwriting selection based solely on quantitative, non-fundamental factors comes with the same risks of quantitative, non-fundamental stock selection. When screening based on volatility, we tend to focus on fundamental elements such as leverage, valuation, profitability and growth to gain an edge over pure historical models.

Our price target based methodology compares our stock view to the option market's volatility view. We start with stocks in the Goldman Sachs coverage universe that are Buy-rated with a minimum level of upside to price target (depending on the time horizon of the analysis) under the assumption that these are the stocks that our analyst would have in a model portfolio. From this list, we price a call option with a strike that is equal to our analyst's price target. We then sort the list of companies based on the premium collected for selling upside beyond our analysts' price targets. This implicitly compares our analysts' view of the upside in the stock to the option market's view of the likelihood that the stock rises to this level based on the volatility implied in the options. The names at the top of this list are stronger overwriting candidates than the names at the bottom of the list. We have published this screen as our "Buy-write Monthly" on the Thursday before expiration Friday for the past three years.

Exhibit 21: Price target screen based on Goldman Sachs Price targets and April options
Universe = all Buy rated stocks with >10% upside to price target; we screen for premium collected for selling an April call at the linearly interpolated price target at April expiration

Highest premium collected for agreeing to sell the stock at the fundamental price target

			GS Target		Apr-12 Call to SELL					
							Premium			
Ticker	Company	Stock Price	Price	Term	Strike	Strike % spot	%	$	Est Div	Return to Exercise (%)
FWLT	Foster Wheeler Ltd.	$22.21	$25.00	12m	$23.61	106	**5.9**	1.31	0.0	12
HOT	Starwood Hotels & Resorts	$51.97	$58.50	12m	$55.23	106	**4.7**	2.43	0.0	11
ATI	Allegheny Technologies	$49.63	$55.00	6m	$55.00	111	**4.7**	2.31	0.2	16
POT	Potash Corp.	$45.41	$52.00	12m	$48.70	107	**4.4**	1.99	0.1	12
WSM	Williams-Sonoma, Inc.	$34.86	$40.00	12m	$37.43	107	**3.9**	1.36	0.2	12
MET	MetLife Inc.	$35.61	$41.00	12m	$38.31	108	**3.9**	1.39	0.0	12
PCLN	Priceline.com Incorporated	$518.83	$610.00	12m	$564.40	109	**3.8**	19.50	0.0	13
JPM	J.P. Morgan Chase & Co.	$36.54	$41.00	12m	$38.77	106	**3.6**	1.30	0.3	10
WFT	Weatherford International Ltd.	$16.18	$22.00	12m	$19.09	118	**3.5**	0.57	0.0	22
CMG	Chipotle Mexican Grill, Inc.	$356.82	$410.00	12m	$383.41	107	**3.4**	12.16	0.0	11
MON	Monsanto Co.	$80.98	$90.00	12m	$85.49	106	**3.4**	2.75	0.3	9
CRM	Salesforce.com, Inc.	$107.70	$150.00	12m	$128.85	120	**3.4**	3.66	0.0	23
RAX	Rackspace Hosting, Inc.	$43.28	$54.00	12m	$48.64	112	**3.4**	1.45	0.0	16
NDAQ	The Nasdaq Stock Market, Inc.	$24.78	$28.00	12m	$26.39	107	**3.2**	0.80	0.0	10
CAT	Caterpillar, Inc.	$104.26	$118.00	12m	$111.13	107	**3.2**	3.36	0.9	11
LVS	Las Vegas Sands Corp.	$46.83	$59.00	12m	$52.91	113	**3.2**	1.49	0.0	16
HIG	The Hartford Financial Services	$18.11	$23.00	12m	$20.56	114	**3.1**	0.56	0.1	17
BRCM	Broadcom Corporation	$33.35	$41.00	12m	$37.17	111	**3.0**	0.99	0.1	15
MAR	Marriott International	$33.94	$38.00	12m	$35.97	106	**3.0**	1.00	0.1	9
CMI	Cummins, Inc.	$101.32	$121.00	12m	$111.16	110	**3.0**	2.99	0.4	13
PRU	Prudential Financial, Inc.	$56.12	$66.00	12m	$61.06	109	**2.9**	1.62	0.0	12
BEN	Franklin Resources, Inc.	$99.69	$115.00	12m	$107.35	108	**2.9**	2.86	0.3	11
ETN	Eaton Corp.	$49.43	$56.00	12m	$52.72	107	**2.9**	1.42	0.4	10
DF	Dean Foods Company	$10.89	$14.00	12m	$12.45	114	**2.9**	0.31	0.0	17
CSCO	Cisco Systems, Inc.	$19.54	$22.00	12m	$20.77	106	**2.8**	0.54	0.1	9
WMB	The Williams Companies, Inc.	$29.05	$32.00	12m	$30.52	105	**2.6**	0.74	0.3	9
GE	General Electric Co.	$19.02	$21.00	12m	$20.01	105	**2.5**	0.48	0.2	9
QCOM	QUALCOMM, Inc.	$57.59	$65.00	12m	$61.30	106	**2.5**	1.45	0.2	9
CREE	Cree, Inc.	$24.45	$36.00	12m	$30.23	124	**2.4**	0.60	0.0	26
PCP	Precision Castparts Corp.	$174.59	$200.00	12m	$187.29	107	**2.3**	4.07	0.0	10
GILD	Gilead Sciences Inc.	$47.51	$57.00	12m	$52.26	110	**2.2**	1.05	0.0	12
STT	State Street Corp.	$39.95	$48.00	12m	$43.98	110	**2.2**	0.88	0.2	13
PBR	Petroleo Brasileiro S.A. (ADR)	$29.99	$36.00	12m	$32.99	110	**2.2**	0.65	0.0	12
CCL	Carnival Corp.	$30.55	$39.00	12m	$34.77	114	**2.0**	0.61	0.3	17
AXP	American Express Co.	$50.56	$58.00	12m	$54.28	107	**2.0**	0.99	0.2	10
LULU	lululemon athletica inc.	$60.51	$76.00	6m	$76.00	126	**2.0**	1.18	0.0	28
GM	General Motors Company	$24.51	$32.00	12m	$28.25	115	**1.9**	0.47	0.0	17
IBM	International Business Machines	$181.07	$200.00	12m	$190.54	105	**1.8**	3.32	0.8	8
BAX	Baxter International, Inc.	$51.75	$58.00	12m	$54.88	106	**1.7**	0.89	0.3	8
TRV	The Travelers Companies, Inc.	$59.89	$67.00	12m	$63.45	106	**1.7**	1.00	0.4	8

Source: Goldman Sachs Research estimates.

Six decisions to make in an overwriting investment process

The decisions at each of the following steps allow investors to increase or reduce the impact of the overwriting program on the returns, alpha and beta of each stock position and the portfolio as a whole. The first five decisions in an overwriting process need not be made in any particular order. One factor or another may be of primary importance depending on the nature of the alpha that is trying to be extracted from the overwriting strategy. Given the focus of fundamental investors on stock selection, we find that many investors start there.

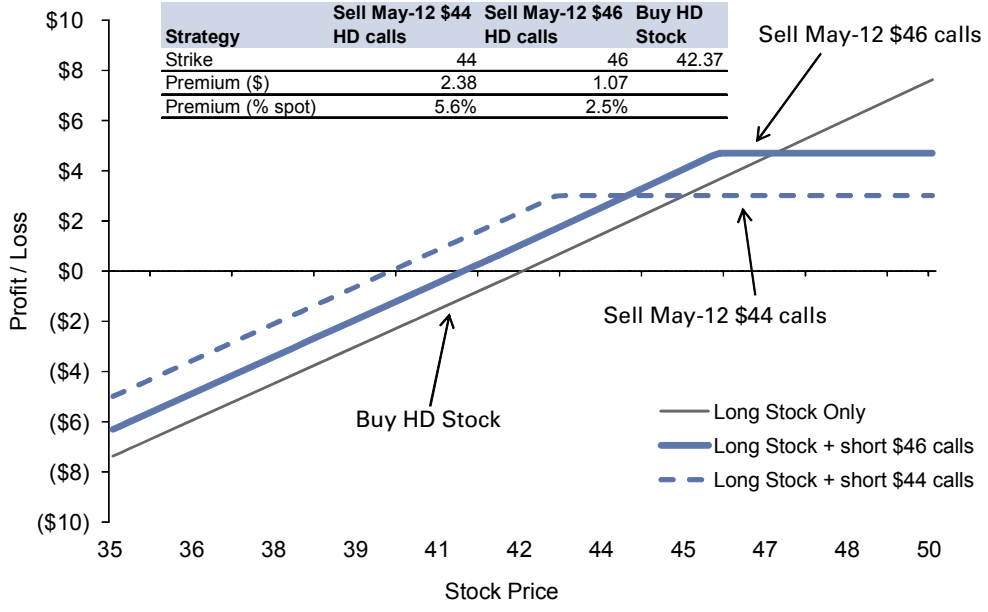
1. Choose a percentage of stocks in the portfolio to overwrite. Example: Sell options on 20% of the stocks in the portfolio.

Considerations: If stock selection is the main source of alpha in the overwriting strategy, then one must focus on a sufficiently small number of stocks to leverage the view. Selling options on more names in the portfolio diversifies the risk of an unexpected event in one stock. Selling options on more names in the portfolio allows an investor to increase the premium received without increasing the percentage of each position that is overwritten.

2. Choose a strike to sell. Example: Sell calls that are 5% out-of-the-money (above the current stock price).

Considerations: You receive more premium for selling a call that is closer to the money; however, you run a greater risk that the stock is called away and your total return is more limited. Investors typically look to strike a balance between premium collected and upside maintained. Strike selection can be a primary tool for expressing a view on likely upside in the period. When upside potential is greater, investors may choose a further out-of-the-money option (10% OTM); when upside potential is less, investors may choose a close to the money option (2% OTM). Strike selection is another important area where fundamental investors can look to add alpha.

Exhibit 22: Closer to the money strike provides more premium but with greater exercise risk
Comparison of payoffs at expiration for HD stock overwritten with May-12 $44 and $46 strike calls.

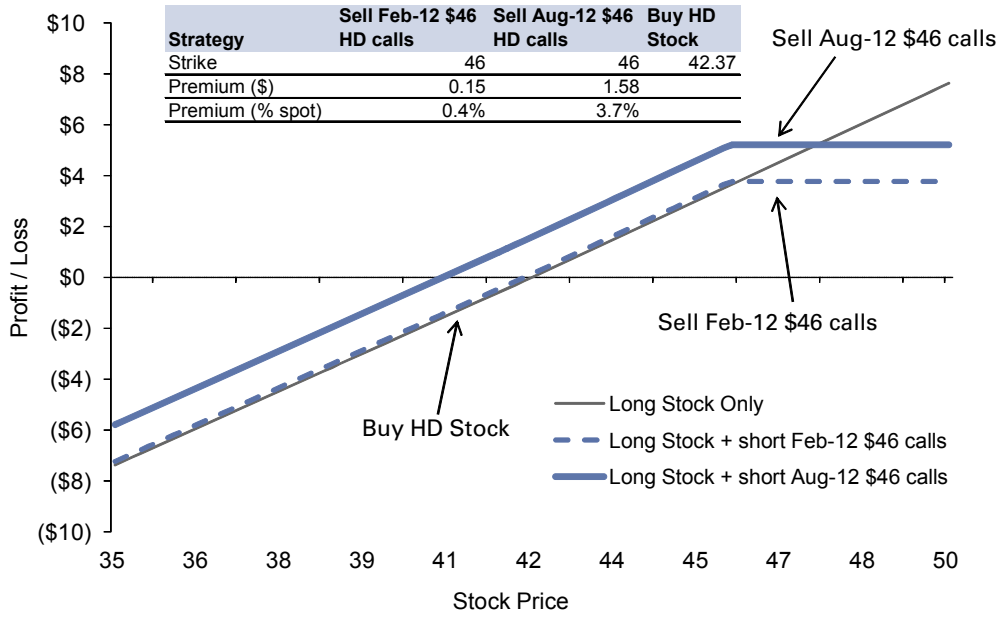


Source: Goldman Sachs Research estimates.

3. Choose a term to sell. Example: Sell options that expire in 1 month.

Considerations: You receive more premium for selling long-dated options; however, the longer dated the options, the more time there is for the stock to move up through the strike price. Our studies show that selling short-dated options has generally added more to risk-adjusted returns than selling long-dated options, especially at the index level. Managing short dated options positions can be more time consuming as the exposure of short-dated options can change rapidly as the stock moves, requiring additional trades to maintain similar delta and volatility exposures. The exposure of short-dated options also changes more rapidly than for long-dated options as they decay more rapidly, requiring more frequent replacement.

Exhibit 23: More time to expiration provides more premium
Comparison of payoffs at expiration for HD stock overwritten with Feb-12 and Aug-12 $46 strike calls.

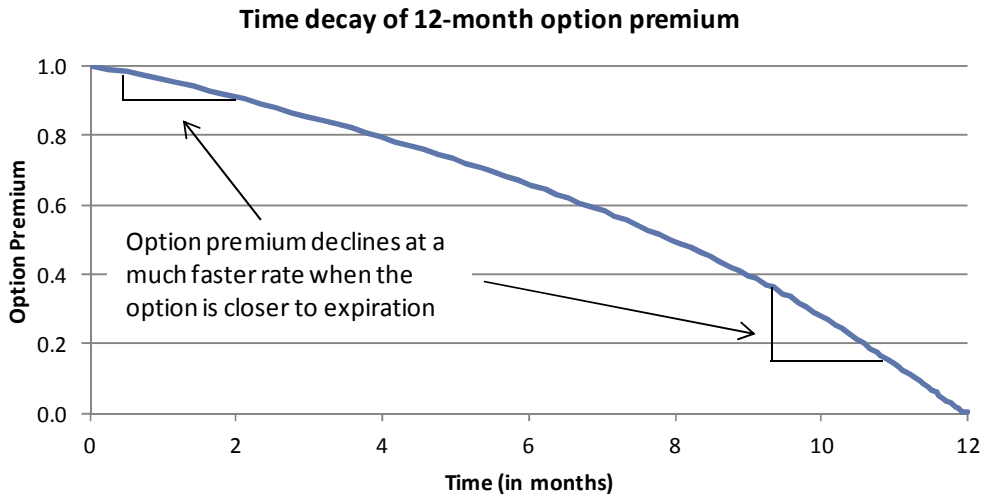


Source: Goldman Sachs Research estimates.

4. Choose a frequency at which to sell options. Example: Twice per month.

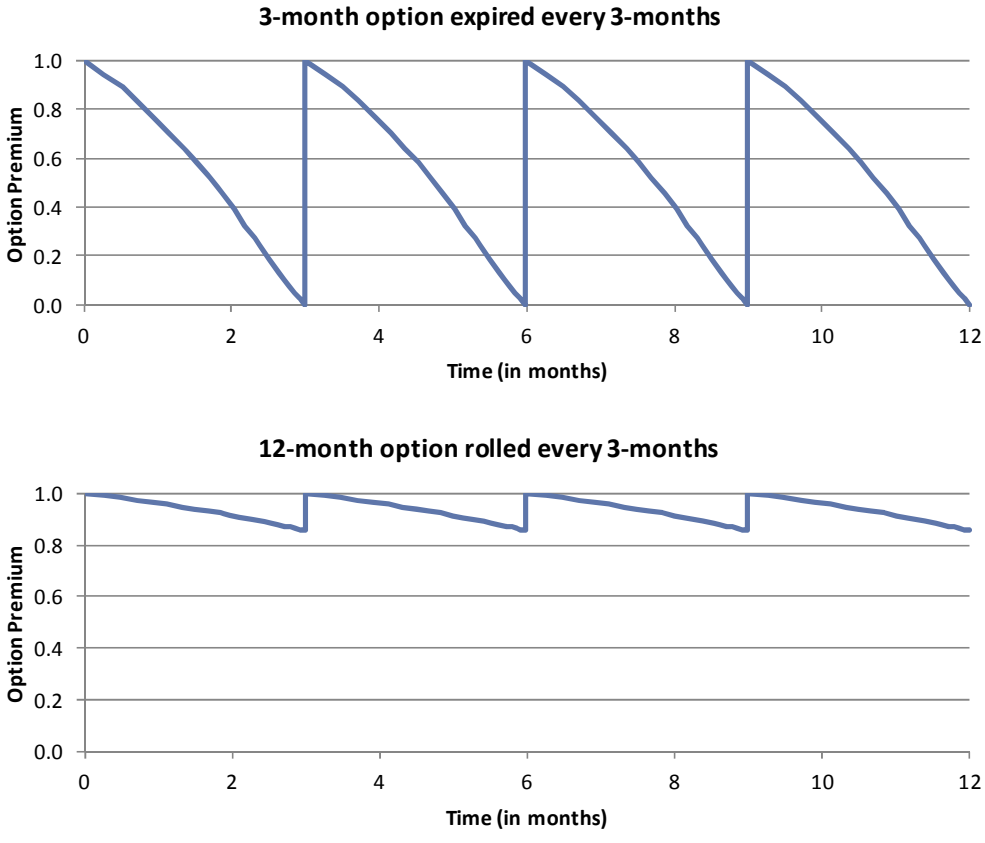
Considerations: Overwriting strategies that have frequent transactions can provide a smoother exposure profile. More frequent transactions require time to execute and can detract from fundamental research time. Transactions that are more frequent than the expiration cycle chosen will overlap and help smooth exposure. For example, if the overwriting strategy uses 6 month calls, they may only need to be sold every couple of months to maintain reasonably stable exposures. If the overwriting strategy uses 1 month calls, the investor may wish to sell calls several times a month to smooth exposures.

Exhibit 24: Option premium decays at faster rate when the option is closer to expiration
Price a of an OTM 12-month call option decaying with time



Source: Goldman Sachs Research estimates.

Exhibit 25: Frequent rolling before option expiration can provide smoother exposure
Comparison of time decay of 3-month calls expired every 3-months vs. 12-month calls rolled every 3-months.

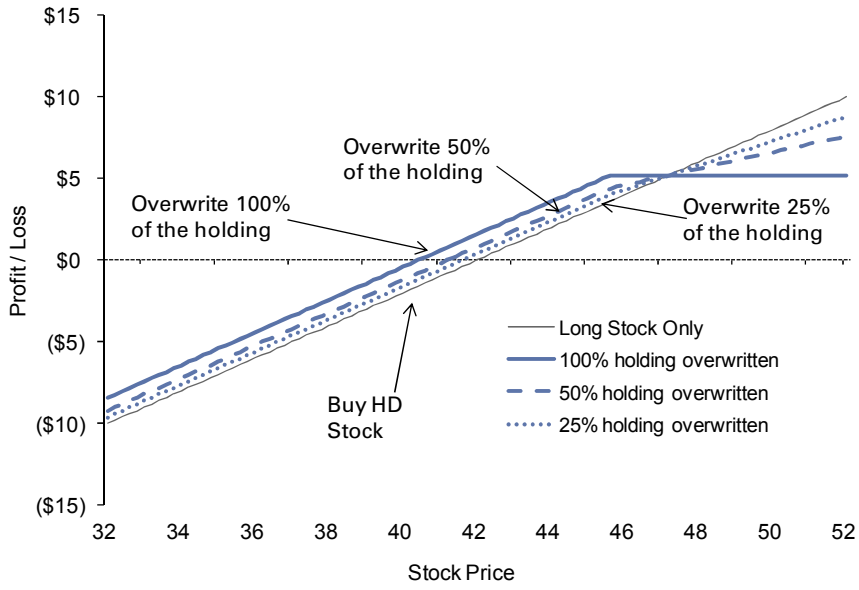


Source: Goldman Sachs Research estimates.

5. Choose a percentage of holding to overwrite. Example: Sell calls on 25% of the holdings of those stocks.

Considerations: The absolute premium collected in any call selling program is directly proportional to the percentage of holdings overwritten. Higher percentages of total positions overwritten yield higher premiums but increase the proportion of stock that has the potential of being called away. This completes the three factors that balance to determine the percentage of the total portfolio overwritten: (1) frequency at which to sell options, (2) percent of stocks overwritten, and (3) percent of holding overwritten.

Exhibit 26: Overwriting a larger percentage of the holding allows investors to collect more premium, but caps upside more substantially
Comparison of payoffs at expiration for HD stock where 25%, 50% or 100% of the position is overwritten



Source: Goldman Sachs Research estimates.

6. Closing, rolling, hedging or allowing call options to expire

Managing a covered call writing strategy as part of an overall portfolio management process involves ongoing evaluation of options sold against stocks with an eye for opportunities to alter strikes, roll out positions in time, or shift to options with different strike prices. These decisions can be motivated by a change in the outlook for the stock, in which case the option strike could be rolled to be consistent with the new target price. Alternatively, if the stock price has fallen and the investor has a profit on the call, they may wish to close out the position by buying back the option or may be able to roll down the strike price at a profit. Analysis of exposures, rolling options and thresholds for action are often done by the trading desks at institutions rather than the portfolio managers.

The most common trade for ongoing management of covered writing strategies is to roll out a short call position to a longer expiration. In the case where the call is out-of-the-money or slightly in-the-money and the investor's stock view has not changed, there are frequently opportunities to shift to a longer-term call with the same or even a slightly higher strike price for a credit.

These opportunities occur because call option prices increase with time to expiration. The intuition is that the investor who is short the call is agreeing to extend the period over which returns are capped. Of course, there should be a premium received in compensation for this extension. Many investors evaluate their short call positions two to four weeks prior to expiration to consider different strategies to roll out the position with different terms and strike prices. Very often, the investor may choose to roll up to a slightly higher strike price if the outlook is more favorable for the stock. On the other hand, if the stock has fallen in price and the investor thinks there may be some time before the stock rallies, but does not want to liquidate the position, the short call can be rolled down for a profit/credit. Scenario analysis can be quite helpful in comparing alternative rolling strategies.

Investors often have a threshold that will trigger action. The action that is triggered depends on the needs of the overwriting strategy. This threshold may be on the upside or the downside and is generally framed in terms of percentage change in premium or the delta of the option and often depends of the remaining time to expiration. For example, an investor may have a stop-loss on the call option sale such that an action is triggered if the call option price reaches 3 times the initial premium collected at any time during the life of the trade. Similarly, an investor may prefer to close an overwrite if the call has decayed to less than 10% of its initial value.

If the call option is in-the-money and trading near intrinsic value, the investor may decide to hedge the implicit stock exposure rather than closing out the option. The higher bid-offer spread in options would be a drag on returns, while stock trading costs may be much lower.

Overwriting in a portfolio context: impact to exposure

Overwriting changes the exposure of a portfolio by converting future upside exposure into current yield. This has the effect of reducing the delta, beta and volatility of the portfolio in exchange for a fixed payment. Investors often have an inherent bias to underutilize overwriting strategies as short call options reduce equity exposure and can have an impact somewhat similar to a cash drag on a portfolio. However, in periods of flat equity performance, the income received from overwriting can far out-weigh the drag from underinvestment in equity.

Calculating net delta exposure at the stock level is critical to determining whether the net position adds or detracts from the beta of the portfolio. The change in exposure can be calculated by simply multiplying the delta of the option by the notional value of the options contracts. For example, assume an investor has a $100 mn position in Google, against which they have sold call options on $25 million notional value (number of call contracts multiplied by the strike price = $25 mn). If the delta of these calls is 0.20, the net initial exposure to Google is $95 million or ($100 mn – [$25 mn x 0.20]). This net exposure will change daily as the delta changes with Google's price, but the delta is bounded by 0 and 1. Therefore, the minimum exposure of the combined positions could be $75 million and the maximum $100 million.

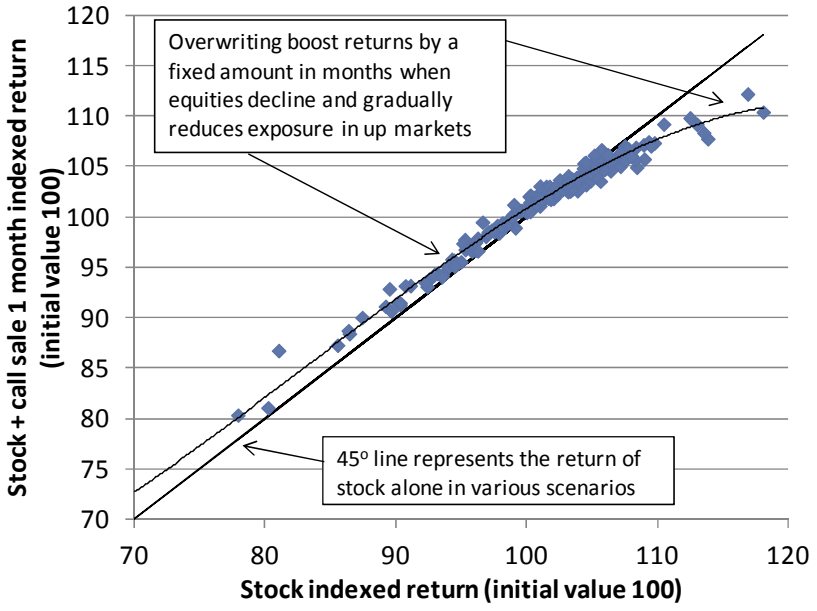
Overwriting increases benchmark risk, and many investors set limits. Calculating net delta exposures at the portfolio level is critical to understanding the overall risk of the portfolio. The same "net exposure" principles can be applied at the portfolio level to determine the exposure to beta at any given moment. By multiplying the net notional exposure to each stock by the beta, an estimate of option adjusted beta can be established. To limit benchmark risk, an investor may want to establish a minimum beta/equity exposure under the assumption that the delta of the call options are the maximum of 1. If the investor overwrites 25% of the stocks in the portfolio and would like to achieve a minimum beta/equity exposure of 90%, the maximum percentage of each holding that can be overwritten on average is 40% or (100 – [0.25 x 0.40]).

Delta and Beta: **Selling covered calls lowers the overall exposure to a stock and effectively lowers the mark to market beta of stock position.**

Volatility: **Selling covered calls positions the portfolio short volatility. A rise in implied volatility during the holding period has a negative mark to market effect.**

Changing Exposure over holding period: **Options decay as the time to expiration declines (theta decay). Investors that have sold an option have a smaller exposure to that position on day 2 than on day 1.**

Exhibit 27: Overwriting reduces the beta of the portfolio in exchange for an upfront yield
Historical distribution of stock and overwriting monthly returns



Source: Goldman Sachs Research estimates.

Appendix: Methodology details and study overview

Methodology: On expiration day each month, determine the list of stocks that have liquid options based on a graduated bid-ask spread restriction. We simulated buying those stocks with liquid options and selling a call that expires at the next expiration date at the bid price listed on the close. On expiration, approximately 1 month later, we calculated the intrinsic value of the combined position to determine the return over the period. We assume that option premiums are held in cash without interest over the period. We assume that no stock is called away prior to expiration.

Universe of stocks: We include all stocks that we believe had liquid options at any point during the 16 year period. We included about 3,000 stocks in our initial analysis (any stock in the S&P 500 or Russell 2000 at any time during the period), but only deemed about 800 to have had sufficient liquidity in options during the period after our bid/ask spread restrictions.

Dates, initiation/expiration: On each expiration date, we assume an investor sells a call that expires 1 month later, on the subsequent expiration day.

Strikes: We simulated selling calls based on the moneyness (0%, 2%, 5%, 10% and 15% out-of-the-money relative to the spot price at initiation) and the delta exposure of the call (50-delta, 40-delta, 30-delta, and 20-delta).

Trade size: We assume the investor sells calls 1-for-1 on the entire stock position.

Price history: We use OptionMetrics daily-close listed bid and ask option price data over the past 16 years.

Sample period: We include observations from January 1996 to November 2011.

Liquidity screen: We include only datapoints where the bid ask spread was less than 20% of the option premium for a 50-delta call, 25% for 40-delta calls, 30% for 30-delta calls, and 35% for 20 delta calls. We only include datapoints that pass all 4 of these liquidity tests so that the portfolios are consistent across strategies. Observations for all moneyness iterations are the same. Note that liquidity restrictions were not extended to 15% OTM calls because that would have reduced the number of datapoints substantially. This helps to explain the higher transaction costs estimated in the 15% OTM iteration. Liquidity restrictions reduced the number of datapoints from an available 100,000 to a usable 30,000.

Dividends: We implicitly assume that dividends would be collected by stock holders and overwriters alike and therefore exclude dividends from our analysis of returns.

Reg AC

We, John Marshall, Krag Gregory, Ph.D., Katherine Fogertey and Amarnath Jha, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

Disclosures

Option Specific Disclosures

Price target methodology: Please refer to the analyst's previously published research for methodology and risks associated with equity price targets.

Pricing Disclosure: Option prices and volatility levels in this note are indicative only, and are based on our estimates of recent mid-market levels. All prices and levels exclude transaction costs unless otherwise stated.

Buying Options - Investors who buy call (put) options risk loss of the entire premium paid if the underlying security finishes below (above) the strike price at expiration. Investors who buy call or put spreads also risk a maximum loss of the premium paid. The maximum gain on a long call or put spread is the difference between the strike prices, less the premium paid.

Selling Options - Investors who sell calls on securities they do not own risk unlimited loss of the security price less the strike price. Investors who sell covered calls (sell calls while owning the underlying security) risk having to deliver the underlying security or pay the difference between the security price and the strike price, depending on whether the option is settled by physical delivery or cash-settled. Investors who sell puts risk loss of the strike price less the premium received for selling the put. Investors who sell put or call spreads risk a maximum loss of the difference between the strikes less the premium received, while their maximum gain is the premium received.

For options settled by physical delivery, the above risks assume the options buyer or seller, buys or sells the resulting securities at the settlement price on expiry.

Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	30%	55%	15%	47%	42%	34%

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