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Covered call writing's effect on risk and returns, analysis on Finnish stock market companies

Accounting and Finance
Bachelor's thesis

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This study investigates the impact of the covered call strategy on risk and returns, focusing on individual stocks within the Finnish stock market. Given the limited research on covered calls in smaller markets, this analysis fills a gap by examining the effectiveness of this strategy during the volatile period of 2020 to 2021. The research employs historical data on option prices and stock returns from ten Finnish companies. The primary objective is to determine whether covered calls can enhance investor returns and how stock performance variations influence these returns.

Results indicate that while covered calls generally increase returns compared to a traditional buy and hold strategy, their effectiveness heavily depends on market dynamics. Specifically, the strategy performs best in sideways or weak markets where stock gains are moderate. Additionally, the study confirms that covered calls significantly reduce investment risk, as evidenced by the decreased volatility across all companies examined. The Sharpe ratio analysis suggests an improvement in risk-adjusted returns for most companies when employing this strategy.

Key words: Covered call, Options, Risk, Return

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Tämä tutkimus tarkastelee taatun osto-optio strategian vaikutusta riskiin ja tuottoihin, keskittyen yksittäisiin osakkeisiin Suomen osakemarkkinoilla. Taatuista osto-optioista on tehty vain vähän tutkimusta pienemmillä markkinoilla, joten tämä analyysi täyttää aukon tutkimalla strategian tehokkuutta volatiilien vuosien 2020–2021 aikana. Tutkimuksessa käytetään historiallista dataa kymmenen Suomalaisen yrityksen optiohinnoista ja osaketuotoista. Ensisijainen tavoite on selvittää, voivatko taatut osto-optiot parantaa sijoittajan tuottoja ja miten osakkeiden tuottojen vaihtelut vaikuttavat strategian lisätuottoihin.

Tulokset osoittavat, että vaikka taatut osto-optiot yleensä lisäävät tuottoja verrattuna perinteiseen osta ja pidä-strategiaan, niiden tehokkuus riippuu suuresti markkinaolosuhteista. Erityisesti strategia toimii parhaiten lisätuottojen valossa sivuttain kulkevilla tai heikoilla markkinoilla. Lisäksi tutkimus vahvistaa, että taatut osto-optiot vähentävät merkittävästi sijoitusriskiä, kuten kaikkien tutkittujen yritysten volatiliteetin lasku osoittaa. Lisäksi riskikorjattujen tulosten analyysi viittaa riskikorjattujen tuottojen paranemiseen useimmilla yrityksillä, kun käytetään kyseistä taattujen optioiden strategiaa.

Avainsanat: Taattu osto-optio, Optiot, Riski, Tuotto

TABLE OF CONTENTS

1 Introduction 7

1.1 Background and motivation of the study 7

1.2 Purpose of the study 7

1.3 Outline of the study 8

2 Literature Review 9

2.1 Covered Call 9

2.2 Option moneyness 10

2.3 Black-Scholes model and implied volatility 11

2.4 Effect on returns and risk 12

2.5 Out-of-the-money call writing 14

2.6 American and European style options 15

2.7 Duration of the call option 16

3 Methodology 18

3.1 Data 18

3.2 Return and risk 19

4 Results 22

4.1 Returns 24

4.2 Risk 25

4.3 Risk adjusted returns 25

5 Conclusions 27

References 29

LIST OF FIGURES

Figure 1 Covered call strategy's payoff diagram. 10
Figure 2 Average implied and realized volatility. 12
Figure 3 Stock return’s effect on covered call strategy’s excess returns. 23

LIST OF TABLES

Table 1 The companies used in this study. 19
Table 2 Summary of buy and hold strategy's results. 22
Table 3 Summary of CC strategy's results. 23

1 Introduction

1.1 Background and motivation of the study

Options trading is usually seen as a risky and a speculative way to bet on one's views about the future direction of the markets. Options can be viewed mistakenly as a complex derivative which only big asset managers have access to and is hence completely ignored by small investors. Nonetheless options can be used as an effective way to hedge against the systematic risk and can therefore potentially increase portfolio returns.

With options there is numerous strategies that investor could use to speculate or protect itself from different market conditions. These strategies involve buying or selling a call or put options either simultaneously or individually, depending on one's views about the future direction of the markets. However, one of the most popular options strategies used by fund managers and institutional investors is covered call writing, where one sells a call option against his/her position on the underlying asset (Board et. al. 2000.) This way the call option seller receives a premium payment for selling the call option while simultaneously holding a long position in the same underlying asset. The premium serves as a slight cushion against downturns, inherently making covered calls less risky than simply holding the underlying asset (Diaz & Kwon, 2016.) There have been previous studies made about the performance of the covered call strategy with index or index portfolios. However, there has been only few studies made about the performance of covered call writing on individual stocks. Additionally, there has not been any studies made on the performance of covered call strategy in the Finnish stock market, at least to the authors knowledge. It is also intriguing to see how this strategy performs in a relatively small stock market compared to the previous studies made from the US stock market. Thus, further research about the performance of the covered call strategy in the Finnish stock market is necessary.

1.2 Purpose of the study

Purpose of this study is to find out how covered call strategy affects risk and returns when applying it on individual stocks in the Finnish stock market and how different market conditions affects the excess returns of covered call writing. This is done by collecting data from well-known Finnish companies' historical call option prices and then measuring the returns and risk with and without a call overwrite and comparing these

results between each other in a timeframe that includes a bull and bear market. The timeframe spans from the start of 2020, when COVID-pandemic began, to the end of 2021, when post COVID-pandemic bull market ended. By choosing this timeframe it is possible to compare how covered call strategy performs in different kind of market conditions. The study is conducted by purchasing the underlying stock on the third Friday of each month, and based on previous studies, concurrently selling a 2-3% out-of-the-money (OTM) call option for each stock fully covering the position. Each position is maintained for a one-month duration, until the third Friday of the following month, at which point it is liquidated and then repeated each month. Subsequently, the monthly median, average and the standard deviation of returns are calculated for the 2020-2021 period to define the risk and the excess returns of the covered call strategy. Additionally, the Sharpe ratio is calculated from these results to define the risk-adjusted performance.

This study aims to answer the research question of whether investors can enhance their returns using covered call writing, and to examine how variation in stock performances influences the excess returns, with a focus on Finnish stock market companies. Additionally, this study seeks to address a secondary question: does the covered call strategy significantly reduce risk associated with investment returns? The hypothesis, based on previous studies and theoretical framework, is that the covered call strategy increases excess returns in relatively weak markets but underperforms in strong equity markets. The covered call strategy is thought to decrease the overall volatility of returns.

The data for this thesis is retrieved from the LSEG workspace. The data consist of 10 Finnish companies' monthly returns and American call option premiums in the period between 20.12.2019 and 17.12.2021.

1.3 Outline of the study

The outline of this thesis is as follows: Chapter 2 provides a comprehensive overview of the topic, including relevant financial theories related to the subject and examines prior research on the covered call strategy, focusing on its impact on risk and returns. The approach of the research, including how risk and returns are calculated and the selection of companies for the study, is detailed in Chapter 3. Chapter 4 presents a summary and analysis of the findings, while the final conclusions are outlined in Chapter 5.

2 Literature Review

2.1 Covered Call

Options can be generally divided in to two categories; call and put options. Call option gives the buyer the right to buy the underlying asset at agreed strike price and put option gives the buyer the right to sell the underlying asset at agreed strike price. Since this research focuses on covered calls, we are going to focus more on the call options (Stoll, 1969.)

The writer (seller) of the call option receives a premium paid by the buyer and the possible profits of option buyer are unlimited while their losses are limited to the premium paid. The potential losses for an option writer are unlimited, whereas their gains are capped at the premium received from the buyer of the call. On the other hand, buyers of options are not burdened with the margin requirements associated with the stock; they only need to provide the premium in cash. However, the call option writer, obligated to provide the underlying asset, must provide margin as a security for their contractual obligation. If the seller already holds the underlying asset in question, they are not required to provide additional margin beyond that required for their existing long position. In the context of covered call writing, the writer's losses are limited to the capital invested to the underlying asset. The losses could be unlimited if the call writer would sell the call "naked" as in not owning the underlying asset, since the stock price could theoretically appreciate infinitely (Stoll, 1969.) With covered call, the strike price plus the premium received acts as a cap for the maximum return the writer can receive. The potential profit exceeding the strike price of the call option that is sold is sacrificed, in return for receiving the premium of the call (Diaz & Kwon, 2016).

For example, consider a scenario where a stock is priced at 95€ per share and the seller issues an out-of-the-money (OTM) call option with a strike price of 100€, receiving a premium of 25€ in the process. The highest payoff the call writer can achieve are limited to the strike price of 100€ per share, in addition to the premium. Should the stock's value rise to 110€ per share upon expiration, the "loss" for the call option seller is the opportunity cost from selling a call option on the asset versus outright stock investment (Stoll, 1969.) Figure 1 visualizes the covered call strategy's payoff in relation to the underlying asset's price.

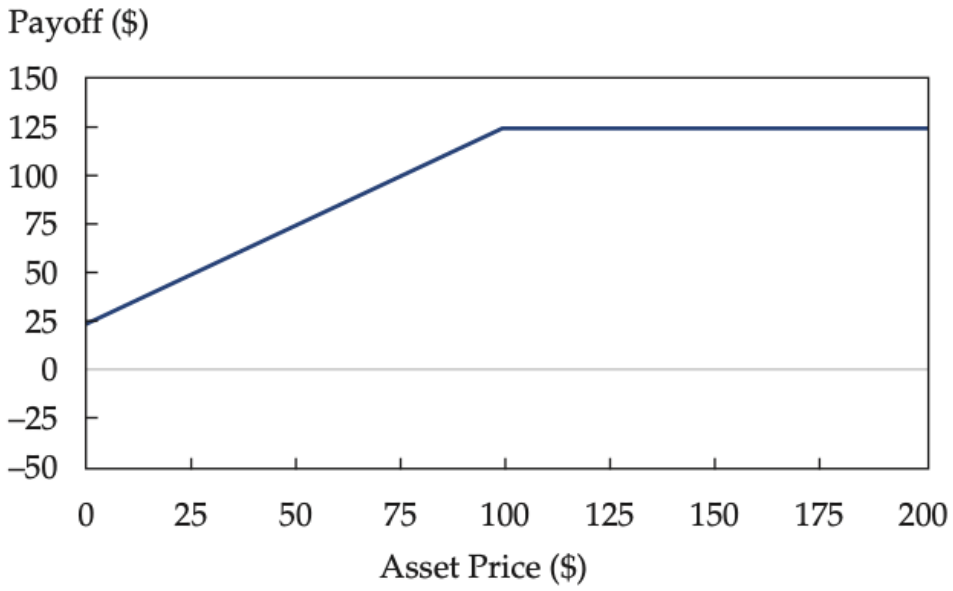

Figure 1 Covered call strategy's payoff diagram.[1]

2.2 Option moneyness

Call options can be divided into three levels of moneyness based on the strike price of the call option compared to stock's current share price. These are out-of-the-money (OTM), at-the-money (ATM) and in-the-money (ITM) call options. Option is referred to be out-of-the-money when the underlying asset's price is lower than the strike price of the call option. When the underlying asset's price is the same as the strike price the option is said to be at-the-money. Consequently, when underlying asset's price is higher than the strike price of the call option, option is referred to be in-the-money. OTM call option is the most used in covered call writing and thus why we use it similarly in our research. With OTM writing the benefits are that when the underlying asset appreciates the call writer still receives some returns for the ownership of the stock. If the sold call is at-the-money or in-the-money the writer doesn't receive any upside profits for the underlying asset's appreciation since the call option acts as a cap for the profits and the only return that the call writer receives is the premium received. Although, it is worth mentioning that writing the call option at-the-money or in-the-money, the premium received is higher compared to OTM call option (Diaz & Kwon, 2016.)

[1] (Israelov & Nielsen 2015, 46)

The call option moneyness can be also seen as a probability of the call being exercised. This probability of the call being exercised is called by the Greek letter delta. For call options, the delta is always a positive number between 0 and 1, implicating the probability of the call being exercised. The deeper the call is out-of-the-money, the smaller the delta typically is. At-the-money, delta is usually near 0,50 and the deeper the call is in-the-money, the closer the delta is to 1 (Hill et. al. 2006.)

2.3 Black-Scholes model and implied volatility

Pricing models for options, such as the Black-Scholes model, link the cost of an option to several key factors: the price of the asset it's based on, the asset's price volatility, the option's strike price, the time until the option expires, the interest rate, and the dividend yield of the asset. These parameters are typically straightforward to determine. To estimate volatility, one might use historical prices of the stock. This estimated volatility is then used in the pricing model to calculate the value of the option. Alternatively, by looking at the option's market price and working backward through the pricing model, one can get the volatility that the market implies. This backward-calculated volatility, calculated from the option's market price, is termed the option's implied volatility (Mayhew, 1995.)

Through time, it has become clear that the market doesn't align all option pricing with the Black-Scholes model. The general view is that while the model is fairly accurate for European options that are at-the-money with expiration periods of one to two months, for options beyond these parameters, significant and consistent deviations from the model's pricing occur. If market pricing strictly followed the Black-Scholes formula, implied volatilities for all options would be identical. However, previous research have shown that there is differences in the implied volatility between OTM, ITM and ATM options. This variance in implied volatilities, dependent on strike prices and expiration times, has led to the recognition of certain patterns. The variation over different expiration times is termed the "term structure of implied volatilities," while the variation across strike prices gives rise to the "volatility skew" or "volatility smile", the latter term sometimes including the overall pattern observed both in terms of expiration times and strike prices (Mayhew, 1995.)

In the context of CC strategy, the implied volatility is one of the key factors to consider. The higher the implied volatility, the higher the premium received from the sold call. If

one believes that the implied volatility of the underlying asset is too high, selling a call option to receive the premium can be benefitial in the long term, since market excpects more volatility for the underlying asset than its actual realized volatility is. This has been the case according to previous studies, implied volatility has often been higher than realized volatility. This suggests that certain options carried a positive risk premiums for the call writers, essentially making the call premiums priced higher than their actual value. This indicates that for those writing covered calls, there may be potential for excess returns over the long term (Diaz & Kwon, 2016.) For instance, Figure 2 presents the comparison of average implied and realized volatility for S&P 500 index options from 1988 to 2001.

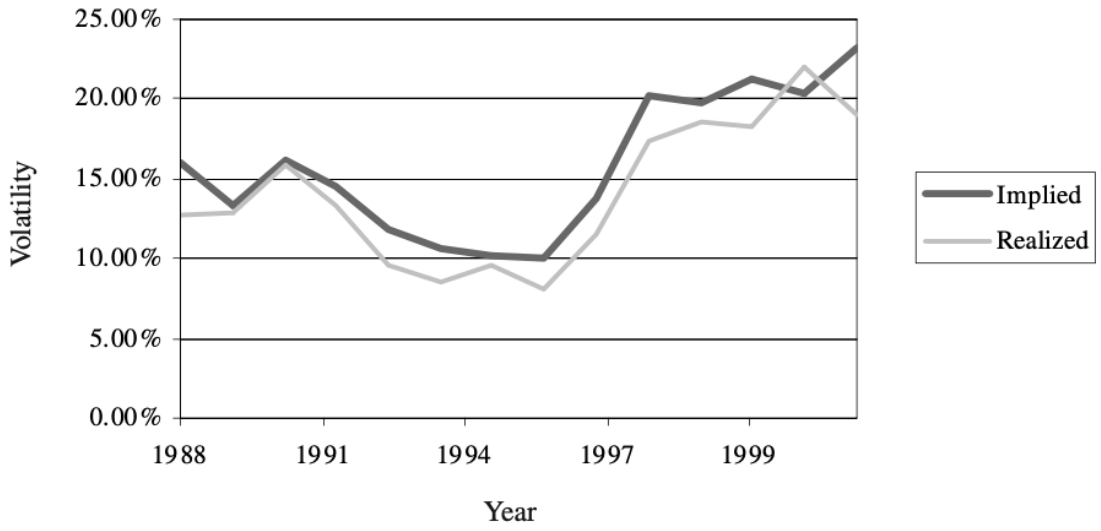

Figure 2 Average implied and realized volatility. [2]

2.4 Effect on returns and risk

There have been previous studies made about the performance of the covered call strategy compared to the traditional buy and hold strategy. These studies have been done mainly on US indexes and companies. Board et. al. (2000) summarized the US studies made on the performance of the covered call strategies; eight studies found a rise in returns, two found no change, and eleven found a fall. All studies without exception found a decrease or no change in the variance of returns. Four out of the 22 studies found no change in

[2] (Whaley 2002, 41)

variance of the returns, therefore, a vast majority of the studies found that the covered call strategy decreases the variance of returns (Board et. al. 2000.) It's important to highlight that earlier research primarily concentrated on analysing the performance of share portfolios or indices, rather than individual stocks. Typically, there's a distinction in how covered calls perform on single stocks versus on a portfolio of stocks or an index (Board et. al. 2000).

Covered call strategy could be used as an effective tool when done on individual stocks that one believes in long term but sees that due to market conditions or the current state of the company the stock is anticipated to yield poor results in short term. In bullish market scenarios or when the market prices of options are relatively low, it may be advantageous to overwrite the underlying asset only partially, or to avoid overwriting altogether (Diaz & Kwon, 2016.)

Han and Dadlani (2006) studied outright stock investment versus call writing on Dow Jones Industrial Average (DJIA) companies during the period of 1990-2003. Their findings showed that from 1990 to 2003, covered call writing substantially decreased the volatility of returns, yet it did not significantly lower returns. The results from this study suggest that through covered call writing investors do not have to sacrifice returns to reduce risk (Han & Dadlani, 2006). Based on these previous studies, a following hypotheses H1 and H2 can be formed:

H1

H0: Covered call (CC) strategy reduces risk.

H1: Covered call (CC) strategy increases risk.

H2

H0: CC strategy increases risk adjusted returns.

H1: There is no change in risk adjusted returns.

In 2002, the CBOE S&P 500 BuyWrite Index (BXM) was launched by the Chicago Board Options Exchange (CBOE). This index was created to monitor the returns of the covered call strategy where S&P 500 index is the underlying asset. Robert Whaley (2002)

demonstrates in his study that from 1988 to 2001, the index yielded returns nearly equivalent to the S&P 500 but with a monthly standard deviation of returns one-third lower than that of the S&P 500 (Whaley, 2002). Feldman and Roy (2004) and Callan Associates (2006) have replicated Whaley's analysis, reaching similar conclusions. Hill et. al. (2006) research indicated that the BXM index performed best compared to the S&P 500 during periods of low volatility, such as the early 1990s, and during bear markets from 2000 to 2002. However, during extended bullish periods like from 1995 to 1998, when the S&P 500's price doubled, the BXM index lagged the S&P 500 by over 5 percentage points annually (Hill et. al. 2006). By nature of the covered call strategy, investor needs to be willing to accept some underperformance, in relative to the outright stock or index investment, in spectacularly strong equity markets (Hill et. al. 2006). Within the European market, McIntyre and Jackson (2007) identified comparable results with covered calls on the FTSE 100, indicating covered call writing's effectiveness across different markets. Building upon the findings of earlier research, the following hypothesis H3 can be made:

H3

H0: CC strategy's excess returns are positive when stock returns are average or below.

H1: CC strategy's excess returns are negative when stock returns are average or below.

2.5 Out-of-the-money call writing

One of the most important factors to consider when using the CC strategy is to decide the moneyness of the call option. As previously mentioned, the call option can be divided into three subcategories which are out-of-the-money (OTM), at-the-money (ATM) and in-the-money (ITM) options.

Hill et. al. (2006) studied the results between outright investment to S&P 500 index, ATM covered call writing, 2% OTM and 5% OTM covered call writing for the period 1990-2005 with one-month to expiry call options. The research found that the 2% OTM call writing strategy had higher returns compared to the ATM strategy. Leggio & Lien (2002) also discovered in their comparison of returns, from options that are slightly in-the-money versus those slightly out-of-the-money, that the findings indicate the OTM strategy to be

the most appealing approach. The results are as expected given the OTM strategy's approach of selling options that, considering the market's positive expected return, tend to be near or at the money when they expire (Hill et. al. 2006).

Hill et.al. (2006) found that the risk associated with OTM strategy doesn't significantly surpass that of the ATM option strategy. Moreover, this strategy continues to offer higher returns compared to the outright investment to the underlying asset but with roughly two-thirds the risk associated. A strategy of overwriting by selling calls that are just slightly out-of-the-money showed less volatility in annual returns compared to the ATM strategy. This was because it permitted investors to benefit from up to 2 percent movements in the underlying asset each month. While this strategy didn't outperform the ATM strategy as much during bear markets, its performance was remarkably steady. The strategy's consistent performance across diverse market conditions makes it a potentially more attractive alternative than the ATM strategy, primarily due to its stability and reliability in generating returns (Hill et. al. 2006.)

Hill et. al. (2006) also found that the 2% OTM strategy's performance aligns closely with a target delta, the probability of the call being exercised, of 30 percent. Due to this, Hill et. al. (2006) suggest that the optimal strategy employs OTM options, selecting a higher strike price during periods of increased market volatility and a lower strike price in more stable market conditions. The option's strike price is thus determined by aiming for a specific delta, rather than just using the 2% OTM strike price, since the strike price can vary based on the market's implied volatility (Hill et. al. 2006.)

2.6 American and European style options

The main difference between American and European style options is the buyer's right to exercise the option before the specified maturity date. American style options can be exercised at any time by the buyer, and European style options can only be exercised at the time of the maturity. This distinction between the American and European style options brings alight a few notable differences in the pricing of these options. European style options are usually priced with the Black-Scholes formula since it doesn't have to take account the early exercise possibility. Due to the possibility of early exercise, American style option premiums are priced higher compared to the European style options (Board et. al. 2000.)

Diaz & Kwon (2016) examined the performance of the covered call strategy using the largest equities in the S&P 500 index. They note that since exchange-traded options for these assets are only offered as American style, they use them as a substitute to European options in the covered call strategy. Due to possible arbitrage profits, an American style option should always have a value greater than the immediate gain from exercising it. Therefore, it's uncommon for American options to be exercised prior to their expiration date, making them an effective alternative to European options for implementing a covered call strategy (Diaz & Kwon, 2016.) McIntyre and Jackson (2007) also examined the performance of covered call strategy using American style options. They note that even though the options possessed the early exercise feature, there was not any evidence to imply that early exercise occurred in the life of the call options used. American options are the most used option style in the market. Hence in the context of covered call strategy, it is more practical to use the American style call option as a basis compared to the European (Myneni, 1992.)

Klemkosky & Resnick (1980) examined the put-call parity and, in addition to research mentioned earlier, found that the early exercise feature in American style options is not beneficial for a rationale investor. The ex-ante analysis on put-call parity revealed that price corrections in mispriced options occur rapidly enough to eliminate most opportunities for economic profits from arbitrage. This rapid correction reduces the incentive to exercise American options prematurely, as the potential for profit from such exercises is limited by market efficiency. Klemkosky & Resnick (1980) also found that when taking account of the transaction costs it would not be beneficial for an investor to exercise the call option before its maturity. Even for member firms of exchanges, who might have lower transaction costs, the study found that economic profits are unlikely after accounting for these costs (Klemkosky & Resnick, 1980).

2.7 Duration of the call option

One significant factor that impacts the returns of the CC strategy and the premium received is the duration (time to maturity) of the call option. Hill et. al. (2006) studied the return differences between one-month and three-month maturities with various moneyness levels and found that, in all cases, strategies involving the sale of three-month call options fell short in performance compared to those that sold one-month options. This outcome is believed to stem from the lack of chances in a three-month strategy to adjust

the strike price each month during swiftly ascending markets. Additionally, the three-month strategy, compared to the one-month strategy, lacks to engage more often in the benefits of time decay (theta**)** during periods of significant bear market volatility and take advantage of the difference between implied and realized volatility more regularly throughout the year (Hill et. al. 2006.) Furthermore, the tactic of selling call options with a one-month time to maturity capitalizes on the accelerated depreciation of an option's time value as it nears expiration. This phenomenon, known as option's time decay, tends to intensify in the final month of an option's life. This is also known as the option's Greek letter theta, which is a measure of the rate of decline in the value of an option due to the passage of time (Han & Dadlani, 2006.)

Figelman (2008) came to same conclusions in his study about the returns and risk of various covered call strategies. Figelman (2008) examined the variations among options with one-month, six-months, and one-year maturities under the CC strategy, concluding that, given a steady implied-realized volatility spread across all option expiry periods, opting for calls with shorter durations is the preferred tactic. Figelman (2008) noticed that selling call options with a shorter lifespan turns the gap between implied and actual volatility into profits more rapidly than if one were to sell options with a longer lifespan. Annualized cumulative return increases as the expiration time shortens, confirming the advantage of using the CC strategy with options that expire sooner. The primary advantage is due to the quicker realization of the implied to realized volatility differential when dealing with short-term options (Figelman, 2008.)

3 Methodology

3.1 Data

This study's dataset was obtained from the LSEG workspace and spans from 19.12.2019 to 17.12.2021. The data includes the daily closing prices along with the call premiums, with a strike price 2-3% above (out-of-the-money) the market value for the eligible companies. The criterion for the data is as follows: 1) The company must be a listed company in Nasdaq Helsinki 2) The company must have exchange tradeable options in the European market 3) The company must have the required options and daily closing price data during the selected time period for return and risk estimations 4) The exchange tradeable options must be American-style 5) The selected call option's strike price must be 2-3% out-of-the-money compared to the stock's closing price on the third Friday of each month in the selected time period 6) The chosen option's time to maturity must be one month (to the following third Friday).

Based on previous studies the 2-3% out-of-the-money call option is chosen. Since the OTM strategy performs slightly better and didn't significantly increase the risk, compared to ATM or ITM strategy, the 2-3% OTM strategy is chosen for this study (e.g. Hill et.al. 2006, Leggio & Lien 2002). The selection of a strike price that is 2 to 3% out-of-the-money is due to the varying levels of liquidity in the options markets across the different companies under consideration. This variability in options market liquidity means that it's not always possible to identify a strike price that is precisely 2% or exactly 3% out-of-the-money. Consequently, a range between 2 to 3% is utilized to accommodate the differing liquidity conditions, ensuring that a suitable strike price can be selected.

Given that American-style options are the most used style in the financial markets, and for certain assets and stocks represent the only type of exchange-traded options available, this research prefers to focus on American-style options for assessing the covered call strategy's performance. This preference aligns with the practices observed in existing literature (e.g. Diaz & Kwon 2016), which also employs American-style options for similar analytical purposes. This approach ensures the study's relevance and applicability to the real-world trading environment, where American-style options play a critical role in investment strategies.

Drawing from prior research, this study focuses on call options with one-month to maturity. According to findings by Hill (2006) and Figelmann (2008), options with a one-month till expiration were identified as being the most advantageous in terms of expected returns. This performance is linked to the strategic utilization of the options' time decay characteristic, which is most significant during the shortest time periods.

The final dataset consists of total 10 Finnish companies' daily closing prices from 19.12.2019 to 17.12.2021 and the 2-3% call premium prices for the selected companies. The selected 10 companies are detailed in Table 1.

Company	**Abbreviation**
Elisa Oyj	ELISA
Nokia Oyj	NOK
UPM Kymmene Oyj	UPM
Neste Oyj	NESTE
Fortum Oyj	FORTUM
Nordea Bank Oyj	NDA
Sampo Oyj	SAMPO
Stora Enso Oyj R	STERV
Telia Company AB	TELIA
TietoEVRY Oyj	TIETO

Table 1 The companies used in this study.

3.2 Return and risk

In assessing the effectiveness of the covered call (CC) strategy, compared to the traditional buy and hold strategy, we focus on two critical dimensions: returns and risk. By comparing the returns and risk between the two strategies we can evaluate the performance of the CC strategy's practical use to buy and hold strategy. The evaluation process involves calculating the returns generated by each strategy, with a particular emphasis on the CC strategy's alpha, which represents its excess returns over the buy and hold strategy. Such an analysis not only shows the CC strategy's performance

across various market scenarios but also examines how individual stock performance influences these excess returns. Through this comparison, we gain insights into the potential advantages and limitations of employing the CC strategy in different market conditions.

The methodology for calculating returns differs between the covered call strategy and the traditional buy and hold strategy. In CC strategy, the option call premium is added to the returns compared to the traditional buy and hold. Additionally, CC strategy's returns varies based on if the call option is in-the-money or out-of-the-money. Given that both strategies include holding a long position in the underlying asset, this study did not specifically consider dividends in the cash flows generated from each respective strategy (e.g. McIntyre & Jackson, 2007). For the simplification of the calculations, transaction costs are not considered either. Returns for the buy and hold strategy is thus calculated as follows:

$$R_{t+1} = (S_{t+1} - S_t)/S_t$$

where R_{t+1} is the return at time *t+1*, S_{t+1} is the stock price at time *t+1* and S_t is the stock price at time *t*. The CC strategy's return is calculated similarly but with the addition of call premium. However, there is a difference between the calculation of returns depending on if the stock price is higher or lower, on the third Friday of each month, relative to the call option's strike price. Should the stock price exceed the strike price upon expiration, it is presumed that the buyer will exercise the option, leading to the following calculation for the return:

$$R_{t+1} = (X + C_t - S_t)/S_t$$

where X is the call option's strike price and C_t is the call option price at time *t*. The call option price is essentially the premium that the call seller receives when writing the covered call on the underlying asset. However, if the stock price upon expiration is equal or below the strike price, it is presumed that the buyer will not exercise the option, leading to the following calculation for the return:

$$R_{t+1} = (S_{t+1} + C_t - S_t)/S_t$$

For our sample, we calculate 24 monthly returns, both with and without the call option writing, with earlier equations. The timing for *t+1* is consistently aligned with the

option's expiration date, which falls on the third Friday of each month, while time *t* corresponds to the third Friday of the preceding month. Based on previous studies, the selected options are chosen to be 2-3% out-of-the-money. In the calculations of returns, the option price C_t is based on the option's settlement price at time *t*, which is determined at the end of trading from that Friday.

The risk associated with CC strategy and the buy and hold strategy is calculated as follows:

$$\sigma_r = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}\left(r_i - \mathbb{E}(r)\right)^2}$$

where σ_r is the standard deviation of monthly returns, N is the number of calculated monthly returns and r_i is the monthly return each month. $\mathbb{E}(r)$ is the expected return calculated from monthly returns. Both, the CC strategy, and the buy and hold strategy, are calculated with the previous formula.

To assess the relationship between returns and risk, the selected metric is the Sharpe ratio. This ratio evaluates the returns in relation to the asset's total risk, which is quantified by the returns' standard deviation. For the purposes of calculating the Sharpe ratio, the risk-free rate is derived from the European Central Bank's (ECB) average short-term rate for the specified timeframe. The ECB's short-term rate serves as a benchmark for the risk-free rate in European markets, comparable to the T-bill rate in the US. Sharpe ratio is calculated as follows:

$$S_i = \frac{R_i - R_f}{\sigma_i}$$

where S_i is the Sharpe ratio for the stock *i* and R_i is the average return for stock *i*. R_f is the ECB's risk-free rate and σ_i is the standard deviation of returns for stock *i*.

4 Results

This section examines the findings derived from the dataset selected for this research, offering a detailed examination and analysis of the results. This includes a comparative analysis with previous research and evaluates how the findings align with the initial hypotheses. The statistical measures such as the average, median, and standard deviation of the dataset's returns are outlined in Tables 2 and 3. Additionally, the analysis incorporates the Sharpe ratio for both the covered call strategy and the buy and hold approach. All results are based on monthly returns. Moreover, Figure 3 illustrates the dynamic between the returns from covered call and those from direct stock investment, showcasing the excess returns (alpha). The excess returns of covered call writing are determined by deducting the returns from stock investments from those obtained through covered call writing over the same period. This complete analysis not only highlights the performance metrics but also provides insights into the risk-adjusted returns of the covered call strategy.

	Buy&Hold			
	Average return	**Median Return**	**Standard deviation**	**Sharpe ratio**
ELISA	0,67 %	1,00 %	5,02 %	0,23
NOK	2,87 %	1,94 %	12,04 %	0,28
UPM	0,49 %	0,37 %	8,19 %	0,12
NESTE	2,42 %	4,46 %	12,65 %	0,23
FORTUM	1,52 %	2,29 %	11,18 %	0,18
NDA	2,07 %	3,20 %	10,44 %	0,25
SAMPO	1,04 %	1,63 %	9,75 %	0,16
STERV	1,51 %	1,24 %	11,14 %	0,18
TELIA	-0,39 %	-0,70 %	6,08 %	0,02
TIETO	0,22 %	1,06 %	8,54 %	0,08

Table 2 Summary of buy and hold strategy's results.

	Covered call			
	Average return	**Median Return**	**Standard deviation**	**Sharpe ratio**
ELISA	1,11 %	1,57 %	3,32 %	0,48
NOK	2,62 %	4,77 %	8,86 %	0,35
UPM	0,89 %	2,05 %	6,48 %	0,21
NESTE	0,60 %	4,13 %	9,17 %	0,12
FORTUM	0,82 %	3,36 %	9,00 %	0,15
NDA	1,63 %	4,57 %	9,00 %	0,24
SAMPO	0,98 %	3,09 %	8,89 %	0,17
STERV	0,58 %	2,53 %	8,00 %	0,14
TELIA	0,47 %	1,03 %	5,74 %	0,17
TIETO	0,52 %	2,86 %	7,35 %	0,14

Table 3 Summary of CC strategy's results.

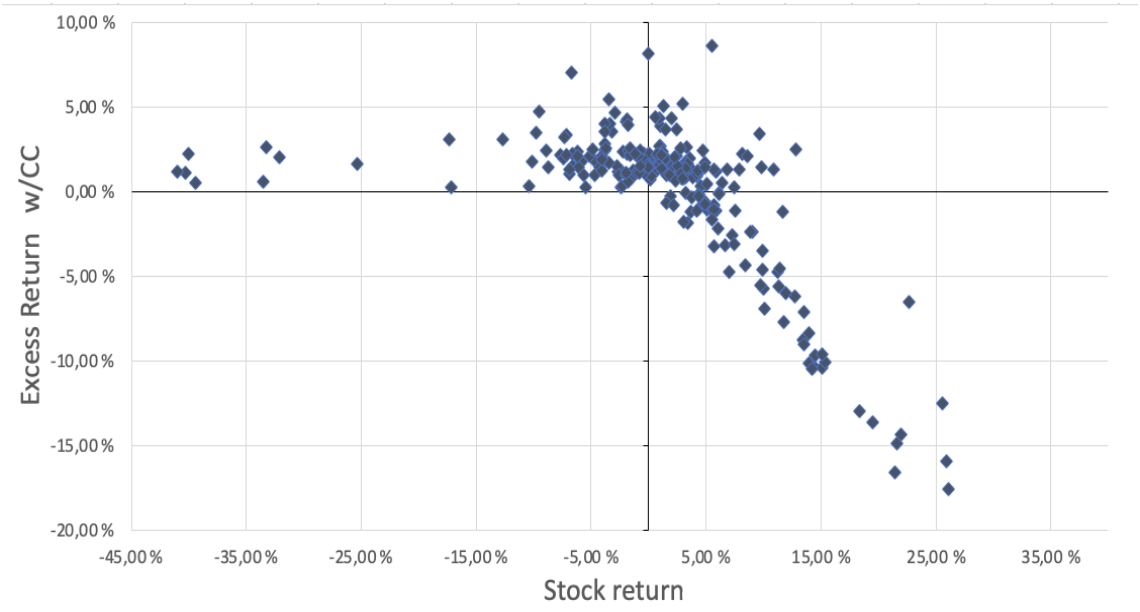

Figure 3 Stock return's effect on covered call strategy's excess returns.

4.1 Returns

Examining the results, from Tables 2 and 3, reveals that the covered call strategy outperformed in terms of monthly returns for 4 out of 10 companies when considering the average returns. However, when looking at median monthly returns, 9 out of 10 companies showed better performance with CC strategy.

This discrepancy between average and median performance can be attributed to the trade-off involved in covered call writing. As previously mentioned, the covered call strategy involves exchanging the potential for substantial gains in the underlying asset's price for gaining immediate income from the call option's premium. As a result, while a few exceptional stock price increases can significantly elevate the average returns of a buy-and-hold strategy, such irregularities have less influence on the median returns, which tend to better reflect typical outcomes rather than exceptional ones. This explains why the median results might show a more consistent outperformance by the covered call strategy compared to average returns, affirming the null hypothesis of H3 that a covered call approach generally outperforms a conventional buy-and-hold strategy when underlying asset returns are moderate.

Further examination of Tables 2 and 3 shows that the only company that had higher monthly median returns with buy and hold strategy compared to CC strategy was Neste, with nearly 4,5% median monthly return compared to CC strategy's 4,13%. This combined with analysis on Figure 3, that shows the relationship between covered call strategy's excess returns to stock returns, further affirms the null hypothesis of H3. Figure 3 shows that as the stock returns start to increase, the excess returns with covered call writing start to diminish. Further examination shows that when monthly stock returns start to approach and exceed 5%, the excess returns not only diminish but become negative. Specifically, Figure 3 shows a downward trend in excess returns as one moves rightward along the x-axis, indicating higher returns from the buy and hold strategy in strong equity markets. Based on these findings, we accept the null hypothesis of H3:

H3

H0: CC strategy's excess returns are positive when stock returns are average or below.

4.2 Risk

In this study, we employ the widely recognized, and in prior studies used, financial metric of standard deviation to assess risk. Upon reviewing the results presented in Tables 2 and 3 it becomes evident that the standard deviation with the covered call strategy is reduced for each company analysed. Standard deviation of returns decreased with 10 out of 10 companies examined. The result aligns with earlier studies. This also supports the earlier H1 null hypothesis that the CC strategy reduces risk. This decrease in volatility can be attributed to the mechanics of the covered call strategy itself. By adding the premium to the returns, investors effectively lower the overall risk profile of their investment, as the cushion provided by the premium lessens the effect of stock price volatility. Based on prior research and earlier analysis, this is particularly appealing in uncertain or fluctuating markets, where the likelihood of price declines is more probable. Therefore, the use of covered calls is a strategic choice for investors aiming to stabilize their portfolio returns during market volatility. Based on these findings we accept the null hypothesis of H1:

H1

H0: Covered call (CC) strategy reduces risk.

4.3 Risk adjusted returns

For this study, the Sharpe ratio was selected as the metric to evaluate the performance of covered call strategy returns when adjusted to risk. The Sharpe ratio is widely recognized as a robust measure for assessing how well investment returns compensate for the risk taken. It measures the return achieved over the risk-free rate, relative to the volatility experienced, thereby offering a clear picture of the risk-adjusted return efficiency.

Upon reviewing the results from Tables 2 and 3, it was found that 6 out of 10 companies experienced an increase in their Sharpe ratio, compared to buy and hold strategy, indicating an improved risk-adjusted performance for the majority. However, despite these positive results, the limited sample size and the nature of the data might pose challenges in conclusively determining the overall effectiveness of the covered call strategy from a risk-adjusted perspective.

It is also important to note that the Sharpe ratios calculated here are based on average returns. There's an argument to be made that using median returns instead might provide a more stable and representative measure of risk-adjusted performance. Median-based calculations tend to be less influenced by extreme values, which can skew the average and give a distorted view of typical performance levels. Thus, if median returns were used, the results might show a more favorable adjustment for risk, providing stronger support for the effectiveness of the covered call strategy in generating consistent, risk-adjusted returns. Based on previous research and the results from this study, the null hypothesis H2 is accepted:

H2

H0: CC strategy increases risk adjusted returns.

5 Conclusions

The purpose of this study was to find out whether investors can enhance their returns using covered call writing, and how does variation in stock performances influence the excess returns, with a focus on Finnish stock market companies. The initial hypothesis that covered call writing increases returns was determined to be partly true. The covered call writing increases returns compared to the more traditional buy and hold strategy, but the excess returns are heavily influenced by the market conditions. Especially when used on individual stock, the covered call strategy is most efficient compared to outright stock investment in sideways markets or times when returns are not great.

The risk associated with covered call writing can be determined to be clearly decreasing. This is supported by the theoretical framework in addition to previous studies and the results from this study. When examining the risk-adjusted returns, it was observed that the Sharpe ratio for most companies analyzed was higher with covered call compared to outright stock investment. These findings suggest that covered call writing can be an effective strategy for investors looking to improve their risk-adjusted returns, particularly for those who are risk-averse, as it reduces volatility without sacrificing too much of the returns.

It must be noted that some factors may affect the results of this study. For the simplification of calculating the returns this study did not account for transaction costs. Writing a call on a stock that one already owns increases transaction costs involved. Additionally, if the sold call finishes in-the-money and the call option is exercised, investor must buy the owned stock position back if the investor believes that the underlying asset could be a good investment in the long-term. Thus, engaging in covered call writing increases transaction expenses, as does repurchasing the underlying asset when sold calls end in-the-money and are exercised.

Another consideration is the data limitation concerning Finnish stock market companies. Given the relatively small size of the Finnish market, the sample size is limited, and not many companies have exchange-tradable options available. Moreover, historical data for those that do may not be extensive enough for a thorough analysis.

For further research it would interesting to study how investors' utility function affects the performance of covered call strategy. As previously mentioned, CC strategy could be

a useful tool for risk averse investor and thus further research on how behavior towards risk impacts the utility of covered call writing would be interesting. The appeal of the covered call strategy lies in its ability to generate consistent income through premium collection, which can be particularly attractive in fluctuating or sideways markets. However, it is important for investors to recognize the opportunity cost involved: the possibility of missing out on significant gains from the stock’s appreciation. Investors who prefer the covered call strategy are essentially willing to sacrifice potential profits in exchange for the steady income and reduced volatility associated with collecting the call option premiums. This trade-off reflects a strategic decision based on the investor's risk tolerance, investment goals, and market outlook.

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