

Portfolio Hedging with Option Strategies: An Applied Study in Amman Stock Exchange (ASE)

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ABSTRACT

The purpose of this study is to investigate the impact of ATM covered call writing and ATM protective put option strategies in pure portfolio performance from risk and return dimensions. Consequently, the study aimed to investigate whether the two hedged portfolios perform better than unhedged portfolio, testifying the study hypotheses and to answer the relative questions. The study sample consisted of fifty five companies listed in ASE. Quarterly return of individual stocks after hedging with option strategies as a dependent variable and equally weighted index return (a proxy of market portfolio) as an independent variable were used. Black and Scholes model has been implemented to calculate the ATM option call and put prices. Basic investment characteristics were calculated using Market Model for individual stocks and portfolios.

The study concluded that covered call option is superior to the other two strategies and more desirable for hedging in ASE. Both hedging strategies result in magnificent reduction in unsystematic risk. Simultaneously, the covered call strategy result in considerable reduction in systematic risk. Hedging a portfolio by selling covered call strategy lead to improve the performance of the portfolio according to the AIMR's measures, Sharpe ;Treynor ; Alpha Jensen; CAPM and Sortino Ratios.

Keywords: Hedging strategies; Call and Put options; Modern portfolio theory; Securities analysis; Black & Scholes Model; Amman Stock Exchange.

INTRODUCTION

The increasing volatility of the equity market in recent years has been very deleterious for portfolio managers with strong risk constraints. This is particularly true for pension funds, banks investment portfolios, insurance companies, and individuals who wish to preserve their capital. Moreover, the recession of Arab stocks during the first quarter of the year 2006 had extended to Amman Stock Exchange; this caused stocks to drop in value. At the same time, share prices fluctuated randomly without any means to control them. For example, Amman Stock Exchange revealed declining performance in stock prices for listed companies throughout the year 2006, as the weighted

price index closed at 5518 points at year-end of 2006 compared with 8192 points at the year-end 2005 – i.e. a 33% decrease. To overcome such volatilities, Modern Portfolio Theory offers diversity, which eliminates unsystematic risk. However, portfolios are still exposed to systematic risk which constitutes about 50% of the total risk for diversified portfolios (Tergesen, 2001). This has caused great concern in many well-developed financial markets about controlling risk connected with volatility and developing a number of financial innovations and strategies that can be used to hedge portfolio risk.

From among other option hedging strategies, this study had a particular interest in the buy-write strategy (the so-called covered call strategy) and selling covered put (the so-called protective put strategy). Buy-write strategy combines a long position on a stock or a basket of stocks and simultaneously a short position on a call

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option on the same stock or basket of stocks in order to pay off the downside risk. Buying the protective put option involves taking a long position in both stock (underlying asset) and put option guaranteeing the investor a limit on losses or unfavorable outcomes and a probable infinite profit.

This study aims at proving the suitability of hedging strategies for Amman Stock Exchange. In order to do so, the quarterly buy-write strategy and protective put strategy were applied to a certain portfolio, and the risk-adjusted performance was measured before and after applying both strategies. The study had chosen to implement the well known Sharpe; Treynor; Jensen; CAPM and Semi variance measures in order to evaluate the performance of the implemented strategies. The research is based on data collected from the period 1996-2006, and uses many statistical instruments like SPSS, in addition to the option pricing model of Black and Scholes.

Problem Definition

Fluctuation and variability are the main attributes of financial markets worldwide. This encourages many researchers to find strategies to manage risks inherent in investment and financial securities. Portfolio Theory emerged to support these efforts and reduced successfully one facet of these risks that is unsystematic risk. However, academics and practitioners in the stock exchange, especially Amman Stock Exchange (ASE), find themselves exposed to high levels of risk resulting from common factors that cannot be diversified away. These factors still expose the owners of portfolios to intensive risks represented in decreasing market value. This fact incited the researchers to apply new techniques, developed and implemented successfully in many developed financial markets around the world, to hedge investments against the different kinds of risks.

Options represent one of the most widely used and significant financial engineering instruments in well-developed financial markets to hedge such risks. This fact induced the researchers to apply the two basic option strategies to identify and analyze any significant effect on controlling risk and enhancing return in (ASE).

The problem of the study can be stated as follows:

1. What is the effect of applying hedging strategies with options on portfolio return?
2. What is the effect of hedging strategies with options on reducing portfolio's systematic risk?
3. What is the effect of hedging strategies with options on portfolio's unsystematic risk?
4. What is the suitable hedging strategy for a portfolio that achieves the best protection and return?
5. Will hedging strategies be successful in Amman Stock Exchange?

Study Objectives

This study aims at investigating whether option hedging strategies will be successful at (ASE). Accordingly, the following objectives should be achieved:

1. Examining the effect of portfolio hedging with options on systematic risk.
2. Scrutinizing the effect of portfolio hedging with options on the expected rate of return.
3. By proving that most of the risks can be managed successfully through these strategies, this study is aiming at attracting domestic and foreign capital investment to (ASE).

Study Importance

We think that this study is one of few studies that deal with this issue and hope to provide the Arab financial markets and libraries with needy materials. Furthermore, it is also important because of the following reasons:

1. This kind of research is important as long as fluctuation and instability exist in the financial markets.
2. Sustaining the national wealth, portfolio investment and foreign investment by providing them with the best hedging strategies.
3. The general hedging strategies to be investigated in this study could be applied to various types of underlying assets like currencies, interest rate and commodities.
4. The importance of this study ensues also from

the recent orientation towards attracting foreign and local investments in all economic sectors, especially the financial market. Accumulating these investments contributes to increasing the liquidity and depth of Amman Stock Exchange (ASE). Moreover, ASE investors must have an efficient instrument to protect these investments.

Study Hypotheses

In order to achieve the study objectives, the following first three hypotheses were set in relation to Covered Call Option hedging strategy, while the next three were hypothesized as related to Covered Put Option hedging strategy. The seventh hypothesis considers how these were hypothesized as two strategies, in general, will be successful.

First Hypothesis Hedging the investment portfolio with covered call option strategy will earn a higher return than unhedged portfolio.

Second Hypothesis Hedging the investment portfolio with covered call option strategy will reduce the unsystematic risk.

Third Hypothesis Hedging the investment portfolio with covered call option strategy will reduce the systematic risk.

Fourth Hypothesis Hedging investment portfolio with protective put option strategy will earn a higher return than an unhedged portfolio.

Fifth Hypothesis Hedging the investment portfolio with protective put option strategy will reduce the unsystematic risk.

Sixth Hypothesis Hedging the investment portfolio with protective put option strategy will reduce the systematic risk.

Seventh Hypothesis Portfolio risk adjusted-return will be improved by applying option hedging strategies in terms of the following performance measures: Sharpe; Treynor; Alpha Jensen; CAPM and Sortino Ratios.

THEORETICAL FRAMEWORK AND PREVIOUS STUDIES

Option definition

Options are believed to have been used since ancient

times, but organized exchanges began trading options on equities in 1973 (Fischer and Jordan, 1995). The Chicago Board Options Exchange (CBOE), the oldest and largest market, began option trading in April 1973. It initially traded only call options on about two dozen stocks. Trading volume grew rapidly, and so did the number of option contracts available. By January 1997, CBOE listed puts and calls on 881 common stocks. Today it is the largest option exchange in the world in aggregate dollar value of contract traded. Among U.S securities exchanges, only the New York Stock Exchange (NYSE) is bigger (Emerery et al., 2004).

Some identify options as one type of derivatives that derive their value from an underlying asset, which could be a security or a commodity, others defined it considering the two basic types:

1. Call Option: grants its holder the right to buy a specific amount of an asset at a specific price at any time up to and including a specified date.
2. Put Option: Gives its holder the privilege of selling or putting to a second party a fixed amount of some stock at a stated price on or before a predetermined day (Bhalla, 2004).

Since the option gives the buyer a right and the seller an obligation, the buyer has received something of value. The amount paid by the buyer to the seller for the option is called the option premium (Gitman and Joehnk, 1999). Four specifications of any option contract appear clearly in the previous definitions:

1. Option type (put or calls).
2. The underlying asset (stocks, currencies, interest rate, etc...).
3. The expiry date.
4. The striking (exercise) price (McMillan, 1986)

The importance of the option pricing theory stems from the wide use of options and the need of investors to determine the appropriate value of an option to enable them make rational investment decisions by computing the expected rate of return.

There are three basic positions for a specific call: At-In – Out – The Money; At the Money (ATM) means that the exercise price of the option equals the current price

of the underlying share. In the Money (ITM) means that the call option would result in positive value (profitable position) to the holder if exercised because the exercise (strike) price of the option is less than the current price of the underlying share. Out the Money (OTM) means the opposite condition, where an option's strike price is unprofitable for the holder when compared to the stock's current price (Keasey et al., 2000).

Portfolio Hedging

Individual securities have risk-return characteristics of their own. Portfolios, which are combinations of securities, may or may not take on the aggregate characteristics of their individual parts. Portfolio analysis considers the determination of future risk and return in holding various selections of individual securities (Fischer and Jordan, 1996).

A hedge is simply a combination of two or more securities into a single investment position for the purpose of reducing risk. This strategy might involve buying stock and simultaneously buying a put or selling call on that same stock, or it might consist of selling some stock shortly and then buying a call (Gitman and Joehnk, 1985).

These investment strategies are designed to hedge portfolio positions by providing a minimum return on the portfolio while simultaneously providing an opportunity for the portfolio to participate in rising security prices (Jones, 2000).

Covered Call Hedging Strategy

The covered call strategy takes a long position in the underlying stock with selling call options on the same stock (McMillan, 1986). A simpler but low-risk strategy involves one call for each share of stock in the portfolio (Chance, 2004). If the stock is purchased simultaneously with selling (writing) the call contract, the strategy is commonly referred to as "buy-write". If the shares are already held from a previous purchase, it is commonly referred to an "overwrite". In either case, the mechanism is the same. When an investor writes a covered call, he agrees to sell stock for a specific price by the option's

expiration date (Tergesen, 2001:132). The long stock position protects the investor from the possibility of a sharp increase in the stock price.

Covered call strategy are often considered return enhancing and risk reducing (Hearth and Zaima, 2001). These strategies increase the income of stock ownership through the collection of option premiums, and they convert the prospects for uncertain future capital gains into immediate cash flows (L'habitant, 2000). This is why they are also considered as selling volatility strategies (Chandra, 1998).

The return of the covered call position is superior to the long only position as long as the stock price does not exceed exercise price (E). However, the call writer thereby loses potential capital gains should the stock price rise above (E). Options can affect the risk and return distribution for a portfolio, writing a covered call limits upside returns while not appreciably affecting loss potential. Moreover, buying a protective put has the effect of controlling downside risk (Reilly and Brown, 2000).

This strategy is the most basic and most widely used strategy combining the flexibility of listed options with stock ownership (Walker, 1991). For instance, covered call writing is often presented as an efficient way to increase income of stock ownership through the received option premium and convert the prospects for uncertain future capital gain into immediate cash flow (L'habitant, 2000).

Protective Put Hedging Strategy

A protective put is constructed by holding the underlying security and buying a put option (Bernstein and Damodaran, 1998). The rationale for a protective put is straightforward: it reduces some of the downside risk associated with owning stock, either by guaranteeing a sale price or offsetting losses on the stock with profits on the put (Hearth and Zaima, 2001). The protective put is insurance for a stock, for that the buyer pay a premium that assures him that in the event of a loss, the protective put will cover at least some of the loss (Chance, 2004).

The maximum loss from protective put is found as

the profit if the stock price at expiration ends below the exercise price. Above the exercise price, the profit is less than the payoff profile for the investment because of the cost of the put. The cost of the portfolio insurance has both direct and opportunity cost components. The direct cost is the amount spent on the puts. The opportunity cost consists of lost dividends and potential lost stock price appreciation (Radcliff, 1994). Below the exercise price, losses in the stock price are partially offset by gains from the put, resulting in a constant loss equal to the cost of the put (Jones, 2000). The investor loses the premium when the stock price declines, and gains unlimited profit if the stock price rises.

The amount of coverage the protective put provides is affected by the chosen exercise price. A protective put with a higher exercise price provides greater downside protection, but lower upside gain.

Previous Studies

Abid, Fathi; Mroua, Mourad; Wong, Wing-Keung (2007)

This study employs the mean-variance (MV) criterion and Capital Asset Pricing Model (CAPM) to investigate the performance of option strategies, including writing out-of-the-money (OTM) covered call and buying in-the-money (ITM) protective put, with that of the pure-stock investment by analyzing the French data in the entire 1999 year. The results from MV criterion show that none of these three strategies dominate the others but the CAPM statistics show that in general buying ITM protective put strategy obtains the highest performance, followed by the writing OTM covered-call strategy while the naked stock obtains the smallest values. This confirms the superiority of ITM protective put strategy, followed by OTM covered-call strategy by using the Beta coefficient, Sharpe ratio, Treynor and Jensen indices (ratios).

Machado-Santos (2006)

This paper addresses one of the most relevant and challenging issues in the area of portfolio management: the performance evaluation of stock portfolios hedged with options. The Portfolio Change Measure (PCM), that

uses an estimate of the risky asset's portfolio weight rather than an estimate of the expected return for the asset, was applied with a database consisting of 150 simulated portfolios of stocks delta hedged with options constructed as five underlying stock portfolios quoted on London Stock Exchange (LSE), and implemented thirty option delta hedging strategies on those portfolios quoted on London International Financial Futures Exchange (LIFFE). Three kinds of stock portfolio that underlie the option strategies were used, which are efficiently diversified portfolios, equally weighted stock portfolios and portfolios with randomly selected stocks during the period extending from October 1994 to October 2000. In order to evaluate the performance of those portfolios, the daily return was computed, ATM options and Black and Scholes OPM were used. Covered call and protective put have three month maturities. The results indicated that all strategies without transaction cost exhibit highly significant positive performance estimates. (Measured by mean)

El-Hassan, Nadima; Hall, Tony; Kobarg, Jan-Paul (2004).

This study analyzed the risk-return characteristics of a balanced portfolio with covered call strategies in the Australian market, across various asset classes including Australian equity 40%, international equity 25%, fixed income 20%, property 10%, and cash 5%. The study covers the period from July 1997 to June 2004. The covered call strategy was implemented by selling slightly OTM stock call options with maturities of three months. The portfolio was rebalanced quarterly, with the rebalance dates chosen to coincide with the quarterly option expiry date. The Sortino ratio* was also used to

* Sortino Ratio equals excess portfolio return per unit of downside risk (semi standard deviation of return). A variation of the Sharpe ratio which differentiates harmful volatility from volatility in general by replacing standard deviation with downside deviation in the denominator. Thus the Sortino Ratio is calculated by subtracting the risk free rate from the return of the portfolio and then dividing by the downside deviation (El-Hassan et al., 2004). The Sortino ratio measures the return to "bad" volatility. This ratio allows investors to assess risk in a better manner than simply looking at excess returns to total volatility, since such a measure does not consider how often the price of the security rises as opposed to how often it falls. A large Sortino Ratio indicates a low risk of large losses occurring. The ratio

assess the performance of the covered call strategies in terms of excess return per unit of downside risk. The results show that covered call strategies have the effect of enhancing the average return of the portfolio by +2.7%, reducing the standard deviation of returns by (7.36%), semi variance (12.5%) and (6.34%) of semi standard deviation and improving the risk-adjusted returns of the balanced portfolio, where Sortino ratio improved from 0.0975 to 0.1256 and Sharpe Ratio improved from 0.0756 to 0.0985.

Board, J. Sutcliffe, C. and Patrinos, E. (2000)

This study examined the performance of the covered call hedging strategies that investors actually employ, allowing for transaction costs and margins. It also uses a range of dominance criteria (mean-variance, mean-semi-variance, mean-variance-skewness, stochastic) and four utility functions to compare the performance of partly and fully covered call strategies with that of the underlying equity portfolio. For the partly covered strategies, equal values of call options were written on the twenty companies with the highest/lowest volatility or price-earnings ratio for the previous quarter, based on data from the London Business School (1992–5). The holding period for each covered position was one month, giving thirty six monthly returns per strategy. The thirty six monthly returns were computed for each of the five covered call strategies, as well as for the two uncovered index baskets. This study found that in every case, across a wide range of parameter values, the covered call strategy is preferable to the index basket and suggests that many investors prefer fully or partly covered call strategies and found support for the general statement, made by options exchanges, that writing covered calls is a beneficial strategy.

Ferguson, Robert (1993)

By using the formulas provided in the study, the researcher computed the stock long-term periodic return, and the initial price of the put using Black-Scholes formula, at-the-money stock plus put strategy's long-term return. After comparing the long-term annualized

periodic return of the stock alone with the long-term annualized periodic return of the stock plus put strategy, Ferguson concluded that the long-term annualized periodic return of the stock plus put strategy never exceed that of the stock, but approach it as the put's strike price approaches zero. Giving the formula for computing the long-term return for At-the- money stock minus call strategy, he concluded that it is below the At-the- money stock plus put strategy and never exceeds that of the stock, but approaches it as the call's strike price approaches infinity.

METHODOLOGY

This part explains and evaluates the research methods employed in this study. In addition, it describes the population of the study and its main contents, the sample of the study and its sources of data, procedures that will be followed to gather, analysis of data and testing of the hypotheses.

The Sample and Selection Criteria

The population of the study contains all companies listed on (ASE) as of January 1996. The sample of this study has been chosen depending on the following two criteria: First, continuous listing throughout the study period extended from the beginning of 1996 until the end of 2006. Second, continuous trading through the study period. Any stock not traded for three months or more were excluded from the sample. Fifty five companies achieved these two rules (see Appendix A). We think that this big sample which constitute more than 55% of the population and the long study period which covers more than 10 years can help to achieve the following: first, to build a well-diversified portfolio. Second, to cover all the ups and downs of the financial market. Third: AIMR** recommended that for evaluating financial investment, it is necessary to provide data for ten years at least (Jones, 2000).

** AIMR- The Association for Investment Management and Research is a nonprofit professional organization of investment practitioners and academics formed in 1990 in the United States from a merger of the Financial Analysts Federation and the Institute of Chartered Financial Analysts (ICFA).

was created by Brian M. Rom in 1986 as an element of Investment Technologies (www.en.wikipedia.org/)

Study Primary Data

The study database was obtained from three sources; Amman Stock Exchange, Central Bank, and Companies guide as a secondary data. These are elaborated as follows:

1. Stock Close Prices, which include monthly closing prices for all stocks in the sample throughout the study period. In case, there is no trade during specific month, the close price of the previous month will be used instead. The data related to the close price obtained from Studies and Research Department in ASE.

2. Market Index Price, as a proxy to market portfolio that consists of the monthly closing prices of General Weighted Index.

3. Quarterly Treasury Bills rate, as a proxy of quarterly Risk-Free rate of return. These data obtained from Central Bank of Jordan. The study had worked with quarterly call and put options and used Black and Scholes Model to quote market prices for the options that requires calculating the continuously compounded risk-free rate.

This study has excluded dividends because, it is considered as a compensation of transaction costs as explained by Groothaerth, 2003 and Abid et al., 2007.

Methods of Analysis

The research was conducted to investigate the effect of applying two of the option hedging strategies on a portfolio considering the two main dimensions of investment decision, which are the expected rate of return and the two kinds of risk. The statistical analysis was carried out using the SPSS software, the statistical analysis techniques were:

1. Descriptive statistics. The basic investment characteristics for the individual stocks and investment portfolios were calculated according to the *Market Model*, which is statistical in nature that the SPSS should be used and ANOVA as well.

2. Simple Linear Regression was used to test the significance of various relationships between dependent variable (unhedged and hedged portfolios) and the

independent variable (a market portfolio).

STUDY PROCEDURES

Data Treatment: One of the basic assumptions of portfolio theory is that, the distribution of return is normally distributed. So the researchers used Histogram tests to investigate the normality of return for unhedged, and for the other two hedging strategies. The results revealed that the return of the three portfolios appear normally distributed. Autocorrelation problem^{***} among residuals appeared in both portfolios without hedging strategy and with covered call hedging strategy. It was found that Durbin-Watson is less than the critical dL 1.48, so the null hypothesis has been rejected because there is statistical evidence that the error terms are positively autocorrelated. On the other hand, Durbin-Watson of portfolio with protective put equals 1.869, which is higher than dU 1.57; the null hypothesis has been accepted which mean that the result are not positively autocorrelated. In order to solve autocorrelation problem the RATS program was used according to the technique used by Black. See (Black, 2007)

Option Pricing Model (OPM): There is no option trading yet in (ASE) .So, in order to compute the return of stock and portfolio after hedging, the price of the option is required. Black and Scholes option pricing model used to price the call and put options by using special computer software program^{****}. The volatility used for any trading period is based on the historic variance in the preceding period; time to maturity is calculated up to the end of the period in which the strategy is being applied; and the risk-free rate is calculated from Jordan Treasury Bills as (Bradley and Walsh, 1988) did. To price call and put, the following

^{***} When autocorrelation occurs in regression analysis, the estimates of the regression coefficients no longer have the minimum variance property and may be inefficient. Also, the variance of the error terms may be greatly underestimated by the mean square error value.

^{****} The bsb3.xls computer software program attached with the textbook of Chance, 2004 and its web site www.cob.vt.edu/finance/faculty/dmc were used to estimate the call-put option prices.

two equations should be used:

$$C_a = PN(d_1) - Ee^{-(RFT)}N(d_2)$$

$$P_u = Ee^{-RFT}[1 - N(d_2)] - P[1 - N(d_1)]$$

where:

C_a = call option price.

P = the current market price of the underlying asset.

E = the exercise price of the option.

$e = 2.71828$, base of natural logarithm.

T = time remaining before expiration expressed as a fraction of a year.

RF = the continuously compounded risk free rate expressed annually.

σ = stock risk measured by the standard deviation of the continuously COMPOUNDED annual rate of return on the stock.

\ln = the natural logarithm function (Emery et al., 2004)

To hedge the investment portfolio with options by using the most familiar strategies-covered call and protective put- calculating the expected rate of return and the two basic types of portfolio risk require pricing the options using OPM. Thus, a Couple of assumptions should be identified:

a. Three months maturity date. Many studies proved that Black and Scholes provided accurate results when it is applied on three months maturity option, like Machado-Santos, 2006.

b. At-The-Money Options. L'habitant, 2000 and Ferguson, 1993 proved that OPM (Option Pricing Model) worked probably with ATM compared with OTM or ITM.

Hedging Returns

For simplicity, low risk strategy; one call (put) for each share of stock owned, has been written (bought). For hedging the portfolio using covered call strategy, the call option for each stock in portfolio quoted in specific time and after three months, at maturity, the return of each hedged stock in portfolio was computed using the

following equation:

$$- \text{Max} [(P_T - E), 0] + C_a + P_T - P_1 \quad (\text{Chance, 2004})$$

The same thing was applied on the purchasing put option. Quarterly return of the stock hedged with protective put was computed according to the following equation:

$$\text{Max} [(E - P_T), 0] - P_u + P_T - P_1 \quad (\text{Chance, 2004})$$

The end date of the first period (quarter) will be the beginning date for the second period, and so on, and then the option will be priced for the second period. The previous procedure was repeated for forty-four quarters of each stock, also it was repeated for the rest of the fifty-five stocks that composed the portfolio. Then the portfolio rate of return for each period was computed.

Systematic and Unsystematic Risk

Systematic risk is that portion of total variability in individual or portfolio returns is caused by factors which simultaneously affect the prices of all marketable securities. Changes in the economic, political, and sociological environment which affect securities markets are sources of systematic risk (Keasey et al, 2000), (Francis, 19805). Sometimes systematic risk is referred to as market risk (Ross et al., 2005). *Market Model* of Sharpe will be used to estimate the systematic risk; unsystematic risk; total risk and the expected rate of returns as follows:

$$\sigma^2 p = \beta^2 p \sigma^2 m + \sigma^2 ep$$

$$R_p = \alpha p + \beta p R_m \quad (\text{Sharpe and Alexander, 1990})$$

where: $\sigma^2 p$ = portfolio total risk; $\beta^2 p \sigma^2 m$ = portfolio systematic risk; $\sigma^2 m$ = quarterly market portfolio variance; $\sigma^2 ep$ = portfolio unsystematic risk; R_p = portfolio expected rate of return; αp = Constant or portfolio alpha; R_m = Quarterly average rate of return of the market portfolio. To calculate these figures, the quarterly hedge returns will be regressed on market quarterly rate of return, and from ANOVA calculate the

unsystematic risk from the mean square error, for easier in calculating the systematic risk for the hedged portfolios with different strategies and compare it with the basic investment characteristics for the unhedged portfolio especially the expected rate of return. Unsystematic risk is that part of total risk that specifically affects a single asset or a small group of assets. It is referred to as firm-specific risk. It can be eliminated through efficient diversification, and most investors do indeed diversify, either by holding a large portfolio or purchasing shares in a mutual fund (Weston et al, 1996). Modern portfolio theory (MPT) describes how to alter the risk and return of a portfolio by changing the mix between assets (Siegel, 2002).

There has been growing recognition that derivative are ideal tools for accomplishing myriad changes in a portfolio basic characteristics. For example, systematic and unsystematic risk of equity portfolios can be modified by using options derivatives. Options can affect the risk and return distribution for a portfolio (Reilly and Brown, 2000); (Ross et al., 2005) or to sell risk to another party (Compbell and Kracaw, 1993).

Valuation of Hedged Portfolios

Sharpe performance measure. Sharpe Ratio is designed to measure the risk premium of the portfolio (where the risk premium is the excess return required by investors for the assumption of risk) relative to the total amount of risk in the portfolio (Sharpe and Alexander: 1990). It is also called a Reward-to-Variability Ratio (RVAR) that measures the portfolio performance, and is calculated as the ratio of excess portfolio return to the standard deviation (Jones, 2000). The larger the ratio, the better the portfolio has performed (Fischer and Jordan, 1996).

$$RVAR = \left[\frac{R(p) - R_F}{\sigma(p)} \right]$$

Treynor performance measure. Some people view systematic risk as a type of volatility measure. Thus, by comparing the slopes of characteristic lines, the investor gets an indication of the portfolio volatility. The steeper

the line, the more systematic risk or volatility the portfolio possesses. Treynor has proposed that the investor should be concerned only with systematic risk. Treynor Index measures the risk premium of the portfolio, where risk premium equals the difference between the return of the portfolio and the riskless rate. This risk premium is related to the amount of systematic risk assumed in the portfolio (Fischer and Jordan, 1996).

Jensen performance measure. Jensen's measure of portfolio performance is calculated as the difference between what the portfolio actually earned and what it is expected to earn given its level of systematic risk.

$$\alpha_p = (R_p - R_F) - [\beta_p (R_m - R_F)]$$

Capital Asset Pricing Model (CAPM). CAPM used to compute the required rate of return for the stock and portfolio as follows:

$$RR_p = R_F + \beta_p \left[\frac{R_m - R_F}{\sigma_p} \right]$$

RESULTS AND DISCUSSION

The Results of the Unhedged Strategy*****

The results presented in appendix B include summary statistics and the basic investment characteristics of the study sample. These results are achieved by regressing the individuals stock's quarterly returns on the quarterly returns of the General Index as a proxy of market portfolio over the study period. *Market Model* was used to calculate the basic investment characteristics, which includes the expected rate of return, beta, systematic risk, unsystematic risk, total risk, coefficient of determination R² and F statistic. In general, twenty-four companies from the study sample (fifty-five) achieved a higher rate of return than the sample average, which means 43.6% of the stock outperformed the sample average rate of return.

***** In this study the unhedged strategy and the study sample are used interchangeably, which means study sample before applying any hedge strategy.

The Results of Portfolio Hedging with Covered Call Strategy

The results presented below include summary statistics and basic investment characteristics of the covered call strategy. For each individual stock in the sample, the call option hedging strategy was applied quarterly. Black and Scholes Option Pricing Model were used to calculate ATM option price. Simple linear regression was used to regress the portfolio quarterly realized rate of return over the quarterly realized market portfolio rate of return. In order to calculate the basic

investment characteristics, the covered call return for individual stocks were used by *Market Model* and the result in Appendix C has been obtained. It can be noticed that the covered call strategy succeeded in reducing the total risk to thirteen companies and improve the return to the sixteen companies. The systematic risk reduced from 0.003 to 0.001 by (66.6%). Table (1) compares the results of the investment portfolio hedged with covered call option strategy with unhedged portfolio.

Table (1): Descriptive statistics for portfolio hedged with covered call Strategy and unhedged portfolio

Basic Investment Characteristics	Unhedged Portfolio	Portfolio hedged with Covered Call
Beta of portfolio β_p	0.799	0.602
Portfolio Alpha α_p	(0.00525)	0.01267
Expected Return \bar{R}_p	0.0178	0.0301
Unsystematic Risk	0.004	0.0009
Systematic Risk	0.0076	0.0043
Total Risk	0.0116	0.0052
Coefficient of determination R^2	0.638	0.362
Mean Return	1.66%	1.85%
Standard Deviation	10.37%	3.65%
Maximum Return	31%	8%
Minimum Return	(15%)	(8%)
Skewness	0.714	(0.669)
Kurtosis	0.329	0.234

Testing Hypotheses Considering Covered Call Option Strategy

First Hypothesis. Hedging the investment portfolio with covered call option strategy will earn a higher return than unhedged investment portfolio. So, the study accepts the first hypothesis where using covered call strategy enhanced the rate of return by 69%. These results are consistent with the results of (El-Hassan et al., 2004).

Second Hypothesis. Hedging the investment portfolio with covered call option strategy will reduce the unsystematic risk. Covered call strategy succeed in reducing the unsystematic risk from 0.004 to 0.0009 a

decreased of (77.5%) then the study accept the second hypothesis.

Third Hypothesis. Hedging the investment portfolio with covered call option strategy will reduce the systematic risk. Covered call strategy succeeded in reducing the systematic risk from 0.0076 to 0.0043 a decreased of (43.4%) then, the study accept the third hypothesis.

The Results of Portfolio Hedging with Protective Put Strategy

The results presented below in Appendix D include summary statistics and basic investment characteristics

of the protective put strategy. The same procedures in the covered call option strategy were used in this strategy. These investment characteristics and descriptive statistics of the quarterly returns for the

investment portfolios with and without protective put hedging strategy are also compared in Table (2).

Table (2): Descriptive statistics for hedged portfolio with protective put and unhedged portfolio strategies

Basic Investment characteristics	Unhedged Portfolio	Portfolio Hedged with Protective Put Strategy
Beta of Portfolio β_p	0.799	0.772
Portfolio Alpha α_p	(0.00525)	(0.0067)
Expected Return \bar{R}_p	0.0178	0.0156
Unsystematic Risk	0.004	0.0023
Systematic Risk	0.0076	0.0071
Total Risk	0.0116	0.0094
Coefficient of Determination R^2	0.638	0.604
Standard Deviation	0.1037	0.074
Maximum Return	0.31	0.25
Minimum Return	(0.15)	(0.07)
Skewness	0.714	1.514
Kurtosis	0.329	2.041

It is obvious from Table (2) that the use of the protective put strategy decreased the expected return measured by market model from 0.0178 to 0.0156 a decline of 12.3 %. The decrease in the expected return of the portfolio hedged with protective put strategy can be explained by the premium amount paid. Alpha decreased from (0.00525) to (0.0067) when protective put strategy has been used, which reflected negatively on the expected rate of return. Protective put strategy also reduced the total risk from 0.0116 to 0.0094, a decline of approximately %19. This reduction was evident in unsystematic risk which was reduced by 42.5% compared with the unhedged portfolio, contrary to the systematic risk; the decline was relatively small 6.5% from 0.0076 to 0.0071, referred to the slight reduction in Beta coefficient.

Testing Hypothesis Considering Protective Put Option Strategy

Fourth Hypothesis. Hedging investment portfolio with protective put option strategy will earn a higher

return than an unhedged investment portfolio. According to the previous results, the use of protective put strategy reduced the rate of return by 12.3 %. For that, the study did not find an evidence to accept this hypothesis.

Fifth Hypothesis. Hedging the investment portfolio with protective put option strategy will reduce the unsystematic risk. According to the previous results, the use of protective put strategy was able successfully to reduce the unsystematic risk by approximately 42.5%. For that, the study accepts the fifth hypothesis.

Sixth Hypothesis. Hedging the investment portfolio with protective put option strategy will reduce the systematic risk. According to the previous results, the use of protective put strategy reduced the systematic risk by only 6.55%. Hence, the study accepts the sixth hypothesis.

Portfolio Performance Measures

Both hedging strategies provided a reduction in the total risk of the portfolio. For example, in covered call option strategy the standard deviation dropped from

10.37% to 3.65%, resulting in a 64.8% relative reduction in total risk. While, the standard deviation dropped from 10.37% to 7.4%, resulting in a 28.6% relative reduction in total risk as a result of the protective put strategy. The previous results indicate that the covered call is preferred to the protective put strategy, which is also preferred to the unhedged strategy. The study concluded that the option strategies are successful in Amman Stock

Exchange, where covered call strategy succeeded in reducing the systematic, unsystematic risk and total risk. At the same time enhanced the expected rate of return. While the protective put strategy failed in achieving higher expected return, but it was able to relatively reduce the total risk. Table (3) summarizes the results of the portfolio performance measures.

Table (3): Summary of portfolio performance measures*

Performance Measures	Unhedged Portfolio	Covered Call St.	Protective Put St.
Sharpe Ratio (RVAR)	0.0463	0.4685	0.0351
Treynor Ratio (RVOL)	0.006	0.0284	0.0034
Jensen (Alpha)	(0.0079)	0.0075	(0.0097)
CAPM	0.0257	0.0226	0.0253
Sortino Ratio	0.074	0.633	0.067
Semi Variance	0.004	0.001	0.002
Semi Standard Dev.	0.065	0.027	0.039

* Most of these portfolio performance measures are recommended by AIMR standards.

Seventh Hypothesis. Portfolio risk adjusted-return will be improved by applying option hedging strategies in terms of the following performance measures (Sharpe Ratio; Treynor Ratio; Alpha Jensen; Sortino Ratio and CAPM). According to the previous portfolio Performance measures, it is clear that covered call hedging option strategy is superior to the other portfolios in Amman Stock Exchange.

CONCLUSION

In light of the study objectives and in order to answer the research questions outlined at the beginning of this study, the research has reached the following conclusions:

1. Hedging investment portfolio with stock option strategies proved to be successful in ASE in terms of risk and expected return.
2. Hedging investment portfolio with covered call option strategy proved to be the most successful strategy in Amman Stock Exchange.

3. Covered call option hedging strategy shifts the portfolio return distribution to the right, reflecting the receipt of premium from writing the call; the portfolio's upside return potential becomes more limited as increasing percentages of the stock become callable. The addition of protective put option hedging strategy shifts a portfolio's return distribution to the left, reflecting the cost of buying the option, but reduces undesirable downside risk.

4. A portfolio with written call appeared to outperform the other strategies in bear markets, as option premiums more than compensate for poor overall performance. Written call, however, limited the optioned portfolio's ability to respond to rising market returns, and the portfolio appeared inferior to a stock-only portfolio when market returns are high. Buying Put had substantially the opposite effects.

5. Hedging portfolio with covered call strategy and protective put strategy in Amman Stock Exchange resulted in a magnificent reduction in unsystematic risk.

Simultaneously, the covered call strategy resulted in considerable reduction of systematic risk contrary with protective put strategy that resulted in marginal reduction.

6. Applying option strategies by selling covered call and buying protective put not always achieve higher expected rate of return, nonetheless the covered call strategy enhanced the portfolio expected rate of return by 69%. Hedging a portfolio by selling covered call strategy led to improve the performance of the investment portfolio considering the basic two dimensions (risk and return) and according to the following AIMR's portfolio performance measures: Sharpe ratio; Treynor ratio; and Alpha Jensen.

REFERENCES

- Abid, F. Mroua, M. Wong, W. 2007. The Impact of option Strategies in Financial Portfolios Performance: Mean-Variance and Stochastic Dominance Approaches, **Working paper**, Faculty of Business and Economics, University of Sfax; Department Of Economics, National University of Singapore.
- Black, F. 1989. How to use the holes in Black-Scholes. **Journal of Applied Corporate Finance**, 1(4).
- Bhalla, V.K. 2004. **Investment Management: Security Analysis and Portfolio Management**, S. Chand & Co. Ltd. Ramnagar, New Delhi.
- Bernstein, P. L. and Damodaran, A. 1998. **Investment Management**, John Wiley & Sons, Inc.
- Board, J. S. C. and Patrinos E. 2000. The Performance of Covered Calls, **The European Journal of Finance**.
- Black, K. 2007. **Business Statistics for Contemporary Decision Making**, John Wiley and Sons, Inc., 5th ed.
- Bradley, D.P. and Walsh, M. 1988. Portfolio Insurance and the UK Stock Market. **Journal of Business Finance & Accounting**, 15(1).
- Chance, Don M. 2004. **An Introduction to Derivatives & Risk Management**, Thomson South-Western, 6th ed.
- Chandra. 2004. **Financial Management: Theory and Practice**, Tata Mc Graw-Hill Publishing Company Limited. New Delhi 6thed.
- Compbell, T. S. and Kracaw, William A. 1993. **Financial Institutions and Capital Markets**, Harper Collins College Publishers.
- El-Hasan, N. Hall, Tony and Kobarg, J. 2004. Risk Return of Covered Call Strategies for Balanced Funds: Australian Evidence, Work Paper, Quantitative Finance Research Centre, **University of Technology, Sydney**.
- Emery, D., Finnety, J. and Stowe. 2004. **Corporate Financial Management**, Pearson Education International, 2nd ed.
- Ferguson, Robert. 1993. Some Formulas for Evaluating Two Popular Option Strategies, **Financial Analysis Journal**, 8(5).
- Figlewski, Stephen. 1989. Options arbitrage in imperfect markets. **Journal of finance**, 44(5).
- Fischer, Donaied E. and Jordan, Roland J. 1996. **Security Analysis and Portfolio Management**, 6th ed., Prentic Hall, Engle WoodCliffs.
- Francis, Jack Clark. 1980. An Introduction to Risk and Return, **Investment: Analysis and Management**, John Wile & Sons, Inc 3rd ed.
- Groothaert, T. and Sacha, T. 2003. Creation of Eurex Buy-Write Monthly Index on SMI, **Master Thesis**, unpublished, University of Lausanne.
- Gitman L. J. and Joehnk, M. D. 1999. **Fundamentals of**

RECOMMENDATIONS

1. The authors recommend that the SEC in Amman Stock Exchange should assess the merits of options strategies for managing portfolio market risk.
2. Amman Stock Exchange should conduct training courses for the institutional financial and investment decision makers and for the individual investors as well to recognize the important role that these risk management strategies play in the developed and developing equity markets around the world.
3. The authors recommend employing other different option strategies with one; six; nine and one year maturities and compare the results with the traditional portfolio hedging strategies.

- Investing*, Addison-Wesley, 7th ed.
- Hearth, D. and Zaima J. K. 2001. *Contemporary Investment, Security and Portfolio Analysis*, Harcourt College Publishers 3rd ed.
- Jones, C. P. 2000. *Investment- Analysis and Management*, John Wiley & Sons, Inc. 7th ed.
- Keasey, K., Hudson, R. and Littler K. 2000. *The Intelligent Guide to Stock Market Investment*, John Willy and Sons
- L'habitant, Francois-Serge. 2000. Derivatives in Portfolio Management: Why Beating the Market is Easy, *Derivative Quarterly*, 7(2).
- Machado-Santos. 2006. Performance Evaluation of Hedged Stock Portfolios: Empirical Evidence, *International Research Journal of Finance and Economics*, No 2.
- McMillan, Lawrence G. 1986. *Options: As a strategic Investment*, New York Institute of Finance, New York.
- Radicliff. 1994. *Investment: Concept, Analysis, Strategy*, McGraw- Hill / IRWIN, 5th ed.
- Reilly, F. K. and Brown, K. C. 2000. *Investment Analysis and Portfolio Management*, The Dryden Press, 6th ed.
- Ross, S. A. 2004. *Fundamentals of Corporate Finance*, The McGraw-Hill / IRWIN, 3rd ed.
- Rubinstein, M. 1994. Implied Binomial Trees. *Journal of Finance*. 49(3) July.
- Tergesen, A. 2001. Taking Cover with Covered Calls *Business week*, No.21.
- Sharpe, W. F. and Alexander, G. J. 1990. *Investments*, Prentice-Hall International, Inc. 4th ed.
- Siegel, J. J. 2002. *Stocks for the Long Run: the Definitive guide to Financial Market Returns and Long-Term Investment Strategies*, McGrew-Hill, 2nd ed.
- Walker, J. A. 1991. *How the Options Markets Work*, Institute of Finance, New York.
- www.en.wikipedia.org
- www.cob.vt.edu/finance/faculty/dmc

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