Hedging with derivatives

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Futures Hedging

A futures contract compels the buyer to purchase a particular quantity of assets within a certain period of time. The price of the purchase is agreed in the contract at the time of entering this contract. The asset that is to be purchased is referred to as the underlying asset and the time when this asset is purchased or sold is known as the expiry date or maturity date (Sundaram, 2011). While the major difference of a futures contract from an option contract is the obligation to purchase an asset, forward contracts also oblige the buyer to purchase the underlying asset. However, in contrast to forward contracts, futures contracts are drawn according to standardised forms and are more liquid since they are traded on secondary markets. Futures contracts provide more liquidity in comparison with forward contracts. A party that enters a futures agreement to purchase a security may sell this right at the available market price (Parameswaran, 2007).

Hedging with futures implies lowering the risk of price growth of the underlying asset for the buyer. Another advantage is the fact that establishment of a predetermined price assists in management decisions. In the meanwhile, the disadvantages of futures contract include the fact that gains that may be obtained from price decrease are limited. Furthermore, futures position requires a margin deposit. The contract quantity is normally standardised and may be not in line with cash quantity (Sartwelle et al., 1998). Hedging a portfolio with futures implies that an investor who has a long position in the portfolio can enter a futures contract to minimise the downside risk as the investor would still be able to sell the portfolio at the predetermined price. However as the investor is protected against a decrease in prices, he or she may not be able to enjoy the abnormal benefits from growth in price of the underlying asset above the futures price. This incorporates the basis risk of futures hedging. In addition to this, the investor has a risk of a margin call when his or her position might be forced to be closed if the margin account does not have a sufficient balance (Major and May, 2009).

Forwards Hedging

Forward contracts are similar to futures as they imply an obligation of a buyer to purchase a particular security at a particular date. The obligation clause is the major difference from the options contracts. However there are differences from futures contracts as well. Forward contracts are rather unique and are not as standardised as futures. The prices at which the agreements are settled are different. The settlement price of futures is the price that is fixed on the last trading date. In the meanwhile forwards prices are agreed on the trade date at the start. Forward contracts involve no cash flows until the delivery period. In contrast, futures contracts include margin requirements and margin calls (Tripathy, 2007). Forward hedging implies forward selling the securities or currency. For example, multinational corporations may sell the currency that is received as earnings by their subsidiaries. In this way, corporations are able to create cash outflows to hedge translation exposure. Still, hedging translation exposure may be inappropriate due to inaccurate earnings forecasts. In some cases, translation losses may be significantly higher than the benefits obtained from forward hedging (Madura, 2011).

One of the major disadvantages of forward contracts is the credit risk or default risk that is inherent to forward hedging strategy. One of the parties of the contract may fail to fulfil its obligations under the contract. Then, although the forward price of a security is a prediction of a spot price, some unexpected events may happen and one of the parties of the forward contract may face undesired price movements. The actual spot price at the moment of delivery of an asset or security may be different from the forward price that has been agreed on in the forward contract (Kevin, 2010). However, there are particular advantages of forward contracts as well. For example with respect to foreign exchange markets forward exchange rates are negotiable. This is especially important for large companies that can make use of their market power in negotiations with a bank to obtain a favourable forward market rate. Then, the banking system is available 24 hours a day, while futures markets are not open overnight. This makes forward contracts more attractive to some parties (Fraser and Simkins, 2010).

Swap Hedging

Swap deals involve an exchange of securities and act as techniques for management of risks. Companies obtain various assets to generate income and bear particular liabilities for financing such acquisition of assets. In some cases firms may be not satisfied with the assets that are obtained or the liabilities that are incurred. For example, a company may wish to shift from a fixed interest rate loan to a floating interest rate loan in order to avoid the interest rate risk. Such a company may enter an interest rate swap to realise its objective. Another type of swaps is a currency swap. If a company predicts a decrease of the value of a particular currency it may exchange the existing asset that yields income in this currency for another asset that generates income in a currency that is expected to be stronger. Consequently interest rate swaps and currency swaps are financial strategies that involve exchange of liabilities or assets (Kevin, 2010). Interest rate swaps are popular among the companies that have comparative advantages in particular markets. A company may have a comparative advantage in a floating rate market and therefore borrow funds there. However, it may be actually more interested in a fixed rate loan. In this case, the company may enter a swap agreement to exchange the fixed rate loan for a floating rate loan. The same action may be observed if a company has a comparative advantage in a fixed rate market but is interested in a floating rate loan (Siddaiah, 2010).

One of the disadvantages of swap deals is the fact that companies may default on interest payments in case of interest rate swaps. The default risk is similar to the one that is observed in forward hedging. In addition to this, swap deals do not provide high level of liquidity. Swap hedging involves particular risks. They include interest rate risk, the cost of lost opportunity, credit risk, basis risk, and legislative risk (Das, 2006). As with any derivatives that are used in hedging strategies, swap contracts may generate losses if markets change significantly and the derivatives are used as a speculative instrument. However, the application of the derivatives including swaps implies that financial risks are at least partially transferred to other parties. These parties may be more skilful at managing these risks. With the help of swap deals interest rate risk may be hedged (Arditti, 1996).

Black and Scholes Option Valuation Model

The Black and Scholes (1973) option valuation model represents a technique to estimate the equilibrium value of an option. The model provides an evaluation standard for traders, investors and hedgers who wish to value an option (Khan and Jain, 2007). This technique was first developed to evaluate stock warrants. The calculation included the evaluation of a derivative to estimate the variability of the discount rate in the course of time and with stock price volatility. Eventually the option pricing model was developed. In the model, the expected profit from the purchase of stock outright is calculated by multiplying stock price by the change in the call premium in relation to the change in the underlying stock price (15Writers, 2018). Then the current value of paying the spot price on the expiration day is derived.

Eventually the fair market value of the call option is obtained as the difference between the expected profit and the current value.

The model is as follows:

C = SN (D 1) – Ke – rt N (d 2)

Where

C is the call premium, S is the present stock price, *t* reflects the time until option expiration, *K* is the option strike price, *r* is the risk-free interest rate, *N* represents the standard normal distribution, *e* is the exponential term.

d 1 = ln S K + r + s 2 2 t s t

and

d 2 = d 1 – s t

Where *s* is standard deviation of stock returns.

The put-call parity is inherent to the equation. For example, one portfolio is a call option and cash at period *t* equals to Ke^{-rt} and another portfolio is a put option and a share of the underlying, S. *K* is the strike price for both options, and *t* is the period to expiration of both the call and the put.

At maturity, the call option portfolio is worth:

K + max S t – K , 0 = max (S t , K)

and the put option portfolio is worth:

$S_t + \max(K - S_t, 0) = \max(K, S_t)$

Since no arbitrage opportunity is assumed to exist, the prices are the same. Consequently:

$c_0 + Ke^{-rt} = p_0 + S_0$

This equation is the put-call parity.

The Black and Scholes (1973) option pricing model rests on particular assumptions. Firstly, it is assumed that the stock provides no dividends during the life of the option. Secondly, it is supposed that markets are fully efficient and the fluctuations of the market or particular stocks cannot be predicted. Thirdly, no commissions for purchase or sell of options are taken into account. Fourthly, interest rates are considered to be constant and known (Rubash, 2011). It is valid to note that the Monte Carlo simulation is sometimes applied for option pricing. The model simulates random fluctuations of asset prices and generates a probabilistic outcome to option pricing. Another model is the binominal option pricing model. Empirical evidence reveals that the results of the binominal pricing model and Black and Scholes (1973) pricing model are very close. The major difference in the outcomes is the fact that Black and Scholes (1973) model is not able to compute the price of American options. In contrast to European options, American options have the privilege of early exercise. This difference leads to the differences in price between parallel options that have the same underlying goods. The early exercise premium may be added to the European option price to estimate the value of the American option (Kilic, 2005). Other models may include the jump diffusion model and the stochastic volatility model. Empirical research by An and Suo (2009) provides evidence that the performance of the models depends on the type of the hedged option. The stochastic volatility model outperforms the Black and Scholes (1973) approach when up-and-out call options are evaluated. The jump diffusion model generates poorer results in hedging barrier options. However, for hedging call-on-call options the jump diffusion and the stochastic volatility models are better (An and Suo, 2009).

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