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MANAGING RISK IN FINANCIAL MARKET IN SHIPPING INDUSTRY

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Abstract. *This paper examines how to manage risk in financial market in shipping industry by using option strategies instead of investing directly into shipping stocks. Freight rates play an important role in shipping industry, since they determine the income to the shipping companies, and thereby the company's share price. Based upon the residual earning model of equity valuation of Farstad Shipping, it appears that a 3 months straddle strategy and a cylinder strategy seems to be a better strategy than a 1 year straddle strategy, due to the volatility in the shipping industry.*

Key words: *risk in shipping, freight rates, equity valuation, option strategies*

Introduction

One year after crisis 2008, shipping industry still barely wakes up to refresh their self in gaining the profit. In business week 2009, Jung, Schulz, and Wagner wrote in their sub headline '*a brutal downturn in global trade has left shippers with idle capacity, billions in losses, and even facing potential bankruptcy*'. This news for sure will not make any player in this industry to be happy. But why is shipping industry still promising as the investment area? Research from Drobetz (2010) found interesting phenomenon where actually the risk is not as big as other industry. He stated that that shipping market has lower beta compared with overall stock market (Drobetz, Schilling, & Tegtmeier, 2010) . This statement has opposite view from what is written from Stopford (2009) where in his book Stopford told that volatility of the shipping industry is very high where actually means that the beta should be bigger than overall stock in the financial market.

Stopford (2009) claimed that managing the shipping industry itself is volatile. The volatility in the shipping industry is driven by the freight rates, which is determined by the demand and supply in the shipping market (Stopford, 2009). Furthermore, the freight rates are the income for the shipping companies, i.e. they generate the revenue to shipping companies (Stopford, 2009), and thereby influence the stock price of the shipping companies. So if the freight a rate goes up then the stock price to the shipping companies also goes up and vice versa if the freight rates goes down.

Based on aforementioned, the freight rates in the shipping industry are extremely important for the price of the stock to a shipping company, since the freight rates determine the income to the shipping company. Moreover, investment in shipping stocks can be very difficult, since these stocks might vary a lot. This because the shipping industry is extremely volatile, where supply and demand of the freight rates determines the income to a shipping company, and thereby its stock price, which again affect the price of the option related to the shipping companies.

The shipping industry is embedded with risk(Ghiorghe & Ana-Maria, 2012, p. 25). Ghiorghe and Ana Maria (2010) also suggest that it is the fluctuation in the freight rates that

create the risk in the shipping industry. In order to understand the fluctuations of the freight rates one have to understand the economic mechanism. The freight rates are determined by the supply and demand

The freight rates are the earnings to a shipping company. This earning affects the value of the shipping company. Generally, if the freight rates are high, then the earning to the shipping company will also be high. Thus, the stock to the shipping company will be high. If the opposite happens, i.e. freight rates are low, and then the value of the shipping company will be low.

However the factor that determines the price of shipping stock in financial market is not always on freight rates. This phenomenon become more attractive since the shipping industry has allegation about inefficiency in this market. Inefficiency here means that there is possibility for some player to get own benefit based on imperfectness of the shipping market information. This idea brings this paper into the valuation of stock analysis.

By getting the deep analysis of one shipping financial stock analysis, this paper also suggest one of many ways in managing risk. Our recommendation here is the financial investor use option strategies to hedge against the risk in the shipping industry in financial markets.

In section 4 we will discuss a lot about the option strategy. Typically, an option valuation model is used to identify overvalued and undervalued observed (call) option premiums, which are sold or bought against a delta hedged position in the underlying asset (McKenzie, Thomsen, & Phelan, 2007, p. 511). A fundamental problem associated with efficiency test that it assumes some model of market equilibrium. In the other woes a the option valuation model is correctly specified and option market is efficient (McKenzie et al., 2007, p. 512). An alternative way to empirically test for options market efficiency is to use and event study type approach (McKenzie et al., 2007, p. 512). That's why when this paper does not have expert ability in predicting the 100% true model and the option market equilibrium also not 100% efficient, we tend to use case study. The existence of a trading strategy generating systematic profits, implemented around known (scheduled) events, would indicate a degree of market inefficiency by failing to take into account all relevant price sensitive information.

Straddle is a trading strategy that involves the simultaneous purchase of an equal number of put and call options with the same strike price (McKenzie et al., 2007). Some research already used this strategy to test market efficiency (McKenzie et al,. 1997; Chen and Leung, 1994). The result assuming half tick transaction cost, suggest pricing inefficiencies because evidence is found of systematic profits from long straddle positions. However in this paper, straddle will be used as the case study material in understanding the volatility in the market and how to deal with it.

The remainder of the paper is organized as follows. Part 2 is a discussion of the freight rates in the supply market. In part 3 is a valuation model used in order to value the shares of Farstad Shipping. Part 4 is about option strategies. The last part, part 5 is the conclusion

Discussion of freight rates

The freight market is determined by the interaction between demand for freight and supply of tonnage (vessels)(Stopford, 2009, p. 160). In the short term, the supply of tonnage is relatively fixed where a shipowner can adjust its supply of vessels through lay-up, speed and reactivation(Stopford, 2009, p. 163). In the long term the supply is more flexible, i.e. the shipowner can adjust its supply of ships by order or cancel orders of new vessels, and even change supply sources(Stopford, 2009, p. 163). Olivier Blanchard defines the short-run as *"year-to-year movements in output are primarily driven by movements in demand"*

(Blanchard, 2006, p. 34). And according to Stopford it typically takes 1 to 4 years to build a ship (Stopford, 2009, p. 157). Therefore will we define the short-run as within a year, and our main focus will be on the short-run. Furthermore we know that the demand consists of the World economy, seaborne commodity trade, average haul, random shocks and transport costs, while the supply side consists of the world fleet, fleet productivity, shipbuilding production, scrapping and losses, and freight revenue (Stopford, 2009, p. 136).

Stopford uses GNP (Stopford, 2009, p. 141), but Olivier Blanchard writes that there is a subtle difference between GDP and GNP(Blanchard, 2006, p. 22), and therefore we will use GDP as the indicator for the demand of and investment activity. The intuition is as following, when the income for an individual increase, then the individual will consume more. This increase in consumption leads to a higher GDP, where some of the consumption is directed towards domestic produced goods, and some demand is directed towards foreign produced goods. This means that as the world GDP gets higher, then there will be more traded goods, and therefore there will be more demand for freight(Blanchard, 2006, p. 399). DNBNOR data suggests a 3.6% change in the work economy by 2011i. However, we see that different countries have different growth rates in their GDP, which have an impact on the demand for freight. The GDP numbers that are most interesting for Farstad is the GDP for countries that are allocated near their geographic segments, such as the North Sea, Brazil and Indian Pacific. The countries which are allocated near the segment North Sea is the Netherlands, Norway, Denmark and the UK. In per cent change IMF has estimated that the GDP will be 1.511 for Denmark, 1.630 for the Netherlands, 1.677 for Norway and 1.137 for UK. In other words the activity in this area doesn`t seem to be very big. From the same report the estimated GDP in per cent change seems to be 3.769 for Brazil, which is more promising for demand of the vessels Farstad is offering in their market segment. The last segment, Indian Ocean, stretches from Africa in east to Asia in west and north, and to Australia and Antarctica in south (THE WORLD FACTBOOK 1994, ELECTRONIC VERSION). Since the Indian Ocean consists of a lot of countries we choose to look at the GDP for Australia and Indonesia. This because there is a heavy traffic of oil and oil products from Indonesia, and that Western-Australia has large reserves of hydrocarbons outside their coast (THE WORLD FACTBOOK 1994, ELECTRONIC VERSION). The GDP for Australia looks to be 1.796 in per cent change for 2011, and 6.4 in per cent change for Indonesia in 2011ii. So in other words when we solely look at the GDP numbers it doesn`t very good for the North Sea area, but the GDP numbers for Brazil and Indian Ocean looks more promising

Seaborne commodity trade consists of two parts, short-term and long-term (Stopford, 2009, p. 143). The long run is affected by changes in demand for a particular good (e.g. oil), changes in supply sources, changes in reallocation of processing plants and transport policy (Stopford, 2009, p. 144). Since our focus is the short-run, we will therefore focus on the factor seasonality. The reason is that seasonality affects the demand for freight in the short-run. And as Stopford writes, the seasonality is about cycles that last just a few months, and repeats itself every year(Stopford, 2009, p. 144). For instance, the demand for oil increases during fall and winter in the northern hemisphere, and decreases during spring and summer. This mechanism repeats itself every year, and has a substantial effect on the spot market, since the price of the product varies a lot(Stopford, 2009, p. 144). Average haul is defined as tonnage of cargo shipped multiplied with the average distance (Stopford, 2009, p. 146). For a company that is transporting iron-ore the average haul is more significant, than for a company that is in the offshore-supply vessel. This can be seen from the map from Statoil, where the distance from the Norwegian coast to the North Sea, where Ekofisk exists, is much smaller than the distance from Australia to Chinaiii, and due to the fact that the distance from Ekofisk to Stavanger is 250 kmiv, while the distance from Australia to China is around 7474 kmv. And the vessels that operates in the offshore-service are AHTS and PSVs, where a PSV is

defined as loading capacity of 2000 DWT, and AHTS is defined as engine power than 10 000 BHPvi. Vessels that carry oil and iron ore for instance have deadweight capacity from 30 000 to 200 000, and increases over time (Stopford, 2009, pp. xxi-xxiv). Therefore we assume that this variable does have not a very big effect in the market for offshore-service, and we choose to ignore it. Random shocks, on the other hand, have a significant effect on the demand for ships, and it consists of wars, commodity price changes, and economic shocks. Wars have generally a positive effect on the shipping industry. The intuition is as follow, when wars break out the demand for commodity increases, leading to higher freight rates, and the shippers will then get higher revenues (Stopford, 2009, pp. 147-148). When the war in Libya broke out February 15th 2011vii the oil price increased significantly when almost all of the oil production in Libya ceasedviii. And according to IEA, the world has lost 1.5 b/d millionix. Economic shocks are the most important factor, and are specific economic disturbances which are superimposed on business cycles, often with dramatic effect(Stopford, 2009, p. 148). A good example of this is the subprime crisis which struck in 2007x, and developed in to a financial crisis in 2008xi,xii. Whether it was a shock or something anticipated is debatable. According to Rune Skarstein the financial crisis, which occurred in 2008, was not unexpected, but expected, since the financial market is an unstable system (Skarstein 2008, p. 188-189). The consequence of this crisis would be at the same level as the crisis in 1987, and even as catastrophic as the Great Depression that started in October 1929 (Skarstein, 2008, p. 189). However, whether the crisis was expected or not it had a major impact, especially for the industrialized countries as the data from IMF showsxiii. The last variable on the demand side is transport cost. As Stopford writes, materials will only be transported from distant sources if the cost the shipping operation can be reduced to an acceptable level or some major benefit is obtained in quality of product (Stopford 2009, p. 149). For Farstad it is the service it provides to the oil companies which is important, i.e. how good the quality of their service is compared to the level of the cost they have. For Farstad it is the crew cost which constitutes the majority of the operating costsxiv.

The merchant fleet is the most important variable on the supply side, and is measured in deadweight ton (DWT) (Stopford 2009, s. 151). What decide the size of the fleet is scrapping and delivering of ships. The fewer ships that are scrapped the bigger the supply will be, and therefore DWT will be high. In addition, if more ships enter the market, then again the supply of ships will increase, DWT will be even higher, thus only a small proportion of vessels is scrapped each year (Stopford 2009, p. 151). As the annual report from Farstad shows, between 1998 to the beginning of 2011 the merchant fleet has increased by 397 %xv. This has been an increase in the fleet over 10 years. Therefore we regard this variable to be constant. The productivity of the fleet is measured in ton miles per deadweight, and relies on speed, port time, deadweight utilization and loaded days at sea (Stopford 2009, p. 155). In the segment for offshore-service we assume that it is deadweight utilization and port time at sea which are important. Since Farstad has a deadweight utilization of 82 % for the rest of 2011, we therefore assume that the total deadweight utilization for Farstad will be between 80-90 % for 2011xvi. Port time shows the physical performance of ships and it is related to number of loaded days at sea (Stopford 2009, p. 156). An increase in number days at sea will reduce the time off-hire or time in lay-up (Stopford 2009, p.156). And the higher the freight rates are, i.e. higher demand for freight, the fewer ships will be in lay-up/off hire (Stopford 2009, p. 161). The reason for this is that higher freight rates are so high that it covers the cost for the least efficient ship (Stopford 2009, p. 165-166). The third variable is the newbuilding market and this is a long-term cycle. The reason is that it takes time to build a ship, normally between 1-4 years, depending on how large the shipyards orders are. The shippers order ships based on the anticipation of the future. And there is a tendency that the shippers order ships when the

freight rates are high. When the freight rates are high the revenues are high, and the price on the second-hand ships are high. Therefore will the shippers turn to the newbuilding market, since the price in this market is relatively lower than the price for second-hand ships. As the annual report for 2010 shows, there were ordered totally 259 large and medium-sized supply vessels, and approximately 54 % (about 140 vessels) of them is going to be delivered in 2011xvii. Farstad also wrote that if all vessels were delivered, it would not be enough work for them, and therefore some of the planned delivered vessels have to be cancelled/delayedxviii. A shipowner may also scrap ships, and this scrapping also affect the supply of ships (Stopford 2009, p. 158), although very few ships are scrapped. The key decisions for scrapping vessels are age, technical obsolescence, the scrap price, current earnings and market expectations. Age is the most important one because as the vessels get older the repairs and maintenance increases. The effect is a combination of heavier coasts and more time off hire. Technical obsolescence is related to the efficiency of the vessels, i.e. how well suited the vessels are for their missions. Another thing is that obsolescence also is related to gear and machinery, since vessels are always enhanced with new technical solutions, however, this is a long term-trend, so we chose to ignore this factor. The scrap price on the other hand is more important a lot, because vessels are sold to shipbreakers, and the shipbreakers sell the scrap to the steel industry. The scrap price varies a lot, because it depends of demand and supply in the steel industry, as well as the availability of scrap metal from other sources, such as the destruction of vehicles and other shipbreakers. But the most important factor for decision of scrapping is the shipowners anticipation of the future operating profitability of the vessels and the financial position for the firm. That is, if the shipowner believes in an increase or decrease in the freight rates in the future. The last variable is the freight revenue, which helps to adjust capacity in the short term, and to find ways to reduce costs and improve service in the long term. The intuition is as following; in the short run the shipowner decides whether to put vessels in lay-up or not. If the freight revenue is high, then the operating income is low and the shipowner has no incentive to put vessels in lay-up. If the opposite is the case, low freight rates, then the shipowner has an incentive to put vessels in lay-up, because of low income and little work for the ships. In the long run the decision for the shipowner is whether to scrap or invest. If the freight revenue is high (low) then the shipowner might order new ships (scrap old ships) as discussed above (Stopford 2009, p. 160). As of the 1st quarter of 2010 the freight revenue was NOK 730 530 000, while it was 801 015 000 in the 1st quarter 2011. This means that the freight revenue has increased with 9.6 %. In the second quarter of 2011 the freight income was NOK 880 443 00018, i.e. an increase of freight income of about 9.92 %.

Based on the discussion of how the freights are determined theoretically, and the empirical evidence we have, we believe that the freight rates will continue to increase in the future. Based on this we assume that the freight income to the firm will increase with about 10 % each quarter.

Valuation of Farstad Stock

There are several models which can be used to value a firm. The models that can be used are the Dividend Discount Model (DDM), the Discounted Cash Flow Model (DCFM), the Residual Earnings Model (REM), and the Abnormal Earnings Growth Model (AEG) (Penman, 2010). The valuation model we will use is the REM. The reason for this is the advantages of this model outweigh its disadvantages. First, it focuses on value drivers, which means it focuses on the profitability of investment and growth in investment (Penman 2010, p. 169). Second, it incorporates the value that is already recognized in the balance sheet,

meaning the book value is already incorporated, and that it forecasts the income statement rather than the cash flow statement (Penman 2010, p. 169). Furthermore, REM uses accrual accounting, and therefore recognize the value added, and treats investment as an investment rather than a loss of value (Penman 2010, p. 169). By using REM, the forecast horizon can be shorter than for DCF and more value is typically recognized in the immediate future (Penman 2010, p. 169). By using this immediate forecast we can then forecast the valuation of the firm up to the horizon, which gives a good indicator of profitability and growth for continuing value calculations (Penman 2010, p. 169). And the last advantage is that this forecast model protects from paying too much for growth (Penman 2010, p. 169).

However, there are two disadvantages by using this valuation model. The first one is that we have to understand how accrual accounting works (Penman 2010, p. 169). Second, is that the model relies on the accounting numbers, which can be suspect (Penman 2010, p. 169). Nevertheless, since there are more advantages than there are disadvantages, we will therefore use the REM model.

The residual earning can be expressed like this:

$$RE = Earn_t - (\rho_e - 1)B_{t-1}$$

Equation 1. Residual Earning Model, (Penman 2010, p. 153)

Where $\rho_e = 1 + r$, and r can be viewed as the return the shareholders require in percent. In our case we will view r as the depreciation rate, meaning the cost of capital. For Farstad the depreciation rate is at 10 %xix, i.e. r = 10 % = 0.1. Penman defines $Earn_t$ as comprehensive income in period t (Penman 2010, p. 153). In our analysis of Farstad Shipping Stocks we will use total operating income as $Earn_t$ in period t. The reason for this is by using the definition as Penman uses the company value per share actually should be approximately NOK 7, when in fact the company's value per share per October 24th 2001 is at NOK 149xx. Another reason for us to use total operating income is due to the fact that Farstad operates mainly in three different geographic areas, namely Indian Pacific, Brazil and Northwest Europe. This makes it hard to evaluate the value of the company based solely on the activity in the North Sea. The activity in the North Sea constitutes approximately 19.73% of the total operating incomexxi, which means that the other sectors constitute approximately 80.27%. That is why we regard total operating income as $Earn_t$, and in 2nd quarter 2011 Earn for Farstad was at NOK 883 925 000. In the first quarter of 2011 the total operating income was at NOK 730 530 000xxii, i.e. the total operating income had increased with approximately 10.35 %. We assume the income will increase with the same percent for 2011 in the 3rd and 4th quarter. This means it will be at approximately NOK 975 411 238 in the 3rd quarter of 2011 and approximately NOK 1 076 366 301 in the 4th quarter of 2011.

B_{t-1} is the book value in last period. Here we will use total equity as the book value, and t-1 is the period before. In the first quarter of 2011 the total equity was at 6 700 710 000, and in the second quarter it was at 6 660 785 000. This states that the total equity had declined by approximately 0.6 %. We regard the percentage change in the total equity to be so small that it will be viewed as a constant. In other words, we will use the total equity from the first quarter as the book value for all of the quarters in 2011.

But residual earning can also be expressed in the following way:

$$RE = [ROCE_t - (\rho_e - 1)]B_{t-1}$$

Equation 2. Another Form of Retained Earning, (Penman 2010, p. 156)

We have that $ROCE_t = (Earn_t / B_{t-1})$. From this equation, we see that the residual income consists of two elements, namely the return on common equity (ROCE) which is expressed in dollars instead of percentages, and the book value of equity investment. These two components are called residual earnings drivers. The reason for this is as following, if ROCE > r then the value of the firm will increase over the book value. Thus, the value of the firm will increase more with growth in the book value, at a given level of ROCE, when ROCE > r. So in this case we should sell at a premium. So if the ROCE < r, then the opposite happens, and we should sell at discount (Penman 2010, p. 156). At the appendix we have calculated ROCE based on our assumption of the book value and the earnings. As we can see from the appendix the ROCE is at 14.08 %, 14.56 %, and 16.06 % in respectively 2nd, 3rd, and 4th quarter 2011. This shows that ROCE is larger than the depreciation rate, which gives an incentive to buy the stock today and sell it at the end of December. And the residual earnings for the 2nd, 3rd, and 4th quarter is respectively NOK 5.48, NOK 7.83 and NOK 10.41. In other words there will be added value for the next two quarters, since the residual earnings are positive.

But we need to find what the value of Farstad Shipping will be in the future. Since it is reasonable to assume that Farstad Shipping is a going concern, then the value of common equity can be expressed in three different cases:

$$V_0E = B_0 + \left(\frac{RE_1}{\rho_e}\right) + \left(\frac{RE_1}{\rho_e^2}\right) + \cdots + \left(\frac{RE_1}{\rho_e^T}\right) = B_0 + \sum\left(\frac{RE}{\rho_e^T}\right) \ldots (\mathbf{1})$$

$$V_0E = B_0 + \left(\frac{RE_1}{\rho_e}\right) + \left(\frac{RE_1}{\rho_e^2}\right) + .. + \left(\frac{RE_1}{\rho_e^T}\right) + \left(\frac{\left(\frac{RE_T}{\rho_e^T - 1}\right)}{\rho_e^T}\right) = B_0 + \sum\left(\frac{RE}{\rho_e^T}\right) + \left(\frac{\left(\frac{RE_T}{\rho_e^T - 1}\right)}{\rho_e^T}\right) .. (\mathbf{2})$$

$$V_0E = B_0 + \left(\frac{RE_1}{\rho_e}\right) + \left(\frac{RE_1}{\rho_e^2}\right) + .. + \left(\frac{RE_1}{\rho_e^T}\right) + \left(\frac{\left(\frac{RE_T}{\rho_e^T - g}\right)}{\rho_e^T}\right) = B_0 + \sum\left(\frac{RE}{\rho_e^T}\right) + \left(\frac{\left(\frac{RE_T}{\rho_e^T - g}\right)}{\rho_e^T}\right) .. (\mathbf{3})$$

Equation 3. Value of Common Equity in Three Different Cases

As we can see in each case the value of the equity of a firm, V_0^E, depends on the book value in current period, B_0, plus the residual earnings for each period RE_T, divided on 1 plus the cost of capital in each period, ρ^T_e.

The second case includes the continuing value (CV) with no growth, which is the expression $(RE_T / \rho^T_e - 1) / \rho^T_e$. This means that the RE will grow as perpetuity.

In the third case 1 plus the growth rate, g, is included in the continuing valuation. The reason for including the continuing valuation is to determine the current premium that is needed to calculate a premium in the future. In other words we are trying to calculate the horizon premium by including the continuing value, in order to determine what kind of option strategy we should choose. However, the problem is that the long-term growth rate is hard to predict, and therefore we should not pay too much attention to growth (Penman 2010, p. 163-164). Therefore, and on the basis from discussion of the freight revenue in the previous section, we assume that the growth rate will be equal to zero. This means we will value the firm by using the second valuation case as stated above. In the appendix the value per share is calculated to be approximately NOK 255.88. This means that the actual value per share should be higher than NOK 151, as is the case of 17.10.2011.

The target price is book value in period t plus the continuing value in the same period, expressed like this:

$$V_t^E = B_t + CV_t$$

Equation 4. Target Price of Company, (Penman 2010, p. 164)

In the pro-forma table in the appendix we have shown that the book value per share is NOK 171.81 in the 4th quarter of 2011, and the continuing value in the same period is NOK 85.3. This means that the target price 4th quarter of 2011 should be NOK 257.3. So since the stock price at October 24th 2011 is at NOK 149 a person should by the stock today, and sell it at the end of December.

However, since the freight revenue varies a lot, and therefore the volatility of Farstad's earnings are quite high, so instead of investing directly in the stocks, it might better to hedge by using different option strategies. The use of different options strategies is discussed in the section, where we first will discuss the theory, and thereafter the empiric.

Options Strategy

Options, the meaning and definition

Options come from the concept of hedging. Brigham and Houston (2004) define hedging as the method of the investor in locking the value of the asset in the future in some specific number in order to maintain the uncertainty risk. Moreover, Black and Scholes (1973) define options as a security giving the right to buy or sell an asset, it also means as a subject to certain conditions, within a specified period of time. Moreover, Black and Scholes divided the Options into two types. First is an American option, which is one that can be exercised at any time up to the date the options expires. The second one is a European option, which is one that can be exercised only on a specified future date. Madura and Fox (2011) describe the way an option works is by providing the right but not the obligation to purchase and sell an underlying asset in specified prices. Mostly options are used in Currency Market and Stock Market.

There are several things that we should know about options. First is exercise price or striking price, the price that is paid for the asset when the option is exercise. Second is expiration date or maturity date which means the last day on which the option may be exercised.

Options have been used since 1982; exchanges in Amsterdam, Montreal and Philadelphia first allowed trading in standardized foreign currency options. Mostly options are used in Exchange. In United States, options exchanges are regulated by The Securities and Exchange commissions. In the market, brokers are the main hub between customer and seller who want to buy options. Brokers will ask that the margin will be maintained during the life of the contract. For the options which have deteriorated positions, the margin will much higher. The reason is the broker need protections if the clients do not fulfil their obligation. Madura and Fox (2011) told in September 2000 the exchanges in Amsterdam, Brussels, and Paris merged to form Euronext N.V, A Dutch holding company. All developing structures in the market have made Options more visible to public.

Options technique

There are several techniques in using option. The two main types in this hedging technique are call and put options. Madura and Fox (2011) define call option as the security that grants the right to buy specific currency/stock at a designated price within a specific period of time. On the other hand, put options grant the right to the buyer to sell specific currency/stock at designated price within a specific period of time.

Madura and Fox (2011) give an explanation about Options

Stock Exchange Pounds / Dollar for call options for 50000 Dollar – European Style Model

Spot : £0.67:$1

Current Date : November

Strike price value of $1 in pounds	Premiums £s per $1	
	December	January
£0.60	£0.076	£0.085
£0.65	£0.040	£0.052
£0.70	£0.017	£0.029

Table 1. Options Strategy Calculation

- A January call options at a strike price of £0.65 would incur a cost £0.052x50000 = £2600 known as the contract premium
- The buyer of the January call option at a strike price of £0.65 will collect £0.01 x 50000 = £500 for every penny (£0.01) the spot rate of the dollar is above £0.65 at the designed date in January.
- If the spot rate is below £0.65 in January, the option will not be exercised and will be allowed end will be allowed to lapse, the premium will have been forfeited by the purchaser of the call option.
- European options can only be exercised at the exercise date – an American option any time up to the exercise date.

Factors affecting currency call options premium

$$C= f(S-X,T,\sigma)$$

Equation 5. Currency Call Option Premium (Madura et. all, 2011)

Where :

S-X = the difference between the spot exchange rate (S) and the strike or exercise price

T = the time to maturity

σ = the volatility of the currency, as measured by the standard deviation of the movements in the currency.

The relations with shipping in each factor

- Level of existing spot price relative to strike price

The higher the performance of shipping company which represent by the increase in the ship stock price relative to strike price, the more likely to payout. Where the spot of ship stock company is above the strike, the option contract is going to enable the holder to buy the stock at below the current price.

- Length of time before the expiration date

Madura and Fox (2011) describe that people generally expecting that the spot rate has greater chance of rising above the strike price if I has longer period of time to do so. In the example above the premium of January is higher than December.

- Potential variability of shipping stock

In the shipping industry the cyclicality between the bull and bear season are quite volatile, align with the price of the stock. In the concept of options, the greater variability of stock changes, the higher probability that the sport rate will above the strike price. It means more volatile spot have higher call option price.

Several types of options combinations

Conditional Currency Options

Conditional Currency Option is the way of doing option hedge with conditional premium. The price of premium will be adjusted with the fluctuation of the real spot price. The objective of conditional currency option is to compete with futures which do not have premium. The intention behind this method is to get a higher premium than a basic option when the condition is favorable and there will be no premium when the condition happens on the opposite side. This idea makes people consider that conditional currency option is an option on an option.

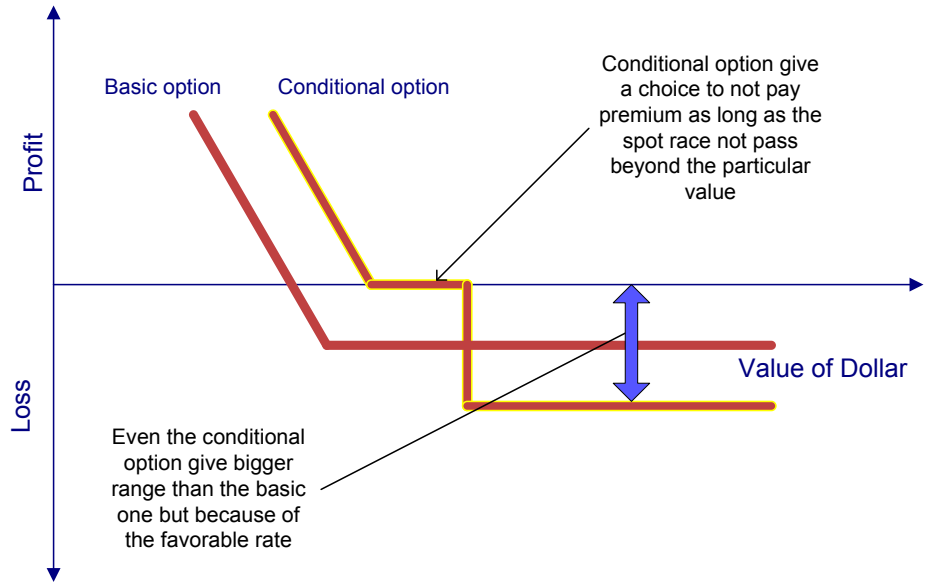

Figure 1. Conditional Currency Options

Cylinder Options

Based on Madura (2010), a cylinder option is a kind of option which uses currency range as the base of an agreement. The role is quite simple; the agreement is between bank and Farstad Shipping. If the price of the currency goes above the limit, the bank will compensate Farstad Shipping, but in return if the price goes below the lower limit, the Farstad Shipping will have

to buy at the lower limit price and the bank will gain by the difference between the lower limit price at which the bank sell the currency to Farstad Shipping and the even lower market price.

Even the option does not have premium and cost any money, but the bank will get the profit if the currency lower the limit. A similar argument can be made out for the income in foreign currency. Increases above the upper limit would be collected by the bank (the Farstad Shipping writes a call to the bank); but if the value of the foreign currency fell below a lower limit, the bank would compensate Farstad Shipping for the difference (Farstad Shipping hold put option funded by the bank).

The guaranteed limit to sell currency also can be one of the alternatives in using cylinder option. Suppose Farstad Shipping wanted to sell dollars that they earn in UK British pound. The dollar was offered an upper limit at 0,8 pounds, in return the bank will guarantee a lower limit to the value of the dollar of 0,70 pound. Farstad Shipping would in effect purchase a put at the lower limit to benefit from falls below 0,7 pound and sell or write a call at the higher limit where the bank would now benefit from being able to buy dollar from the Farstad Shipping at the top limit of 0,8 if the market rates even higher.

The table of the explanation is in the appendix 2

Straddle

Madura and Fox (2011) describe straddle as the bet on the standard deviation or variability of the currency/spot. Straddle concept are constructed from both call option and put options. The investor should buy both to which have same expire date and strike price. The concepts come from the expectation from each option character, such as call option will become profitable if the foreign currency appreciates, and put option will become profitable if the foreign currency depreciates, a long straddle will become profitable when the underlying asset either appreciates or depreciates.
The example will portray the way of straddle working,

Put and call options are avalaible for dollars with the following information

Call option premium on dollar = £0.03 per unit

Put option premium on dollar = £0.02 per unit

Strike price = £0.60

One option contract represents $50000

To construct long straddle the buyer purchase both dollar call and put option, paying £0.03+£0.02=£0.05 per unit. If the value at expiration dates above £0.6, the call option is in the money, but the put option is out of the money. On the other hand if the value is under £0.6, the put option is in the money, but the call option is out of the money.

Value of dollar at option expiration	£0.5	£0.55	£0.6	£0.65	£0.7
Profit (loss) from purchasing a call	-£0.03	-£0.03	-£0.03	+£0.02	+£0.07
Profit (loss) from purchasing a put	£0.08	£0.03	-£0.02	-£0.02	-£0.02
Net	£0.05	£0.00	-£0.05	£0.00	£0.05

Table 2. Straddle Calculation

The description based on the graph of straddle

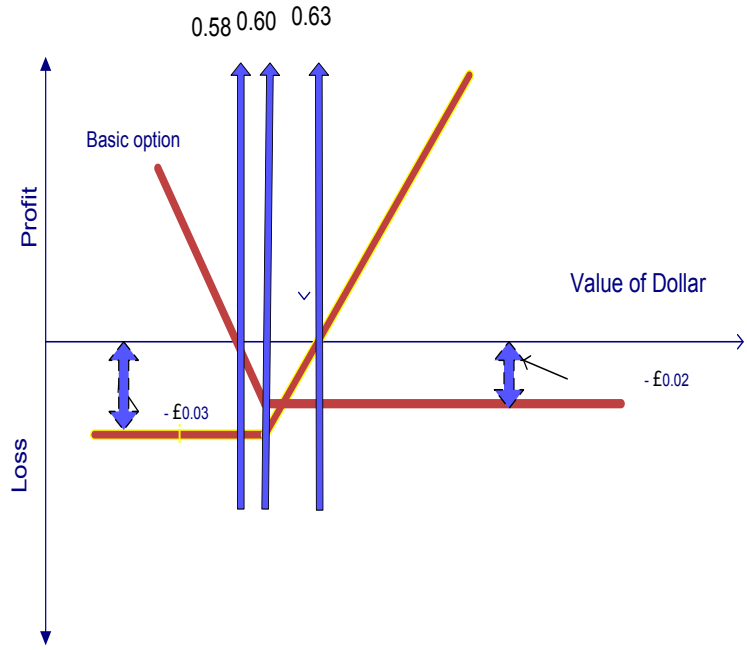

Figure 2. Description of Straddle Strategy

Options Valuation

Black–Scholes (1973) formulate the calculation of the price of European put and call options in two different types. First is the calculation of the stock that does not shares their dividend, and second is the stock which does dividend retaining.
First is the calculation of the option call price which does not share the dividend:

$$C(S,t) = N(d_1)\ S - N(d_2)\ Ke^{-r(T-t)}$$

$$d_1 = \frac{\ln(\frac{S}{K}) + (r + \frac{\sigma^2}{2})(T-t)}{\sigma\sqrt{T-t}}$$

$$d_2 = \frac{\ln(\frac{S}{K}) + (r - \frac{\sigma^2}{2})(T-t)}{\sigma\sqrt{T-t}}$$

$$d_2 = d_1 - \sigma\sqrt{T-t}.$$

Equation 6. Option Call Price for the Company who does not share Dividend

Where

C = call option price

On the condition

$$\begin{aligned} P(S,t) &= Ke^{-r(T-t)} - S + C(S,t) \\ &= N(-d_2)\ Ke^{-r(T-t)} - N(-d_1)\ S\ . \end{aligned}$$

Equation 7. The Price Of A Corresponding Put Option Based On Put-Call Parity

For both, as above:

- $N(\cdot)$ is the cumulative distribution function of the standard normal distribution
- $T - t$ is the time to maturity
- S is the spot price of the underlying asset
- K is the strike price
- r is the risk free rate (annual rate, expressed in terms of continuous compounding)
- σ is the volatility of returns of the underlying asset

The calculation from The Data

S = stock price = NOK 255.88

X = strike price = year 1 = NOK 260.9976
X = strike price = 3 months = NOK 255.88

T = years of maturity = 1 year

R = risk free rate = inflation + risk premium = 2.5% + 1.5% = 4%

$V_{3months}$ = average volatility in 3 months volatility from EPS4-1 = 23, 25, 28 = ((25-23)/23 + (28-25)/25)/2 = 0.10347826 = 10.35 %

V_{1year} = average volatility in 1 year = 28-23/23 = 21 %

Strike price one year from now = price of equity x discount factor one year ahead

The price of stock for three months and one year ahead are in appendix 3.

Implementation of option strategies

For year one we see from appendix 4 that use of a straddle will not be profitable, since the net profit will be negative. The reason is that the time period is quite long, and therefore the volatility will be quite high. This means that the company that sells the option requires a high price on premium. Also from appendix 4, we see that the only time where we will not have any profit is when the stock price is equal to the forecasted stock price. This is due to the fact that we sell the stock at the same price as we buy it for. In reality we make a loss when the stock price is equal to the forecasted stock price (which is at NOK 260.9976), because we have to pay the premium.

But instead of buying options we as investors can use cylinder, i.e. we agree with our counterpart to buy the stock at an agreed price, and hope that the stock will be worth more than the agreed price. The drawback is if the stock price in the future will be lower than the agreed price of the stock. For example, if we agree with our counterpart for a price of Farstad Shipping's shares equal to the target price, then we hope that the actual value will be higher than the forecasted target price. The reason for this is when the share price is lower than the expected we then will suffer a loss. However, we don`t have to pay any premium by using a cylinder. This means that if the actual share price of Farstad Shipping is equal to the target price of NOK 257, we will break even. Therefore, it may be wise to use both the cylinder strategy, and straddle strategy for 3 months. We prevented an option strategy for 1 year, since the risk is too high.

Conclusion

As we see from our study of the freight market, there are a lot of things that affect the freight rates. This makes the shipping business very volatile. When we tried to estimate the value of Farstad Shipping, we saw that the freight revenue plays an important role. In section 4 of this paper we discussed how the use of different option strategies using a 3 months straddle implantation would be a better idea than using a 1 year straddle implementation. We also indicated that it may be wise to use a cylinder strategy. This proves that the knowledge of shipping economics in the financial market is a benefit for investors in order to avoid risk.

Appendix

Appendix 1:

	Year: 2011			
	1st quarter	2nd quarter	3rd quarter	4th quarter
Earnings per share (EPS)		22.66	25.01	27.60
Book value per share (BPS)	171.81	171.81	171.81	171.81
Return on common equity (ROCE)		14.08 %	14.56 %	16.06 %
Residual Earnings (RE)		5.48	7.83	10.41
Discount rate		1.1	1.21	1.331
Present value of residual earning (PV of RE)		4.98	6.47	8.53
Total present value (Total PV)	19.98			
Continuing value without growth (CV)				19.98
Present value of continuing value without growth (PV of CV)	64.09			
Value of equity per share (V_0^E)	255.88			

Appendix 2:

Column Number	1	2	3	4	5
Value of US dollar at settlement to pay	-£0.65	-£0.70	-£0.75	-£0.80	-£0.85
Farstad Shipping profit (loss) from purchasing a call on dollars	Not exercised	Not exercised	Not exercised	Not exercised	+£0.05
Farstad Shipping profit (loss) from selling a put on dollars	-£0.05	Not exercised	Not exercised	Not exercised	Not exercised
Net rate for the US dollars for Farstad Shipping	-£0.65	-£0.70	-£0.75	-£0.80	-£0.80

Appendix 3:

	for 1 year	for 3 months
S	**255,88**	**255,88**
X	**260,9976**	**257,1594**
T	**1**	**0,25**
r	**2,00%**	**0,50%**
v	**21,0%**	**10,0%**
d1	**0,1059**	**-0,0498**
d2	**-0,1041**	**-0,0998**
call value	**21,4209**	**4,6483**
put value	**21,3704**	**5,6064**

Appendix 4:

Value of Farstad stock at option expiration	235	250	260,9976	280	295
Profit (loss) from purchasing a call	-21,4209	-21,4209	-21,4209	-2,4185	12,5815
Profit (loss) from purchasing a put	4,6272	-10,3728	-21,3704	-21,3704	-21,3704
Net	-16,7938	-31,7938	-42,7914	-23,7890	-8,7890

For 3 Months

Value of Farstad stock at option expiration	235	250	260,9976	280	295
Profit (loss) from purchasing a call	-4,6483	-4,6483	-4,6483	14,3541	29,3541
Profit (loss) from purchasing a put	20,3912	5,3912	-5,6064	-5,6064	-5,6064
Net	15,7429	0,7429	-10,2547	8,7477	23,7477

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