

NHH



Enterprise value to kilogram

An analysis of EV/kg used in salmon farming

Oscar Semb Fredricsson

Supervisor: Aksel Mjøs

Master's thesis in Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was written as a part of the Master of Science in Economics and Business Administration degree at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

Preface

This Master's thesis is the final work for the Master of Science in Economics and Business Administration degree from The Norwegian School of Economics. During the preparation of this thesis I have been able to make use of all the areas where I have acquired knowledge during my studies at NHH.

I want to sincerely thank my supervisor, Aksel Mjøs, for great guidance and advice in the process of writing this thesis.

It would be a pleasure for me if the thesis is as interesting reading as it has been writing it.

Oslo, December 2015

Oscar Semb Fredricsson

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Introduction

1.1 Hypotheses

Norway has during the last two decades developed a new industry, fish farming, that in 2013 produced fish for more than NOK 40 billion, with total exports of around NOK 39 billion (Norges Sjømatråd, 2014). Almost 6,000 people are currently employed by the aquaculture sector in Norway, a number that has grown threefold in 15 years.

The industry has historically been very cyclical and there have been some structural changes and consolidation during the last years. In 1997 some 70 companies accounted for 80% of Norwegian production, while only 24 companies accounted for 80% of Norwegian production in 2013 (Marine Harvest, Salmon Farming Industry Handbook, 2014).

During the development of the aquaculture sector in Norway several companies have been listed on Oslo Stock Exchange (Oslo Børs), in the search for capital, research coverage and liquidity. This has resulted in Oslo Stock Exchange being the world's largest and most important financial market place for seafood, supporting the cluster represented by the companies within the industry (Oslo Børs, 2014). The Oslo Seafood Index had a total market capitalization of more than NOK 100 bn at the end of 2014, representing some 6% of the total capitalization of companies listed on the Oslo Stock Exchange (Oslo Børs, 2015)

The financial analysts and others following the industry have developed over the last couple of years an industry specific multiple, enterprise value to kilogram or EV/kg, to value fish farming companies (Strand, Structural shift to demand-driven market, 2014). This multiple will be analyzed and discussed in this thesis.

In addition to an analysis of the multiple, this thesis will analyze some hypotheses:

- 1) *Have the companies been priced at significant different EV/kg-levels historically?*
- 2) *Are there significantly different normalized operating margins implied in the pricing of fish farming companies on an EV/kg basis?*
- 3) *Are there significant differences in EV/kg at different salmon prices, or are the companies priced at a constant normalized salmon price?*
- 4) *Given that salmon farmers are price-takers, are the normalized costs implied significantly different from historical prices?*

1.2 Existing literature

The enterprise value to kilogram multiple is widely used by the analysts following the aquaculture and salmon farming sector. This multiple is a capacity multiple using production volume as a measurement of the value of the firm. Production is a key value driver for a salmon farmer, and capacity multiples with key value drivers, such as the number of employees, number of customers etc., can be used for valuation purposes. However, there is very limited current research and literature on these kinds of multiples, both within the salmon farming industry but also for other industries.

Kaldestad and Møller (2011) derive, discuss and explain the different fundamental valuation methods in their book *Verdivurdering*. A section on non-financial multiples is also included. According to the authors' conclusion the only advantage in using such multiples is that it is easy to communicate the multiples and that they can be used without any financial estimates. However, it is further said that such multiples are only primitive varieties of EV/Sales multiples. At the end the authors add that non-financial multiples should be used with caution and only be in the absence of other potential methods.

1.3 Structure

This thesis is divided into two different parts, the first sections with general information, data and a discussion on the multiple, before the last sections focus on an analysis of EV/kg. After a brief introduction to the salmon farming market, the next section will address valuation in general and move into specifics about multiple valuation and EV/kg. Then an analysis of the EV/kg-multiple will be presented; in both cases only with respect to the salmon farming sector.

Throughout the analysis in the thesis all nominal values, i.e. stock prices, salmon prices, costs etc., are deflated to be able to reflect the kilogram which is a real value as of 1 November 2015. In the market introduction segment, all values are in nominal values to give a better picture of the historical development.

2. The salmon farming market

2.1 Salmon

Salmon is one of the most important fish groups within aquaculture. It is a commonly used name for different species within the Salmonidae fish family. Included in this family we find species such as Atlantic salmon, Trout and Coho, which are mainly farmed with around one quarter being wild catch. On the other hand we find the species Pink and Chum that almost only are harvested through wild catch. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

Salmon are anadromous fish, which means that as wild fish they are born in fresh water, they then migrate to seawater before they return to fresh water to reproduce. The major bulk of all salmon live in the Atlantic and Pacific Oceans. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

Historically, the wild catch of salmonids has been the major supply source. However, farming of salmonids exceeded the wild catch in 1999, and aquaculture has continued a rapid increase to around 2,200,000 tons, while the wild catch has stagnated and in its peak years is around 1,000,000 tons. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

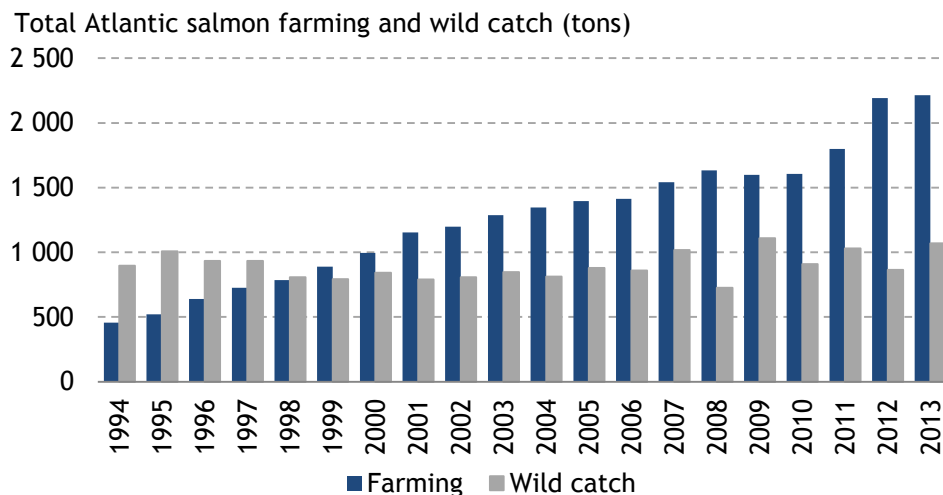


Figure 2-1 - Source: Kontali Analyse

2.2 Farming and production

Fish farming has been carried on for thousands of years, and started out in China 4,000-5,000 years ago, with the farming of common carp. Around 500 B.C. the former politician Fan Lee wrote the book “The Chinese Culture Classic”. In the book he describes the techniques for farming carp in land ponds, and from this fish farming started to spread. (Rabanal, 1988)

Aquaculture in Europe had its beginning around the temples and monasteries that had a sufficient water supply during the Middle Ages. The techniques came to the Nordic region at around the same time, but due to the cold climate fish farming did not establish itself. (Rabanal, 1988)

The beginning of industrial salmon aquaculture in Norway is a result of pioneering projects in the 1960s. Different experiments lead to the possibility of smoltification, the physiological changes that make it possible for a fish to migrate from fresh to seawater, and in 1969 two brothers on the small island of Hitra, Norway put smolt into sea cages for the first time with success. (Asche & Bjørndal, 2011)

The farming of salmon has developed greatly since the beginning of modern farming. Today the total production cycle until harvest has a time range of 24 - 36 months in Norway, depending on growth conditions, sea temperatures etc. Other production sites, such as Chile and the Faroe Islands have more optimal sea temperatures, and have a somewhat shorter production cycle. (Asche & Bjørndal, 2011)

Production of salmon consists of two main phases, beginning in fresh water and ending in seawater, just like the growth cycle of a wild salmon. The figure below shows a simplified description of the current production cycle.

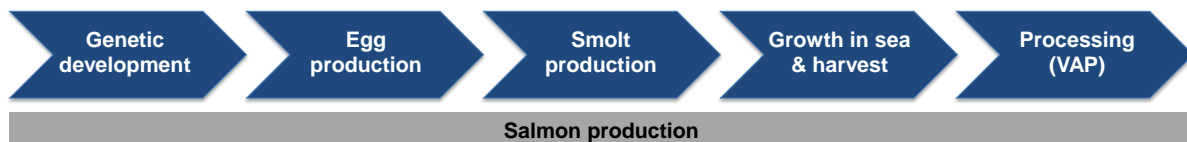


Figure 2-2 - Salmon production value chain - Compiled by the author

In the first year of production salmon eggs are fertilized and grown to around 100 grams, also known as smolt. This is done in tanks placed on land with fresh water. The smolt is then transported to the sea cages in the ocean for further growth. During the next 14 - 24 months

the fish is grown to its optimal size of some 4 – 5 kilograms, before the harvest takes place. The fish is then either sold to a processor or processed by the harvesting company into a value added product (VAP). (Asche & Bjørndal, 2011)

During the autumn the brood fish are stripped of their eggs and the development to smolt begins. In Norway the release of smolt into seawater is normally carried out twice a year, in the spring and in the fall, each release being referred to as a generation. It is typical to split a generation into two groups, S0 and S1 according to how old the smolt is when it is released into seawater. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

Sea temperatures are a very important factor in determining the potential for salmon farming and how the growth rate for salmon develops. The optimal temperature is 8 - 14°C. Temperatures above and at the high end of the optimal range increase the probability of diseases, while temperatures below or at the low end of the optimal range make the fish less comfortable with the result that they eat less and do not grow. Too low temperatures will also result in possible high mortality rates. It is also important to remember that temperatures over the year are inverted in the southern part of the earth. While we see the highest temperatures in July and August in Norway, Scotland etc., the highest temperatures in Chile are observed in January and February. (Strand & Øyen, High expectations for Norway, low for Chile, 2013)

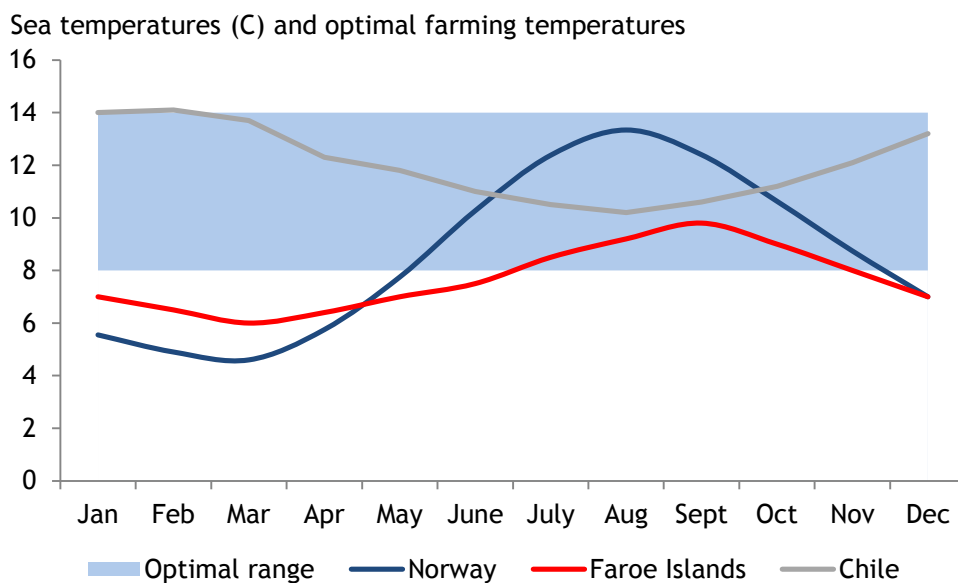


Figure 2-3 - Source: Marine Harvest, Norwegian Meteorological Institute

As an example of how important sea temperatures are, the investment bank SEB Enskilda carried out an analysis of the effect of the extraordinary high temperatures seen in Norway during the first half of 2012. The average sea temperatures in Norway were 12% higher in the period January to April. This isolated effect of higher temperatures led to a 20% higher Norwegian harvest in 2012, or 131 million kilograms, due to the fact that the biomass in sea cages has its peak average weight in the winter months. This calculation also took account of the lower sea temperatures seen later in 2012, compared to the average. (Strand & Øyen, High expectations for Norway, low for Chile, 2013)

In addition to the sea temperatures, there are a number of other factors that are important for salmon farming to succeed. A good movement of the seawater is necessary, for the water in the sea cages to be exchanged and to hold a high oxygen percentage. It is important the movement is not too strong, so that the equipment is not damaged and the fish are able to move around smoothly in the sea cage. These conditions are often found in fjords protected from the open seas, and that is why we see the major production in Norway, Chile, Canada and the Faroe Islands. (Asche & Bjørndal, 2011)

There is also considerable political risk involved in the salmon farming industry. Political risk is defined as when the return on an investment could be affected by political decisions (Investopedia, Investopedia, 2014). All major production regions have regulated the industry, and sudden changes could affect the industry significantly, e.g. an increase in licenses or concessions that will increase the total supply, or new restrictions and limitations on the concessions that will affect production. (Marine Harvest, Salmon Farming Industry Handbook, 2014). Other regulations, such as the maximum allowed biomass (MAB) system in Norway, could be changed and increase production costs. In addition there is political risk on the demand side, such as the Russian import ban of all seafood products from several countries including Norway. With Russia consuming around 8% of the world production in 2013, which mostly is imported from Norway, the effect of such political actions has a noticeable impact and the Russian ban in August 2014 resulted in a 15% drop in salmon spot prices (Lund & Steinslien, 2014).

2.3 Supply

When reporting salmon production, there are various standardized equivalents: HOG, standing for “Head On, Gutted” where the weight corresponds to around 84% of a live fish and WFE, standing for “Whole Fish Equivalent” reflecting a whole harvested bled fish equivalent. Some companies also report harvest weight in C-trim, equivalent to the fillet with skin on, or around 60 % of a live fish. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

The farmed production of Atlantic salmon has had rapid growth over the last 20 years. From global production of only 320,000 metric tons (WFE) in 1994, the world has seen a 20 year CAGR of as much as 9.7%, to global production of 2,046,000 metric tons (WFE) in 2013. The harvest of Atlantic salmon has only had two years with negative growth in the last 20 years, 2008 and 2009 after the ISA¹ crisis in Chile.

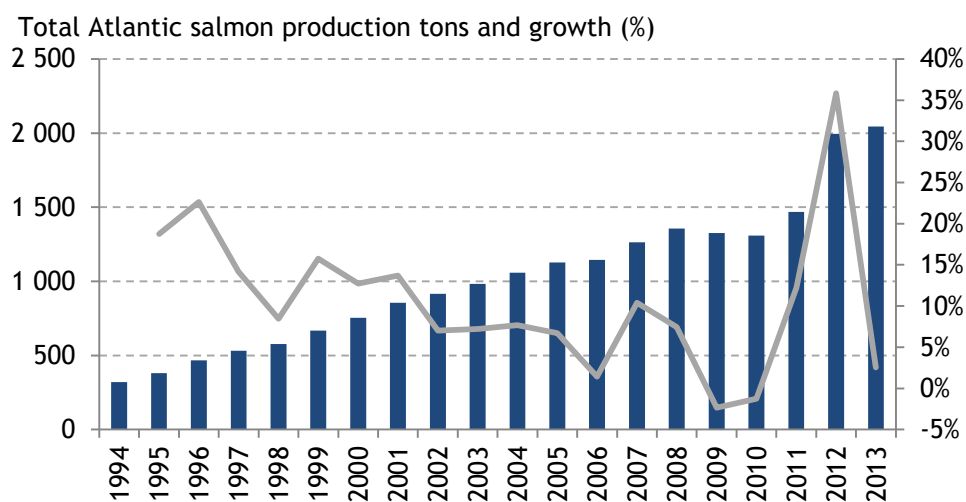


Figure 2-4 - Source: Kontali Analyse

¹ Infectious salmon anaemia or ISA is a disease of marine-farmed Atlantic salmon. An outbreak in Chile started during July 2007, and lasted until September 2010 when the last outbreak was recorded. (Alvial, Kibenge, Forster, Burgos, Ibarra, & St-Hilaire, 2012)

According to Kontali, an aquaculture research firm, Norway has been the most important source for farmed salmon in the world for the last twenty years, and in 2013 produced 1,144,000 tons or around some 56% of world production. Chile, with a coastline quite similar to Norway with fjords giving protection from the ocean, has developed to be the second largest producer with 473,000 tons in 2013, or 26% of the world harvest. The United Kingdom, Canada and the Faroe Islands are the third to fifth largest producers with harvests in 2013 in the range of 73,000 – 158,000 tons. (Kontali Analyse, 2014) Please see the table below for more details on the development (Liasjø, 2014).

<i>Harvest (WFE), ktons</i>	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Norway	508	537	574	599	723	741	856	945	1006	1183	1144
Chile	281	346	385	369	356	403	239	130	221	364	473
UK	161	150	120	127	135	137	145	142	155	159	158
Canada	92	89	108	115	111	122	122	122	120	137	115
Faroe Islands	47	37	17	12	19	37	51	45	56	70	73
Other	54	46	46	48	54	56	67	73	75	81	83
Total harvest	1143	1205	1250	1270	1398	1497	1480	1457	1633	1994	2046

<i>Yearly growth</i>	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	CAGR	Avg.	St.dev
Norway	6 %	7 %	4 %	21 %	2 %	16 %	10 %	6 %	18 %	-3 %	8.5 %	8.7 %	7.4 %
Chile	23 %	11 %	-4 %	-4 %	13 %	-41 %	-46 %	70 %	65 %	30 %	5.3 %	11.8 %	38.3 %
UK	-7 %	-20 %	6 %	6 %	1 %	6 %	-2 %	9 %	3 %	-1 %	-0.2 %	0.2 %	8.5 %
Canada	-3 %	21 %	6 %	-3 %	10 %	0 %	0 %	-2 %	14 %	-16 %	2.3 %	2.7 %	10.6 %
Faroe Islands	-21 %	-54 %	-29 %	58 %	95 %	38 %	-12 %	24 %	25 %	4 %	4.5 %	12.8 %	44.5 %
Other	-15 %	0 %	4 %	13 %	4 %	20 %	9 %	3 %	8 %	2 %	4.4 %	4.8 %	9.0 %
Total harvest	5 %	4 %	2 %	10 %	7 %	-1 %	-2 %	12 %	22 %	3 %	6.0 %	6.2 %	7.1 %

Table 2-1: Atlantic salmon harvest (metric tons WFE) - Source: Kontali Analyse

2.4 Land-based salmon farming

The further development of the traditional salmon farming industry is uncertain, given limited potential for production growth in Chile (Dempster, 2014), and the Norwegian government's action in limiting further growth until improvements have been made in controlling sea lice and disease (Ministry of Fisheries and Coastal Affairs, 2013). However, instead of transferring the smolt into seawater at 100 grams, the technology has now been developed to continue growth in closed land-based tanks until slaughter size at 4-6 kilograms. This technology could also enable production to move from peripheral parts of the world, like Norway and Chile, to production sites nearby the actual markets in Asia and North America, thus saving the transportation cost for fresh salmon from Norway to Southeast Asia of some NOK 12-13 per kilogram and NOK 10-11 per kilogram from Norway to North America (Berge, iLaks, 2015).

Besides a huge transportation cost advantage, potential land-based salmon farming production will currently not need licenses or concessions if established outside a traditional production country. On the other hand, when land-based industry develops it will be regulated by the local government. In December 2014 the Directorate of Fisheries in Norway conducted consultation on whether licenses for land-based salmon farming in Norway should be issued (Berge, iLaks, 2014).

So far the development has struggled with different problems, but during the last two years progress has been significant. Atlantic Sapphire is a company founded by two Norwegians and a Dane with experience from the traditional seawater farming industry. They have developed a land-based factory site in Denmark, and started the first commercial harvest of 1,000 tons of salmon in August 2013 with production costs at NOK 29 per kilogram. With further volume expansion beyond their testing level the estimated cost is around NOK 25-26 per kilogram, and at these cost levels it will be profitable to expand the production volume. However, the company has had some problems with diseases recently, but sets an example for the possibilities in the future (Berge, iLaks, 2014). Other potential participants in the land-based salmon farming industry are Niri in Norway, Danish Salmon in Denmark, The Freshwater Institute in West Virginia, US and Kuterra in British Columbia, Canada. (Holm, 2013)

Land-based salmon farming still needs to develop further to reach significant production volumes, but the potential to affect global supply will most likely be there in 5 – 10 years.

Other ways of increasing the production outside the traditional sea cages have also been discussed. One of these is to use old tanker ships for farming, and it is said that this could be possible with a yearly harvest of 10,000 tons per ship (Bertelsen, 2014). This technology has not only reached the larger companies but also other smaller local companies are starting trials in farming in ships (Åsberg, 2015).

In addition the technology is developing in other areas and trials involving closed sea cages have begun and will be part of the development going forward. (Aadland, 2015)

2.5 Demand

In brief, the distribution of salmon has been divided between Norway supplying the EU and Russia; Chile supplying South America and the east coast of North America and Canada the west coast of North America. However, all regions have also had some exports to Asia, but only in quite limited quantities. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

Salmon (HOG) kilo tons	Consumption	Consumption (%)	Production	Production (%)	Net import
North America	389 000	22 %	122 000	7 %	267 000
South America	123 000	7 %	421 000	23 %	-298 000
Russia	143 000	8 %	9 000	0 %	134 000
Nordics	36 000	2 %	1 094 000	60 %	-1 058 000
Europe	817 000	47 %	154 000	8 %	663 000
Japan	53 000	3 %	0	0 %	53 000
Asia	151 000	9 %	0	0 %	151 000
Oceania	38 000	2 %	33 000	2 %	5 000

Table 2-2: Salmon demand per region - Source: Marine Harvest

In the past the main market for Atlantic salmon has been the EU, which at the moment absorbs around 40% of world production. Since an important feature of salmon production is to offer the salmon fresh, most of the main export markets for the producing countries are nearby. Almost 98% of Norwegian production is exported, and the main markets are the EU, Russia and Asia (Norges Sjømatråd, 2014). Chile has covered the demand for salmon on the east coast of the US, and is the main exporter to the Salmon trade city Miami, as well as Latin America and Japan. Canada's somewhat smaller production has on the other hand covered demand from the West Coast of the US.

2.6 Prices, costs and margins

Overall, the salmon farming market has been extremely volatile since the beginning of its industrialization in around 1990, with a nominal standard deviation of NOK 5.4 per kilogram for the yearly nominal average Norwegian salmon prices. The average nominal salmon price since 1990 has been NOK 27.9 per kilogram.

As can be seen from the chart below salmon prices and profitability have been cyclical since the beginning of the industry, with five cycles in which a supply driven market has increased the effect.

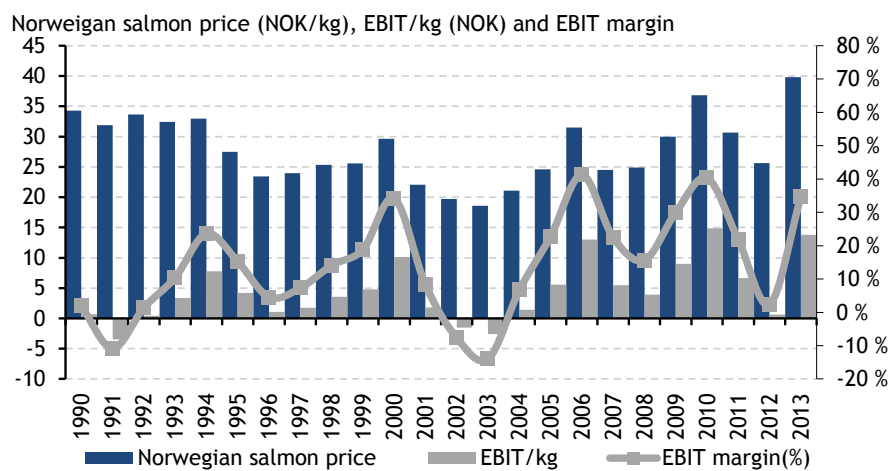


Figure 2-5 - Source: Kontali Analyse and Directorate of Fisheries

However, it seems that general profitability has grown in the last 20 years. The average EBIT per kilogram in Norway over the last 20 years is around NOK 5.3 per kilogram, with a standard deviation of NOK 4.9 per kilogram. To get a more normalized view of profitability, the 3-year moving averages show an average EBIT per kilogram around NOK 4.9 per kilogram.

Since 1994 the 3-year moving average EBIT per kilogram has moved from NOK 3.6 in the first ten to NOK 6.3 in the last ten years. For the whole period the average EBIT per kilogram has been NOK 5.11 with a standard deviation of NOK 3.15

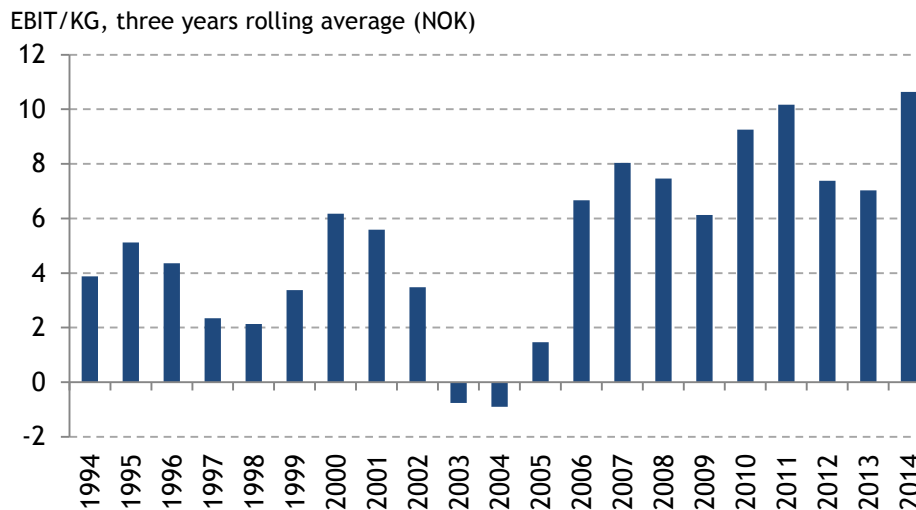


Figure 2-6: Source: Kontali Analyse and Directorate of Fisheries

2.6.1 Salmon prices

There are some different sources that report the Norwegian salmon price. NOS Clearing, which is a part of Nasdaq OMX, reports a price to farmer, delivered in Oslo, based on sellers' and buyers' information. To find the farm gate price received by the farmer one then has to adjust for the transportation cost to Oslo (NOS Clearing, 2012).

Additionally, the Norwegian export price is reported weekly, compiled by Statistics Norway, which in addition to the FCA² Oslo also includes freight to the border and duty (Statistisk sentralbyrå, 2014). Fish Pool, a Norwegian exchange for trading derivatives with a basis in seafood, also reports a Norwegian salmon price named Fish Pool Index. Due to their activities they argue it is vital that a reference price reflecting the actual spot price of salmon is available, and they have therefore established a synthetic index. This index is currently composed as to 55% of the NOS Clearing price, as to 20% of the Norwegian Statistics export price and as to 25% of the Kontali Analyse Benchmark (Fish Pool). In the analysis

² Free carrier or FCA requires the seller to deliver the goods, with costs and risk transferred to the buyer after the delivery (Investopedia, Free Carrier - FCA).

conducted in this thesis an average between the Fish Pool price and the Statistics Norway price is used to exclude potential outliers.

There are no listed prices for Scottish or Faroese salmon, but due to the short distance these have traditionally been quoted at the same prices as in Norway with a small premium for the Scottish salmon and a small discount for the Faroese salmon.

The main source for salmon prices from Chile and Canada is Urner Barry's quotation of salmon prices in Miami and Seattle. Urner Barry is a publisher of market news and quotations within poultry, eggs, meat and seafood (Urner Barry, 2015). These prices do not represent the farm gate price, i.e. the price that the farmer gets paid for the salmon produced. It is possible however to make some assumptions to find a fair estimate of the real farm gate price to farmers.

2.6.2 Costs

The production cost for salmon was on average NOK 30 per kilogram in 1990 in Norway. Through the 1990s and the beginning of the 2000s costs declined rapidly to a low of around NOK 18 per kilogram in 2005. Since that time the costs in Norway have steadily increased, and the average cost delivered in Oslo is currently around NOK 26 – 27 per kilogram.

Average production cost Atlantic salmon in Norway (NOK/kg)

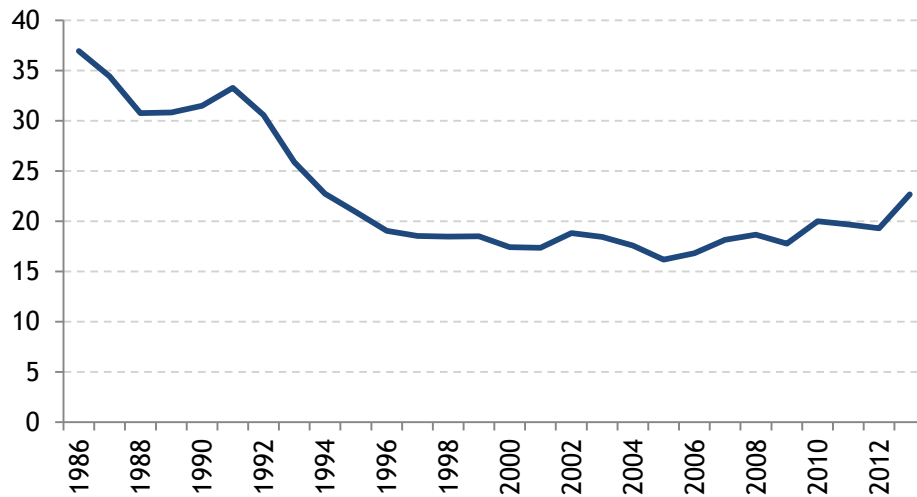


Figure 2-7 - Source: Directorate of Fisheries

The production cost in 2014 at the farm gate is presented in the table below, which also shows a split between the different components for an illustrative view of the importance of cost components. The costs listed below include in the “Other” segment sickness costs, which result in mortality and lower achieved prices for the salmon.

	Norway	Canada	Scotland	Chile
Feed	50.2 %	40.9 %	45.6 %	43.5 %
Primary processing	10.2 %	10.8 %	7.6 %	8.0 %
Smolt	9.4 %	9.4 %	9.4 %	10.2 %
Salary	6.1 %	9.4 %	5.5 %	3.5 %
Maintenance	3.3 %	4.2 %	2.4 %	4.3 %
Wellboat	4.1 %	3.6 %	6.7 %	5.7 %
Depreciation	3.1 %	3.8 %	3.3 %	2.9 %
Sales/Marketing	2.3 %	0.0 %	0.0 %	0.0 %
Mortality	0.6 %	0.0 %	1.2 %	2.2 %
Other	10.7 %	17.9 %	18.2 %	19.6 %
Total costs in NOK	27.42	36.05	38.45	35.21

Table 2-3: Production cost and segment split (2015), Source: Marine Harvest and Kontali (adjusted for FX, USD/NOK 8.60, CAD/NOK 6.30, GBP/NOK 13.09)

The salmon industry has also experienced a considerable amount of negative coverage from the media since its inception, especially in Norway. It is hard to estimate a monetary value for the cost impact of the negative publicity on Norwegian farmers. The two main effects have been increased marketing spending to make up for the negative comments and a potential decrease in demand, which in turn decreases realized selling prices for farmers. With “sticky” costs this has the effect of shrinking the margin as well.

3. Valuation

3.1 Valuation methods

Fundamental analysis is based on determining the true value of a company or an asset from its financial statements and balance sheet, growth, competitive advantages and the markets in which it operates. A core and important feature of fundamental analysis is the estimation of future earnings of the company, as past earnings are not of any value to the company. (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

A valuation also includes an assessment of the risk in the underlying asset, which is defined as the likelihood of an outcome of the return being different from the expected return (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012). When making a valuation this is handled by using different discount rates.

There are several methods and approaches for conducting a valuation. The first one is discounted cash flow analysis (DCF), which estimates the present value of all expected future cash flows from the underlying asset. The discounted cash flow analysis is the real foundation of all fundamental analysis. (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

A second approach is a contingent claim valuation, which uses option-pricing models to value equity or assets. It is possible to value an asset as an option if the payoff from the asset is a function of an underlying asset. Hence, the value of the asset is the difference between a pre-specified level and the asset's value. This valuation method is useful because it is hard for a discounted cash flow model to estimate a value that is contingent on an event. Examples of useful areas are companies that have negative earnings and/or high leverage. The equity in the firm could then be looked on as a call option, with a strike price given by the debt in the firm. As the debt has to be dealt with, all value above the debt will accrue to the equity holders. If liquidating the firm, the strike price for equity holders will then be level of debt. This will however not be used in this thesis, (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

The third method is relative or multiple valuation, which is the most commonly used valuation method in practice, and will be explained in the next section.

3.2 Relative valuation

A multiple is an expression of the market value relative to a key statistic that one assumes relates to the value (Suozzo, Cooper, Gillian, & Deng, 2001). Discounted cash flow analysis is by far the most accurate and flexible method for valuation purposes of companies or projects (Koller, Goedhart, & Wessels, 2010). However, a discounted cash flow analysis requires a lot of assumptions to be made, while multiples can be calculated with fewer assumptions. It is however important to bear in mind the simplicity and all assumptions behind multiple valuation. A multiple uses a lot of information in one single number, which represents average assumptions. In addition the multiple is a static number, which only represents one point of time (Suozzo, Cooper, Gillian, & Deng, 2001).

The most common use of a multiple is when it is used as a comparison to similar companies. However, this also leads to the most common mistake as the ability to find a comparable company is basically non-existent. All multiples consist of a numerator and a denominator. It is normal to separate multiples into two different groups, enterprise (EV) and equity multiples. This is the value of the numerator in the multiple. On the other hand the denominator is a key statistic, and using the key statistic as the divisor one arrives at the multiple ratio. (Suozzo, Cooper, Gillian, & Deng, 2001). Another dimension is whether it is a stock or a flow multiple, whereas a stock multiple is using values that are valid for a certain time point such as balance sheet values, flow multiples are using numbers that are measured over a time period such as income statement numbers (Macabacus, 2015).

While the enterprise multiple includes the invested capital in a company, the equity multiple only accounts for the shareholders' capital in the company. Hence, it is important to use a statistic that is relevant to the capital invested. In other words, if the numerator is the equity value, the denominator has to relate to the equity for the multiple to be relevant. For example, net income will only relate to equity and not to enterprise value, because net income is what is left after all interest payments on debt have been paid and minority interests. On the other hand, EBIT is useful statistic to enterprise value, because this is what is left from the operations to be divided between equity and debt. (Suozzo, Cooper, Gillian, & Deng, 2001)

When using multiples for valuation purposes there are numerous different ways to try to find what a fair multiple or value should be.

1. Most commonly used is a comparison of the current multiple to the historical values, i.e. any kind of company specific multiple such as trailing or forward compared to observed values. It is important to note that historical comparisons have to be made at a comparable point in a business cycle.
2. Another way is to compare the current multiple to similar companies, often referred to as peers, a sector or the market. The comparisons to peers have to be justifiable with respect to business model, risk, size etc. There is also a possibility to distinguish between traded shares and transactions if any are available. With sales or acquisitions of divisions or companies the fair value in the market may be disclosed.
3. The most theoretical and third method possible is to calculate a fair targeting multiple for companies, and compare it to the current multiple. This will be discussed further below.
4. A forecast multiple uses the current price or enterprise value, and uses a forecast of earnings etc. as the denominator. For valuation and investment decisions, past earnings do not have any impact on the actual value. Hence, one has to evaluate the future earnings and a forecast multiple will give better picture of the valuation.

3.3 Target multiples

Although most multiples are used for comparison reasons, relative to historical values or to other similar companies, it is possible to derive what a target multiple might be. According to Suozzo et al. the target multiple is the multiple paid on an investment that results in the net present value of the investment being zero. When you make a valuation based on multiples, you make all the same assumptions as if you had calculated a discounted cash flow. But while a fundamental discounted cash flow has the ability to change its assumptions every year, multiples have to represent the average assumptions for all of the future. Basic financial theory says that the value of equity is the net present value of all future cash flows or dividends. Below is a derivation of the P/E multiple for illustrative purposes. (Suozzo, Cooper, Gillian, & Deng, 2001)

$$P_0 = \frac{DPS_1}{(1+k_e)} + \frac{DPS_2}{(1+k_e)^2} + \frac{DPS_3}{(1+k_e)^3} + \frac{DPS_4}{(1+k_e)^4} + \frac{DPS_5}{(1+k_e)^5} + \dots$$

$$P_0 = \frac{DPS_1}{(1+k_e)} + \frac{DPS_1(1+g)}{(1+k_e)^2} + \frac{DPS_1(1+g)^2}{(1+k_e)^3} + \frac{DPS_1(1+g)^3}{(1+k_e)^3} + \dots$$

$$P_0 = \frac{DPS_1}{(1+k_e)} + \frac{DPS_1(1+g)}{(1+k_e)(1+k_e)} + \frac{DPS_1\left(\frac{(1+g)}{(1+k_e)}\right)^2}{(1+k_e)\left(\frac{(1+g)}{(1+k_e)}\right)^2} + \frac{DPS_1\left(\frac{(1+g)}{(1+k_e)}\right)^2}{(1+k_e)\left(\frac{(1+g)}{(1+k_e)}\right)^2} + \dots$$

$$P_0 = \frac{\frac{DPS_1}{(1+k_e)}}{1 - \frac{1+g}{1+k_e}}$$

$$P_0 = \frac{DPS_1}{(1+k_e) - (1+g)}$$

$$P_0 = \frac{DPS_1}{k_e - g}$$

$$P_0 = \frac{EPS_1 \cdot (1-r)}{k_e - g}$$

$$\frac{P_0}{EPS_1} = \frac{(1-r)}{k_e - g}$$

Source: Suzzo et. al (2001)

where DPS_1 is the dividend per share, g is the growth rate, k_e is the cost of equity, r is the reinvestment rate. These parameters will be explained and discussed later. Inserting for the company specific variables r , k_e and g , will result in what a fair and target price to earnings multiple will be for a company.

It is possible to arrive at the same derivation for enterprise value multiples. Instead of only the dividend, the net present value of all future free cash flows will be the fair enterprise value of a company. Below is a derivation of the EV/NOPLAT multiple.

$$EV_0 = \frac{FCFF_1}{(1+WACC)} + \frac{FCFF_2}{(1+WACC)^2} + \frac{FCFF_3}{(1+WACC)^3} + \frac{FCFF_4}{(1+WACC)^4} + \dots$$

$$EV_0 = \frac{FCFF_1}{(1+WACC)} + \frac{FCFF_1(1+g)}{(1+WACC)^2} + \frac{FCFF_1(1+g)^2}{(1+WACC)^3} + \frac{FCFF_1(1+g)^3}{(1+WACC)^4} + \dots$$

$$EV_0 = \frac{FCFF_1}{(1+WACC)} + \frac{FCFF_1(1+g)}{(1+WACC)(1+WACC)} + \frac{FCFF_1\left(\frac{(1+g)}{(1+WACC)}\right)^2}{(1+WACC)\left(\frac{(1+g)}{(1+WACC)}\right)^2} + \dots$$

$$EV_0 = \frac{\frac{FCFF_1}{(1+WACC)}}{1 - \frac{1+g}{1+WACC}}$$

$$EV_0 = \frac{FCFF_1}{(1+WACC) - (1+g)}$$

$$EV_0 = \frac{FCFF_1}{WACC - g}$$

$$EV_0 = \frac{NOPLAT_1 \cdot (1-r)}{WACC - g}$$

$$\frac{EV_0}{NOPLAT_1} = \frac{(1-r)}{WACC - g}$$

Source: Suzzo et. al (2001)

where $WACC$ is the weighted average cost of capital, $FCFF_1$ is the free cash flow to firm and $NOPLAT_1$ is the tax adjusted operating earnings.

Noted from the deviation of target multiples, the different statistics in the formulas can vary between firms and will result in varying multiples. Suozzo et. al. (2001) and Kaldestad & Møller (2011) attribute the possible differences in multiples to four reasons, which are explained below

- **Differences in the business**

There are several reasons why differences in multiples appear. These could include the size of the company, growth opportunities, different costs of capital, return on equity, different needs for investments or strategy. In addition different capital structures could affect valuation multiples.

The business structure for a company will also have an effect on a valuation multiple. This includes what part of the value chain a company is present in, to what extent outsourcing is used and business culture in the company.

- **Accounting differences**

There are a lot of different accounting policies around the world, and some of them might affect multiples. Examples could be differences in treatment of depreciation and amortization or income from associates. If possible, a solution could be to restate all financials into a common format that makes them comparable.

Restating financial data for companies with only limited public information available could be hard. A solution to the problem could be to focus on key statistics that are not affected by the accounting differences, such as sales, cash flow, EBITDA or operating cash flow.

- **Not normalized and representative for the future**

Whether the key statistic used is forward, current or historical, it has to represent a normalized future. If a company's income for any reason were to drop to zero for a year, but then continue at historical levels, the multiple for that specific year would be useless and not comparable.

- **Incorrect price**

If it is not possible to find a reason for differences in pricing, it might actually be that there is a mispricing in the market. Hence, this would be a possible situation for going ahead with a market trade.

3.4 Estimation and discussion of ratios and key numbers

Enterprise value and market capitalization

For publicly traded companies the market value of the equity equals the share price times the numbers of shares outstanding. This represents the market value of the equity in the company. (Investopedia, Market Capitalization)

To be able to evaluate all invested capital in a company one can use the enterprise value or EV, rather than the market value of equity. The enterprise value is found by adding together the market capitalization, debt, minority interests and preferred shares, before one adjusts for any cash and cash equivalents surplus. (Koller, Goedhart, & Wessels, 2010)

Income statement numbers

The income statement is what measures the financial performance of a company during a specific period of time, and the critical values for a valuation are represented in the income statement. (Investopedia, Income Statement, 2015). The income statement shows the revenues and costs, divided into an operating section and non-operating section. For a more detailed explanation of the income statement please see the appendix.

It is important to notice the “fair value adjustments” that all salmon farmers have to make in all reports. This is an adjustment of their biological assets, i.e. the living fish in the sea cages that are to be valued at the market price according to the IFRS standard. This applies for all fish above 4 kilograms; only a relative share for fish between 1 and 4 kilograms, while for fish below 1 kilogram the book value should equal the accumulated costs of production so far. Hence, this is only an accounting measure, and has nothing to do with the operational results or performance. This is why all salmon farmers present an “EBIT pre fair value adjustments” which represents the achieved price and the cost realized for the sold fish. (Marine Harvest, Salmon Farming Industry Handbook, 2014)

Cash flow numbers

While the income statement assesses the revenues and costs related to a specific period, it is not necessarily the situation that the revenues are received during that period. A cash flow statement, the second accounting statement, gives an overview of the cash inflow and outflow during a specific period.

The cash flow statement is divided into three main segments; the operating activities, the investing activities and the financing activities. The operating activities include the production, sales and delivery of the company's products and services, and could include things such as raw material purchases and salaries.

The net change in cash is not necessarily the cash generated by the company that is available to the shareholders. Free cash flow to equity (FCFE) is the adjusted cash flow that represents what is left for the equity shareholders.

To get from the earnings to free cash flow to equity there are a couple of adjustments. First one has to add back depreciation and amortization as it does not represent a cash flow. To charge depreciation and amortization the company needs assets, and these are not reflected in the income statement. For that reason the capital expenditure (CAPEX), related to any investment that is recognized on the balance sheet, is subtracted from the earnings. Then the change in working capital is subtracted from the earnings. The present value of all future free cash flow to equity would then represent a fair value of the equity.

$$FCFE = Net\ income + Depreciation - CAPEX - \Delta Working\ Capital + New\ debt \\ - Debt\ repayments$$

It is also possible to calculate the cash flow generated by all claims of the firm, given by the free cash flow to firm (FCFF). The present value of all future free cash flow to firm will then represent a fair value of the entire firm.

The most common and shortest way to calculate the free cash flow to firm is to tax adjust the EBIT. Due to the taxation benefit from depreciation and amortization, the tax adjusted EBIT plus the depreciation and amortization will represent the unlevered cash flow, i.e. the cash flow before interest or debt payments. Then both the capital expenditure and the change in working capital are subtracted.

$$FCFF = EBIT(1 - t) + Depreciation - CAPEX - \Delta Working Capital$$

Balance sheet

The third accounting statement is the balance sheet which unlike the two other statements does not represent a period, but a point in time. It is divided into the left and right side. The left side consists of the assets owned by the firm, with a split into fixed and current assets. The right side represents the financing of the firm, given by equity, liabilities and debt.

Weighted average cost of capital

To arrive at a target multiple one has to estimate the cost of capital for the company. This represents the opportunity cost investors face when investing in the company instead of other companies with similar risk. Due to the fact that a company's capital is raised from both equity and debt, a weighted average of the costs of these will represent the cost of capital, known as the weighted average cost of capital (WACC).

$$WACC = k_e \left[\frac{E}{E + D} \right] + k_d \left[\frac{D}{E + D} \right]$$

The weights used in the WACC calculation are market values as the cost of capital measures the required cost of issuing equity and bonds. These issues are calculated at market values and not at book values. (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012)

The components and assumptions of the WACC are further elaborated in the following.

Cost of equity

There are numerous ways to calculate the cost of equity. Some methods of calculating the cost of equity include, among others, the arbitrage pricing model (APM) and the different multi-factor models. However, the most commonly used method which also is recommended by Koller, et al. using the Capital Asset Pricing Model (CAPM) (Koller, Goedhart, & Wessels, 2010). This is the technique that will be used in this paper. The CAPM cost of equity is built up of the risk free rate, the market risk premium and company specific risk (beta), and represents the expected return on the equity.

$$E(R_i) = R_f + \beta_i [E(R_m - R_f)]$$

Risk-free rate

Financial models often use the risk-free rate as a basis in modeling for risky investment decisions. To be riskless the actual return of an asset has to equal the expected return, with only one return in the return distribution, i.e. a return that of a security that has no default risk. (Damodaran, What is the riskfree rate? A search for the Basic Building Block, 2008)

This is only a hypothetical interest rate, but the most commonly used risk-free rate is a government bond. Then, the question is what length of the government bond one should choose as the yield curve rarely is flat. The long-term government bonds have been the standard for the risk-free rate, which in turn is justified by them being less volatile and the fact that a company often is assumed to continue forever. If the yield curve is very steep one way or the other, or a large share of the cash flows in the actual investment arrives in the short term, it is not necessarily a long-term rate that is the most suitable. (Damodaran, What is the riskfree rate? A search for the Basic Building Block, 2008)

PWC and Norwegian Society of Financial Analysts (NFF) since 2011 have conducted a survey and reported the “The Norwegian Market Risk Premium” with the objective to gain insight on the size of, among others, the risk premium and the risk-free rate. For the risk-free rate the most frequent applied is the 10-year government bond, despite that the median horizon on investments is 6 – 8 years. However, it is pointed out that there is no clear answer to the investment horizon and that several respondents vary their risk-free rate used according to the underlying cash flow. (Angell-Hansen, Gärdehall, & Johansen, 2013)

The assumption is that the risk-free rate given by the 10-year government bond will not give a global risk-free rate, as the 10-year government rate varies between different currencies. This is because of different inflation rates in different countries. It is important that the 10-year government rate is in the same currency as the cash flow in the valuation when determining the risk-free rate. (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012)

Regarding the enterprise value per kilogram multiple, the analysis will be calculated in real values, due to the fact that the harvest quantity of fish is not a monetary value and is not subject to increases like the general price level of goods and services. Thus, the cost of capital will have to reflect the usage of real and not nominal cash flow and the risk-free rate should be real and not nominal.

Risk premium

The market risk premium is the difference between the expected return in the stock market and the risk free rate, and is the excess return financial investors demand to hold more risky assets. There are several ways to estimate the risk premium such as looking at historical risk premiums, the implied premium in the market and surveys of market participants. (Kaldestad & Møller, 2011)

The implied risk premium can be calculated by using simple formulas, which is exemplified below.

$$P_0 = \frac{\text{Dividend}}{r_e - g} = \frac{\text{Dividend}}{(r_f + \beta \cdot r_p) - g}$$

$$r_p = \frac{\text{Dividend}}{r_e \cdot \beta} + \frac{g - r_f}{\beta}$$

Source: Kaldestad & Møller (2011)

The survey conducted by PWC and Norwegian Society of Financial Analysts (NFF) concluded that the risk premium in the Norwegian financial market is 5%, unchanged during the three years the survey has taken place.

In addition 83% of the participants in the survey wanted to add a small company premium, with a median of 0 – 1% for market capitalization in the NOK 2 – 5 billion range and 1 – 2% for companies with a market capitalization in the range NOK 1 – 2 billion. (Angell-Hansen, Gärdehall, & Johansen, 2013)

Beta

Beta is the measure of risk relative to the market. Also for beta, numerous techniques have been developed to calculate it. The most conservative technique, which corresponds most to the definition of beta, is a regression of the return of the company or asset against the market return. The linear regression will result in an equation

$$R_i = a + bR_m$$

where R_i the stock return, R_m is the market return, a equals the intercept and b is the slope of the regression. Hence, the slope of the regression implies the riskiness of the company. With a higher slope, the stock tends to fluctuate more than the market. As for all regressions a R-

squared (R^2) is calculated, and in beta estimation R-squared tells how much of the risk in the firm that can be attributed as market risk. Consequently, the inverse given by $1-R^2$ represents firm specific risk. (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012)

To do the regression needed to estimate the beta, one needs observations of the return on the asset and returns for the index the beta is estimated against, and there could be some issues related to choosing the frequency and time period. In terms of the time period, the longer time period will include more observations. This will give a better estimate of beta, but this could on the other hand be offset by changes in the company, and old observations might not be representative. For mature companies without any change, it is possible to use very long time periods, but for companies with restructuring and acquisitions it is beneficial to use a shorter time period. It is also a question of what frequency to use in the observations, which could be a problem for illiquid securities not trading every day. In such case it is better to use weekly or monthly returns, but this again gives a weaker estimate of beta. (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012)

In the analysis the beta is measured against Oslo Stock Exchange (OSEBX), which is the stock exchange on which all the aquaculture companies are listed. Potential weaknesses in using this include limited trading and the fact that OSEBX historically has been dominated by the energy sector. However, since all the companies are listed on the Oslo Stock Exchange it is more accurate than using any type of world index.

Cost of debt

The cost of debt should reflect the company's marginal cost of its debt, in other words the interest cost of refinancing all its debt today. The yield to maturity on long-term investment grade bonds without options is the best proxy for the cost of debt. The yield to maturity is a promised yield rather than an expected yield as it assumes that the principal and all coupons are paid back in full, i.e. no default risk is incorporated in the yield. If a company has bonds outstanding and the trading frequency on them is high, the estimation of cost of debt will be better.

Some companies do not have bonds outstanding, or they are not regularly traded. An estimate could also be the interest cost of potential bank debt or debt to other financial institutions. Another approach is to create a synthetic rating, based on different financial

ratios. It is then possible to compare the firm's ratios with the rated firm's ratios and find the best possible match. This could lead to an estimated rating and an indication of a fair cost of debt.

Interest costs are tax deductible for companies, and the cost of debt has to be adjusted by the tax rate to view the real cost of capital. Firms are often exposed to different tax rates, and one often calculates an effective tax rate from interest costs divided by interest bearing debt. Nevertheless, the tax deductible is related to the statutory tax rate and this tax rate should be used to calculate the cost of debt.

$$k_d = \text{Marginal interest rates} \cdot (1 - \text{tax rate})$$

Growth

The most important factor to estimate when making a valuation is growth. A small change in the growth estimation could have a huge impact on the fair value. As for all key statistics used in multiples, the growth factor also has to be normalized and respond to the average future growth rate. However, the growth rate for specific years could differ and there could be some estimates in the forecast period that are different from the terminal long-term growth rate. (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

A firm's theoretical growth will be derived from the yearly reinvestments of earnings. Assuming a constant return on equity, the net income will be a function of the book value of equity. Without any capital issues, the only increase in book equity will be the retained earnings from the company's operations. Hence, the retention ratio b and the ROE of a company give a growth rate in year t .

$$g_t = b \cdot ROE$$

However, this is only a very theoretical estimate of the growth rate in a firm. One way to estimate the future growth is to look at the historical growth. By doing an analysis of the average growth rate and the development of the company's sales and net income, one could estimate an appropriate future growth rate. It is however very important to do this analysis carefully, and evaluate the firm's current position as to whether it can be regarded as an established and stable firm or a high growth firm. Making a growth estimation by looking at historical numbers is only useful if the company is in a steady state. The size of the firm is

also vital; small firms might show impressive growth rates while the absolute growth number for a small firm could be marginal for a large company. The historical growth could also vary whether it is based on revenue or earnings. Due to the fact that there are less accounting choices for revenues than other parts of the income statement, historical revenue growth is more accurate. (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

It could also be possible to make an analysis of growth in the same way as equity or credit research analysts estimate the growth of a company. The estimation is often based on the historical numbers, but also uses other information which is firm-specific for the company. This could include a firm's guiding or outlook statement, that could lead to a more accurate estimate. Sometimes it is also useful to follow competitors and other participants in the same industry to get leads on industry developments. It is also possible to look at the general macroeconomic climate, and for some industries general macroeconomic growth in the world has a high correlation to industry growth. (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

While it is possible to have high growth estimates in a specific forecast period, it is simply not possible to have a sustainable long-term high growth rate. The growth rate has a mean reversion, where growth rates seems to converge over time. One reason is that it is hard to maintain growth with finite business cycles, as well as maintaining growth is more challenging the larger the firm gets. To be more specific, the long-term growth rate cannot be higher than the growth rate of the economy. If one assumes that the economy is consisting of high growth firms and stable firms with long-term growth, the economy's growth rate will be a weighted average of these. Then the growth of the stable firms has a high probability of being smaller than the growth of the economy (Damodaran, *Growth Rates and Terminal Value*, 2006).

Key ratios

When valuing a business it is all about whether the company is able to create a return on the invested capital. To account for different levels of invested capital or equity in a period, it is normal to take the average invested capital or equity in the period.

$$ROIC = \frac{NOPLAT}{Invested\ capital}$$

The return on invested capital is not necessarily equal to the return on new invested capital (RONIC). A high return will in time be removed by competition, if the return is not sustainable. Without a sustainable high return on invested capital, the return on the new invested capital will in the end converge to the WACC as more producers start production. For a firm to achieve a sustainable abnormal return on its invested capital, it needs a lasting competitive advantage to either get a higher price or lower costs than its competitors. (Koller, Goedhart, & Wessels, 2010)

The return on invested capital is the return on all invested capital in the company. It could also be interesting to get the return on the equity (Damodaran, Return on Capital (ROC), Return on Invested Capital (ROIC) and Return on Equity (ROE): Measurement and Implications , 2007)

$$ROE = \frac{Net\ income}{Equity}$$

Furthermore, it is also possible to draw the relationship between the return on invested capital and return on equity, by including the gearing and the cost of debt (Koller, Goedhart, & Wessels, 2010).

$$ROE = ROIC + [ROIC - (1 - t)k_d] \frac{D}{E}$$

3.5 Pitfalls using multiples

There are numerous ways to misuse multiples in valuation. The absolutely most common pitfall is closely related to the popularity of multiples, its simplicity.

For multiples it is important that the number used in the denominator is comparable both regarding size, business structure and that an equivalent period is used.

The value of a company is its future cash flows (Kaldestad & Møller, 2011). Hence multiples such as current P/E and trailing P/E will not be correct for valuation purposes. Forecasts will also be more stable and for that reason include a normalization of the estimates. (Suozzo, Cooper, Gillian, & Deng, 2001)

It is possible to prepare relative valuations, i.e. comparing the multiples for companies for specific years. When making such a valuation it is important to compare firms that are comparable both regarding operations and financial gearing. This means that it is important to be careful what multiple to use, and if necessary adjust for possible inequalities. (Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 2012)

However, while short-term fluctuations are possible, all multiples have to be based on normalized inputs that represent an average of the long term.

4. Enterprise value to kilogram

4.1 Introduction

The most commonly used valuation metric for valuation purposes for the salmon farming industry is enterprise value to kilogram, or EV/kg (Strand, Structural shift to demand-driven market, 2014). The numerator is the company enterprise value, as explained above, while the denominator is normalized salmon production per year. By salmon production the number is the company's harvest volume, which normally would equal sold volume due to the fact that fresh salmon has to be sold within a short period of time. It is possible to freeze down the harvested fish and producers could store it for some time. This is however undesirable because it will increase a company's working capital requirement. Also, due to the fact that a fish grows faster the bigger it is the farmer wants to keep in the net cages rather than keep it stocked.

This is a capacity unit multiple, linked to a critical resource for a salmon farmer (Dyrnes, 2009). This multiple simply tells how much you pay for each kilogram of production per year.

$$\frac{EV}{kg} = \frac{EV}{EBIT} \cdot \frac{EBIT}{kg}$$

The multiple has been established in the industry by using the normalized harvest, and not the harvest capacity. All around the world, salmon farming is limited by licenses and concessions that could be another way to value companies. But the level of production and harvest from each license differs for every company. While some producers are able to achieve a yearly harvest of more than 1,200 tons on some licenses, others struggle to achieve more than 800 tons for some licenses per year (Marine Harvest, Salmon Farming Industry Handbook, 2014).

In addition to the license restriction, there is also a restriction that limits production capacity in Norway. The maximum allowed biomass (MAB) restriction forbids any producers to have more than 780 tons (945 tons in Troms and Finnmark) of biomass in the sea cages per license (Kråkås, 2012).

4.2 Derivation

It is possible to derive the enterprise value per kilogram multiple formally. First the derivation of EV to NOPLAT is derived.

$$EV = \frac{FCFF_1}{(WACC - g)}$$

$$EV = \frac{NOPLAT_1 \cdot (1 - r)}{(WACC - g)}$$

$$EV = \frac{NOPLAT_1 \cdot (1 - \frac{g}{ROIC})}{(WACC - g)}$$

$$EV = \frac{NOPLAT_1 \cdot (ROIC - g)}{ROIC \cdot (WACC - g)}$$

$$\frac{EV}{NOPLAT_1} = \frac{(ROIC - g)}{ROIC \cdot (WACC - g)}$$

$$\frac{EV}{NOPLAT_1} = \frac{(ROIC - g)}{ROIC \cdot (WACC - g)}$$

$$\frac{EV}{kg} = \frac{EV}{NOPLAT_1} \cdot \frac{NOPLAT_1}{kg} = \frac{(ROIC - g)}{ROIC \cdot (WACC - g)} \cdot \frac{NOPLAT_1}{kg}$$

$$\frac{EV}{kg} = \frac{(ROIC - g)}{ROIC \cdot (WACC - g)} \cdot \frac{NOPLAT_1}{kg}$$

4.3 NOPLAT or EBIT

As noted the formal derivation of the multiple leads to the use of NOPLAT in the valuation multiple. However, it is possible to modify from NOPLAT to EBIT by adjusting for tax at the right side of the equation. It is not the general tax level that is the difference between EBIT and NOPLAT, but the adjusted tax level. As noted earlier salmon farming companies generally report their EBIT pre fair value adjustments. Also, EBIT is a more common and familiar number than NOPLAT.

$$\frac{EV}{kg} = \frac{(ROIC - g)(1 - t)}{ROIC \cdot (WACC - g)} \cdot \frac{EBIT}{kg}$$

As NOPLAT is the tax-adjusted EBIT, this is an improved statistic to use in a valuation as tax rates vary between different countries. For a pure equity funded company without any financial costs NOPLAT would be equivalent to the company's earnings, and the EV/NOPLAT could be looked upon as a delevered P/E. On the other hand, the NOPLAT estimate will include more assumptions and will for that reason be more subjective.

4.4 Margin element

The second part of the enterprise value per kilogram is the normalized EBIT margin per kilogram produced.

Differences in profitability between companies occur, and should be reflected in the valuation. There are regional differences in key factors such as sea temperatures, and differences in company culture, employee motivation and incentives, value chain functionality and security systems related to e.g. diseases. Hence, this element could differ heavily between firms, and will then be a potential source for different fair pricing on an enterprise per kilogram basis.

4.4.1 Integrated firms

Historically, the salmon farmers have mainly been focusing on farming and normally we have seen little vertical integration. In the last decade almost all sizeable and listed companies have integrated vertically, with examples like Marine Harvest acquiring the processor Morpol and building its own feed plant.

This vertical integration has taken place to increase the overall margin for every kilogram produced by the companies. Hence, the EV/kg multiple will be more complicated to use. One could either keep using the EV/kg for the whole company, but this could however be problematic due to the fact that pure salmon farming, processing and feed production will not have the same assumptions for estimating value. Feed production has historically given more stable earnings seen against farming, that has been very cyclical.

Another solution to this problem, and the most used method in the industry, is to extract other assets at an implied fair value. Then one has the implied enterprise value for the farming assets, and is able to calculate a current EV/kg. Even though this seems to be more accurate, this valuation method includes many new highly uncertain assumptions such as the fair value of other assets.

4.5 Conclusion and possible improvements

The multiple is very simple in its form, and additionally it does not demand an extensive analysis of the financial statements and balance sheet of a company. The only information needed is actually current enterprise value, and the expected normalized harvest level. This gives the multiple an advantage, and the multiple value is moreover an intuitive value, i.e. what you pay for one kilogram produced per year.

What is also very positive with this multiple is the fact that it is useable for companies with negative results. The salmon farming industry has historically been very cyclical, and for many periods of time salmon prices have been lower than the production cost.

The growth rate could be somewhat less represented in a capacity multiple, but this is not the case for enterprise value per kilogram. EV/EBIT is given by the formula

$$\frac{EV}{EBIT} = \frac{(ROIC - g)(1 - t)}{ROIC \cdot (WACC - g)}$$

Included is the estimated growth, and hence as long as EV/EBIT has been adjusted for the estimated growth, then the enterprise value per kilogram multiple also will reflect the growth estimated.

Multiples based on critical resources are criticized because of it being hard to detect a relationship between a fair multiple and a financial factor behind it. This will in turn make it hard to argue for comparison of the multiple between the companies within the industry. This is not the case for the enterprise value per kilogram multiple, if one has reasonable EV/EBIT and EBIT per kilogram assumptions. It is argued by Dyrnes (2004) that the correlation between the size of the multiple and the fundamental economic factors that determine the value of the company, and by that reason the multiple will not be comparable between firms. Hence, the multiple should be used carefully and it is not necessarily to be used in a straightforward peer group valuation.

Another weak point of the valuation multiple is the question of what number to use for kilogram, actual harvest, harvest capacity, sold fish or growth in biomass. The difference between sold fish and actual harvest will most likely be small, due to the fact that harvested salmon is a fresh product that has to be sold and consumed during a short period of time. By using the increase in biomass for a company, one would eliminate the potential differences

between harvest and sold fish, but this is something that is very rarely reported by the companies. It is possible to use the harvest capacity instead, but some companies, such as Grieg Seafood, has a much lower harvest and production than its capacity and the valuation would then be misleading. For an acquisition valuation, it could be favourable to use the harvest capacity, if the acquiring company is able to exploit the capacity and licenses better.

5. Historical and current values of EV/kg

5.1 Presentation of companies analyzed

Oslo Stock Exchange has developed to be the world leading financial market for seafood companies, and has its own seafood index, OSLO seafood index, with a total of 12 companies listed (Oslo Børs, 2014). There are currently seven listed companies on the Oslo Stock Exchange that have salmon farming as their main or sole activity. However, some of them are very small and have a very limited daily liquidity. For that reason this analysis will include five companies: Marine Harvest (MHG), Lerøy Seafood Group (LSG), Salmar (SALM), Grieg Seafood (GSF) and Bakkafrøst (BAKKA). Cermaq is not included in the dataset and analysis due to several reasons:

1. Mitsubishi Group recently acquired the company and it is not listed anymore, and the company was attempted to be bought by Marine Harvest in 2013.
2. Cermaq has been the main owner of EWOS, one of the largest feed producers for the salmon farming industry, until divestment during 2013.
3. The company has around 60% of its production in Chile.

These facts tend to make the statistics for Cermaq biased and not comparable to the other companies included in the analysis.

Some key facts about the companies are shown below and the companies are presented in more depth further below.

	Marine Harvest	Lerøy Seafood Group	Salmar	Grieg Seafood	Bakkafrøst
Ticker	MHG	LSG	SALM	GSF	BAKKA
Share price (NOK)	117.5	323.0	148.0	32.4	251.0
Market cap (NOKm)	52 885	17 628	16 768	3 618	12 263
Enterprise value (NOK)	61 770	20 962	19 592	5 459	12 794
Harvest metric tons(2014)	418 873	158 800	141 100	64 736	44 013
WACC (1 Dec 2015)	8.40 %	7.90 %	7.70 %	7.90 %	7.00 %
Beta (OSEBX, adjusted, 1 Dec 2015)	0.743	0.694	0.674	0.782	0.631

Table 5-1: Key company data - Source: InFront, Bloomberg and companies, Beta is Bloomberg adjusted and compared with Oslo Stock Exchange (OSEBX)

The total production from the five included companies has grown since 2008 from 539,000 tons to 827,000 tons in 2014. This implies an annual compounded growth rate of 7.4%. These five companies accounted for 39.7% of the world production in 2008, which had decreased to around 34.0% in 2014.

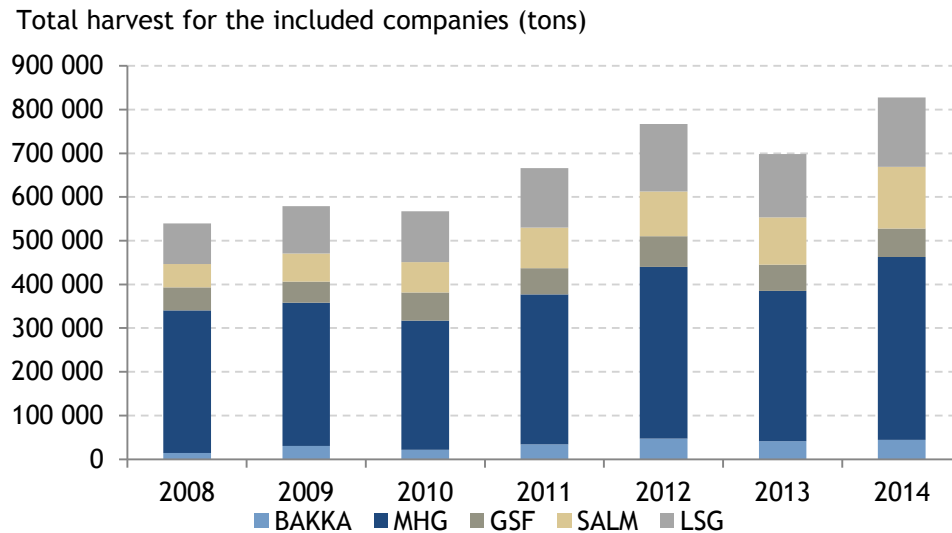


Figure 5-1 - Source: companies

In figure 5-2 the relative share of the total production volume for the included companies is shown, indicating the split in relative terms between the companies to be fairly stable since 2008.

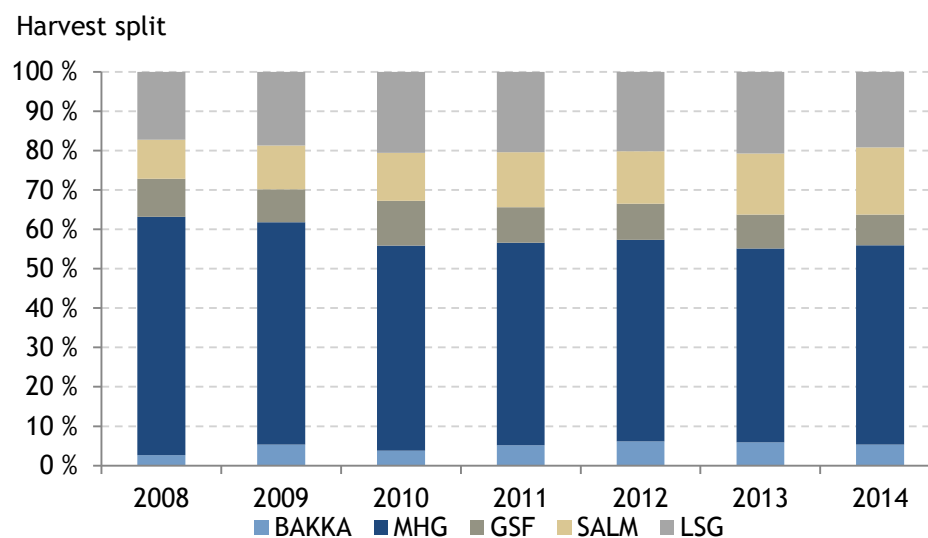


Figure 5-2 - Source: companies

The share price development for the listed companies on the Oslo Stock Exchange has been positive, and since the inception of the Oslo Seafood Index (OSLSFX) on 30 June 2010 the index has risen some 207%. As can be seen from the graph below, the index has developed better than all the listed companies except for Bakkafrost.

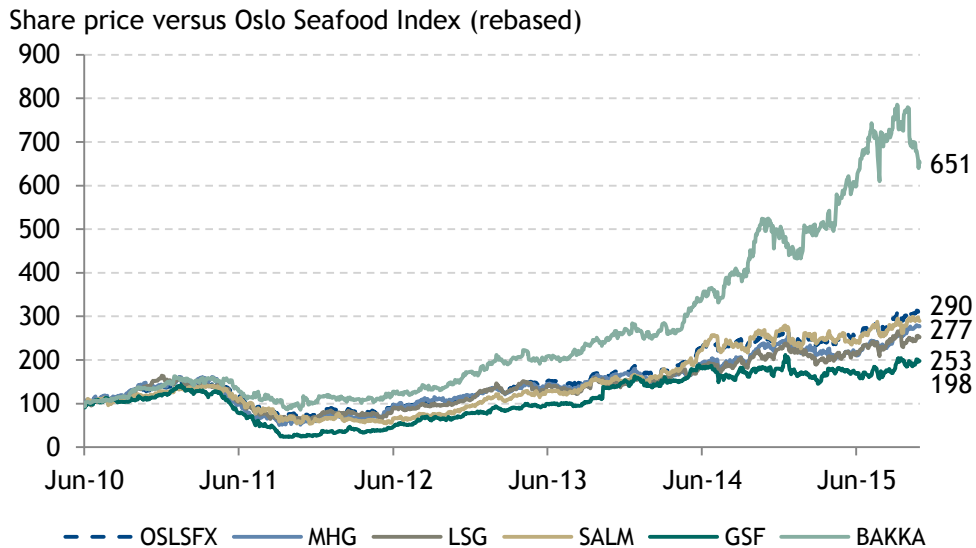


Figure 5-3: Share price development since 30 June 2010 (rebased) - Source: Infront

Compared to the Oslo Stock Exchange, all the fish farming companies have outperformed the OSEBX, the benchmark index, since 1 January 2008.

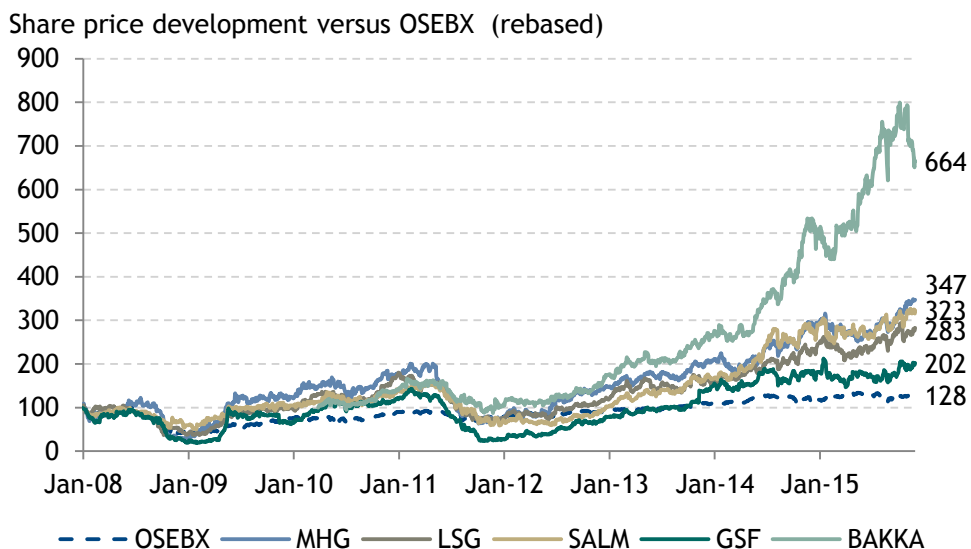


Figure 5-4: Share price development since 1 Jan 2008 (rebased) - Source: Infront

5.1.1 Marine Harvest

Marine Harvest is the largest salmon producer in the world, as well as one of the largest seafood companies, with current employment of at least 10,200 people, divided between 22 countries. The company is listed on the Oslo Stock Exchange and the New York Stock Exchange. (Marine Harvest, About Marine Harvest, 2014)

Over the years Marine Harvest has developed to be fully integrated in the value chain. The last addition is its feed factory located in Bjugn, Norway. Total salmon production in 2013 was 344,000 tons and 414,000 tons in 2014, with production sites in all salmon production regions in the world, including Norway, Chile, Canada and Scotland. In other words, Marine Harvest stands for more than 20% of the world salmon production. In 2013 the company had a turnover of NOK 19 billion. (Marine Harvest, About, 2014)

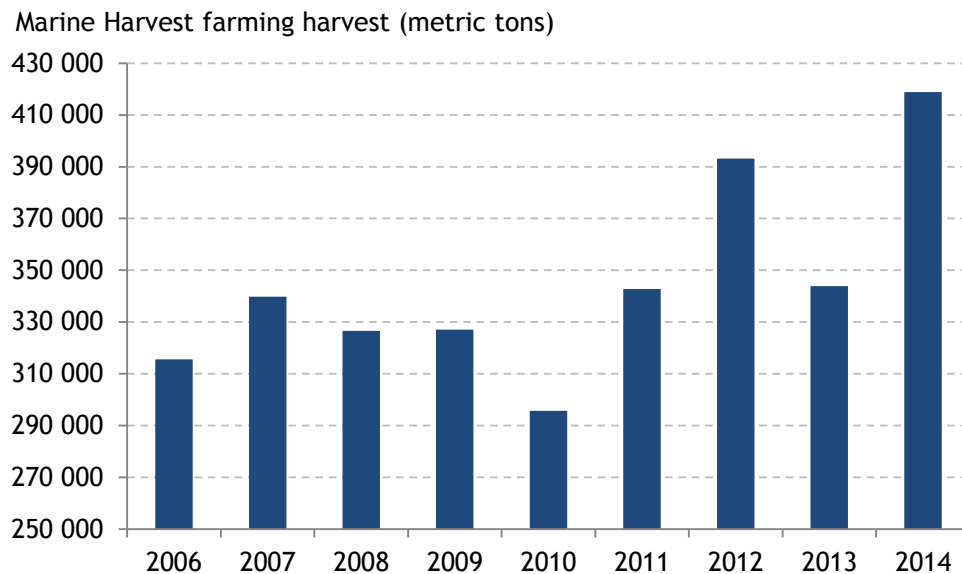


Figure 5-5 - Source: Marine Harvest

5.1.2 Lerøy Seafood Group

Lerøy Seafood Group is able to trace its history back to the very end of the 19th century, but it was not until the 21st century that the company started to move into the form we know it today. With several acquisitions in the last 15 years, the company has developed to be a fully integrated seafood group, with extensive farming activities, VAP-production and sales and distribution channels. All salmon farming production in Lerøy Seafood Group is based in Norway, however it has operations in Sweden, France and Portugal through its sales offices and VAP-production.

There are in total 139 licenses held by the Lerøy Seafood Group, divided between Lerøy Aurora in the north of Norway, Lerøy Midt in the middle of Norway and Lerøy Sjøtroll in the west coast of Norway. The company was listed in the Oslo Stock Exchange in 2002, and currently has a market capitalization of around NOK 17.6 billion.

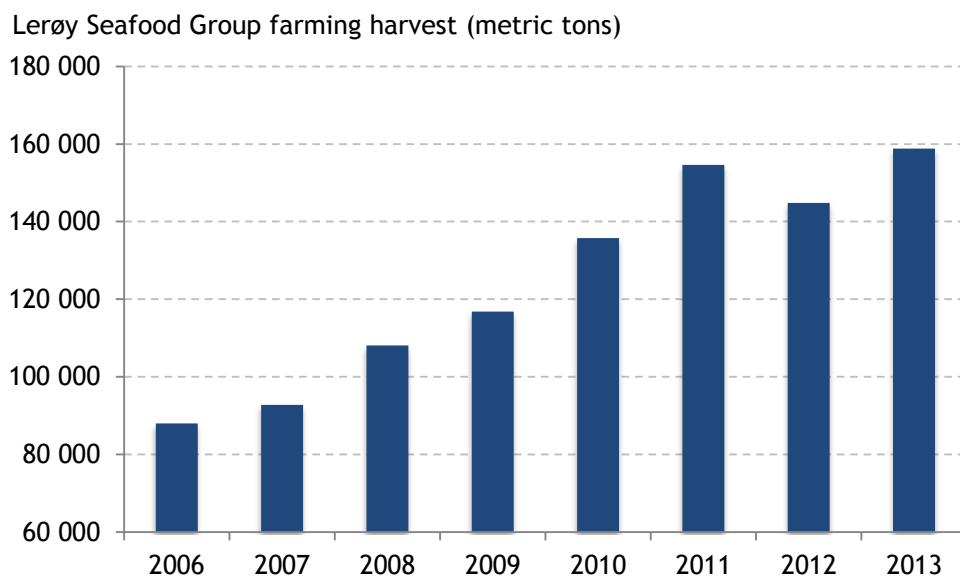


Figure 5-6 - Source: Larøy Seafood Group

5.1.3 Salmar

Salmar was founded in 1991, after an acquisition of a license for salmon production and a harvesting site in Frøya, Norway. The company developed its operations, and today it holds 83 licenses for production of salmon in Norway. 60 of the licenses are in the company's original region in Mid-Norway, while the last 23 licenses are located in Northern Norway. In addition Salmar also has ownership in Norskott Havbruk and Villa Organic, which in total has 12 licenses. It also operates a comprehensive VAP activity, co-located with the Company's main office at Frøya in Sør-Trøndelag.

Both through organic growth and acquisitions, Salmar has grown its harvest volumes threefold in 8 years, to around 140,000 tons in 2014.

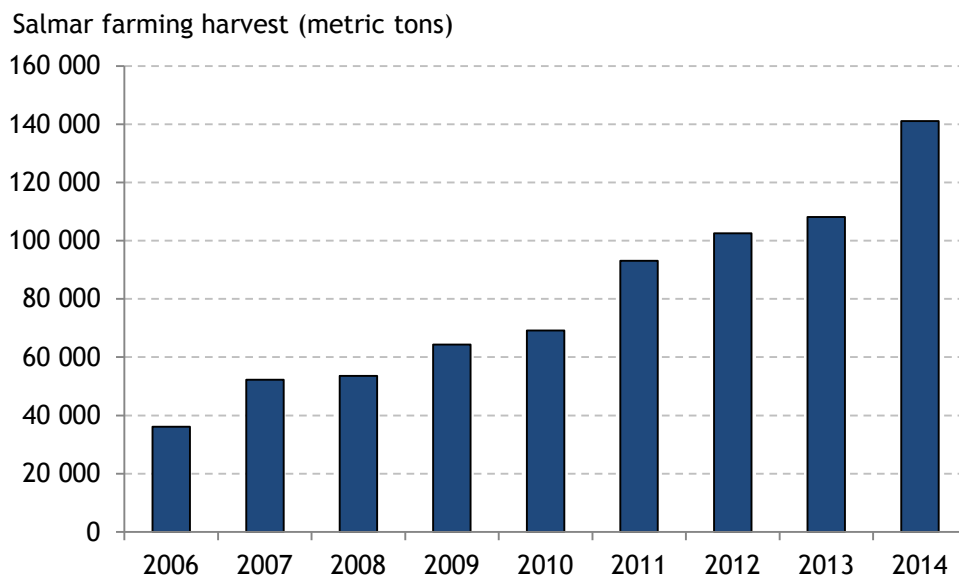


Figure 5-7 - Source: Salmar

5.1.4 Grieg Seafood

Grieg Seafood is controlled by the Grieg family, and has production in Norway, Canada and in Shetland. The production in Norway is divided between Rogaland and Finnmark, with 20 and 24 licenses respectively. In Canada it has 21 licenses, while there are 39 licenses at Shetland. This gives a total of 103 licenses, and capacity of around 95,000 tons.

The company was listed in 2007 on the Oslo Stock Exchange, and currently has a market capitalization of around NOK 3.6 billion.

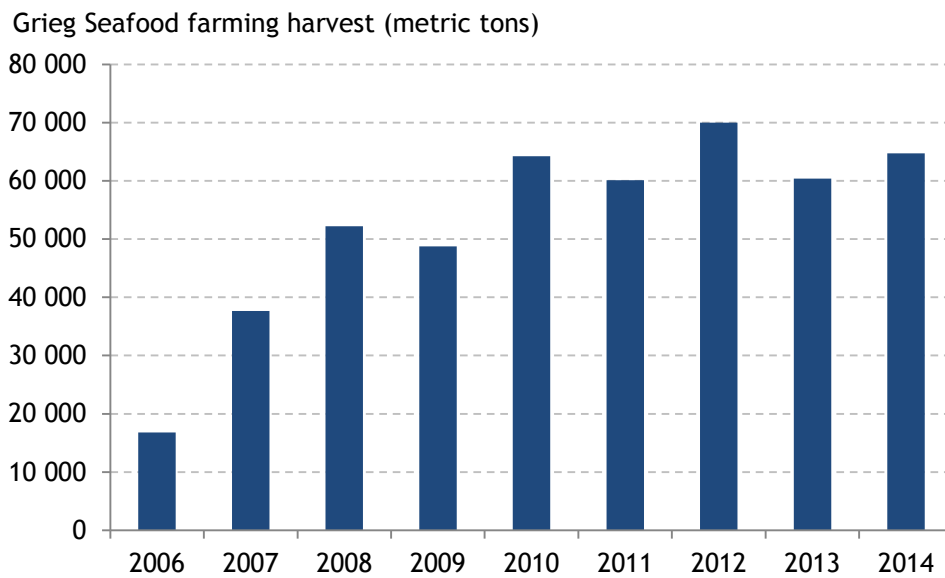


Figure 5-8 - Source: Grieg Seafood

5.1.5 Bakkafrost

Bakkafrost is one of three salmon farmers located in the Faroe Islands, and controls 14 licenses for production. This is 50% of the licenses in the Faroe Islands, and it is not possible to hold more than this level - which means that further farming growth has to come from outside the islands. During the last years Bakkafrost has developed from being a pure salmon farming company to an almost fully integrated salmon farmer, with investments in the VAP-segment, hatchery for smolt production and well boats.

Bakkafrost was listed on the Oslo Stock Exchange in 2010

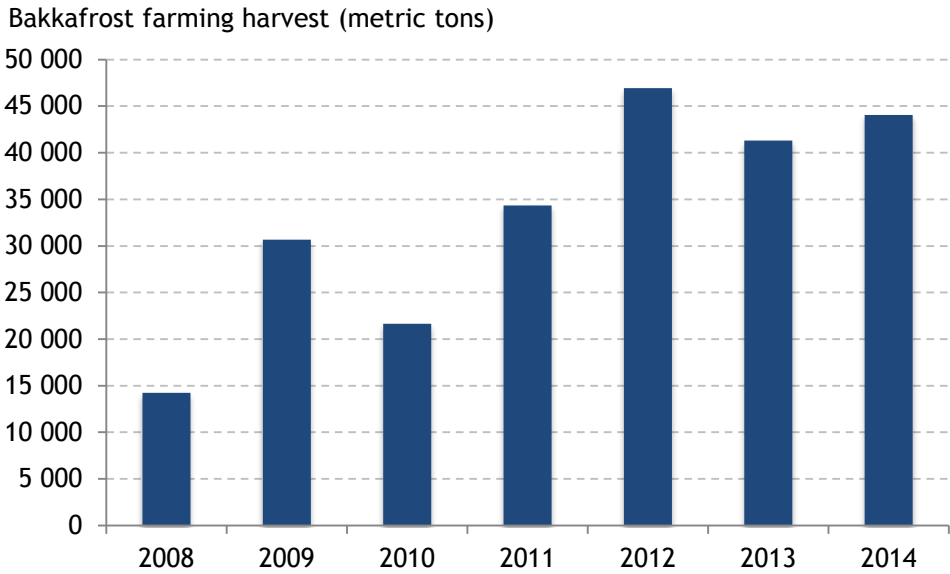


Figure 5-9 - Source: Bakkafrost

5.2 Data

Salmon farming companies have since 2007 provided guidance on their future harvest of farmed salmon in their quarterly reports and presentations. Some of the companies also report their smolt release for some specific periods of time, but this information is very general and not very detailed. Hence, the future production for each company is known to a certain degree and is public information.

As described in the discussion about multiples and relative valuation, a multiple has to reflect normalized margins. Nearly all salmon farmers have had significant growth during the last years. However, the capacity limit for some companies is almost reached, and the weighted 12 months forward production will represent a fair normalization and is what is used in this analysis (Strand, Structural shift to demand-driven market, 2014). Some companies have some special situations arising at different points of time, such as mortality or problems with diseases. If this has happened, the dataset has been adjusted to represent a fair normalization.

The harvest numbers from the firms are self reported, and could be biased for that reason. However, the regulations on operation of aquaculture facilities in Norway require reporting of, among others, the current biomass, harvest, smolt release and feed used. This is inspected and monitored by both the Directorate of Fisheries and the Norwegian Food Safety Authority, and for that reason it is arguable that the reported and estimated numbers are to be trusted (Akvakulturloven, 2014).

In addition, the guidance volumes used for the analysis are cross-checked against research reports and harvest volume estimates from different equity analysts, including SEB Enskilda, Arctic Securities, ABG Sundal Collier and Pareto Securities. This makes the self-reported guidance more sophisticated and plausible, and gives a better estimation of the market consensus harvest for each company. These analysts only represent the sell-side of the financial industry, and it is a known phenomenon that sell-side analysts and their estimates tend to be more positive than institutional buy-side and other investors (Groysberg, Healy, Chapman, Shanthikumar, & Gui, 2007). However, sell side analysts and investment banks are the only ones to have official estimates, and it is thus the only possible way to get a view of the market consensus.

The analysis has a basis from 1 January 2008 until the beginning of November 2014. This time range includes two cycles in the industry with both troughs and peaks, when primarily looking at salmon prices but also to a certain extent when looking at production volumes. The most important reason for choosing this time period is that at the end of 2007 the companies started to provide more explicit communication about the harvest outlook and guidance.

Bakkafrost was listed on the Oslo Stock Exchange at the end of March 2010, and the dataset is for that reason somewhat shorter. It is however long enough, with more than 1,600 observations, to get valid results. After an initial public offering (IPO) it takes around a month before the official estimates for a company are published, according to Norwegian law. This also applies for Bakkafrost, but it is assumed that the first observed estimate is applicable from the listing. This can be justified by the fact that even though the estimates are not official, they are presented to investors during the book building and throughout the IPO-process.

Throughout this analysis, all data are deflated to November 2014 to represent real prices. This is done because the harvest quantity included in the calculation and estimation through enterprise value to kilogram is not exposed to the general price increase in goods and services, while other statistics such as enterprise value and EBIT will increase with inflation, *ceteris paribus*.

As Bakkafrost is a Faroese company, its currency is Faroese Króna, which is issued at par with the Danish Krone (DKK). All estimates and financial numbers for Bakkafrost are in this analysis however converted to NOK at the spot rate to be comparable to the other companies.

All hypothesis will be discussed and analyzed over the next pages.

5.3 Analysis of EV/kg

The first analysis will consider the calculated enterprise value per kilogram for the listed companies in depth, and make a comparison between the five selected companies.

$$\frac{EV}{kg} = \frac{EV}{EBIT} \cdot \frac{EBIT}{kg}$$

To calculate the enterprise value per kilogram for the whole company, the current enterprise value is used. Since none of the companies has any other share types than common stock, the market capitalization is given by the number of shares outstanding multiplied by the share price. Calculation of the enterprise value also includes components consisting of minority interests and total debt after subtracting cash and cash equivalents as well as adjustments. The adjustments are the nominal amount of debt in the price and total debt from financial subsidiaries, before cash and cash equivalents and market securities from financial subsidiaries are subtracted (Bloomberg, 2014). The source for this data is the Bloomberg database, with the dataset cross-checked against Oslo Stock Exchange's trading data.

The market assumed 12 months forward harvest is then the denominator to the current enterprise value. The harvest is the source for the kilogram in the equation, which is discussed above. To get a 12 months blended forward figure, the harvest for the current and next year is weighted and added on the basis of the number of days left in the year, to get a proper estimate. A mix of the guidance from the company and sell-side analyst estimates give the source for the harvest volume.

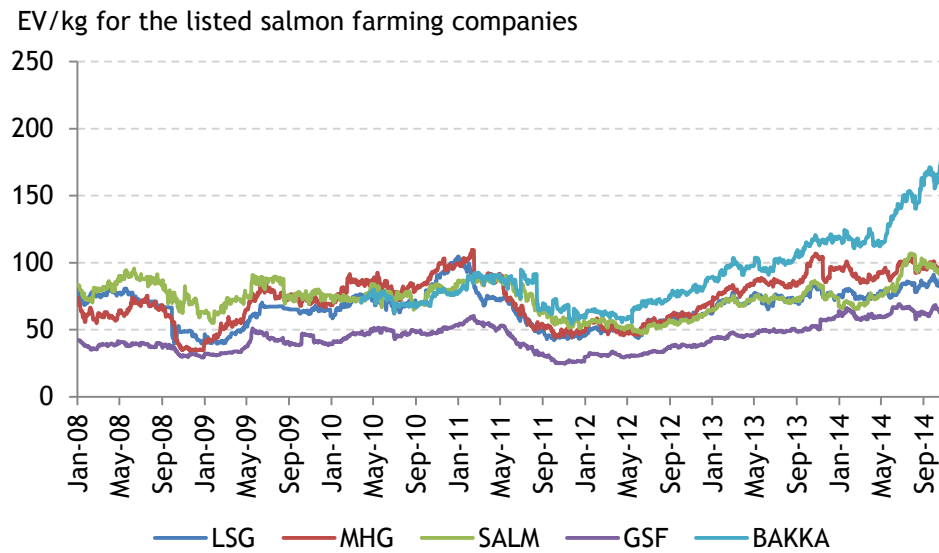


Figure 5-10 - Source: Bloomberg and companies

Details about the enterprise per kilogram observations are summarized in the table below.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	73.25	66.98	73.91	44.12	92.35
Median	74.16	69.48	73.79	43.51	85.84
Standard dev	18.06	13.64	12.45	10.59	28.50
Observations	2508	2508	2508	2508	1693

Table 5-2: Observation summary EV/kg

	MHG	LSG	SALM	GSF	BAKKA
MHG	-	0.879	0.646	0.920	0.687
LSG		-	0.720	0.815	0.617
SALM			-	0.656	0.717
GSF				-	0.809
BAKKA					-

Table 5-3: Correlation matrix EV/kg

To test whether there are significant differences between the different firms it is possible to carry out a test for inference about the difference between the means of the companies. The observations from will be samples from the two populations with unequal variances (Keller,

2012). Please see the appendix for detailed explanation and further information. Assumed significant differences between companies are in the results below marked with * at $p < 0.05$.

The results conclude that there are no significant differences in enterprise value per kilogram between any of the companies, excluding Grieg Seafood that is significantly different from all the other companies in the analysis. The reason for the difference is most likely the poor performance of Grieg Seafood, when it comes to production cost, sea lice levels and sickness. This has increased the risk in the firm and the higher risk has increased the risk premium investors demand, with the result that the company is be priced at a discount to its peers.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	0.83	-0.09	4.23*	-0.92
LSG		-	-1.43	5.27*	-1.26
SALMAR			-	7.79*	-0.92
GSF				-	-2.43*
BAKKA					-

Table 5-4: Test statistics EV/kg

The analysis proves that enterprise value per kilogram is a multiple that is usable and comparable between firms within the fish farming industry.

What might cause such similar valuation matrices for four firms, and a different result for the last one? There are several reasons for a potential difference between the companies on an enterprise value to kilogram basis

1. Production cost differences, due to sea temperatures and other favourable seawater conditions, more efficient feeding, motivated employees.
2. Price achievement differences. Salmon is not necessarily a completely homogenous product, and it is possible to achieve different prices due to the quality of the fish. Also, the company might have future contracts on their harvest volumes that will make the achieved price differ between companies.
3. The company has non-farming segments that are involved in other parts of the value chain than pure farming. Processing and value added product segments both increase the cost and the selling price, but the profit margin will increase. Feed segments will

make a company independent from other feed producers, and they will be able to produce feed their own special way that again could lead to more efficient and less costly production.

The two first bullet points will be justified by different valuations metrics, while it could be possible to adjust the valuation metric with the last point.

As a conclusion this analysis proves that enterprise value to kilogram is equal for all companies in the long-term. Hence, short-term differences could then be looked upon as mispricing in the market and a buying opportunity, unless there are any company specific news or details that would justify a difference.

Even though some of the companies have invested in non-farming activities and have different production costs, this analysis proves that they do not give significantly higher pricing on an enterprise value to kilogram basis.

5.3.1 Estimation of other business segments

All companies have to some degree non-farming activities in their operation, such as processing (value added products), sales and distribution divisions or feed divisions. These divisions will either generate a cost or a profit for the firm, and have a value, which is included in the total current enterprise value used in the calculations. It will then be appropriate to extract the value of non-farming assets, and look at what the enterprise value per kilogram will be for the farming assets of the firm. This analysis will therefore divide the current enterprise value attributable to the farming division by the estimated harvest volumes.

It is possible to estimate a value for the non-farming segments and divisions of a company, in addition to the current enterprise value. The remainder of the enterprise value will then be the enterprise value related to farming. The hitch is how to value the non-farming segments. Involvement of a valuation within a valuation includes more assumptions, and makes the original valuation less credible.

The companies' quarterly and annual reports provide rather limited information on each segment to enable a complete discounted cash flow analysis to be made. However, they usually report revenue and operating margins (EBIT) for non-farming divisions. With analysts following the companies and industry also often providing EBIT estimates for these

divisions, it is possible to conclude on a consensus EBIT estimate. By using the EV/EBIT calculated for the company it is possible to estimate a value for the non-farming divisions.

$$EV = \frac{EV}{EBIT} \cdot EBIT$$

This estimation of the value attributable to non-farming divisions is somewhat simplified due to the following reasons:

1. The non-farming divisions will not necessarily be facing the same risk, return on invested capital and growth opportunities. Non-farming activities, especially feed businesses, have historically been more stable and less volatile than farming, and for that reason have been less risky. The cost of capital for the company is then not representative for the non-farming divisions, and the EV/EBIT for the whole company could be somewhat inaccurate. On the other hand, the calculated cost of capital to the firm also includes the non-farming assets, which influences the cost of capital of the whole firm.
2. Analysts do not always report detailed estimates for the non-farming divisions, but focus on the main drivers of the companies given by the farming activities. Also, the consensus estimate does not necessarily represent a normalized earnings level for the division.
3. It is possible that some non-farming activities increase the EBIT margins in the farming divisions, e.g. by lowering the feed costs, and that will not be reflected in the segment EBIT. This will be reflected in an elimination of the summarized EBIT of the company's segments, but how this elimination should be split between the segments is not necessarily clear.
4. The EBIT estimates are only based on published reports from sell-side analysts. As noted, these might not represent the overall market consensus but are the only estimates available. Also, the estimates are not included in all published reports, and the fact that the estimates change may not always be published in reports.
5. Non-farming assets could be of strategic value to the companies. Marine Harvest has established itself in the feed business, which makes the company less dependent on external feed producers. This strategic value is not necessarily included in the financial estimates and for that reason not reflected in value estimated.

Figure 5-7 illustrates the share of enterprise value that is estimated to relate to non-farming assets.

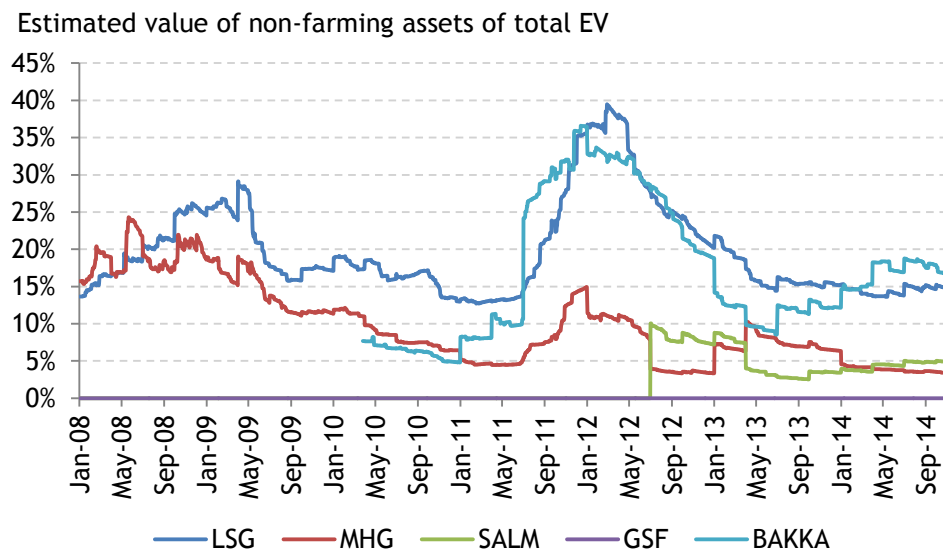


Figure 5-11 - Source: Compiled by the author

With an estimate of the non-farming assets adjusted for in the calculation of enterprise value per kilogram, the key statistics between the companies are presented in the table below.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	66.66	54.53	72.61	44.12	77.38
Median	66.61	56.88	72.88	43.51	74.59
Standard dev	18.72	14.13	12.53	10.59	25.95
Observations	2508	2508	2508	2508	1693

Table 5-5: Observation summary EV/kg excluding non-farming assets

	MHG	LSG	SALM	GSF	BAKKA
MHG	-	0.858	0.508	0.928	0.844
LSG		-	0.701	0.836	0.772
SALM			-	0.584	0.717
GSF				-	0.898
BAKKA					-

Table 5-6: Correlation matrix EV/kg excluding non-farming assets

The test statistics from this analysis is a test of inference between the mean given from the data estimated on each company. Please see the appendix for details. The results of this analysis are somewhat the same as those without the elimination of the non-farming divisions. Grieg Seafood is also in this analysis significantly different from Marine Harvest, Lerøy Seafood Group, Salmar and Bakkafrost when eliminating the non-farming divisions. However, Lerøy Seafood Group is also now significantly different from Salmar, probably due to the fact that the latter did not have any estimates on non-farming divisions until late in 2011.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	1.51	-0.78	3.07*	-0.60
LSG		-	-3.57*	2.28*	-1.36
SALMAR			-	7.4*	-0.29
GSF				-	-2.01*
BAKKA					-

Table 5-7: Test statistics EV/kg excluding non-farming assets

5.3.2 Adjusting for time period included

Bakkafrost was listed on the Oslo Stock Exchange on 26 March 2010, more than two years later than the dataset for the other firms starts. The number of observations is around 1,700 for Bakkafrost compared to more than 2,500 for the other four companies. Also, while Bakkafrost was listed near the peak of an industry cycle with high salmon prices and operating margins, the two previous years included an industry low cycle, with lower salmon prices in both 2008 and 2009.

Will there be any differences when shortening the time period by around two years? The table below presents key statistics from the updated dataset.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	72.81	56.37	70.38	46.67	77.38
Median	76.72	59.84	70.65	48.09	74.59
Standard dev	17.94	14.94	13.51	11.58	25.95
Observations	1693	1693	1693	1693	1693

Table 5-8: Observation summary adjusting for time period

The test statistics from this analysis are also a test of inference between the mean given from the different companies, and are presented in the table below. Please see the appendix for a detailed explanation about the test.

Adjusting for the time period makes the differences smaller, and the only significant difference is between Grieg Seafood against Marine Harvest and Salmar. This further strengthens the earlier presented conclusion that investments in non-farming divisions and lower production costs do not give a higher valuation in the market. As the time period is shortened the difference between Salmar and Lerøy Seafood Group continues.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	1.73	0.27	3.08*	-0.25
LSG		-	-2*	1.53	-1.22
SALMAR			-	4.3*	-0.41
GSF				-	-1.84
BAKKA					-

Table 5-9: Test statistics EV/kg adjusted for time period

5.4 Analysis of EBIT per kilogram

If one knows the EV/kg and the EV/EBIT, it is possible to calculate what the normalized EBIT per kilogram the financial market assumes. This section will look deeper at the implied EBIT per kilogram in the market pricing of the companies, and look for significant differences between them.

The EBIT per kilogram element of the equation could be arrived at on a stand-alone basis by dividing by the EV/EBIT element.

$$\frac{EBIT}{kg} = \frac{EV}{kg} \bigg/ \frac{EV}{EBIT}$$

To find a company's EV/EBIT one could calculate the theoretical correct EV/EBIT given by the formula

$$\frac{EV}{EBIT} = \frac{(ROIC - g)(1 - t)}{ROIC \cdot (WACC - g)}$$

However, this is very theoretical and as discussed earlier some of the key statistics in the formula are hard to estimate. One problem is to be able to estimate a future return on invested capital, given potential differences between the historical return on invested capital and the return on new invested capital. Also, growth is difficult to estimate especially considering that there is political risk involved in the future growth of the industry.

To get a more precise calculation one could use the future consensus market expectations for EBIT, either by looking at the current or next year's EBIT, or even take a blended forward EBIT estimate. Bloomberg has updated estimates from all analysts following the companies, and the 12 months forward blended BEst estimate of EBIT represents the market expectations (Bloomberg, 2007). The decision as to what estimates are included is based on statistics and accounting, as well as market, industry and company knowledge. An example is that estimates that have not been reiterated or revised for a time period of normally 100 days will not be included in the consensus. Also, to eliminate potential outliers and not representative estimates, the dataset has been examined and adjusted.

The enterprise value per kilogram was calculated in the previous analysis, and is also used in this analysis. For an explanation of the derivation, please see above. The chart below shows the estimated normalized EBIT margin per kilogram produced for the companies included in this analysis. It is however important to notice that this margin also includes all non-farming activities.

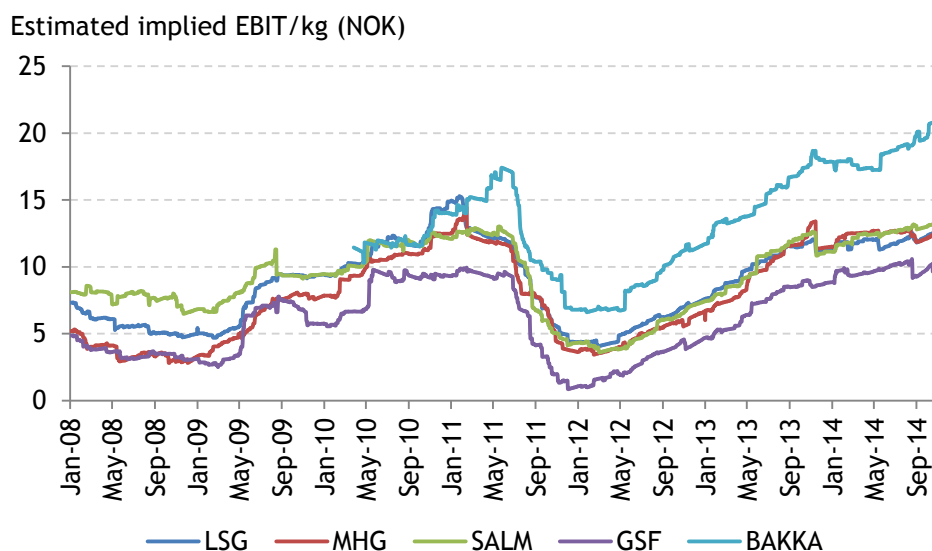


Figure 5-12 - Source: Compiled by the author

The EBIT per kilogram implied for the different companies is summarized in the table below.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	7.99	8.88	9.24	6.15	13.50
Median	7.76	9.35	9.37	6.39	13.73
Standard dev	3.44	3.02	2.76	2.85	3.91
Observations	2508	2508	2508	2508	1693

Table 5-10: Observation summary EBIT/kg

	MHG	LSG	SALM	GSF	BAKKA
MHG	-	0.972	0.897	0.949	0.867
LSG		-	0.929	0.964	0.794
SALM			-	0.963	0.717
GSF				-	0.846
BAKKA					-

Table 5-11: Correlation matrix EBIT/kg

This analysis clearly shows that the implied EBIT margins are significantly different from each other, by discarding the null hypothesis and assuming no companies with historical identical prices implied on an enterprise value per kilogram basis by. The exceptions are Salmar and Lerøy Seafood Group, where the test keeps the null hypothesis and is not able to assume a difference in EBIT margin.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	-2.98*	-4.45*	6.44*	-12.52*
LSG		-	-1.52	11.23*	-11.18*
SALMAR			-	13.93*	-10.62*
GSF				-	-18.15*
BAKKA					-

Table 5-12: Test statistics EBIT/kg

5.4.1 Implied EBIT margins for farming divisions

The EBIT per kilogram levels listed in the most recent analysis are representative for all invested capital in the company, the same way as in the analysis on enterprise value per kilogram, i.e. including other business segments than pure farming such as processing and feed production.

To eliminate this obstacle non-farming segments and assets are valued the same way, i.e. by using an estimated market consensus of the 12 months forward EBIT from non-farming operations and using the current EV/EBIT of the company to estimate a value of non-farming segments.

The adjusted implied EBIT margins are summarized in the table below, and as expected the general average EBIT margin for all companies is somewhat lower without the non-farming segments.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	7.35	7.30	9.07	6.15	11.41
Median	6.95	7.65	9.36	6.39	11.93
Standard dev	3.41	2.84	2.71	2.85	3.79
Observations	2508	2508	2508	2508	1693

Table 5-13: Observation summary EBIT margin farming segments

	MHG	LSG	SALM	GSF	BAKKA
MHG	-	0.956	0.862	0.940	0.927
LSG		-	0.934	0.968	0.887
SALM			-	0.953	0.717
GSF				-	0.910
BAKKA					-

Table 5-14: Correlation matrix EBIT per kilogram farming assets

The test statistics from this analysis show the same results as earlier, that the implied EBIT margins are assumed not to be equal, by rejecting the null hypothesis. There is also one exception in this test. Marine Harvest has now switched with Salmar, and it is now in its test against Lerøy Seafood Group keeping the null hypothesis, and not able to assume any significant difference in EBIT margins implied.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	0.20	-6.26*	4.25*	-9.68*
LSG		-	-8.16*	5.02*	-10.7*
SALMAR			-	13.39*	-6.18*
GSF				-	-13.68*
BAKKA					-

Table 5-15: Test statistics EBIT margin farming segments

5.4.2 Adjusting for time period included

As carried out in the analysis of enterprise value per kilogram, the analysis of EBIT per kilogram is also adjusted for the time period as a result of Bakkafrost's listing more than two years later than the dataset starts for the other firms.

The dataset for the time-adjusted analysis will also be adjusted for non-farming assets, to get a pure farming EBIT margin implied in the price. As the table for summarization displays, the margins have increased on average due to the fact that the dataset now has excluded a trough in the salmon farming cycle.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	8.75	8.12	9.42	6.87	11.41
Median	9.84	9.43	10.91	8.51	11.93
Standard dev	3.41	2.84	2.71	2.85	3.79
Observations	1693	1693	1693	1693	1693

Table 5-16: Observation summary adjusted for time

Outside one exception earlier, the test statics for this analysis also assumes that the implied EBIT margins are different from each other. With a shorter time period, the similarity between Marine Harvest and Lerøy Seafood Group in the previous analysis is removed, and all null hypotheses are rejected, and the alternative hypothesis with unequal means is assumed.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	2.02*	-2*	5.83*	-6.35*
LSG		-	-4.08*	4.12*	-8.12*
SALMAR			-	7.76*	-4.7*
GSF				-	-10.97*
BAKKA					-

Table 5-17: Test statistics adjusted for time included

5.5 Observed costs against implied cost

What about the production cost level for the different companies? It is possible to find the implied production cost level in each company's farming division, by assuming that all companies on average will achieve the quoted reference salmon price.

$$\frac{\text{Production cost}}{\text{kg}} = \frac{\text{Price}}{\text{kg}} - \frac{\text{EV}/\text{kg}}{\text{EV}/\text{EBIT}}$$

Will the implied production costs for each company differ from the actual production cost observed?

The table below displays the implied and observed production costs key statistics, with the test statistic at the bottom. A test is also used here to check inference about two populations with unequal variance. The time period included is the analysis since the beginning of 2008 and since the listing of Bakkafrost.

The test concludes that it is not possible to reject the null hypothesis, and assume that the implied production costs are equal to the actual production costs observed. Hence, the market is able to give a good estimate of the actual costs in its pricing of salmon farming companies at an enterprise value per kilogram basis.

		MHG	LSG	SALMAR	GSF	BAKKA
Implied	Average	26.65	26.71	24.93	27.85	22.99
	Median	25.95	25.99	24.07	26.81	22.85
	Standard dev	5.56	5.65	5.75	5.58	6.00
	Observations	2508	2508	2508	2508	1693
Observed	Average	27.63	26.60	23.45	29.81	15.27
	Median	25.91	27.02	23.12	30.00	20.68
	Standard dev	3.80	2.97	2.66	2.88	9.75
	Observations	28	28	28	28	20
	T-stat	-0.33	0.06	0.96	-1.12	0.35

Table 5-18: Observation summary and test statistics implied cost versus actual costs

5.5.1 Costs conclusion

As described in the derivation and discussion about the enterprise value per kilogram multiple, the EBIT per kilogram element of the multiple is able to capture potential differences in production cost which should imply a different fair valuation. The differences in costs could appear in the industry, but it is not certain that they are durable.

The table below presents the key statistics from observed costs included in the time period in this analysis. Both Salmar and Bakkafrøst seem to stand out somewhat in the low end with averages at 23.45 and 21.37 respectively, and Grieg Seafood in the other end with an average of 29.81.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	27.63	26.60	23.45	29.81	21.37
Median	25.91	27.02	23.12	30.00	21.03
Standard dev	3.90	2.97	2.66	2.88	1.64
Observations	28	28	28	28	20

Table 5-19: Observation summary production cost

	MHG	LSG	SALM	GSF	BAKKA
MHG	-	0.529	0.741	0.612	0.468
LSG		-	0.609	0.226	0.081
SALM			-	0.462	0.248
GSF				-	0.306
BAKKA					-

Table 5-20: Correlation matrix production cost

The test statistic shows that the null hypothesis assuming equal costs is kept for all comparisons, except for Bakkafrøst where the null hypothesis is rejected, and the alternative hypothesis is assumed for all companies except Salmar. Also in the test between Salmar and Grieg Seafood the null hypothesis is rejected, and there are assumed different costs.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	0.30	1.27	-0.64	2.06*
LSG		-	1.42	-1.35	2.83*
SALMAR			-	-2.97*	1.36
GSF				-	4.83*
BAKKA					-

Table 5-21: Test statistics production cost

5.6 Price-taker or able to set prices

The enterprise value per kilogram equation has its margin element, as derived and analysed above. In this analysis an EBIT per kilogram before biomass adjustments has been used as the operational margin for the farmer. Hence, this implies the difference between achieved price and the production cost.

If one assumes that the cost level in the firm is somewhat stable, one could argue that the production cost for a salmon farmer is known. With the EV/EBIT and EV/kg also known, the unknown in the equation will be the normalized salmon price achieved per kilogram produced.

$$\frac{EV}{kg} = \frac{EV}{EBIT} \cdot \frac{EBIT}{kg}$$

$$\frac{EV}{kg} = \frac{EV}{EBIT} \cdot \left[\frac{Price}{kg} - \frac{Production\ cost}{kg} \right]$$

$$\frac{Price}{kg} = \frac{EV/kg}{EV/EBIT} + \frac{Production\ cost}{kg}$$

Marine Harvest argues that there is a global market for salmon, by comparing the three leading prices for salmon in Oslo, Miami and Seattle. By having a global market one is not able to affect the market price, and one has to take the price as given. In other words there should be no market power for any of the firms.

To conduct this analysis the problem arises that just about all salmon farming companies included in the analysis have non-farming activities. Also, in this analysis the estimation of the value of non-farming divisions is made using the estimated non-farming EBIT multiplied by the current EV/EBIT observed in the market for the company.

In this analysis, another element is added to calculate the implied normalized salmon price in the market pricing, the production costs. Except in special situations, the companies do not report the actual production cost, e.g. Cermaq did report its production costs in Chile when

the company launched its cost cutting program for Chile. To estimate the production cost level for the companies, it is possible to look at the implied cost. All companies report revenue, EBIT before fair value adjustments and harvest volumes for farming, and most of the companies report the farming segment in different geographical divisions. The difference between the revenue and EBIT will then be the implied production cost. It is also possible to subtract the EBIT per kilogram from the average reference price for the period, which also will equal an implied cost. It is not necessarily the case that these two methods of implied cost will equal each other. The salmon price fluctuates also within the quarter, and most often the companies do not have a smooth and steady harvest profile during a quarter. The costs used are the implied difference between revenue and EBIT per kilogram, and this is smoothed out and adjusted for quarterly outliers.

The table below shows the key statistics from the implied price from the market prices of the five companies. There are some quality differences for produced salmon, and Faroese salmon has historically traded at a small discount of NOK 1 – 2 per kilogram. As Bakkafrost has all its production in the Faroe Islands, this is adjusted for in the calculation.

	MHG	LSG	SALMAR	GSF	BAKKA
Average	34.88	33.85	32.46	35.92	32.10
Median	32.62	33.39	30.80	36.68	32.41
Standard dev	6.09	3.72	4.20	4.83	4.83
Observations	2508	2508	2508	2508	1693

Table 5-22: Observation summary implied prices

	MHG	LSG	SALM	GSF	BAKKA
MHG	-	0.814	0.916	0.823	0.928
LSG		-	0.791	0.642	0.784
SALM			-	0.777	0.717
GSF				-	0.901
BAKKA					-

Table 5-23: Correlation matrix implied price

The test statistic rejects the null hypothesis, and assumes unequal achieved prices for all comparisons except for three of the ten comparisons, given by Marine Harvest and Lerøy Seafood Group, Marine Harvest and Grieg Seafood as well as Salmar and Bakkafrost. The test proves that the market expectations of price achievements are different for the companies.

	MHG	LSG	SALMAR	GSF	BAKKA
MHG	-	1.30	2.95*	-1.19	2.97*
LSG		-	3.1*	-3.83*	2.76*
SALMAR			-	-5.93*	0.53
GSF				-	5.2*
BAKKA					-

Table 5-24: Test statistics implied prices

5.6.1 Salmon price versus the implied salmon price

The implied salmon price in the salmon farming companies, does not have to equal the actual salmon price in the market. In the table below, the implied average salmon prices are compared to the observed salmon prices in Norway since 2008 and since listing in 2010 for Bakkafrost. We see that the actual prices have a higher variance than all the implied prices. But is it possible to conclude on any differences about the means? A test of inference between the mean of two populations is conducted to check for potential differences.

The test statistic keeps the null hypothesis for all five companies and assumes that the implied salmon price on an enterprise value per kilogram basis is equal to the observed salmon prices. Hence, all listed salmon farmers are price-takers in the market that adjust to the listed salmon price.

		MHG	LSG	SALMAR	GSF	BAKKA
Implied	Average	34.88	33.85	32.46	35.92	32.10
	Median	32.62	33.39	30.80	36.68	32.41
	Standard dev	6.09	3.72	4.20	4.83	4.83
	Observations	2508	2508	2508	2508	1693
Observed	Average	34.00	34.00	34.00	34.00	34.40
	Median	32.53	32.53	32.53	32.53	35.37
	Standard dev	7.24	7.24	7.24	7.24	7.82
	Observations	2508	2508	2508	2508	1693
	T-stat	0.68	-0.14	-1.40	1.68	-1.44

Table 5-25: Observation summary and test statistics implied and observed salmon prices

6. Conclusion

This thesis has proven that the EV/kg multiple is a valuation technique which reports potential differences in valuation.

However, as for all multiples used in relative valuation the EV/kg multiple holds several potential pitfalls in line with all other relative valuation methods. This includes the size of the company, liquidity in the share, growth opportunities, cost of capital, return on capital, investment needs and the strategy of the firm. This is shown through Greig Seafood that historically has had a significantly different EV/kg level than the other companies included in this analysis.

The EV/kg multiple also takes into account the fact that the salmon farmers have different production costs which correspond with the actual costs. The implied production cost level in the observed multiple is not significantly different from the actual observed production costs, which once again shows the capability of the multiple.

Furthermore, the multiple suggests that the achieved prices for the salmon farmers differ. This is most likely the reality and this could for that reason be a weakness of the multiple. However, the multiple suggests that there are no differences between the actual salmon prices and the implied prices in the multiple, which once again strengthens the multiple.

The multiple is an applicable multiple that easily can indicate differences and mispricing among stock exchange listed salmon farmers. The use of the multiple must however be conducted carefully as it is a simplified valuation method including several assumptions.

As explained, the expected growth is also a factor that affects the multiples. The market expectations of long term growth for the salmon farming companies is not available as analyst reports only have two or three years with estimates. This could be focus on future research on the EV/kg multiple.

7. Bibliography

- Akvakulturloven. (2014). *Lov om akvakultur av 16. juni 2005 nr. 79* . Retrieved 12 04, 2014, from <https://lovdata.no/dokument/NL/lov/2005-06-17-79>
- Alvial, A., Kibenge, F., Forster, J., Burgos, J., Ibarra, R., & St-Hilaire, S. (2012). *The Recovery of the Chilean Salmon Industry*. Puerto Montt: Global Aquaculture Alliance.
- Angell-Hansen, G., Gärdehall, T., & Johansen, T. (2013). *The Norwegian Market Risk Premium 2013 and 2014*. Oslo: PWC.
- Asche, F., & Bjørndal, T. (2011). *The Economics of Salmon Aquaculture* (Second Edition ed.). Chichester: Wiley-Blackwell.
- Berge, A. (2014, 09 07). *iLaks*. Retrieved 11 20, 2014, from Vanntrobbel for Langsand Laks: <http://www.ilaks.no/vanntrobbel-for-langsand-laks/>
- Berge, A. (2014, 12 04). *iLaks*. Retrieved 12 06, 2014, from Skal konsesjoner for landbasert oppdrett gis bort gratis?: <http://www.ilaks.no/skal-konsesjoner-for-landbasert-oppdrett-gis-bort-gratis/>
- Berge, A. (2015, 01 28). *iLaks*. Retrieved 01 28, 2015, from - Spørsmålet er om det skjer om ti eller 20 år: <http://www.ilaks.no/sporsmalet-er-om-det-skjer-om-ti-eller-20-ar/>
- Bloomberg. (2007). *Earnings analysis, analyst estimates and company guidance*. Bloomberg. New York: Bloomberg.
- Bloomberg. (2014, 11 27). *Bloomberg terminal*. Retrieved 11 27, 2014
- Damodaran, A. (2006). *Growth Rates and Terminal Value* . New York: New York University.
- Damodaran, A. (2007). *Return on Capital (ROC), Return on Invested Capital (ROIC) and Return on Equity (ROE): Measurement and Implications* . Stern School of Business. New York: New York University.

-
- Damodaran, A. (2008, 12). *What is the riskfree rate? A search for the Basic Building Block*. Retrieved 05 10, 2013, from What is the riskfree rate? A search for the Basic Building Block: http://4iranian.com/uploads/Estimating%20Riskfree%20Rates_881.pdf
- Damodaran, A. (2012). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*. Hoboken, N.J: Wiley.
- Damodaran, A. (2014, 05 10). *Annual Returns on Stock, T.Bonds and T.Bills: 1928 - Current*. Retrieved 05 10, 2014, from Annual Returns on Stock, T.Bonds and T.Bills: 1928 - Current: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/histretSP.html
- Dempster, P. (2014). *The Chilean salmon Industry Current status, future potential and some views over some short term challenges*. AquaGen Chile, Santiago.
- Dyrnes, S. (2009, 08 25). *Lederkilden*. Retrieved 11 10, 2014, from Verdsettelse ved bruk av multiplikatorer: <https://www.lederilden.no/tema/finans/verdivurdering/verdsettelse-ved-bruk-av-multiplikatorer>
- Fish Pool. (n.d.). *Fish Pool*. Retrieved 11 22, 2014, from The Fish Pool Index: <http://fishpool.eu/default.aspx?pageId=8>
- Gjein, H. (2015). *HØRINGSUTTALELSE – NOTAT OM MELDING TIL STORTINGET OM VEKST I NORSK LAKSE- OG ØRRETOPPDRETT*. Mattilsynet. Oslo: Mattilsynet.
- Groysberg, B., Healy, P., Chapman, C., Shanthikumar, D., & Gui, Y. (2007). *DO BUY-SIDE ANALYSTS OUT-PERFORM THE SELL-SIDE?* . Harvard Business School, Boston.
- Holm, T. (2013, 08 26). *Landbased salmon farming semiar*. Oslo: SEB Enskilda.
- Investopedia. (2014, 11 28). *Investopedia*. Retrieved 11 28, 2014, from Political risk: <http://www.investopedia.com/terms/p/politicalrisk.asp>
- Investopedia. (2015, 11 23). *Income Statement*. Retrieved 11 23, 2015, from Investopedia: <http://www.investopedia.com/terms/i/incomestatement.asp>

Investopedia. (n.d.). *Free Carrier - FCA*. Retrieved 11 30, 2014, from Free Carrier - FCA:
<http://www.investopedia.com/terms/f/fca.asp>

Investopedia. (n.d.). *Market Capitalization*. Retrieved 12 12, 2014, from Investopedia:
<http://www.investopedia.com/terms/m/marketcapitalization.asp>

Johnsen, T. (2013). *Lecture on Cost of Capital in Corporate Finance*. Bergen: NHH.

Kaldestad, Y., & Møller, B. (2011). *Verdivurdering Teoretiske modeller og praktiske teknikker for å verdsette selskaper*. Bergen: Fagbokforlaget.

Keller, G. (2012). *Managerial Statistics* (9th Edition ed.). South Western Educational .

Koller, T., Goedhart, M., & Wessels, D. (2010). *Valuation*. New Jersey: John Wiley & Sons.

Kontali Analyse. (2014). *Kontali Monthky Salmon Report July*. Kontali Analyse.
Kristiansund: Kotal Analyse.

Kråkås, Ø. (2012, 02 07). *Salmon Group*. Retrieved 12 02, 2014, from Kva er MTB?:
<http://salmongroup.no/aktuelt/2012/02/kva-er-mtb/>

Liasjø, G. (2014). *Negative estimate revisions ahead; time for caution*. ABG Sundal Collier.
Oslo: ABG Sundal Collier.

Lund, H., & Steinslien, F. (2014). *Near-term prices down on Russian ban, valuation effect limited*. Pareto Securities. Oslo: Pareto Securities.

Marine Harvest. (2009). *2008 Annual report*. Bergen: Marine Harvest.

Marine Harvest. (2010). *2009 Annual report*. Bergen: Marine Harvest.

Marine Harvest. (2011). *2010 Annual report*. Bergen: Marine Harvest.

Marine Harvest. (2012). *Annual report 2011*. Bergen: Marine Harvest.

Marine Harvest. (2013). *2012 Annual Report*. Bergen: Marine Harvest.

Marine Harvest. (2013). *Annual report 2012*. Bergen: Marine Harvest .

Marine Harvest. (2014). *2013 Annual Report*. Bergen: Marine Harvest.

-
- Marine Harvest. (2014, 10 20). *About*. Retrieved 10 20, 2014, from History: <http://www.marineharvest.com/about/history/>
- Marine Harvest. (2014, 10 20). *About Marine Harvest*. Retrieved 10 20, 2014, from About - In brief: <http://www.marineharvest.com/about/in-brief/>
- Marine Harvest. (2014). *Salmon Farming Industry Handbook*. Bergen: Marine Harvest.
- Ministry of Fisheries and Coastal Affairs;. (2013). *Verdens fremste sjømatnasjon - Sjømatmeldingen*. Ministry of Fisheries and Coastal Affairs. Oslo: Ministry of Fisheries and Coastal Affairs.
- Møen, J. (2013). *INT 010 Anvendt metode Forelesningsnotater* . NHH. Bergen: NHH.
- Møller, Y. K. (n.d.).
- Norges Sjømatråd. (2014). *Månedstatistikk desember 2013*. Tromsø: Norges Sjømatråd.
- NOS Clearing. (2012). *Procedures for calculating salmon spot prices*. Oslo: NOS Clearing.
- Oslo Børs. (2014, 12 11). *ose.no*. Retrieved 12 11, 2014, from Seafood: http://www.oslobors.no/ob_eng/Oslo-Boers/Listing/Energy-shipping-and-seafood/Seafood
- Oslo Børs. (2015). *Alle noterte selskaper i OSLO Seafood Index*. Retrieved 01 28, 2015, from <http://www.oslobors.no/Oslo-Boers/Notering/Energi-shipping-og-sjoemat/Sjoemat/Alle-noterte-selskaper-i-OSLO-Seafood-Index>
- Rabanal, H. R. (1988). *History of Aquaculture*. United Nations, Food and Agriculture Organization. Manila: United Nations.
- Statistisk sentralbyrå. (2014, 12 10). *Ekspert av laks*. Retrieved 12 12, 2014, from Om statistikken: <http://www.ssb.no/utenriksokonomi/statistikker/laks/uke/2014-12-10?fane=om#content>
- Strand, P. (2014). *Structural shift to demand-driven market*. SEB Enskilda. Oslo: SEB Enskilda.

Strand, P., & Øyen, H. (2013). *High expectations for Norway, low for Chile*. Oslo: SEB Enskilda.

Suozzo, P., Cooper, S., Gillian, S., & Deng, Z. (2001). *Valuation Multiples: A Primer*. London: UBS Warburg.

Uner Barry. (2015). *Who we are*. Retrieved 02 02, 2015, from <http://www.urnerbarry.com/Whoweare.html>

8. Appendix

8.1 Test statistic

To test the difference between two population means is given by

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

The test is based on known variances of the populations, which in fact almost always are unknown. It is however possible to estimate the standard error from the sampling distribution, which could be used in the testing. What the test statistic will depend on is whether the population variances are equal or unequal.

The equal-variances test statistic is given by

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

with

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

and the number of degrees of freedom, ν , given by

$$\nu = n_1 + n_2 - 2$$

If the variances are unequal, the test statistic formula is given by the following

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} \right)}}$$

This test is not normally or student t distributed. With its degrees of freedom given by ν , it is approximately student t distributed.

$$v = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$

To determine whether the variances are equal or unequal it is possible to conduct a F-test of the two variances. The two hypotheses tested are

$$H_0: \frac{\sigma_1^2}{\sigma_2^2} = 1$$

$$H_1: \frac{\sigma_1^2}{\sigma_2^2} \neq 1$$

The test statistic is the ratio between the two sample variances s_1^2/s_2^2 with degrees of freedom given by $v_1 = n_1 - 1$ and $v_2 = n_2 - 1$. (Keller, 2012)

8.2 Income statement, balance sheet and cash flow statement

The income statement starts out with sales or revenues obtained during the period. For some companies it is possible to calculate the direct production cost for the goods sold, and one could then get the aggregate cost of goods sold (COGS). The residual between the revenues and the cost of goods sold is the gross profit. The remaining costs are the operating costs (OPEX), which are the required costs to run the company, such as sales, administration and research & development (R&D) costs. (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012)

The earnings left after operating costs is the operating profit, often referred to as EBIT (earnings before interest and taxes), which is profit from the operations of the company. Also included in the operating costs are the depreciation and amortization costs related to the assets of the company (Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, 2012). Deducting these costs from the operating costs or adding these costs to the operating profit will result in EBITDA or earnings before interest, taxes, depreciation and amortization (Suozzo, Cooper, Gillian, & Deng, 2001).

The operating income could be adjusted to net operating profit less adjusted taxes, also known as NOPLAT. The NOPLAT is the profit from a company's core operations, after subtracting taxes related only to the core operations. Hence, the NOPLAT is given by a company's ROIC multiplied by the invested capital in the firm. NOPLAT does not include any income or costs from non-operating activities in the company, such as interest costs. This then makes NOPLAT equal to the profit to all investors in the firm, both equity and debt. It is also important to note that the reported taxes will not equal the taxes to be subtracted from the net operating profit. This is due to the fact that reported taxes will be affected by interest and non-operating income. The tax shield gained from interest costs and taxes due to non-operating income has to be adjusted from the reported tax. The tax shield will of course add value, since costs will be lower. When using NOPLAT in a valuation, one then has to adjust for this in the cost of capital.

After the operating profit one adds the financial income and costs, which are the non-operating items in the income statement. After the net financial items, one has the pre tax profit. Adjusting for tax will result in the net income or earnings for the period. If an extraordinary situation happens, it is possible to add extraordinary revenues, costs and taxes for the specific period. The earnings could either be distributed as dividends, or be retained earnings to be added to the equity of the company.

As the retained earnings will be added to the equity, it is reinvested in the company. Hence, the reinvestment rate, r is the share of earnings that is not paid as dividends.

$$r = 1 - \frac{\textit{Dividends}}{\textit{Earnings}}$$