UNIVERSITY OF STAVANGER BUSINESS SCHOOL

MASTER'S THESIS

STUDY PROGRAMME:	THIS THESIS HAS BEEN WRITTEN WITHIN THE FOLLOWING FIELD OF SPECIALISATION:
Master of Science: Business and Administration	Applied Finance

TITLE:

Valuation of Grieg Seafood

AUTHOR(S)		SUPERVISOR:
Candidate number:	Name:	Marius Sikveland
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Acknowledgement

Curiosity regarding valuation of publicly traded companies was what got me into economical studies in the first place.

I decided to perform a valuation of a salmon farming company not only because I had little or no knowledge about the sector, but also because the sector recently has become a growingly important part of the Norwegian economy.

Having accepted a job offer with start-up in March 2020, and with my partner expecting our second child in medio-March 2020, I decided to work intensively on this thesis from December 2019 through February 2020. Writing ended on March 1st 2020, and all literature and sources of information end on that date. I am pleased with the result, everything taken into consideration.

I would like to thank my supervisor, Marius Sikveland, for outstanding availability and swiftness in responding to inquiries. He also has shown a remarkable ability to carefully and consciously balance when to simply hand over information, and when to (pedagogically correctly) encourage- and motivate me to search for the solutions myself.

Tore Berli 02.05.2020

Abstract

The purpose of this thesis was to determine the intrinsic value of Norwegian salmon farming company Grieg Seafood as of 01.01.2019. The closing price of Grieg Seafood on 31.12.2018 was 102.30 NOK/share.

The information used in writing this thesis is public information published prior to the cut-off date of 01.01.2019.

A strategic analysis of Grieg Seafood and the salmon farming industry was performed, giving input to a discounted cashflow valuation model. Important considerations include forecasting free cashflows to firm, discount rate (weighted cost of capital (WACC)) and continuing value (terminal value) growth rate. The discounted cashflow valuation indicated an intrinsic value of 111.69 NOK/share.

A relative valuation was performed to supplement the discounted cashflow valuation. An arithmetic average of relative valuations based on P/E, P/B and EV/EBIT indicated a share price of 114.79 NOK/share.

A sensitivity analysis was performed, studying how changes to the WACC and continuing value growth rate impact the discounted cashflow valuation. It was also studied how the valuation changes as different salmon prices are applied to the model.

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The fishing industry [1]

In 2016 the global total production of fish reached a new all-time high of 171 million tonnes. 47% of this volume came from fish farming (aquaculture), while the remaining 53% was fish captured in the wild. Figure 1 below shows a clear pattern from the 1980s and onward: while the total global fish production is clearly increasing, the volume of wild-captured fish has basically stagnated.

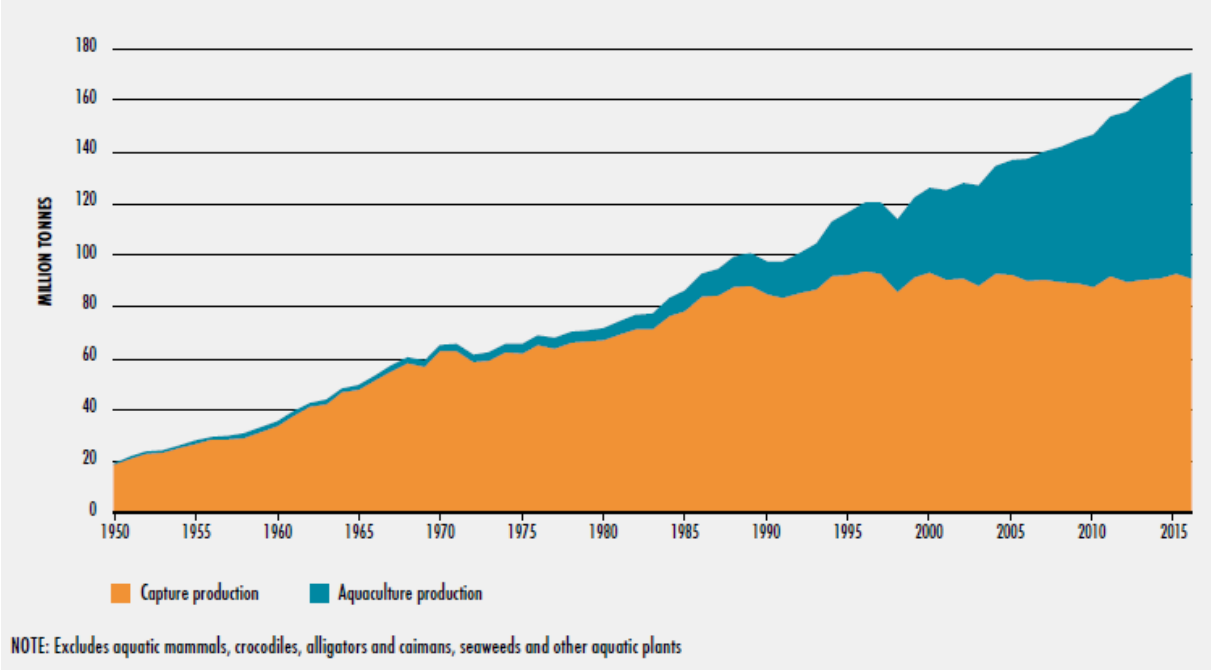


Figure 1: "World capture fisheries and aquaculture production" [1].

The reasons behind the stagnation of wild-capture fish production are many, but two of the most important factors are several years of overfishing taking place, and increased effort from governments and authorities to manage fisheries resources sustainably. Sources claim that world fisheries are currently over 50% over exploited, and that wild fish catch will reach full depletion by 2056 [2]. The reasons behind the increased fish production from aquaculture are many, but one of the most important is the amount of control over the production process it is possible to exercise. Also, the aquaculture industry is leading in horizontal and vertical integration, making its production and supply chains very efficient. Lastly, in a world with growing customer concern for origin and sustainability of products, the aquaculture fish does better than wild-caught. The stagnation of wild-captured fish production means that farmed fish is alone causing the increase in total global fish production, and it had by 2016 essentially

bypassed wild-captured fish as the main supplier of produced volume. By 2016, of all the fish produced for human consumption only, 53% were supplied by aquaculture (fish farming), and 47% was wild-caught fish (figure 2).

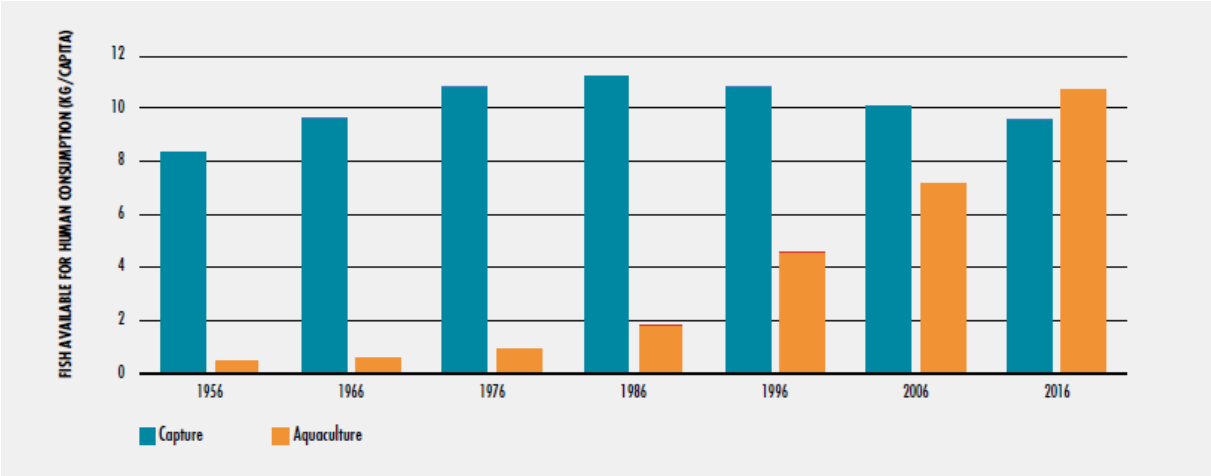


Figure 2: "Relative contribution of aquaculture and capture fisheries to fish for human consumption" [1].

Of the 171 million tonnes fish produced in 2016, about 88% were utilized for direct human consumption. 35% of the produced fish entered international trade, making it a highly traded commodity all over the world. The global export value of fish and fish products in 2016 was 143 billion USD. From 2002, China has been both the biggest producer and exporter of fish, with Norway coming in as the second highest exporter. The total Norwegian export value of fish and fish products was in 2017 12.3 billion USD. The European Union represents the largest market for fish and fish products, followed by the United States and Japan. These three markets make up 64% of the total global import market. It is also worth mentioning that the trade embargo introduced by Russia in mid-2014 has made an impact on the industry, with Russian 2017 import levels of fish and fish products being 43% lower than in 2014. Norway, being one of the countries affected by the embargo, have been forced to find other markets for their products. Meanwhile, unaffected exporters of fish such as Chile and Faroe Island, have seen their export to Russia increase.

Since 1962 the so-called global apparent consumption of food fish has risen by 3.2% per year on average, meaning that it has risen faster than the global human population growth (1.6% annually). Fish has several scientifically proven health benefits and has an important dietary

contribution through its high-quality and easily digestible protein. The rising global awareness and consciousness regarding healthy eating habits and protein rich food, especially in the developed world, has certainly had a positive impact on the positive trend seen in global fish consumption.

The salmon farming industry [1]

The salmon farming industry is part of the aquaculture industry, which again is part of the greater fishing industry. When referring to "salmon farming", "salmon price", "salmon industry" etc., what is usually actually referred to is the *Atlantic* salmon. The Atlantic salmon is one of the *salmonids,* which is a collective term for all salmon species and trout [3]. The Atlantic salmon makes up the largest volume of the total salmonid production (wild-caught and farmed), and essentially all Atlantic salmon originates from the aquaculture industry. In 2018, Atlantic salmon made up 53% of the entire salmonid supply. In the same year the harvested volume of Atlantic salmon was 2 176 600 tonnes (gutted), up 5.4% from 2017. Figure 3 below shows from which parts of the world this supply originated from, Norway having by far the largest harvest with 1 128 100 tonnes [4]. The worlds largest export markets of fresh whole Atlantic salmon in 2018 were Poland, France and the USA, in decending order. The USA is the largest market for fresh Atlantic salmon fillets [5].

GLOBAL SUPPLY OF SALMON

(GWT)	2018	2017	CHANGE %
Norway	1 128 100	1 087 000	3.8%
Scotland	138 200	159 500	-13.4%
Faroe Islands	64 500	72 300	-10.8%
Ireland	12 900	15 300	-15.7%
Total Europe	**1 343 700**	**1 334 100**	**0.7%**
Chile	609 700	507 800	20.1%
North America	147 500	144 600	2.0%
Total Americas	**757 200**	**652 400**	**16.1%**
Australia	55 200	55 100	0.2%
Other	20 500	23 100	-11.3%
Total	**2 176 600**	**2 064 700**	**5.4%**

Figure 3: Global supply of salmon (tonnes gutted weight (GWT) per country 2017-2018 [4].

Most of the world's largest salmon farming companies are Norwegian. Figure 4 below shows the top 20 salmon farming companies in the world in 2016, when ranked by harvested volume. The top four companies have their head offices in Norway, and are all traded on the Oslo Stock Exchange.

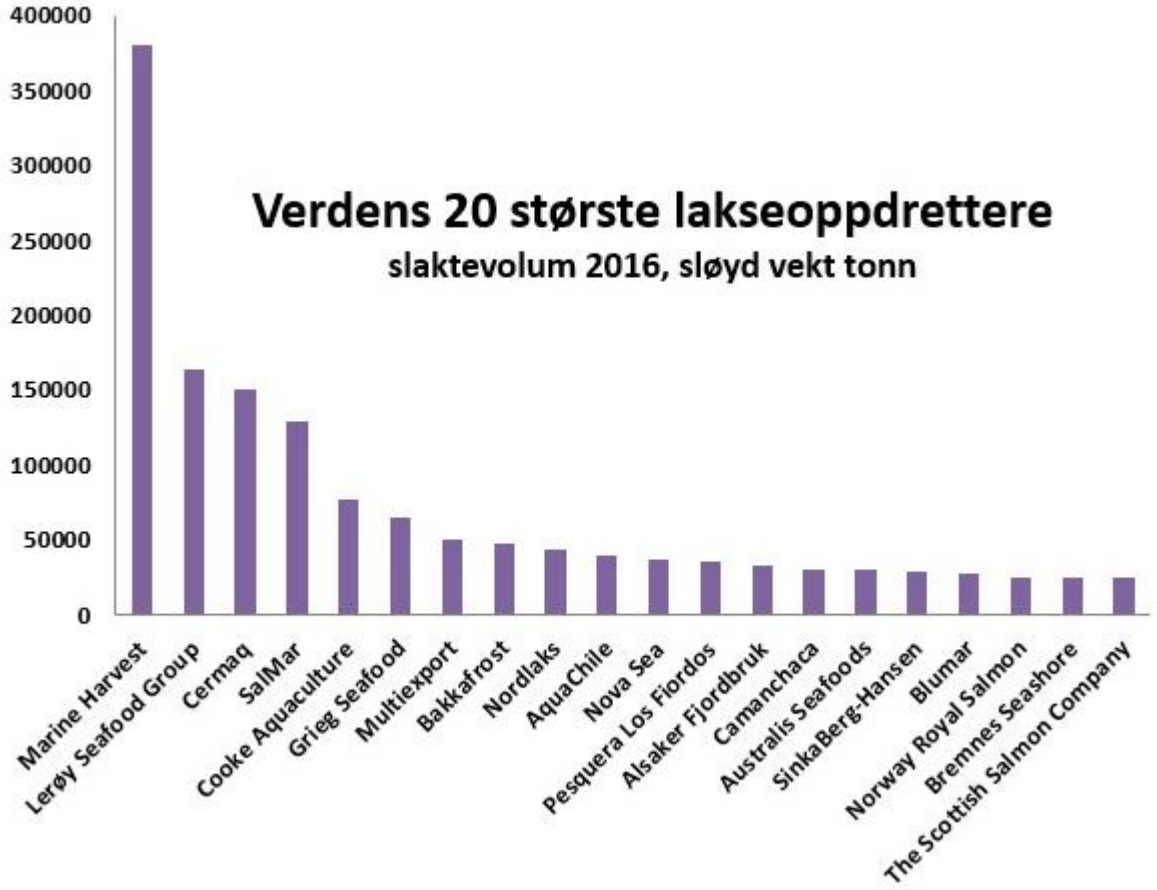


Figure 4: World's top 20 largest salmon farming companies by harvest volume in 2016 [6].

Salmon was the single species with the largest contribution to the *value* of the total world trade in fish and fish products in 2016, accounting for 18.1% of the total value. However, in terms of *quantity*, it made up only 7.4%. Clearly, salmon is considered a high-value commodity, highly traded in the more prosperous markets. From 1976 to 2016 the world trade in salmon in terms of value has risen by an average of 10% per year. The increased trade of salmon is largely caused by globalization and increased incomes in East and Southeast Asia,

but the largest markets remain in developed regions such as the European Union, the US and Japan. Several years of successful international marketing campaigns and product innovation has made salmon a highly demanded product globally. However, the presence of physical (above all site availability for farming and biological assumptions) and regulatory constraints set by authorities have kept supply relatively modest in comparison, resulting in high salmon prices in recent years. Figure 5 below shows that global supply growth rate of Atlantic salmon from 1991 to 2016 has been positive, but with a decreasing trend.

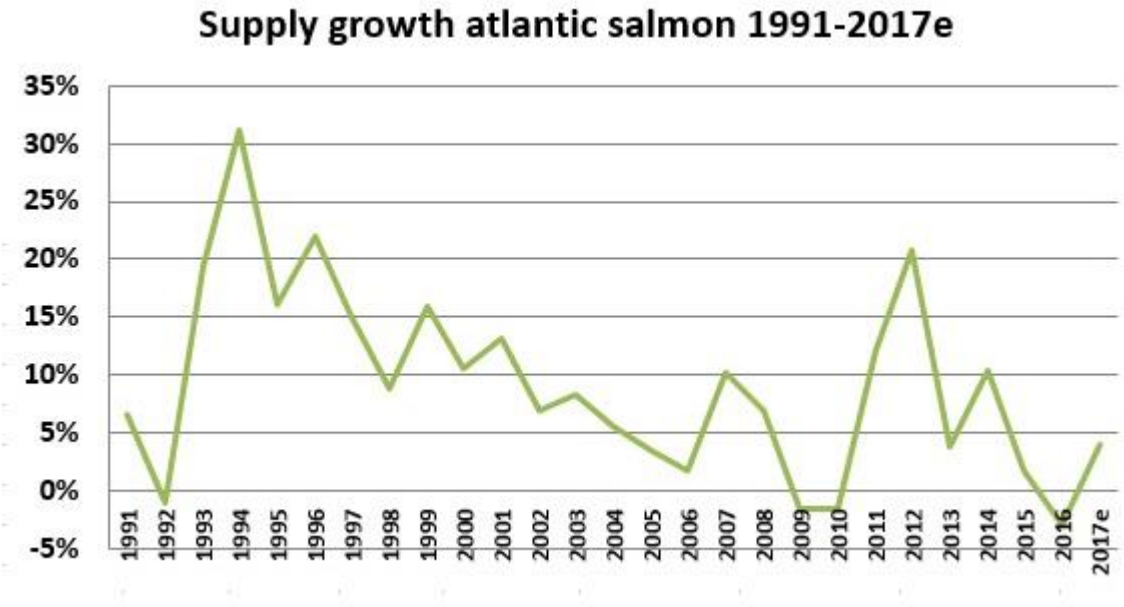


Figure 5: Supply growth of Atlantic salmon 1991-2017e [6].

Salmon price

Figures 6 & 7 below show how the supply of Atlantic salmon has experienced tremendous increase in recent years. However, as figure 5 showed, the supply growth has recently been slowing down. In recent years, improved farming methods and globalization has made farmed salmon more accessible to a growing world population. This, together with an increased global awareness of the health benefits of eating seafood and salmon, are some of the factors that has resulted in increased consumption and demand for salmon (figure 7). The increasing demand for Atlantic salmon, coupled with limited supply in recent years, has resulted in favorable salmon prices for suppliers. Figure 8 below shows that spot price of salmon saw a significant increase in 2016 and has remained high throughout 2017-2018.

At Fish Pool, the average salmon price for 2018 was 60.76 NOK/kg. Experts at the salmon farming industry, Kontali Analyse, estimates that global harvest volume Atlantic salmon will increase by 5% in 2019, up to 2 561 000 tonnes. There is consensus that demand will remain high and that nothing indicates rapidly increasing supply growth rate in 2019-2020. Salmon price is expected to be 55-65 NOK for both 2019-2020 [7, 10].

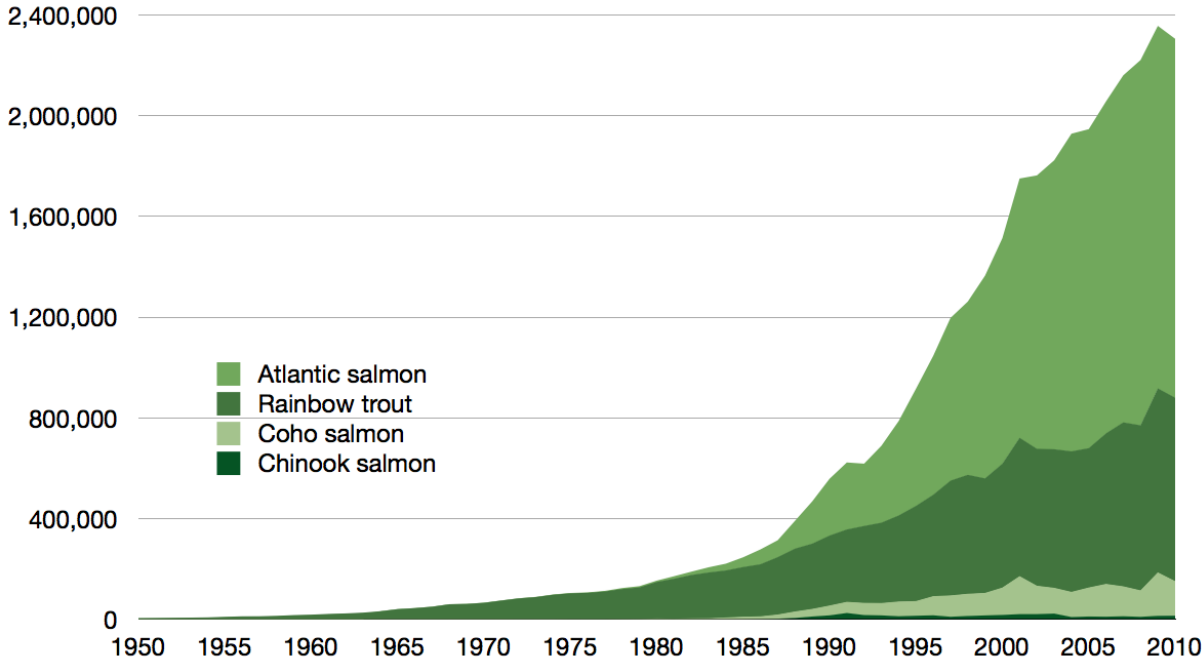


Figure 6: "Aquaculture production of salmonids in tonnes 1950–2010" [8].

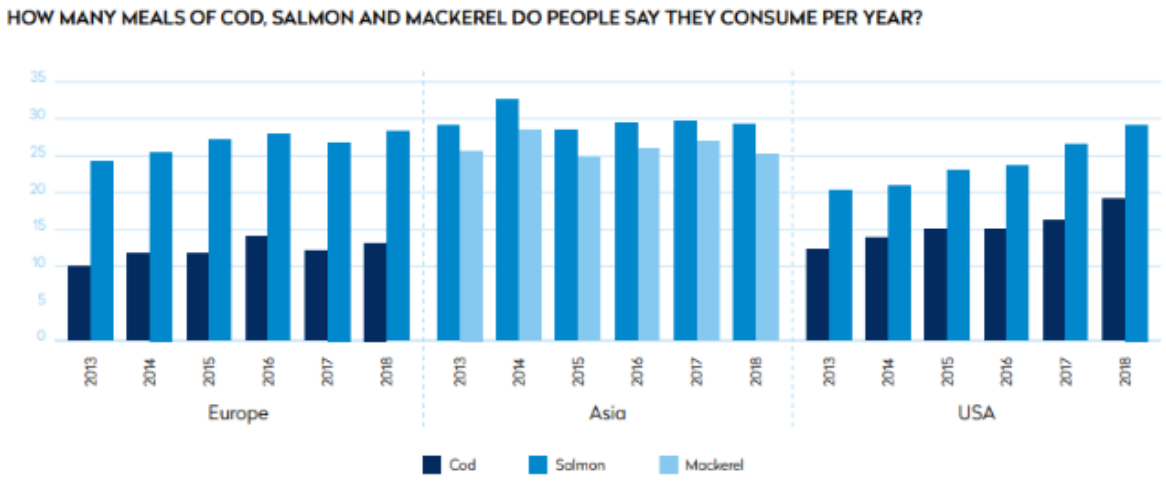


Figure 7: "How many meals of cod, salmon and mackerel do people say they consume per year?" [9].

Figure 8: "Norway whole salmon spot price 2013-2018" [10].

The salmon industry in Norway [11]

In Norway one needs permission and approval from authorities to start farming salmon. Applicants need to fulfill several criteria. As the farms are to eventually be placed in public areas, the applicants need to clearly address how the farming activity ultimately is going to contribute to value creation both locally and nationally.

Demand for salmon farming permits in Norway is high. To ensure a controlled and sustainable growth in the industry and market, the Norwegian Ministry of Trade, Industry and Fisheries (Nærings- og fiskeridepartementet) decides *when* permits are to be granted. Once they have decided that permits are to be granted, the Directorate of Fisheries (Fiskeridirektoratet) decides which applicants receive a permit. Lastly, the county council (Fylkeskommunen) must approve the actual operating permit. A permit specifies which species are to be produced, quantity and exact location of activity. The quantity in aquaculture permits concerns *maximum allowable biomass (MAB)*, which specifies the mass of living fish one is allowed to have in the farming pens at a location at any given time. There exists MABs for each separate location, but also for each separate company in total. A fish farming permit typically has MAB of 780 tonnes, except for the counties Troms and Finnmark where MAB is 945 tonnes.

Salmon farming production process [12]

The salmon farming production cycle lasts 2-3 years. It can typically be divided into the five separate phases given below:

Roe/milk production -> Smolt production -> Farming -> Processing -> Sales & distribution

Some salmon farming companies in Norway -especially the largest ones- have integrated all five phases of the chain into their companies' activities. Other companies, often smaller ones, are active in fewer phases of the chain.

In phase one, roe (eggs) and milk (sperm) from broodstock (salmon with desirable traits) is produced for breeding purposes. Fertilized eggs are placed in incubator, hatching after 8-10 weeks. Out of the egg comes small fish called *fry*. They spend the first few weeks of their

lives living of their yolk sack, after which they can be taken out of the incubator. Out of the incubator the fish -now called *smolt*- receives feed, and the *smoltification* stage starts. Smoltification typically takes place in fresh water, on land, and prepares the smolt for its life in the sea. The longer the smoltification lasts, the larger the smolt will be upon release into the ocean. Large smolt not only is more resistant to the harsh ocean environment, but it also shortens down the next phase: farming. When the smolt has reached desired weight (typically 60-100 grams), it is transferred to the ocean pens (the "farm") where it spends the next 15-24 months. At the end of the farming phase the now fully-grown salmon is harvested and transported in wellboats to a process facility. Here it is killed by stunning, bled out, gutted, iced or frozen down, and prepared for transportation. Additional processing such as filleting may be performed if desirable. Lastly, the fish is sold and shipped to the markets by a sales department.

Grieg Seafood [7]

Grieg Seafood is a Norwegian Atlantic salmon producer, having their headquarters in Bergen, Norway. It started out as a trade company in 1992, but by the time they got listed on the Oslo Stock Exchange in 2007 it had become primarily a salmon farming company. Already before getting listed it had started up activities in Norway (Rogaland and Finnmark) and Canada (British Columbia). In 2007 it also expanded to Shetland (UK) by acquiring a local producer. In 2010 Grieg Seafood and Bremnes Seashore together established the dedicated sales company Quality Ocean, which is the sales organization of both companies. At the end of 2018 Grieg Seafood had salmon farms in Rogaland and Finnmark (Norway), British Columbia (Canada), and Shetland (UK). Their sales organization, Ocean Quality, had offices in Bergen, British Columbia, Shetland, Manchester (UK) and Dallas (US).

Figure 9 below shows the Norwegian salmon farming companies listed on the Oslo Stock Exchange. When ranked by 2018 harvested volume, Grieg Seafood was the fourth largest company.

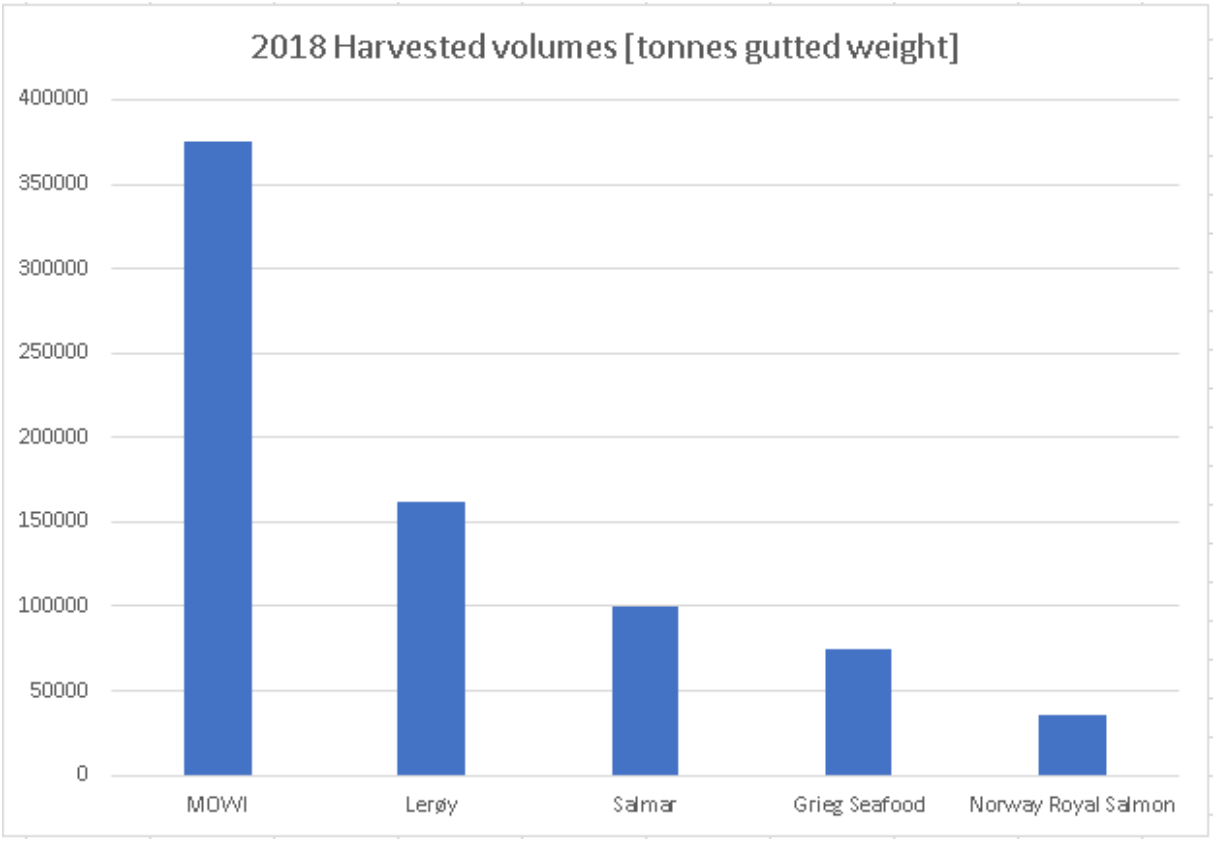
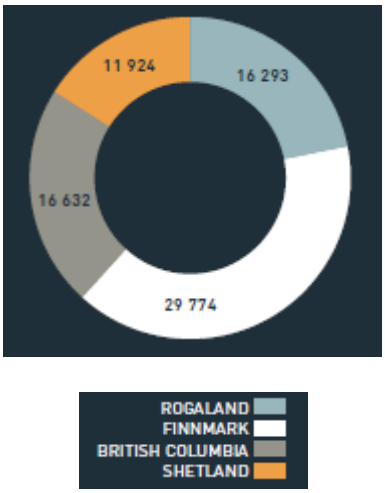


Figure 9: 2018 Harvested volumes for Norwegian salmon farming companies on Oslo Stock Exchange [Own creation, based on 2018 annual reports].

In 2018 Grieg Seafood globally harvested 75 000 tonnes salmon. The volume was spread out according to figure 10 below. The company is aiming to reach 100 000 tonnes by 2020. Their 75 000 tonnes harvested in 2018 was 3% of the global supply of Atlantic salmon, and Grieg Seafood aims to increase this to 5% by 2020.



Grieg Seafood, 2018 production by location [7].

Grieg Seafood sells all its salmon to its sales company, Ocean Quality. Ocean Quality then resells to third parties for further processing or to final consumers. Europe is Ocean Quality's largest market, making up 51% of its 2018 turnover. However, their turnover per region varies a lot, depending on the harvested volume at each location.

Referring to the salmon farming production cycle mentioned in the previous section, Grieg Seafood as a whole is involved in all phases. However, Rogaland is the only location holding broodstock licenses where they can produce roe and milk. Locations without broodstock licenses purchase roe from suppliers. All four locations perform smoltification, and all locations have sites for salmon farming. All except British Columbia performs its own packing and processing of its harvested salmon. Quality Ocean is present at all four locations, taking care of sales and distribution.

Strategic analysis

To better understand the business environment of Grieg Seafood and to ultimately perform a valuation I will perform a strategic analysis. I will be applying the "PESTEL" and "Porter's five forces" frameworks to systematically cover relevant aspects.

Porter's five forces [13]

Porter's five forces is a framework and analysis that evaluates five competitive forces within an industry. It can be applied to any industry and is typically used to assess how attractive an industry is to enter and the prospects of long-term profitability. In general, if the competitive forces contribute to low industry profitability, it is not attractive to be an industry participant.

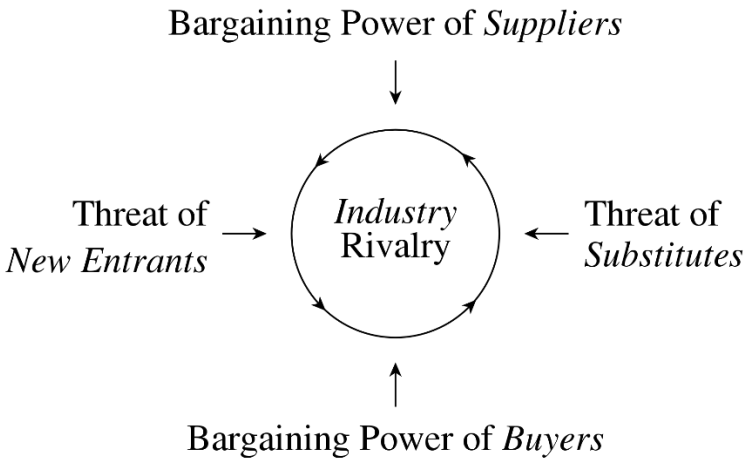


Figure 10: Porter's five forces [13].

Threat of new entrants

This force concerns how easy it is for new players and companies to enter the industry and take its share of any profitability. From what I have discovered working with this thesis, barriers to entry in the salmon farming industry appear to be large. First of all, governments and authorities have strict requirements that needs to be in place prior to entry. Acquiring

licenses to operate is costly, and applications for such licenses needs to be approved by authorities at several levels.

The capital expenditures and investments needed to start operations are very high; licenses, pens, wellboats and other necessary equipment is very costly. The exit-costs from the industry are high as well, as much of the equipment and capital is likely to be made specifically for each location, making any re-sale value much less than the cost of acquiring it.

Threat of substitutes

This force concerns whether there exist products that solves or satisfies the same needs as the one produced by an industry (in our case salmon), thereby threatening the profitability of the latter. As mentioned in section 2, Atlantic salmon is certainly produced primarily for human consumption. Several sources investigated claim that salmon is "one of the most nutritious and healthiest foods available" [2, 14]. Salmon (and fish in general) is a source lean, high-quality, easily digestible protein. Health benefits of consuming fish and salmon is becoming common knowledge, with its high content of omega-3 being one of its main advantages.

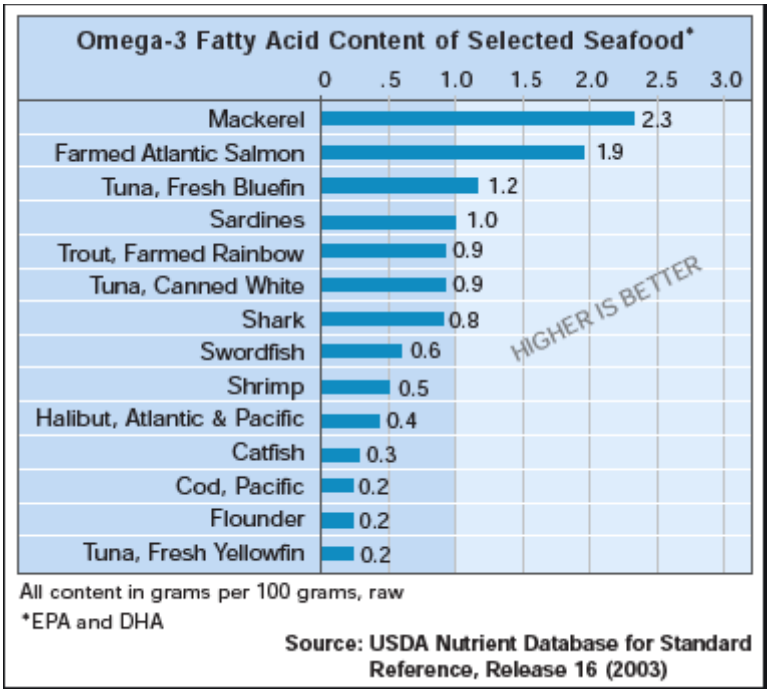


Figure 11: Omega-3 fatty acid content of selected seafood [15].

The degree of substitutability depends on each individual consumer's reason(s) of eating salmon. If it is purely for its high protein content, then any other animal protein source (beef, pork, chicken, other fish) is certainly a candidate for being a substitute product. However, if salmon is consumed only for omega-3 content, then figure 11 above shows that mackerel may be a (better) alternative. However, subjectively speaking, I believe that the combination of taste, looks, protein content and nutritional value of salmon is unique relative to all other animal proteins (including other fish), making the current threat of substitutes low.

The fact that salmon demand is high and has been increasing in recent years, despite the increased prices, indicates that consumers have a "loyalty" to the product, not easily looking for relatively cheaper substitutes.

Bargaining power of buyers ("customers")

Buyers typically have large bargaining power if they are concentrated (large and few), the product sold is standardized (not differentiated), switching-costs to easily accessible alternative/substitutes are low, buyers are price sensitive, and buyers holds significant amounts of information about the product(s) sold.

The true final consumer of salmon products are households. They certainly are small and fragmented, holding very little bargaining power. However, the true buyers from salmon farming companies are typically restaurants and larger retail companies re-selling to final consumers. Salmon, and even most salmon products, are to a large extent standardized. There are also very low (basically zero, unless contractual agreements exist) switching costs if one decides to buy salmon from one supplier or the other, forcing the competitors to some extent to compete on price. Specific demands for quality (e.g. freshness) and origin generally increase switching costs.

Bargaining power of suppliers

Factors that affect bargaining power of suppliers is how critical their supplied product is for the buyer. For example, if the supplied product makes up a large portion of the buyer's cost structure, or if it is an essential part of production,then the supplier typically has larger bargaining power. If the suppliers are large and concentrated, they are likely to hold

bargaining power. However, if the buyer(s) with some ease can successfully integrate the supplier into its own business, the supplier holds less bargaining power. If buyers easily can switch suppliers, the suppliers typically hold less bargaining power.

For salmon farming companies, the cost of fish feed typically make up the largest part of their costs. Also, fish feed is an absolute necessity to produce salmon. For Grieg Seafood, in 2018 fish feed made up 40% of the total cost per kg harvested fish. However, for Grieg Seafood, this portion has been decreasing in recent years as total production costs per kg actually has been increasing, led by increase in salaries, maintenance and costs related to fish health [7].

In Norway there are essentially only three suppliers of fish feed: EWOS, Skretting and BioMar [16]. This means that buyers have less alternatives if they desire to switch supplier, which typically results in supplier bargaining power.

The crucial impact of fish feed on total cost and production, and the high concentration of fish feed suppliers likely results in a certain level of supplier power. However, the fish feed suppliers are aware of the trend that the larger salmon farming companies are starting to integrate more and more stages of the value chain into their business, meaning that they have to offer competitive prices. In 2012 Marine Harvest (now MOWI) established its first feed division, thereby obtaining a fully integrated value chain [4].

Competitive rivalry

The final competitive force deals with the number and size of competitors, and the product(s) offered. If there are many, equally sized competitors, competition is typically high. If competitors have different levels of market influence (i.e. different size), the level of competition is reduced. If the competitors offer low degree of product differentiation, thereby offering basically identical products, there is also typically high level of competition.

Nine fish farming companies are listed on the Oslo Stock exchange, of which three are non-Norwegian. In 2018 Norway supplied 52% of the global Atlantic salmon harvested volume [4]. This indicates together with figure 9 that the salmon farming industry is concentrated, having relatively few companies (competitors). This typically leads to increased competition. However, certain companies are significantly larger than others (figure 9), and varying degrees of market influence therefore exist, thereby reducing the competitive rivalry. MOWI, accounting for approximately one quarter of the total Norwegian Atlantic Salmon supply in

2018, certainly has a different market influence than a relatively smaller producer such as Grieg Seafood.

Even though all companies offer basically the same standardized product -gutted Atlantic salmon-, there is a certain room for product differentiation through additional processing. According to Grieg Seafood the market clearly trends towards increased demand for certified and specialty products [7]. The former is related to the trend of increasing consumer awareness and concern about the sustainability of products, and Grieg Seafood is working hard to maintain and increase its number of ASC (Aquaculture Stewardship Council) certified sites. As a response to changing consumer preference for specialty products, Grieg Seafood is offering Skuna Bay salmon and Kvitsøy salmon. These are premium quality fish, closely inspected and selected during processing. Skuna Bay is offered by Grieg Seafood British Columbia, and it typically makes up only 5% of the harvested volume, but 25% of their margins [7]. The buyers of these premium salmon products are typically chefs and restaurants looking for premium quality. The Norwegian Institute of Food, Fisheries and Aquaculture Research claimed that Norwegian salmon farmers could earn more by adding value to their products [38]. Perhaps one reason why Grieg Seafood have been reluctant to enter the value-added business is that they realize that all value-added products offered can easily be copied, thereby making any market advantage short-lived.

Lastly it can be mentioned the apparently large degree of cooperation going on between salmon farming companies, at least on the behalf of Grieg Seafood; “We collaborate with authorities, researcher institutions, other salmon farmers, NGOs, students, suppliers and others to advance sustainable aquaculture. We share knowledge, expertise and technology. We seek to be honest, exchange ideas and to learn from our surroundings” [7]. Further, being “open” is one of their core values:

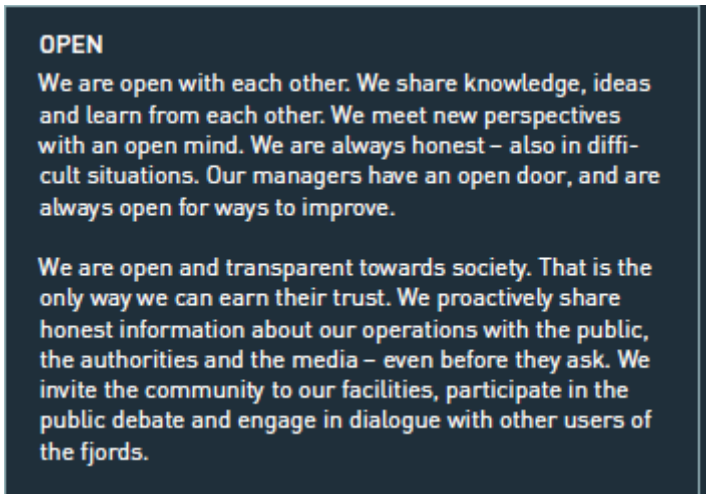


Figure 12: Being "open" is one of Grieg Seafood's values [7].

It is difficult to truly say to what extent the other large salmon farming companies share these attitudes of openness and cooperation -or whether Grieg Seafood actually comply to these values- but it is nonetheless a sign of an industry with a lower level of internal rivalry.

Pestel [18]

To assess Grieg Seafood's macro/external environment I will perform a PESTEL analysis. It is a framework that is used to identify weaknesses and threats in a firm's external environment. The name of the framework indicates that the following aspects will be considered: political, economic, social, technological, environmental and legal.

Political

These aspects deal with the extent to which government and authorities intervene in the industry by imposing laws and regulations, and also how foreign policy can affect an industry.

The European Union is the world's largest market for fish and fish products in general, and also for Atlantic salmon specifically [1]. It is also Grieg Seafood's largest market, representing 51% of Grieg Seafoods turnover (see figure 13 below). Despite not being a member of the European Union, the European Economic Area (EEA) agreement secures Norwegian companies access to this market.

As we can also see in figure 13 below, UK accounted for 17% of the 2018 turnover for Grieg Seafood. Great Britain has voted to leave the European Union. The consequences depend on whether they strike a deal with the European or not. The former will continue to treat Great Britain as an EU and EEA member, not affecting its trade with Norway significantly. However, if no deal is struck (no-deal Brexit), Great Britain will not be treated as EU and EEA member. As all trade between Great Britain and Norway is regulated in the EEA agreement, a no-deal Brexit will likely have large consequences on trade between the two countries [19].

In recent years Norway has been involved in political conflicts with Russia and China. From 2010 to 2016 China stopped importing Norwegian seafood as the Nobel Peace Prize was given to Chinese human rights activist Liu Xiabo [20]. In 2014 Russia annexed Crimea, resulting in sanctions against Russia by many countries in the international community. Norway was one of these countries, and shortly afterwards Russia decided to end all import of Norwegian goods [21]. Despite Russia and China being large markets, the political conflicts had no significant impact on Norwegian salmon export. Global demand for salmon has been high, causing Norwegian exported salmon to find its way to new markets [4].

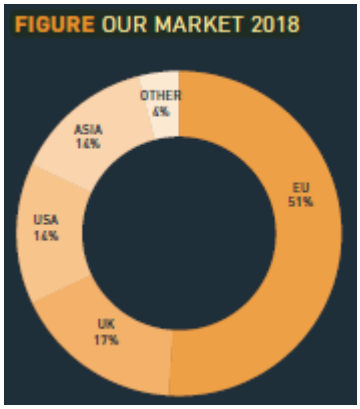


Figure 13: 2018 turnover distribution for Ocean Quality (Grieg Seafood) [7].

One final comment that can be mentioned regarding political aspects is the so-called “salmon-tax”. In June 2017 the Norwegian Parliament (Stortinget) decided to evaluate introducing an additional tax on the aquaculture industry. As the aquaculture industry in recent years had experienced high profitability, politicians wanted to get in place a new tax regime that would make sure that counties and communities hosting the aquaculture sites received a higher share of profits generated. Introducing such a tax will likely hurt salmon farming profitability. The outcome of the proposed change is yet to be decided, but if it is introduced it will take effect earliest mid-2020 [22].

Economic aspects of the external environment that is likely to affect a firm are typically exchange rates, interest rates, economic growth and consumers' disposable income.

Figure 14 below shows the interest rate ("styringsrenten") set by the Norwegian Central Bank (Norges Bank) from 2012 up until 13. December 2018, when they decided to keep it uchanged at 0.75%.

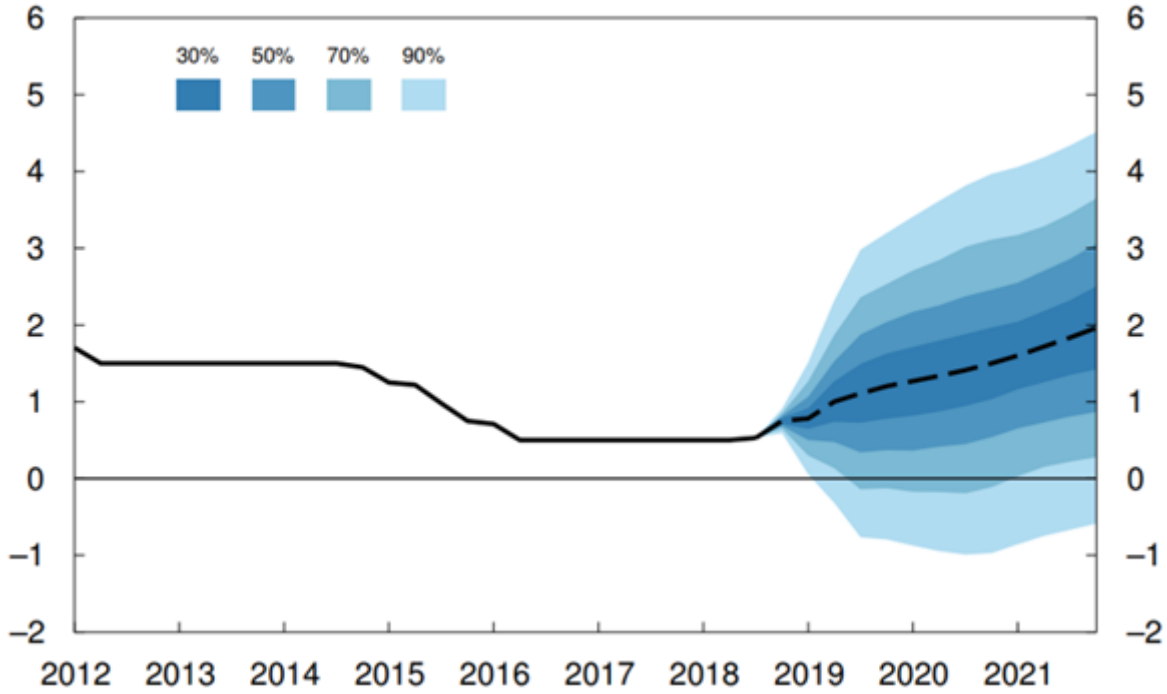


Figure 14: Interest rates set by the Norwegian Central Bank 2012-2018 and forecasted rates for 2019-2021 [23].

If we look back even further, as seen in figure 15, it becomes clear that the interest rate in recent years has been low (interest rate has risen somewhat after the set cut off-date of December 31st 2018 for this valuation). Low interest rates make debt financing more attractive as interest payments decrease. It is very difficult to predict future interest rates, but the "uncertainty fan" in figure 14 indicates the probability of having it inside certain ranges. If the predictions of the Norwegian Central Bank prove correct, interest rates will rise in coming years, more than doubling from 2018 to 2022. A doubling of interests will have largest impact

on firms having entered floating interest rate loans, essentially doubling their interest rate payments.

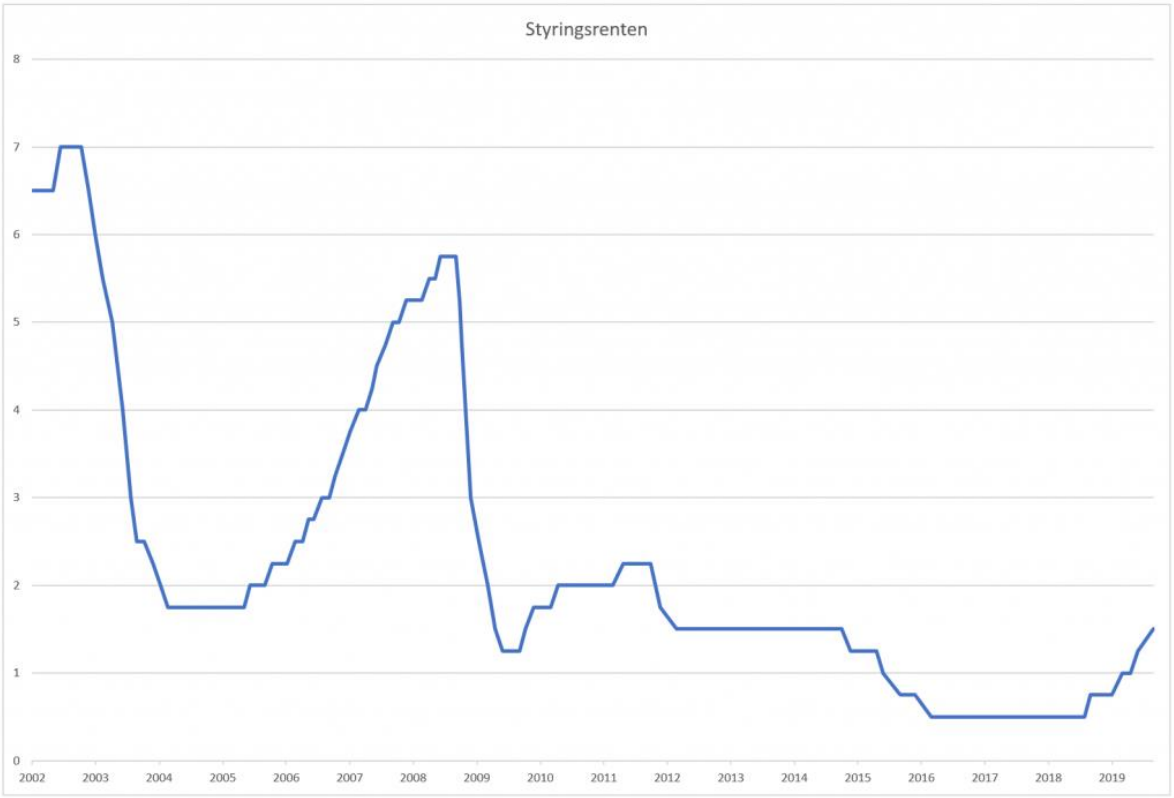


Figure 15: Norwegian Central Bank interest rates 2002-2018 [24].

Another economic aspect of the macro environment that is likely to have a large impact on the salmon industry are the currency exchange rates. Figure 16 below shows the development in NOK versus Euro up until December 31st 2018. The European Union is Norwegian seafood's largest market, and the dominant currency in the EU is the Euro. Figure 16 shows on the vertical axis how many NOK one Euro is worth at any given date. Figure 17 shows the same, but for the so-called "trade weighted exchange rate", which is the NOK versus a weighted average of the top 25 Norwegian trading partner currencies [25]. The tendency is clear: in recent years it has been possible to buy more NOK per foreign currency. This makes it attractive for foreign buyers to buy NOK, and then buy Norwegian goods. This development, especially from 2014 and onwards, has had a very positive impact on Norwegian exporters of seafood, Norway being the second largest exporter of seafood globally in 2017. It is very difficult to predict future exchange rates, but consensus is that exchange rates will stay on the same level as 2015-2018 until oil price approaches levels seen prior to the 2014 oil price crash [26].

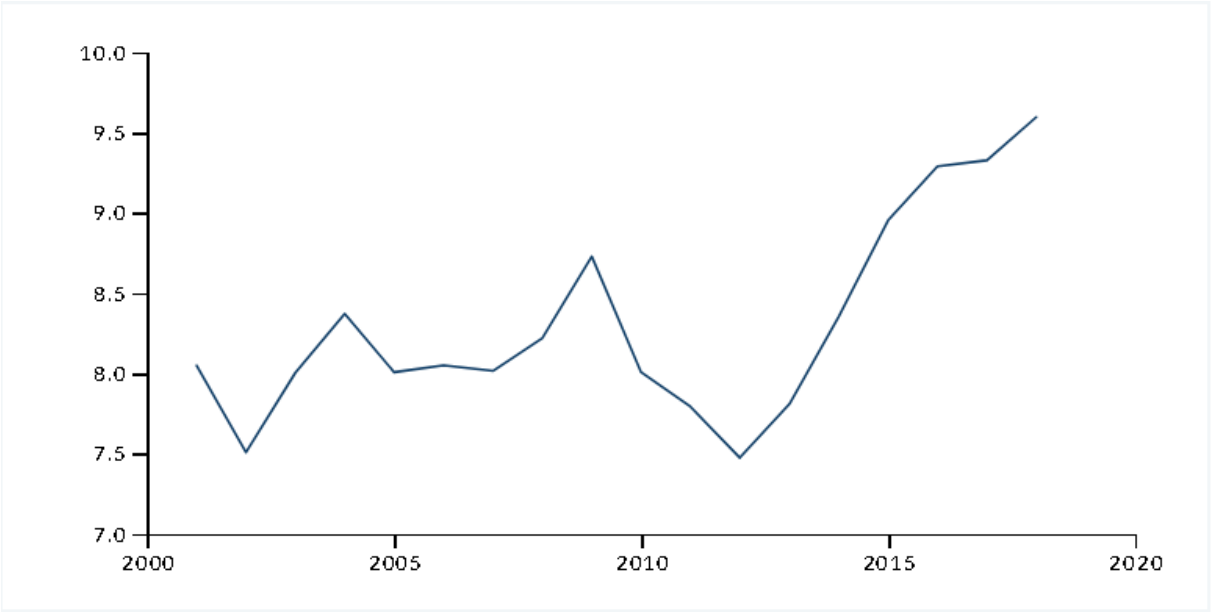


Figure 16: NOK per Euro 2000-2018 [27].

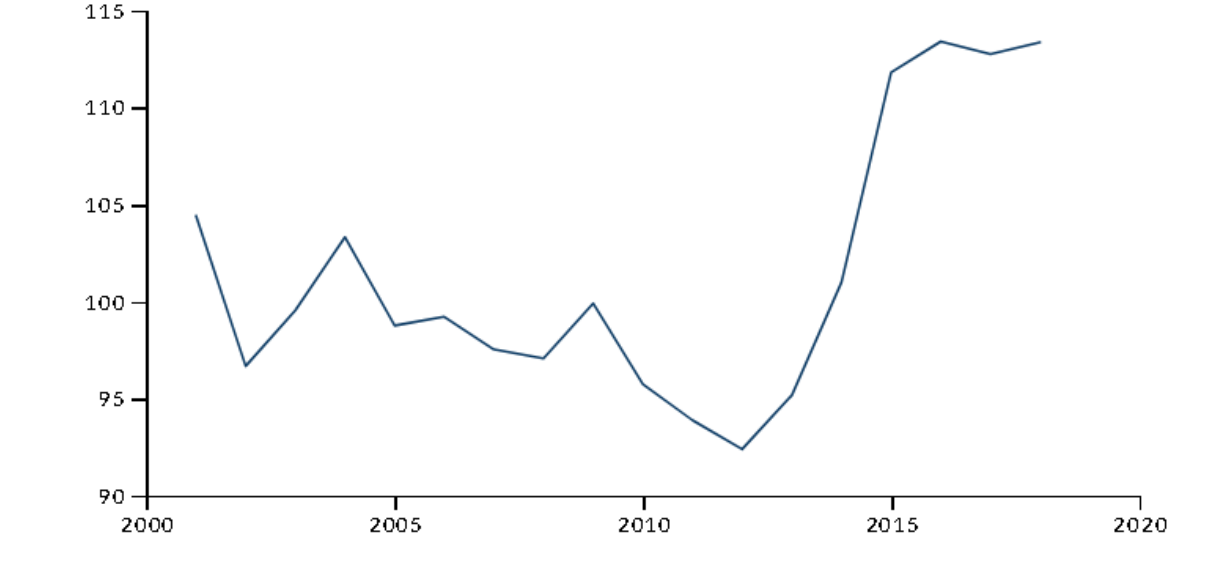


Figure 17: NOK versus the trade weighted exchange rate 2000-2018 [27].

One final aspect worth looking into is the economic growth forecasted for an industry's largest markets. This is associated with the disposable income of the consumers of those markets.

Figure 13 showed where Grieg Seafood's turnover came in 2018. The European Union accounted for 51% and will therefore be the focus of this investigation. In November 2018 the European Commission published an economic forecast for 2018, 2019 and 2020. After having reached a 10-year high growth of 2.4% in 2017, it was now forecasted that the Euro area would experience more modest growth rates of 2.1%, 1.9% and 1.7% in 2018, 2019 and 2020 respectively. Similar pattern was indicated for the so-called EU27 countries. So, all members of the EU were forecasted to continue having economic growth in the coming years, however growing at a slower pace [28].

Grieg Seafood has taken action to deal with uncertainty in the economic aspect of its external environment. Borrowings at variable rates expose them to interest rate risk, and Grieg Seafood has therefore decided to enter fixed-interest contracts and interest rate swap agreements for a certain percentage of its variable interest-bearing liabilities. To handle the risk of the fluctuating salmon price, Grieg Seafood has a policy of hedging 20% of its produced volume with fixed-price contracts. Exchange rate risk is handled in the same way; by entering futures- and forward contracts. However, the annual report does not go into details about policies regarding exchange rate risk [7].

Social

The social (sociocultural) aspects of the external environment that may end up affecting the salmon industry typically include population growth- and public health consciousness.

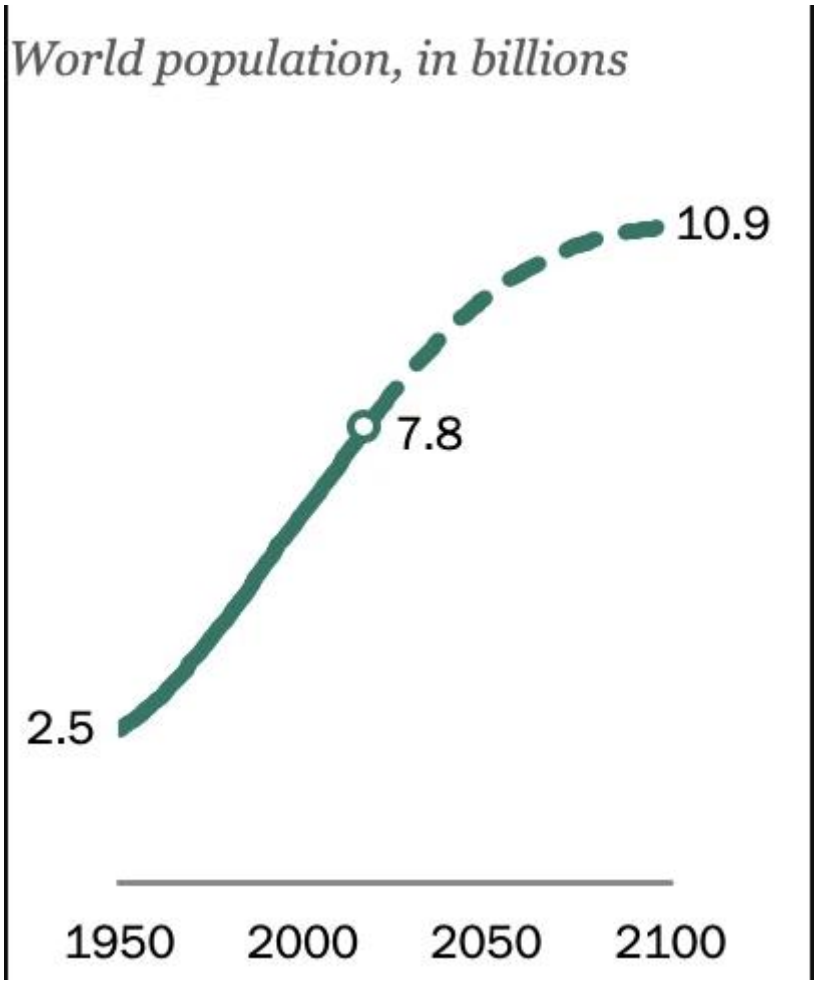


Figure 18: Historical- and forecasted world population, in billions [29].

Figure 18 above shows the United Nations' forecast for world population up until year 2100. The graph clearly indicates that the recent years of rapid population growth will continue its relatively linear trend up until about 2075, before eventually stagnating [29]. Energy will be needed to feed the growing population. Demand for digestible sources of energy and nutrients will be growing as the world population increases. To put the upcoming demand in perspective: the amount of food to be consumed in the next 50 years will exceed the amount consumed in the rest of human history [2]. Interestingly, even though the world is covered by 70% ocean, only 2% of food supply comes from the oceans. There clearly exists a large potential for increasing the global food supply coming from the ocean [7].

Recent years have seen increasing levels of public awareness and consciousness regarding health and environment. The former will be touched upon here, while the latter will be discussed below ("E - Environmental"). Medical science continues pointing to indisputable

benefits of regular exercise and maintaining a healthy diet [30]. This information is easily accessible and communicated to the public through media, internet and governmental campaigns. Salmon has been described as “one of the healthiest foods you can eat” [2], and consensus is that the high omega-3 levels of seafood has unquestionable benefits that cannot be matched by other animal sources of protein. Increased health consciousness in the global population, coupled with a well communicated message of seafood (including salmon) benefits is likely to positively affect its demand in coming years. However, in recent years there has been indications of farmed salmon omega-3 levels dropping as a result of changes made to the fish feed [31]. This could threaten the demand for farmed salmon.

Technological

Technological factors of the external environment that is likely to affect an industry include research & development, automation, digitalization, technology incentives and rate of technological change [32]. The salmon farming industry is looking for better and more sustainable ways to produce its goods and services. The salmon industry in general have several challenges that incentivizes technological change, two of the most critical ones being escape control and sea lice (see next section). One technological development that attempts to get rid of both is the possibility of farming salmon onshore. However, as no one yet has been successful in making a profit doing it, receiving financing for such projects are very difficult. If, however, there is a breakthrough in onshore salmon farming, the geographical competitive advantage of Norway and its unique fjord conditions may disappear, as there already exists large foreign onshore aquaculture players in the market. These onshore complexes are located in countries with lower costs than Norway and are also closer to the largest markets [33].

Another technological development seen in the salmon farming industry is the occurrence of offshore farming. This deals with moving the pens out of the shallow fjords and out to greater depths in the open oceans. Norwegian salmon farming company SalMar is running such a project, and the main benefit is associated with the better water replacement taking place offshore, thereby reducing build-up of waste and feces on the seabed, which in turn contribute to lowering disease and mortality [34].

Grieg Seafood have four strategic focus areas: “post smolt strategy”, “digitalization”, “biosecurity & fish welfare”, and “expansion opportunities”. They all directly or indicrectly

involve aspects of technological development where Grieg Seafood has placed significant efforts.

Post smolt strategy [7]: Grieg Seafood has identified that the smoltification phase of the value chain discussed in section 2 is one of their four focus areas going forward. In 2018 Finnmark, Rogaland and British Columbia had their smolt facilities and capacities upgraded. Smolt is to be kept on land for a longer period of time before being released into the ocean pens. This will result in the smolt being significantly larger in size when released, and this is expected to make them significantly more robust and resistant to biological risks such as for example sea lice. Mortality rates are expected to go down, resulting in higher harvested volumes and higher quality harvest. Also, keeping smolt longer on land prior to release will make the production cycle more flexible as fish will have to spend significantly less time in the ocean before being harvested. Pen capacity in ocean (max allowable biomass) is often a restriction and having the opportunity to keep smolt longer on land facilitates more efficient utilization of pen capacity. Also, salmon having encountered fewer biological challenges and controversial treatments (antibiotics) will eventually sell at a higher price. Lastly, the fact the salmon is more resistant to sea lice and other biological risks will reduce the relatively large costs of treatment.

Digitalization [7]: This strategic focus area deals with the megatrend of collecting large amounts of data and utilizing it for improved decision making. Grieg Seafood's sites have large numbers of advanced sensors monitoring a variety of important parameters: water temperature, salinity, oxygen levels, currents etc. Grieg Seafood's ambition is to have all this sensor data standardized, making it comparable across all sites. Big data analytics will process the data, helping better understand interactions and connections between fish and environments and to predict harmful events such as for example toxic algae blooms. The ambition is that all locations will have their own integrated operations center, where real-time sensor data is analyzed and used in combination with artificial intelligence to improve decision making. In 2018 Grieg Seafood Rogaland opened the company's first pilot for such an operational center. By 2020 the goal is to have a full-scale center for Rogaland up and running. As many operations as possible should be performed remotely and fully automated from the operations centers, for example feeding. The ultimate goal behind digitalization is to produce salmon more sustainably, where key sustainability parameters are sea lice levels, fish survival rates and fish escapes. Grieg Seafood's annual reports are very clear that financial performance walks hand-in-hand with sustainability.

Environmental

As discussed in section X, the global volume of wild-caught fish has basically stagnated since the 1980s as governments and authorities has introduced quotas and restrictions to avoid overfishing and to keep (or hopefully restore) fish stocks at sustainable levels. In fact, if wild global fishing continues at current levels, natural fisheries will be depleted by 2056 [2]. This opens an opportunity for aquaculture, and as seen in previous sections the produced volume of (farmed) salmon has experienced large increase in recent years.

The supply of fish from aquaculture not only decreases the pressure on wild fish stocks, fish farming also has other environmental benefits; fish farming has a relatively low carbon footprint, and uses low levels of scarce resources such as fresh water and fertile soil [7]. Salmon is also considered highly efficient, in the sense that it takes only 1 kg of feed to get 1 kg of salmon. Other animal sources of protein have less efficient conversion ratios; it takes 2 kg of feed to get 1 kg of chicken, while for beef it takes 10 kg feed to get 1 kg. Also, producing the actual fish feed itself also produces less greenhouse gases than the feed of all other farmed animals [2].

However, there are environmental aspects of salmon farming that are less fortunate. One of the main challenges in salmon farming is related to escape control; working to minimize the amount of fish escaping from the farming pens. Escaped fish may mix genetically with wild species or interact with wildlife in other undesirable ways. Figure 19 below shows Grieg Seafood's performance on escape control in recent years. Escape incidents are costly to salmon farming companies, due to loss of production and fines given by the Directorate of Fisheries. Grieg Seafood spends a lot of effort on escape control, applying leading standards on all site equipment and having regular inspections [7].

FIGURE FISH ESCAPE INCIDENTS

Region	2016	2017	2018
Rogaland	0	0	0
Finnmark	1*	0	0
Shetland	2**	0	2***
British Columbia	0	0	0

* 200 fish escaped in this incident
** Two incidents where 829 and 617 fish ecaped each time
*** Two incidents involving 500 and 21 712 individuals.

Figure 19: Grieg Seafood fish escape incidents 2016-2018 [7].

The other main environmental challenge regarding salmon farming concerns sea lice. Sea lice present in large numbers may result in salmon death, while in lower numbers they are likely to cause low-quality harvests. Sea lice are naturally occurring parasites living off salmon skin, mucus and blood. Salmon farms provide ideal breeding conditions for sea lice. Sea lice are easily dispersed, both by wind and by water currents, and poses a considerable threat to wild salmon as well. Juvenile wild salmon migrating from rivers into the ocean are particularly vulnerable [35]. Local stocks of wild salmon could therefore be in danger if they have to pass salmon farms hit with sea lice on their way to the ocean. Grieg Seafood has a significant focus on minimizing sea lice at their sites:

- Roe with high resistance to sea lice is chosen if available when starting the salmon production cycle.

- Smolt undergoes vaccination programs prior to release in ocean pens.

- The pens themselves are fitted with “skirts” designed to stop sea lice from entering the pens.

- Cleanerfish (fish who eat sea lice) are used in pens.

- Only as a last resort is medical treatments (antibiotics) used to fight sea lice.

One last environmental aspect affecting the salmon farming industry is the amount of waste, emissions and debris generated at sites. As the sites typically are far away from electricity, energy is generated by generators, typically running on diesel. Boats and company vehicles run on fossil fuel as well. Grieg Seafood put great focus on waste management. Renewable energy (solar cells) and battery packs are phased in to replace fossil fuels where possible. The

company practices “plastic accounting”, keeping track of how much plastic has been bought. The goal is to buy as little plastic as possible, and recycling as much as possible. Degradable materials are used if possible. Grieg Seafood regularly takes part in local clean-up events on beaches [7].

Legal

The legal framework all Norwegian salmon farming companies deal with is the Aquaculture Act (Akvakulturloven) and its regulations. It is a thorough framework covering detailed regulations in the salmon farming activities; for example, it specifies how many sea lice are allowed per site before corrective measured must be implemented. The act specifies the max allowable biomass of fish per site. It also deals with how concessions are awarded and which prerequisites have to be in place.

All the aspects of the Aquaculture act mentioned are critical to all salmon farming companies. However, some aspects and changes *could* potentially only be applicable to certain regions or parts of the industry, and certain companies may therefore be hit harder by legal changes than others. For example, in October 2017, the Norwegian government introduced a new “traffic light system” for controlling capacity of farmed salmon. The Norwegian coastline was divided into 17 geographical zones (see figure 20 below), and each one was given a color code according to whether capacity of farmed salmon in that zone should be allowed to increase in the next production period or not. This new system is intended to promote sustainable production by considering each zone’s levels of sea lice and biomass. In red areas, the general rule is that production is to be reduced. The general rule for yellow zones is that production levels are to be unchanged, while in green zones the companies are offered to increase production. However, flexibility exists, and it is possible to apply for increased production if certain criteria are met, even for companies in red and yellow zones [36, 37].

Actions Grieg Seafood has taken to deal with challenging legal (and political) aspects of the external environment is difficult to identify. But it is certainly clear that they have consciously decided to spread their operations -both within Norway and globally- and thereby “diversified” away some of the local challenges that may arise. Also, as a socially responsible company with “sustainability” and “openness” as two of their core values they should be

more likely to be one step ahead of future changes made to rules and regulations regarding environment and stustainability.

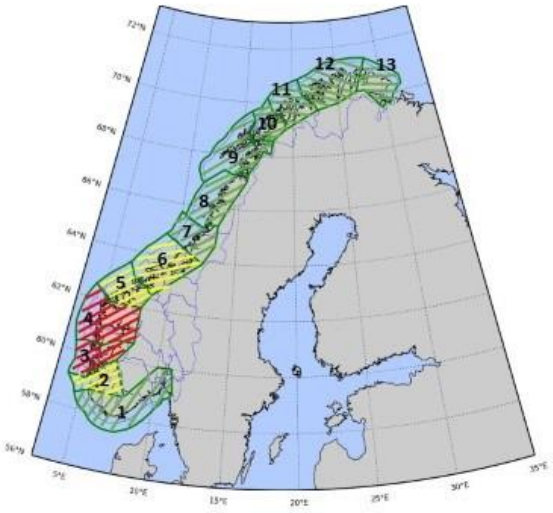


Figure 20: Norwegian fish farming production zones as of 2018 [20].

Summary of strategic analysis

Porter's five forces summary

The Porter's five forces analysis indicated that the salmon farming industry is very attractive. In an attractive industry the participants should expect to experience profitability. More generally, the industry should experience higher growth than the greater economy it is part of. This aspect will be taken into consideration for the upcoming valuation. The longer an industry is expected to experience growth relative to its larger economy, the more attractive it is. The duration of such growth is difficult to estimate for the salmon farming industry, but it will certainly impact the upcoming valuation. As mentioned in earlier sections; salmon demand in the coming years is expected to remain high, and the supply is expected to remain stable; this should contribute positively to industry attractiveness.

The salmon farming industry barriers to entry are very high; sites available for salmon farming are limited, and all concessions must be approved by authorities. Also, the capital expenditures needed for start-up are very large. These two aspects make it difficult for new considerable players to enter the industry.

The threat of substitutes is low, as the omega-3 fatty acid content of Atlantic salmon clearly is higher than other fish and animal meats in general. Current consensus is that omega-3 fatty acids are essential to the human body, and that salmon is one of the healthiest and most nutritious foods one can eat. However, in the seemingly unlikely event that the health benefits associated with omega-3 in the future lose credibility, incentives for consuming Atlantic salmon may certainly go down. It is possible that salmon will then be substituted as a protein source by cheaper alternatives such as pork or chicken.

The fish feed companies are the salmon industry's most important supplier, at least if taking into consideration that fish feed makes up their largest cost. This, coupled with the fact that there are few fish feed companies, give these suppliers some bargaining power over the farming companies. However, as the salmon farming companies have grown larger in recent years, there is an increasing possibility that they wish to integrate the fish feed production into their own value chain. This threat likely offsets some of the suppliers' bargaining power, keeping fish feed prices at competitive levels.

The bargaining power of buyers in the salmon farming industry should be large, at least when considering the commodity in its simplest form. The buyers should be able to change supplier

with ease, thereby forcing salmon farming companies to offer competitive prices. However, the demand is high, so the salmon farmers in recent years have had no difficulties selling their harvest.

Lastly, the internal rivalry between salmon farming companies appears to be low. There are relatively few salmon farming companies globally, and they are of different sizes. Furthermore, despite producing the same standardized commodity, there is room for product differentiation. When studying the annual reports of the largest companies there even appears to be widespread collaboration among them.

PESTEL summary

The PESTEL analysis performed discovered aspects of the external environment that should provide opportunities and threats to Grieg Seafood and other salmon farming companies.

The political risk of trade embargos has been a threat in recent years, with Norway having conflicted with -most notably- China and Russia. However, as demand for salmon has been high, the harvested volumes in recent years have had no problems reaching alternative markets. A "no-deal" Brexit may have large implications for Norwegian salmon farmers. One political threat that may hurt profitability is the "salmon tax" proposed and currently being evaluated.

Economic factors of the external environment that is likely to influence Norwegian salmon farmers in the future are exchange rates, interest rates and salmon price. All have been very favorable to the Norwegian salmon industry in recent years, but it is difficult to predict the direction of either one going into the future. However, interest rates in recent years have been remarkably low, and the Norwegian central bank indicates increased rates in coming years. Also, the Norwegian Krone has been a lot weaker than historically in recent years, being positive for salmon exporters. Salmon price has been at its highest levels ever, but there is no indication of significant decrease as demand is high and supply is limited.

Important social aspects of Grieg Seafood's external environment are the consensus of increased global population growth in coming years. Food will be needed to feed the growing population. 70% of the earth being covered in water, but only 2% of the global food supply comes from the ocean. This means that the road ahead is paved with growth opportunities. Another global megatrend in Grieg Seafood's favor is the increased awareness and consciousness among consumers regarding environment and healthy eating habits.

Environmental factors expected to make an impact on Greig Seafood in future years are both positive and negative. The positives are that farmed salmon, takes some pressure off wild salmon stocks. Also, farmed salmon has a low CO2 footprint and feed conversion ratio. However, there are negatives; biological challenges and escapes. Sea lice is a major challenge, causing mortality to both farmed salmon and passing wild salmon. Escaped salmon may undesirably interact with wild salmon. The costs associated with treatments and escaped fish are large.

The legal external environment Grieg Seafood deals with is the Norwegian Aquaculture act. There are always possibilities that changes are made to this act, and these could potentially lead to a comparative advantage or disadvantage to Norwegian salmon farmers relative to foreign competitors. Also, as seen with the traffic light system introduced in 2017, legal changes can be made that give certain regions in Norway comparative advantage.

Comparative advantage

By studying Grieg Seafood's annual reports and having performed the strategic analysis it is possible to get an understanding of the company, its values, its strategic focus and its industry attractiveness. Grieg Seafood portrays themselves as an open and transparent company, willingly sharing information and knowledge with other companies, authorities, media, shareholder and local communities. They claim that only by doing that are they able to earn the trust of stakeholders and shareholders [7]. It is difficult to evaluate whether other companies are as conscious in being open, collaborative and transparent as Grieg Seafood without studying their respective annual reports. It is also difficult to evaluate how unique Grieg Seafood's four strategic focus areas are relative to their competitors without studying their annual reports in detail. Such an investigation is considered beyond the scope if this thesis. Either way, it is difficult to fully understand how Grieg Seafood is going to gain competitive advantage if they are open, collaborative and seemingly willing to share information with any party. So, what makes Grieg Seafood different from their competitors, and how do they gain any competitive advantage? Grieg Seafood produces Atlantic salmon on four different locations in three different countries, and all locations have their own fully integrated value chain (only Rogaland holds a broodstock license). The only other competitor who has production abroad with a fully integrated value chain is the considerably larger MOWI. However, while each of Grieg Seafood's locations perform their own processing,

MOWI transports its harvest for processing in centralized locations in Europe. By having each location perform its own processing, Grieg Seafood saves transportation costs and keeps the fish fresh and close to their consumer markets. However, they may be missing out on the economies of scale offered by centralizing the processing function.

It remains to be seen if their four current strategic focus areas will create competitive advantage for the future. However, all four are related to increased production, reduced costs and sustainability, all of which will make the company more competitive going forward.

Discounted cash flow valuation

Discounted cash flow valuation method

The strategic analysis performed provides important input to the valuation model presented in this section. The model used will be a discounted cash flow model, as the value of any asset is equal to the present value of all its future cash flows [39]. The general formula of a firm's value is [40]:

$$V_0^F = \frac{CF_1}{\rho_F} + \frac{CF_2}{\rho_F^2} + \frac{CF_3}{\rho_F^3} + \frac{CF_4}{\rho_F^4} + \frac{CF_5}{\rho_F^5} + \ \ldots \qquad (1)$$

Where CF is the firm's expected free cash flow (to firm) in each period, and ρ_F is 1 + the required return of the firm. This discount rate reflects the riskiness of its corresponding cash flow. V_0^F indicates that we are finding the firm's value at time zero (present value). The ellipsis of the equation indicates that, theoretically, the free cash flows must be forecasted indefinitely into the future.

We will initially be interested in finding the value of Grieg Seafood as a firm, before later on valuing only its equity. To find the value of a firm's equity, all we need to do is subtract the value of net debt from firm value. To estimate firm value, we first need to estimate which residual cash flow is present after Grieg Seafood has paid its operating expenses, income tax, and performed operational reinvestments, but before they have made any payments to debt or equity holders. This cash flow is called the free cash flow to firm and represents the amount of residual cash *available* to be paid out to debt and equity holders [39]. The rate at which these cash flows needs to be discounted is called the weighted cost of capital (WACC) and is the expected rate of return that a firm pays on average to its security holders to finance its assets [41]. Typically, the securities present are debt and equity, and the WACC is a weighted average of the expected rate of return to debt and equity holders, weighted by their market value proportions [39].

As equation (1) indicates, one of the challenges associated with the discounted free cash flow valuation model is that future free cash flows (to firm) has to be forecasted, and they have

theoretically to be forecasted for an indefinite number of periods. The riskiness (level uncertainty) of each free cash flow typically grows larger the longer into the future it is forecasted. Therefore, a common version of equation (1) is [40]:

$$V_0^F = \frac{CF_1}{\rho_F} + \frac{CF_2}{\rho_F^2} + \frac{CF_3}{\rho_F^3} + \cdots + \frac{CF_T}{\rho_F^T} + \frac{CV_T}{\rho_F^T} \quad (2)$$

Where T indicates the number of periods that are to be forecasted individually. CV is the continuing value, and is to capture the value of free cash flows expected after period T. If the free cash flows to firm are assumed to grow indefinitely at a constant rate after the horizon time T, the continuing value is [40]:

$$CV_T = \left(\frac{CF_{T+1}}{\rho_F - g}\right) \quad (3)$$

Where g is 1+ the constant rate at which cash flows grow after time T.

Forecasting free cash flows

So, from equations (1), (2) and (3) above, it becomes clear that in order to perform a discounted free cash flow valuation of any firm, we need to:

1. Forecast the future free cash flows of a firm. Specifically, we must forecast free cash flows for a finite horizon, and then come up with a continuing value that captures the value of all free cash flow after the forecasted finite horizon.

2. We need to decide what the firm's required rate of return is; we need to find its weighted cost of capital, in order to discount the forecasted free cash flows and continuing value back to present value.

A general formula for free cash flow to firm is [42]:

$$CF = EBIT * (1 - \tau) + Dep. \& amor. - \Delta WC - Investments \quad (4)$$

EBIT (earnings before interest and tax) is a measure found in a firm's income statement, measuring a its profitability. The earnings are earned across some accounting period. It includes all incomes (operating and non-operating) but does not include expenses associated with interest and tax [43]. The tax rate (τ) in equation (4) above is the *marginal* tax rate of a firm; the percentage taken from your next dollar (or any currency) of taxable income [44]. Depreciation is an accounting measure that allocates the cost of a tangible asset over its useful life [45]. However, it is not an actual cash outflow from the firm and must therefore be added back to EBIT. The same goes for amortization; it is a non-cash expense that is used to periodically lower the book-value of intangible assets and must be added back to EBIT. A firm's working capital (WC) is defined as its current assets less its current liabilities in a given accounting period [46]. The change in working capital is found by subtracting the working capital at the start of the accounting period from the working capital at the end of the period. After discussing with my supervisor, to stay parsimonious, I will be defining current assets as Grieg Seafood's accounts receivables and the inventory (including biological assets (salmon)), while their current liabilities will be their accounts payable. The investments of equation (4) are capital expenditures made in a given accounting period; these are larger purchases of assets to be used in the future. The costs will be depreciated across the asset's useful life. While ordinary operational expenses are found in the income statement, capital expenditures are found in the balance sheet as an asset, and also in the cash flow statement's investing activities [47].

Forecasting EBIT specifically itself is very challenging, and it is likely more intuitive to forecast the components making it up. As explained above, EBIT is simply a firm's revenue minus expenses, before subtracting interest and tax. The EBIT of a firm in an accounting period is found in its income statement. Figure 21 below shows a typical EBIT (before fair value adjustments of biological assets) setup for Grieg Seafood, this one from the most recent annual report (2018):

Income statement

AMOUNTS IN NOK 1 000

GRIEG SEAFOOD GROUP	NOTE	2018	2017
Sales revenues	6	7 500 316	7 017 456
Other income	6	25 853	21 771
Other gains and losses	6	26 157	-1 514
Share of profit from associates	5	-2 328	-550
Raw materials and consumables used	7	-3 852 855	-3 724 200
Salaries and personnel expenses	15/16	-541 047	-482 827
Other operating expenses	11/20/24	-1 821 623	-1 724 604
EBITDA before fair value adjustments of biological assets		**1 334 473**	**1 105 533**
Depreciation property, plant and equipment	9	-230 262	-196 237
Amortization licenses and other intangible assets	8	-5 393	-4 895
EBIT before fair value adjustments of biological assets		**1 098 818**	**904 400**

Figure 21: Grieg Seafood 2018 income statement [7].

As can be seen from equation (4), in order to forecast future free cash flows, we need to forecast future EBITs, marginal tax rate(s), depreciation & amortization, investments and changes in working capital. However, first we need to decide on our time horizon for forecasting individual free cash flows. Theoretically, this time should correspond to the time it takes for the firm's excess returns to converge towards the industry return, after which the firm's free cash flows will grow at a constant long-term rate. 5-10 years of individual free cash flow forecast is common practice [48]. In the strategic analysis I found that the salmon farming industry appears attractive, and the established participants can expect profitability in coming years. This indicates that the valuation should include a forecasted horizon of some length, where free cash flows on average grow at a higher rate than the greater economy which the industry is part of. It is very difficult to say exactly how long this horizon will be. I have decided to forecast five years for two reasons:

1: I found that five years appears to be the most commonly horizon used [48].

2: Being unexperienced doing valuations I want to remain parsimonious. Uncertainty of cashflows grow as we forecast more distantly into the future. Forecasting more than five years will make the valuation too speculative. By only forecasting five years I can anchor my numbers on statements and forecasts made by analysts and Grieg Seafood themselves.

Forecasting the income statement

By looking at figure 21 it becomes clear that the first element that we need to forecast is sales revenue. As a salmon farming company, it is easy to jump to the conclusion that Grieg Seafood's sales revenues equals the quantity of salmon produced times the price per quantity. However -as we will shortly see- it is not as straight forward, but it is nonetheless important to have a clear understanding of expectations for future salmon price and harvest volume.

In 2018, sale of whole fish (fresh or frozen) made up 93% of Grieg Seafood's sales revenues, and the remaining 7% came from processed fish. Even though 93% of Grieg Seafood's revenues came from selling whole salmon, the price they receive for selling it varies. This is because the spot price of salmon varies throughout the year, and Grieg Seafood also has a policy of hedging approximately 20% of their volume with fixed price contracts [7]. Also, the price received for fish depends on the quality of the product. The 12-months average Fish Pool Index for 2018 was NOK 60.76 per kilogram, and this was for so-called "superior quality salmon, head -on gutted". It is very difficult to estimate what Grieg Seafood's realized price will be in the future, so for this thesis we will be assuming that their realized price in future years equals the given spot price for superior quality in the market. As mentioned in the strategic analysis, Atlantic salmon supply is expected to be limited in coming years, and its demand is expected to remain high. The expectations for salmon price going into 2019-2020 is that it will be in the 55-65 NOK/kg range [7]. The strategic analysis indicates that supply will be limited due to governmental regulation, and still-present biological challenges (sea lice, toxic algae and diseases causing mortality). However, if there are breakthroughs in solving these challenges, supply may suddenly rapidly increase. However, forecasting such a breakthrough is highly speculative, and will not be taken into consideration -despite the large investments made by Grieg Seafood to solve the challenges. The strategic analysis also indicated that the megatrend of awareness regarding healthy eating habits will benefit the demand of salmon. However, demand may decrease if environmental challenges such as escape control are left unsolved, leading consumers with increasing levels of environmental consciousness to substitute salmon for apparently more environmentally friendly alternatives. As the future salmon price is difficult to predict, we will therefore use a salmon price of 60 NOK/kg for all five years (2019-2023) of the individual forecasting horizon. Do note that the 60 NOK/kg estimate has completely ignored that Grieg Seafood has a target level of 93%

superior share [7]. The fact that they have a target of "only" 93% superior share means that the average realized price of their salmon will be lower than spot price as the spot price of 60 NOK/kg, which will be for superior quality. We will also be assuming that the entire forecasted harvested volume is successfully sold for 60 NOK/kg.

When it comes to the harvest volume produced in the five-year forecast period, it is reasonable to start off having a look at Grieg Seafood's own targets. After having produced 75 000 tonnes in 2018, they have target volumes of 82 000 and 100 000 tonnes for 2019 and 2020 respectively. This corresponds to year-to-year increases of 9% and 22% respectively. In their 2018 annual report, Grieg Seafood CEO Andreas Kvarme claims that they are in a "strong position" to reach their 2020 target. These increases in harvested volume sound large, especially when considering the stable level of harvest volume in recent years, up until 2018. But by looking at figure 22 below, we clearly see that the large increase in gross investments in 2017 was followed by a significant harvest volume increase in 2018. As gross investments remain high in 2018, it is likely that Grieg Seafood will experience increase in harvest volume for 2019 an on as well.

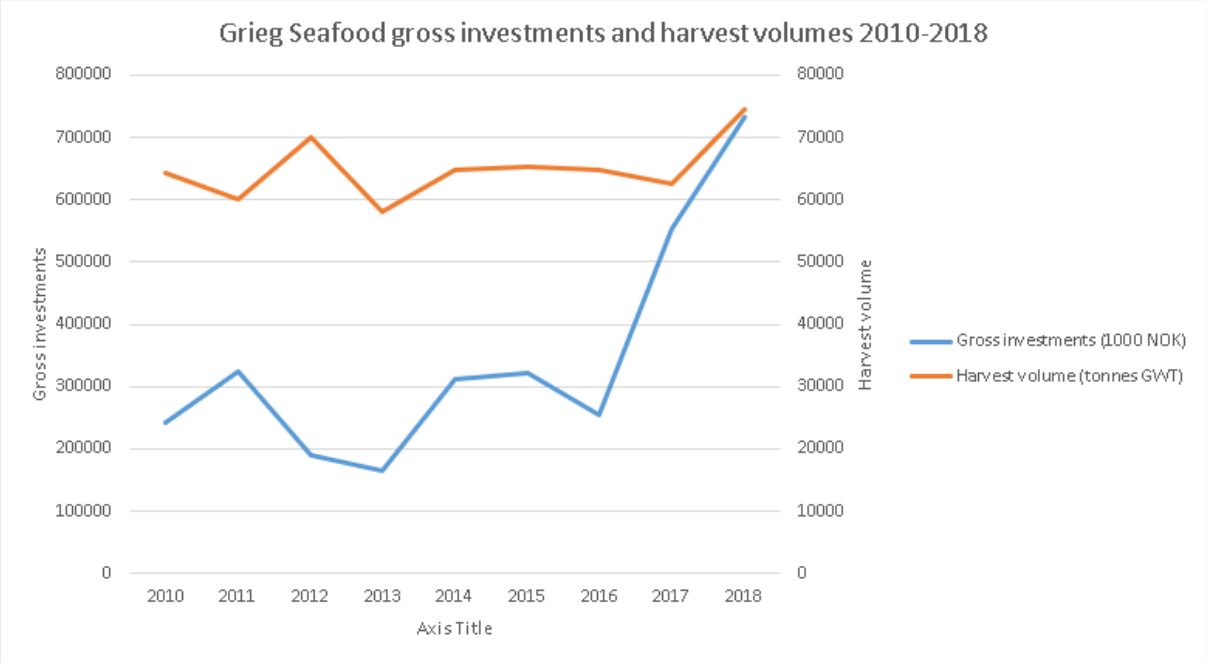


Figure 22: Grieg Seafood gross investments and harvest volume 2010-2018 (Own creation, based on annual report [7]).

There is of course a possibility that Grieg Seafood is purposefully overoptimistic their harvest volume targets in order to attract investors; In the 2017 annual report they had a target of 80 000 tonnes for 2018 but ended up producing only 75 000 tonnes [57]. In 2017 they had a target of 70 000 tonnes but produced 63 000 tonnes. In 2016 also had a target of 70 000 tonnes but produced only 64 000 tonnes. The arithmetic average of tonnes below target is 8.3%. It is very difficult to assess whether their stated 2019 and 2020 targets are truly realistic outcomes, or simply targets to strive for. We do know that all of Grieg Seafood's current strategic focus areas mentioned in the strategic analysis has a goal of decreasing salmon mortality and/or increase their production capacity, so it is reasonable to believe that they from 2019 on will stand a better chance of reaching their future targets. Grieg Seafood and its board and management are aware that investors will hold them accountable for their targets, and that failure to reach them may see share prices drop. I have decided to forecast Grieg Seafood's harvest volume for 2019 and 2020 ~8.3% below their own targets, as this is the average amount they have been below targets the past three years. Also, the management has essentially been unchanged in the same period. **So, for 2019 I have forecasted 75 000 tonnes, while for 2020 it will be 92 000 tonnes**. For 2021-2023 there exists no formal targets yet from Grieg Seafood themselves, so for this period I will rely on findings from the strategic analysis. One important piece of information is that Grieg Seafood's current production capacity is 100 000 tonnes GWT [57], which is identical with their own 2020 production target. This means that if harvest volume is to keep growing beyond 100 000 tonnes, they have to acquire new farming licenses or be allowed to increase capacity at current sites. The danger of Grieg not being awarded new licenses or capacity increases, and/or the ever-present danger that they will be struck by large biological difficulties or escapes, leads me to believe that they will struggle to maintain the targeted yearly increases put up back in the 2016 annual report: 10% harvest volume increase yearly from 2017 to 2020. Also, they may be struck by the political risk associated with the "traffic light system" in Norway, leaving them unable to increase production at yellow and red sites. Rogaland is currently in the yellow region (see figure 20) and could risk turning red in upcoming years. However, as part of their production target of 100 000 tonnes in 2020 we know that Grieg Seafood has four strategic focus areas - all with the potential to increase future harvest volumes: post-smolt, digitalization, biosecurity & fish welfare and expansion opportunities. These focus areas are not purely made for 2020, but will "build a stable platform for growth beyond 2020" as well [7]. Growth in harvested volume should therefore be expected even beyond 2020, even if current production capacity does not actually allow it. The large gross investments performed in 2017 and 2018 should

reap benefits in many years to come, and the strategy of constantly searching for expansion opportunities should see production capacity increase in coming years. Grieg Seafood have already started upgrading their smolt facilities at all locations, allowing them to both produce more- and larger smolt. This means that there will be more smolt put into the ocean in coming years, and they will be larger. The latter means that they will be more resistant to biological risk, therefore resulting in less mortality and larger expected harvested volumes. The general focus on digitalization and biosecurity is expected to increase survival rates as well, and will thus contribute to increased production. The exact increase in volume beyond 2020 is very difficult to predict as Grieg Seafood is still investing, and the exact completion of these investment projects are uncertain. For example, the upgrade of the smolt facility in British Columbia takes full effect in 2020 [7], so there should at least be an increase in production locally there for years to come beyond 2020. The increased smolt capacity should have relatively instant and lasting effect on produced volumes, all else equal. Digitalization efforts and research on biosecurity should reap increasing benefits for longer periods of time as larger amounts of data are collected for analysis. Once the operational centers of each region are up and running (Rogaland is targeted to be ready by 2020 [7]) it is likely that benefits of increased production and lowered costs will be seen. Lastly it should be mentioned that there is always a risk present that large unwanted events occur; large escape incidents will obviously result in loss of harvested volumes, as will sudden outbreaks of diseases, unfavorable water conditions or toxic algae blooms. Large escapes and mortality obviously reduce harvest volume. However, such events -at least the two latter- are to a large extent outside Grieg Seafood's control. But by implementing digitalization efforts -installing sensors and analyzing this big data collected in their operational centers- Grieg Seafood are expecting to be able to foresee such events to a larger degree in the future. As there is currently no way of truly predicting such unfavorable events outside Grieg Seafood's control, they will not in any way be forecasted specifically. It is very likely that Grieg Seafood's own targets for 2019 and 2020 have taken into account the risk of running into such unwanted events. As mentioned above, in the 2018 annual report Grieg Seafood is targeting a growth in harvested volume from 2019 to 2020 of 22%, while in their 2016 annual report they targeted only 10% annual growth each year from 2017 to 2020. **I believe they will be able to sustain the 10% annual growth rate in harvested volume from 2021 to 2023**. As mentioned earlier, the Norwegian supply of Atlantic salmon increased by 3.2% from 2017 to 2018, while the global supply increased by 5.4%. This indicates that an increase in volume of 10% is highly

competitive. This 10% growth rate of harvested volume for 2021-2023 is highly speculative and can easily be adjusted if more information becomes available at a later stage.

Forecasting sales revenues

In figure 23 below we have multiplied each year's harvested volume from 2014 to 2018 with that corresponding year's weekly average salmon price. We have also included the actual sales revenue for each year. All information is found in Grieg Seafood's annual reports. We quickly see that the average price multiplied by the harvested volume does not equal the actual sales revenues. The actual sales revenues are on average 1.67 times larger. The reason behind this deviation is complex, but is likely associated with the fact that Grieg Seafood hedges 20% of its volume with fixed price contracts [7], that they offer certain other products with different prices than the ones tabulated (see figure 24), and that they historically have had a superior quality share of less than 100%. Future forecasted sales revenues (forecasted salmon price*forecasted harvested volume) will be multiplied by 1.67 to get final adjusted forecasted sales revenues. I feel confident applying this historical ratio of 1.67 to future forecasted sales revenues, as Grieg Seafood continues having a policy of hedging 20% of volumes with contracts. Also, there are currently no indications of Grieg Seafood heavily entering into the value-added product market, so their vast majority of future revenue is expected to keep coming from selling fresh or frozen whole fish.

	2014	2015	2016	2017	2018	Average
Harvested volume (tonnes GWT)	64736	65398	64726	62598	74623	
Average weekly price (NOK/kg)	40,3	42,09	63,13	60,88	60,76	
Harvested volume*Price (1000 NOK)	2608860,8	2752601,82	4086152,38	3810966,24	4534093,48	
Actual sales revenues (1000 NOK)	4099543	4608667	6545187	7017456	7500316	
Actual revenues/(Harvested vol*Price)	1,571392	1,67429483	1,60179709	1,84138498	1,654204095	1,668614601

Figure 23: Investigating 2014-2018 relationship between harvest volume, average salmon price and sales revenues (Own creation, based on Grieg Seafood annual reports).

SALES REVENUES DISTRIBUTED BY PRODUCTS
Fresh whole fish
Frozen whole fish
Fresh processed fish
Frozen processed fish
Other products

Figure 24: Products contributing to Grieg Seafood sales revenues in 2018 [7].

Forecasting other income statement items

Now we have an idea of how to forecast sales revenues in future income statements. In order to forecast the other elements making up EBIT in figure 21 I have decided to investigate how each one historically has behaved as a function of sales revenues. Figure 25 below shows the Grieg Seafood income statements from years 2014 to 2018.

Column1	2014	2015	2016	2017	2018
Sales revenues	4099543	4608667	6545187	7017456	7500316
Other income	2819	44921	41019	21771	25853
Other gains and losses	59122	-15218	17386	-1514	26157
Share of profit from associates	3576	6994	569	-550	-2328
Raw materials and consumables used	-2293279	-2738936	-3287159	-3724200	-3852855
Salaries and personnel expenses	-359529	-409432	-483473	-482827	-541047
Other operating expenses	-1028434	-1235695	-1491867	-1724604	-1821623
Depreciation property, plant & equipment	-135495	-162211	-175352	-196237	-230262
Amortization licences and other intangible assets	-5222	-5163	-5036	-4895	-5393
EBIT (before fair value adjustments of biological assets)	343101	93927	1161274	904400	1098818

Figure 25: Grieg Seafood income statements 2014-2018, all values in 1000 NOK (Own creation, based on annual reports)..

By dividing each element with the corresponding year's sales revenues, we can study the resulting historical ratio. The ratios are found in figure 26 on next page. Referring to figure 26, I found that all elements have reasonably constant ratio, which means the ratio can be used as a starting point to forecast each element (given that I have made a forecast of future sales revenues). I took the average ratio from the past five years and will be using this value to forecast the elements for the next five years, 2019 to 2023. Figure 26 shows what percentage each element is compared to sales revenues. The only element I initially was reluctant to use this approach for is the "Raw materials and consumables used". This is the element ratio with the highest volatility. For Grieg Seafood, in 2018 fish feed made up 40% of the total cost per kg harvested fish. This means that, ideally, I would like to get hold of a forecast for fish feed prices for 2019-2023, together with estimates of the amount of feed needed to reach the forecasted harvested volumes. However, I found it difficult to get hold of fish feed price forecasts, and I also realized that fish feed prices are correlated with salmon price. Forecasted fish feed price is therefore indirectly forecasted in the forecasted salmon prices. I concluded that my best way of forecasting raw materials and consumables would be to use the ratio in given in figure 26, despite its relatively high volatility. Grieg Seafood had in 2018 farming costs of 43.1 NOK/kg. This is above the weighted industry average of 37.9 NOK/kg. Grieg

Seafood has a targeted cost level at- or below industry average by 2020 [7]. As Grieg Seafood has historically been above the industry average, and have failed to reach recent harvest volume targets, I am reluctant to adjust the ratios associated with costs down. However, as all their strategic focus areas mentioned in the strategic analysis (except possibly the one regarding expansion opportunities) have great potential to reduce costs, I have decided to adjust the ratios for "raw materials and consumables used" and "other operating expenses" down by 12% starting from 2021. 12% per year is chosen as they in 2018 were 12% above targeted industry average, and I believe Grieg Seafood with their strategic focus areas will be able to get their costs down to the targeted industry average level. Salary ratio is left unchanged as Grieg Seafood themselves in the annual report claim that planned- and ongoing digitalization and automatization efforts will not lead to unemployment. The depreciation & amortization charges are on average 3.1% and 1.0% of sales revenues respectively. Both are expected to increase in absolute terms the coming years. This is because we know that Grieg Seafood has an ambition to grow its production beyond 100 000 tonnes, but are currently limited by capacity in order to reach such a target. If production volume is to grow, so is sales revenues (given price does not drop). Increased production will require investing in equipment (capital expenditures) for new sites (plant, property and equipment). Acquiring PPE will increase future depreciation, and acquiring new licenses and intangible assets will increase future amortization. However, it is very challenging to estimate what these future charges will be, so for this valuation we will be using the historical ratios found below. If the future depreciation and amortization at some stage ends up being larger than 3.1% and 0.1% of sales revenues due to increased capital expenditures, so should eventually the value in the ratio denominator (sales revenues), so the long term ratios should not be drifting wildly far off from the historical ones.

Column1	2014	2015	2016	2017	2018	Average	Adjusted
Sales revenues	4099543	4608667	6545187	7017456	7500316		
Other income/Sales revenues	0,1 %	1,0 %	0,6 %	0,3 %	0,3 %	0,5 %	0,5 %
Other gains and losses/Sales revenues	1,4 %	-0,3 %	0,3 %	0,0 %	0,3 %	0,3 %	0,3 %
Share of profit from associates/Sales revenues	0,1 %	0,2 %	0,0 %	0,0 %	0,0 %	0,0 %	0,0 %
Raw materials and consumables used/Sales revenues	-55,9 %	-59,4 %	-50,2 %	-53,1 %	-51,4 %	-54,0 %	-47,5 %
Salaries and personnel expenses/Sales revenues	-8,8 %	-8,9 %	-7,4 %	-6,9 %	-7,2 %	-7,8 %	-7,8 %
Other operating expenses/Sales revenues	-25,1 %	-26,8 %	-22,8 %	-24,6 %	-24,3 %	-24,7 %	-21,7 %
Depreciation PPE/Sales revenues	-3,3 %	-3,5 %	-2,7 %	-2,8 %	-3,1 %	-3,1 %	-3,1 %
Amortization/Sales revenues	-0,1 %	-0,1 %	-0,1 %	-0,1 %	-0,1 %	-0,1 %	-0,1 %

Figure 26: Historical ratios for income statement elements divided by sales revenues, 2014-2018 (Own creation, based on Grieg Seafood annual reports).

EBIT forecasts

We have finally obtained all the information we need to forecast EBIT for 2019-2023, and the result is presented in figure 27 below:

Column1	2019E	2020E	2021E	2022E	2023E
Harvested volume (Tonnes GWT)	75000,0	92000,0	101200,0	111320,0	122452,0
Average (realized) salmon price (NOK/kg)	60,0	60,0	60,0	60,0	60,0
Sales revenues	4500000,0	5520000,0	6072000,0	6679200,0	7347120,0
Sales revenues * 1.67	7515000,0	9218400,0	10140240,0	11154264,0	12269690,4
Other income	34946,4	42867,6	47154,3	51869,7	57056,7
Other gains and losses	25622,5	31430,3	34573,3	38030,6	41833,7
Share of profit from associates	3138,3	3849,7	4234,6	4658,1	5123,9
Raw materials and consumables used	-4058585,0	-4978531,0	-4816614,0	-5298275,4	-5828102,9
Salaries and personnel expenses	-588193,9	-721517,8	-793669,6	-873036,6	-960340,2
Other operating expenses	-1857039,3	-2277968,2	-2505765,1	-2756341,6	-3031975,7
Depreciation property, plant & equipment	-231016,5	-283380,3	-311718,3	-342890,1	-377179,1
Amortization licences and other intangible assets	-6883,9	-8444,2	-9288,6	-10217,5	-11239,2
EBIT (before fair value adjustments of biological assets)	836988,6	1026706,0	1789146,6	1968061,3	2164867,4

Figure 27: EBIT forecasts for Grieg Seafood 2019-2023, all values in 1000 NOK.

EBIT margin

Column1	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E
EBIT	343101	93927	1161274	904400	1098818	836988,6	1026706,0	1789146,6	1968061,3	2164867,4
Sales	4099543	4608667	6545187	7017456	7500316	7515000	9218400	10140240	11154264	12269690
EBIT/Sales	0,0836925	0,020380513	0,1774241	0,1288786	0,1465029	0,1113757	0,1113757	0,17644027	0,17644027	0,17644027

Figure 28: Grieg Seafood EBIT margin 2014-2023E.

Figure 28 shows Grieg Seafood's EBIT margin (EBIT/sales revenues) for 2014-2023E. The EBIT margin is useful for studying the operating efficiency and profitability of a company [59]. The EBIT margin of the estimated period is comparable to the ones of previous years (at least 2016-2018), thereby indicating that the assumptions used when forecasting EBITs are relevant.

Forecasting marginal tax rate, changes in working capital, and investments (CAPEX)

Having a look back at the free cash formula of equation (4), we have now forecasted 2019-2023 EBITs and depreciations & amortizations. What remains to be forecasted now are marginal tax rate, investments (capex) and changes in working capital. Working capital can be found using the balance sheet and is defined as current assets minus current liabilities [46]. After having discussed with my supervisor I have decided to define current assets as

inventory (including biological assets) and accounts receivable, and current liabilities as accounts payable. Working capital from 2014-2018 are presented in Figure 28 below:

	2014	2015	2016	2017	2018	Average
Inventories	91016	90867	89164	92262	126092	
Biological assets	1844097	1929115	2459625	2698352	3195142	
Trade receivables	504110	581904	800591	761407	925232	
Trade payables	360358	653083	493534	585378	649352	
Working capital	2078865	1948803	2855846	2966643	3597114	
Change in working capital		-130062	907043	110797	630471	
Working capital/Sales revenues	51 %	42 %	44 %	42 %	48 %	45 %
Working capital/Harvest volume	32,1129665	29,7991223	44,1220839	47,3919774	48,2038246	40,3259949

Figure 29: Grieg Seafood working capital 2014-2018, all values in 1000 NOK (Own creation, based on Grieg Seafood annual reports).

In order to forecast changes in working capital I wanted to study how working capital historically had changed in relation to sales revenues and harvest volumes. The result is presented in figure 29 above, and it becomes evident that the working capital/sales revenue ratio is the least volatile of the two, at least in the five years studied. Therefore, forecasted working capital will be 45% of the forecasted sales revenue from 2019 and on:

Column1	2019E	2020E	2021E	2022E	2023E
Sales revenues	7515000,0	9218400,0	10140240,0	11154264,0	12269690,4
Working capital	3409747,028	4182623	4600885,3	5060973,856	5567071,24
Changes in working capital	-187366,9719	772875,99	418262,3	460088,5323	506097,386

Figure 30: Forecasted changes in working capital 2019-2023, all values in 1000 NOK.

Investments (capital expenditures) are defined as [49]:

$$\text{CapEx} = \text{PP\&E (current period)} - \text{PP\&E (prior period)} + \text{Depreciation (current period)}$$

where PP&E is an abbreviation for “plant, property & equipment” found in the balance sheet. In figure 31 below, the resulting investments from 2014 to 2018 are listed, along with historical ratios based on sales revenues and harvest volumes. The historical ratio of investments divided by sales revenue again is the least volatile, and this will be used to forecast future investments. Knowing that Grieg Seafood has a clear strategy of growing their business towards a 2020 production target of 100 000 tonnes I have decided to make a

speculative adjustment of the investment ratio from 7% of sales revenues up to 8%. Also, I am worried about whether the low 2% ratio found in 2016 is representative at all. It was difficult finding any real forecasts by Grieg Seafood themselves regarding what would be spent on investments in the coming years. If such information becomes available at a later stage the valuation can be updated accordingly.

	2014	2015	2016	2017	2018	Average	Adjusted
PPE (current)	1424952	1534770	1510379	1871804	2292912		
PPE (previous year)	1204207	1424952	1534770	1510379	1871804		
Depreciation PPE (current year)	135387	162211	175352	196237	230262		
Investments	356132	272029	150961	557662	651370		
Investments/sales revenues	9 %	6 %	2 %	8 %	9 %	7 %	8 %
Investments/harvest volume	5,501297578	4,159592	2,3323085	8,908623279	8,72881015	5,92612631	

Figure 31: Grieg Seafood CapEx 2014-2018, all values in 1000 NOK (Own creation, based on Grieg Seafood annual reports).

In 2018 the Norwegian corporate (marginal) tax rate was 23% [50], and this is what we will be using for the valuation. It is difficult to reliably forecast any changes in this rate. Do note that my valuation will not take into consideration the so-called "salmon tax" that was mentioned in the strategic analysis.

We can now set up a table that gives us forecasted free cash flows to firm within the five-year horizon (2019-2023):

Column1	2019E	2020E	2021E	2022E	2023E
EBIT (before fair value adjustments of biological assets)	836988,6	1026706,0	1789146,6	1968061,3	2164867,4
23% Marginal corporate tax	192507,3749	236142,38	411503,729	452654,1022	497919,5124
Depreciation (3.1% of sales revenues)	231016,5157	283380,259	311718,285	342890,1138	377179,1251
Amortization (0.1% of sales revenues)	6883,86627	8444,20929	9288,63022	10217,49324	11239,24257
Investments (8% of sales revenues)	601200	737472	811219,2	892341,12	981575,232
Changes in working capital	-187366,9719	772875,993	418262,302	460088,5323	506097,3856
Free cash flow to firm	468548,6	-427959,9	469168,3	516085,2	567693,7

Figure 32: Grieg Seafood free cashflows to firm 2019-2023, all values in 1000 NOK.

Discount rate (WACC)

All forecasted cash flows, and the continuing value, needs to be discounted back to present value using the firm's required rate of return; the weighted cost of capital (WACC). The WACC formula is given below [52]:

$$WACC = \left(\frac{E}{V} * Re\right) + \left(\frac{D}{V} * Rd * (1 - Tc)\right) \quad (5)$$

In order to calculate the WACC, we need information about the capital structure of the firm; we need the market values of equity (E) and debt (D). V is simply the sum of E+D.. Further, we need to know the equity cost of capital (Re), the debt cost of capital (Rd) and the (marginal) corporate tax rate (Tc) [52].

The market value of Grieg Seafood's equity can be found by multiplying the number of shares outstanding with the share price on 31.12.2018:

111 662 000 shares * 102.3 NOK/share = 11 423 022 600 NOK.

Grieg Seafood has no issued bonds trading in the market. After having discussed this with my supervisor, I will therefore estimate the market value of debt by finding the book value of non-current debt in the balance sheet. At the end of 2018, the Grieg Seafood group had total non-current liabilities of 2 491 251 000 NOK. The sum of equity and debt is:

11 423 022 600 NOK + 2 491 251 000 NOK = 13 914 273 600 NOK.

Cost of equity

To calculate Grieg Seafood's cost of equity, we will be using the capital asset pricing model:

$$Re = r_f + \beta(equity\ risk\ premium) \quad (6)$$

As a proxy for the risk-free rate (r_f), A. Damodaran recommends using long-term government bond rates [39]. As Grieg Seafood's free cashflow to firm is measured in NOK, I will be using the 10-year Norwegian government bond rate. In 2018, the annual average of daily rates for a 10-year Norwegian government bond was 1.88% [53]. This is the rate I will be using as proxy for risk-free rate going forward.

In equation (6), the (levered) equity beta (ß) is the relative risk of a stock relative to the average stock trading in the market. To find the equity beta, Damodaran recommends using a "bottom-up approach" [54]. Figure 33 below lists four salmon farming companies with comparable operations as Grieg Seafood, all traded on Oslo Stock Exchange.

Column1	Levered equity bet	D/E ratio	Tax rate
Norwegian Royal Salmon	0,64	0,12	23
Lerøy Seafood	0,77	0,18	23
MOWI	0,70	0,17	23
Salmar	0,72	0,05	23
AVG	0,71	0,13	0,23

Figure 33: Equity betas, D/E ratio and tax rates of four firms comparable to Grieg Seafood.

Their listed equity betas were found by downloading the 2014-2018 daily closing prices from Yahoo Finance, the 2014-2018 OSEBX index closing levels from Oslo Stock Exchange, and using the daily returns in the following formula [58]:

$$\beta_p = \frac{Cov(r_p, r_b)}{Var(r_b)} \tag{7}$$

Where the numerator is covariance between daily returns of a given company and OSEBX, and the denominator is the variance of the daily returns of OSEBX.

The debt-to-equity ratios and tax rates listed as well and are based on the latest annual reports from each company. After discussing with my supervisor, I decided to use market values for debt-to-equity ratios. Book value of non-current liabilities found in the balance sheets is used as an estimation for market value of debt, and market value of equity is found by multiplying share price on 31.12.2018 with number of shares outstanding.

Moving on in the bottom-up-beta process, we find the so-called *unlevered business beta* given by [39]:

$$Unlevered\ beta_{business} = \frac{Beta_{comparable\ firms}}{1 + ((1 - tax\ rate) * \frac{D}{E}_{comparable\ firms})} = \frac{0.71}{1 + (0.77 * 0.13)} = \mathbf{0.64}$$

Knowing that Grieg Seafood's D/E ratio as of 31.12.2018 is 0.37 [7], their levered bottom up equity beta becomes:

$$Levered\ beta_{Grieg\ seafood} = Unlevered\ beta_{business} * \left(1 + \left((1 - tax\ rate) * \frac{D}{E}_{Grieg\ seafood}\right)\right)$$

$$= 0.64 * (1 + (0.77 * 0.37) = \mathbf{0.83}$$

A levered beta of 0.83 seems low. However, when estimating Grieg Seafood equity beta based on five-year daily returns, I get 0.73, which is even lower. I will therefore be using 0.83 for further calculations.

The equity risk premium in equation (6) refers to the expected excess return of a market portfolio over the risk-free rate. In our case, we are interested in the 2019 expected returns of a Norwegian market portfolio over the 10-year Norwegian government bond rate. Historical risk premium data can be used, but I have opted to use the expected equity risk premium for 2019 provided by The Norwegian Society of Financial Analysts; 5% [51].

The resulting cost of equity for Grieg Seafood is then:

$$Re = 1.88\% + 0.83(5\%) = 6.01\%$$

Cost of debt

In order to get Grieg Seafood's cost of debt I have decided to do a synthetic rating. The rating will be based on interest coverage ratio and the thresholds made by A. Damodaran [39, 55].

The interest coverage ratio is EBIT of a given period divided by interest expenses in that same period. The ratio describes how easily a company can pay interest on its outstanding debt [56]. EBIT (before fair value adjustment) is found in Grieg Seafood's income statement, and interest expense is found in the cash flow statement. The resulting interest coverage ratio for Grieg Seafood is 15.4, meaning that the synthetic rating according to Damodaran's thresholds is AAA. AAA-rated companies currently (2020) have a 0.63% default spread, and I assume that 0.63% was a representative spread for Norwegian companies on 31.12.2018 as well. This means that Grieg Seafood has a cost of debt of:

Rd = risk free rate + default spread = 1.88% + 0.63% = 2.51%

We now have Grieg Seafood's market values of debt & equity, the marginal tax rate, and we have their costs of debt & equity. The resulting WACC is:

$$WACC = \left(\frac{11\,423\,022\,600}{13\,914\,273\,600} \times 6.01\%\right) + \left(\frac{2\,491\,251\,000}{13\,914\,273\,600} \times 2.51\%\right) \times (1 - 23\%) = \mathbf{5.28}\%$$

Present value of forecasted free cashflows

Continuing value and growth rate beyond forecasted horizon

In order to capture the free cash flows to the firm after 2023 we must come up with a continuing value. The formula for continuing value is given in equation (3). g is 1 + the rate at which free cashflows to firm grow after the 5-year forecast horizon. This constant growth rate cannot exceed the growth rate of the economy it operates within [39]. For this thesis we will be using a 2% growth rate, which is what was recommended in a 2018 report put together by PwC and The Norwegian Society of Financial Analysts [51].

Having found the WACC, we can now calculate the continuing value (in 1000 NOK):

$$CV_{2023} = \left(\frac{CF_{2024}}{\rho_F - g}\right) = \frac{CF_{2023} * g}{\rho_F - g} = \left(\frac{567693.7 * 1.02}{1.0528 - 1.02}\right) = 17\,646\,238.53\ TNOK$$

Wrapping up the discounted cashflow valuation

The present value of Grieg Seafood's future free cashflows -the firm value- can now be arranged according to equation (2) (values given in 1000 NOK):

$$V_0^F = \frac{468548.6}{1.0528} + \frac{-427959.9}{1.0528^2} + \frac{469168.3}{1.0528^3} + \frac{516085.2}{1.0528^4} + \frac{567693.7 + 17646238.53}{1.0528^5} \approx 14\,962\,424.03$$

To get from firm value to equity value we need to subtract the net interest-bearing debt (NIBD) from firm value. To stay consistent throughout the valuation, I will be subtracting the book value of non-current liabilities found in the balance sheet of the 2018 annual report:

$$V_{2018}^E = V_{2018}^F - NIBD_{2018} = 14\,962\,424.03 - 2\,491\,251 = 12\,471\,173.03\ TNOK$$

Dividing equity value by number of shares outstanding completes the discounted free cash valuation by finding the intrinsic value per share for Grieg Seafood on 31.12.2018:

$$\frac{12\ 471\ 173\ 030\ NOK}{111\ 662\ 000\ shares} = 111.69\ NOK\ per\ share$$

Relative valuation

To complement the discounted cash flow valuation, I will perform a relative valuation. In fact, relative valuation is the most common way of performing valuation [39]. In relative valuation, an asset is priced (valued) according to how comparable assets are priced. While a discounted cash flow valuation attempts to find the true intrinsic value of a stock, relative valuation makes the assumption that the market prices stocks correctly on average, but that it fails to correctly price individual firms [40]. In relative valuation, market- or industry-average ratios can be used to value any firm given that they are comparable and share a common variable such as earnings, book value and revenues. Relative valuation is quick and easy to use and is particularly useful if several comparable firms exist. However, truly comparable firms in terms of for example risk and growth are hard to find, so any use of relative valuation must be done with caution.

I will be performing a relative valuation based on the ratios price/earnings, price/book value of equity and EV/EBIT. Prices used will be the closing prices on 31.12.2018, while the earnings, book value of (total) equity and EBIT will be based on information found in the financial statements. EV (enterprise value) will be based on market value of equity and book value of noncurrent debt.

	GSF	Lerøy	MOWI	SalMar	NRS	Average (excl. GSF)	GSF relative valuation
Price (per share) (NOK)	102,30	65,94	182,70	428,00	179,00		119,498256
Earnings (per share) (NOK)	8,81	4,90	11,24	31,70	16,21		
P/E	11,6118048	13,4571429	16,2544484	13,5015773	11,0425663	13,56393371	

Figure 34: GSF relative valuation based on P/E.

Figure 34 lists the price per earnings ratios of Grieg Seafood (GSF) and four comparables. The table indicates that GSF is undervalued; its price per earnings ratio is lower than the comparable salmon farming companies' average ratio. Also, the value obtained by multiplying the industry average P/E ratio with GSF earnings is 119,50 NOK/share, indicating that GSF currently is undervalued at 102,30 NOK.

	GSF	Lerøy	MOWI	SalMar	NRS	Average (excl. GSF)	GSF relative valuation
Price (per share) (NOK)	102,30	65,94	182,70	428,00	179,00		124,3611375
Book value of total equity (per share) (NOK)	34,78	28,77	54,56	80,67	53,33		
P/B	2,9413456	2,2919708	3,34860704	5,30556589	3,35645978	3,575650876	

Figure 35: GSF relative value based on P/B.

Figure 35 lists the price-to-book value of equity (P/B) ratios of Grieg Seafood and the comparables. Again, we see that the GSF ratio is lower than the average ratio of its comparables, thus indicating that GSF is undervalued based on this ratio. GSF book value of equity multiplied with the comparables' P/B gives a relative valuation of the GSF equity of 124,36 NOK/share.

	GSF	Lerøy	MOWI	SalMar	NRS	Average (excl. GSF)	GSF relative valuation
Enterprise value (NOK)	13914273600,00	46326751440,00	109591023661,30	51052947572,00	8755235189,00		100,5007864
Earnings before interest and tax (NOK)	1098818000,00	3568536000,00	9041158000,00	3460812000,00	869838000,00		
Book value of non-current debt (NOK)	2491251000,00	7061064000,00	15310567000,00	2560548000,00	955813000,00		
EV/EBIT	12,66294655	12,98200479	12,12134813	14,75172519	10,06536296	12,48011027	

Figure 36: GSF relative value based on EV/EBIT.

The EV/EBIT ratio of GSF is 12.66, very similar to the comparables' average of 12.48. This indicates that GSF is correctly priced in the market based on that ratio. However, when multiplying the comparables' average and GSF EBIT (and subtracting book value of non-current debt), we see that the value of GSF equity per share is 100.50 NOK. This is close to the current price of 102.30 NOK/share.

Ratio	GSF relative value (NOK/share)
P/E	119,50
P/B	124,36
EV/EBIT	100,50
Average	114,79

Figure 37: Average Grieg Seafood price/share based on the three ratios.

The arithmetic average of the three relative valuations is 114.79 NOK per share, very close to the intrinsic value found by the discounted cash flow method (111.69 NOK per share). This indicates that Grieg Seafood is currently underpriced at 102.30 NOK/share. However, one

issue with taking the arithmetic average of the valuation based on different ratios is that we are then indicating that we do not truly “trust” any of the separate relative valuations.

Sensitivity analysis

The discounted cash flow valuation model includes uncertain and speculative variables. Examples of such variables are the discount rate (WACC), the forecasted salmon price and the constant growth rate of the free cash flows after the 5-year forecasted horizon.

The WACC is a weighted average of the cost of debt and cost of equity. The cost of debt turned out to be 2.51%, after having rated Grieg Seafood as a AAA company based on interest coverage ratio. AAA is the highest possible rating, resulting in the lowest possible default spread (0.63%). The latest annual reports do not indicate that Grieg Seafood has ever been formally rated by a rating agency. I believe that if such a thorough rating had been performed, based on more than interest coverage ratio, Grieg Seafood may not have received AAA rating. The default spread would then likely have become larger. I will therefore investigate how the discounted cashflow valuation turns out if different discount rate (WACC) is used.

If interest coverage ratio is			
>	≤ to	*Rating is*	*Spread is*
8.50	100000	Aaa/AAA	0.63%
6.5	8.499999	Aa2/AA	0.78%
5.5	6.499999	A1/A+	0.98%
4.25	5.499999	A2/A	1.08%
3	4.249999	A3/A-	1.22%
2.5	2.999999	Baa2/BBB	1.56%
2.25	2.249999	Ba1/BB+	2.00%
2	2.2499999	Ba2/BB	2.40%
1.75	1.999999	B1/B+	3.51%
1.5	1.749999	B2/B	4.21%
1.25	1.499999	B3/B-	5.15%
0.8	1.249999	Caa/CCC	8.20%
0.65	0.799999	Ca2/CC	8.64%
0.2	0.649999	C2/C	11.34%
-100000	0.199999	D2/D	15.12%

Figure 38: A. Damodaran ratings and default spreads based on interest coverage ratio [55].

The continuing value of the discounted cash flow valuation was based on the assumption that free cash flow after 2023 grows at a rate of 2% indefinitely. The reason for using 2% is based

on a question survey performed by the Norwegian Society of Financial Analysts among its members. However, figure 39 below shows that even though 2.0% is the most commonly used rate, there are significantly many respondents claiming that other rates are more suitable. I will therefore do a sensitivity analysis studying how the discounted cash flow valuation changes as the growth rate of the continuing value is changed.

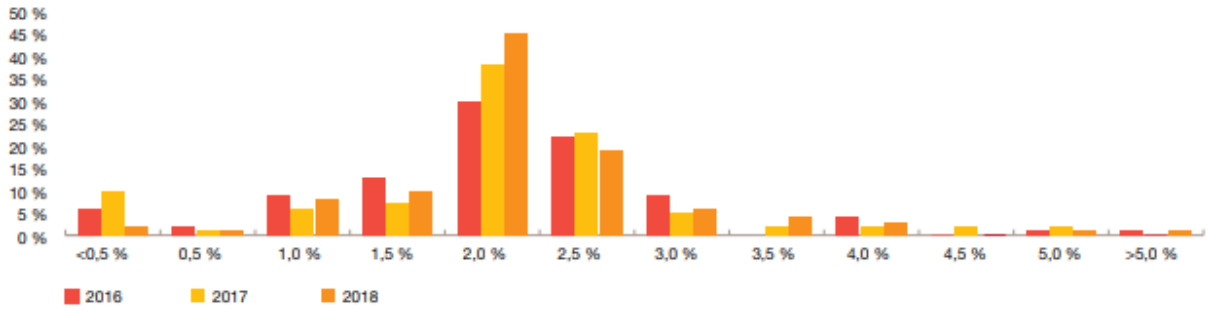


Figure 39: Continuing value growth rate survey among Norwegian Society of Financial Analysts (2018) [51].

Lastly, I want to investigate how a change in salmon price affects the discounted cash flow valuation. Such an investigation is important as the spot price of salmon ultimately affect the realized price of all products sold by salmon farming companies. The volatility of past salmon prices (see figure 8) makes it important to be aware of how sizable movements in share price may end up being. Ideally a Monte Carlo Simulation would be used to study the outcome (share price) of most- or all potential salmon prices, allowing the prices to vary from year to year. However, for illustrative purposes, for this thesis I will simply illustrate how the intrinsic value per share of Grieg Seafood changes as different constant salmon prices are applied to the discounted cash flow valuation method.

WACC and growth rate sensitivity

		WACC						
		4,00 %	4,50 %	5,00 %	5,28 %	5,50 %	6,00 %	6,50 %
Growth rate	1 %	130,73	107,56	90,21	82,27	76,73	65,97	57,17
	1,5 %	159,70	127,86	105,15	95,06	88,13	74,92	64,36
	2,0 %	203,16	156,28	125,06	111,69	102,79	86,10	73,14
	2,5 %	275,59	198,92	152,95	134,44	122,33	100,48	84,12
	3,0 %	420,45	269,97	194,77	167,09	149,69	119,66	98,23
	3,5 %	855,04	412,08	264,48	218,07	190,73	146,51	117,05
	4,0 %	N/A	838,41	403,91	308,89	259,13	186,78	143,40

Figure 40: WACC and growth rate sensitivity, values in NOK/share.

Figure 40 verifies the importance of performing sensitivity analysis; small adjustments to WACC and continuing value growth rate give large changes to the valuation of price per share. Being aware of the consequences of increased WACC is important, especially considering the historically low levels of interest rate we are currently experiencing (see figure 15). Increased interest rates will increase the risk-free rate proxy, thereby increasing both the cost of debt and cost of equity.

Salmon price sensitivity

Salmon price (NOK/kg)	Price per share (NOK)	%change in share price
45	85,84	-23 %
50	94,45	-15 %
55	103,07	-8 %
60	111,69	0 %
65	120,3	8 %
70	128,92	15 %
75	137,54	23 %

Figure 41: Salmon price sensitivity.

Figure 41 illustrates how a change in salmon price affects the discounted cash flow valuation, everything else equal. As mentioned earlier, the Grieg Seafood 2018 annual report states that consensus for 2019-2020 is that salmon price will be in the 55-65 NOK/kg interval. Being

aware of the outcomes in price per share for the entire interval is certainly very useful. If price deviates up or down by 5 NOK/kg (+/- 8.3%) from the 60 NOK/kg used in the forecast, then share price will experience a change of +/- 8%. In all tabulated outcomes of salmon price, the corresponding %change in share price is essentially identical to %change in salmon price.

Summary and comments

In this thesis we have performed a strategic analysis of Grieg Seafood, followed by a discounted cash flow valuation. We then complemented the fundamental analysis with a relative valuation before finishing up by having a look at the fundamental analysis' sensitivity to key input parameters.

On 31.12.2018 Grieg Seafood closing price was 102.30 NOK/share. The fundamental analysis performed indicates that intrinsic value is 111.69 NOK/share. This indicates that the share is currently undervalued by the market.

The relative valuation used P/E, P/B and EV/EBIT ratios to value the Grieg Seafood share. The arithmetic average of these valuations turns out to be 114.79 NOK/share. This value is close to the intrinsic value found by fundamental valuation, and also indicates that the Grieg Seafood share is currently undervalued in the market.

Comments

The discounted cash flow valuation performed is built up of numerous inputs that are subject to personal judgement and speculation. Where possible, I have attempted to consult experts' opinion or information disclosed by Grieg Seafood themselves. I concluded that, even though Grieg Seafood may be incentivized to communicate over-optimistic targets and forecasts, they are very aware that failure to fulfill such targets is likely to result in decreased share price and discontent investors. Also, when it comes to certain information, such as production targets, there is no better source to consult than the company themselves. When it comes to risk-free rate proxy and method for determining costs of equity and capital, I have relied on methods by A. Damodaran and input parameters from the Norwegian Society of Financial Analysts. After discussing with my supervisor, I have consistently been using the book value of non-current debt for calculating WACC weights, D/E ratio in the bottom-up beta calculation, and when subtracting debt from enterprise value to finally arrive at intrinsic value of equity.

The strategic analysis included PESTEL and Porter's five forces analysis. I concluded that the salmon farming industry is attractive, offering profitability to current players. Even though I consider the industry attractive, partly implying that competitive advantage and profitability likely should last for more than five years, I still decided to only forecast five years of cash

flows. This is perhaps counter-intuitive, as one would expect a truly attractive industry to experience even more years of above-average cash flow growth before eventually adopting the same growth rate as the economy it is part of. However, not being neither a valuation expert nor an expert on the salmon farming industry, I consciously decided to limit my forecasted horizon to five years, thereby avoiding the increased uncertainty associated with forecasting cash flows 5-10 years ahead.

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