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Optimal Capital Structure of Norwegian Dry Bulk Shipping Companies. The effect of the life cycle and development in determining factors.

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OPTIMAL CAPITAL STRUCTURE OF NORWEGIAN DRY BULK SHIPPING COMPANIES

THE EFFECT OF THE LIFE CYCLE AND DEVELOPMENT IN DETERMINING FACTORS

Study Programme: MSc in Business, major in Accounting and Business Control

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EXECUTIVE SUMMARY

This thesis focus on the optimal capital structure of Norwegian dry bulk shipping companies and its determining factors. The research concerns whether the stage of the life cycle of dry bulk shipping companies affects its optimal capital structure, how optimal capital structure can be attained, as well as if the determining factors of optimal capital structure have changed over the past 20 years. The noteworthy characteristics of the market are subject to deeper elaboration. As follows, the thesis accounts for subjects such as differences in the submarkets, drivers of supply and demand, the essence of the cyclicality and profitability in the industry, how to manage the risk, as well as the different financing options available.

To conduct the analysis, accounting data on the forty largest dry bulk companies in Norway are gathered from Proff Forvalt. The time span on the dataset stretches from 1998-2018 which allows us to take into account the market cyclicality when analysing the data. Additional data are gathered from Bloomberg and Eikon. The following analysis is conducted in Excel and Stata using financial calculations and regression analyses. The study was based on theory on life cycle stages including the univariate method, the comprehensive index method and the cash flow combination method. The capital structure analysis was then based on the trade-off theory, the pecking order theory and empirically proven determining factors of capital structure.

The analysis of the influence of life cycles on capital structure presented ambiguous results. There were high fluctuations and no clear pattern. Therefore, we rejected the first hypotheses and concluded that the life cycle does not influence the capital structure of Norwegian dry bulk shipping companies. The analysis of the optimal capital structure of the companies found that several measures other than just the weighted average cost of capital have to be taken into account. Therefore, the second hypothesis was rejected as well. At last, a set of determining factors on capital structure is assessed to test if these have changed over the years. Several time periods were analysed to adjust for market cycles. The hypothesis was partly true as some of the determining factors have changed, but there are also indications that the focus might have shifted towards other factors over the years.

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1.0 INTRODUCTION

The shipping industry is an important driver in the global economy as approximately 90% of goods in international trade is transported by sea, either one part of the route or as the only means of transportation (Kavussanos & Visvikis, 2016). It is a complex industry and the different sectors provide different transport services. The three major segments within the industry are liner, bulk and specialized shipping (Stopford, 2009, pp. 53). Within the liner segment, small parcels of general cargo are transported along a planned route. This includes manufactured goods, semi-manufactured goods, and small quantities of bulk commodities. In the modern liner industry, the dominating type of ship is container ships where commodities are transported in standardized containers. In turn, specialised shipping transports difficult cargoes such as cars, forest products, chemicals, and liquified gas. Lastly, the bulk cargo carries large parcels of raw materials and the vessels normally only handle a few transactions each year with low service levels. Bulk cargo can further be divided into the transportation of dry bulk and liquid bulk.

Dry bulk shipping is the transportation of raw materials shipped in large unpacked parcels. The materials are transported in bulks, which can be divided into major and minor bulks. Dry bulk commodities are the foundation of the seaborne trade in the world, especially related to the increased demand from growing economies in developing countries (UNCTAD, 2014). Many of the largest industries in the world, like steel and aluminium, are dependent on transporting their cargo efficiently and cost-effectively. In this matter, the dry bulk industry has been crucial. The decision to charter a certain type of seaborne vessel for transportation of a specific commodity is usually reliant on three different factors; the type of commodity which is to be transported, the size of the parcel, and finally the route and physical characteristics and infrastructure at the loading and discharge ports (Grammenos, 2010, pp.321). Thereby, there are many sub-markets and niches present within the dry bulk industry. The dry bulk shipping market can be divided into three main sub-markets based on the size of the vessels. These are capesize, panamax and handysize, where the size ranges from large to small respectively.

The shipping industry has traditionally been featured as a market that follows the global business cycles. There is a low concentration in the industry with a high number of demanders and providers, which is reminiscent of a perfect market. Moreover, it is a global industry with actors located all over the world competing on the same terms. These factors explain the high competitiveness in the industry. When a company operates in a competitive market which also demands a lot of capital due to the high expenses, it has to take higher risk in terms of high capital intensity. On this basis, we find it very interesting to look deeper into the capital structure of shipping companies, where the Norwegian dry bulk sector as a whole is at focus. As business cycles have a high influence on the industry, there is already a lot of research on the topic regarding the impact of business cycles on the capital structure of shipping companies. Thereby, we find it interesting to look further into what other variables that may impact on the capital structure of shipping companies. As a result, we are to assess the subject of optimal capital structure, including the effect of life cycles on the capital structure of the companies and other determining factors and their development over time.

1.1 Problem statement

The initial idea regarding our master thesis was to analyse the optimal capital structure of shipping companies based on their economic situation. After assessing the current literature on the subject, we found it interesting to investigate which variables that may have an impact on the capital structure of companies. We found it particularly interesting to examine if the stage of the life cycle a company is in affects its capital structure choices, as there were no research present on this subject regarding dry bulk shipping companies. Furthermore, we wanted to study if the choice of financial instruments has an impact on capital structure as there have been an increasing number of financing alternatives available over the last couple of years. However, due to the outcome that our dataset mainly consists of private companies, we found it unachievable to conduct a proper analysis of this problem statement. Our first intention was also to include a series of interviews with industry professionals, both on the shipowner side and the financing side of the industry. Unfortunately, this became challenging due to the unprecedented circumstances we have experienced. However, we did conduct two interviews which provided further clarifications. The process culminated in three hypotheses

enabling us to analyse the capital structure of Norwegian dry bulk shipping companies, hereby the impact of life cycle stages and the development of the determining factors. The three hypotheses we are going to analyse are:

H1: *The stage of the life cycle that a Norwegian dry bulk shipping company is in affects what it assess to be its optimal capital structure.*

H2: *The theory of minimizing the weighted average cost of capital to obtain an optimal capital structure is applicable for Norwegian dry bulk shipping companies.*

H3: *The determining factors of the capital structure of Norwegian dry bulk shipping companies have changed over the past twenty years.*

1.2 Delimitations

As the shipping industry consists of many submarkets with differing characteristics, we have chosen to focus solely on Norwegian dry bulk shipping companies in our thesis. We found this interesting as Norway is one of the world's 5th largest shipping nations (Rederiforbundet, 2018). Furthermore, several assumptions have had to be made as the majority of the Norwegian dry bulk companies in our dataset are private. When running calculations on the optimal capital structure of companies, several numbers have been calculated from industry averages. As of this, comparable, public companies have been used as a proxy for calculating an overarching beta and debt-to-equity ratio to enable further calculations on the company-specific weighted average cost of capital. A disadvantage of this is that we have not been able to use company-specific measures and market values where it preferably should have been used.

1.3 Methodology

To conduct the analysis, we have gathered financial data on the forty largest dry bulk companies in Norway. The list of the companies included is obtained from

Norges Rederiforbund (Appendix 1), and the accounting data are then collected from Proff Forvalt.

The dataset is created in an excel-file and contains all the available accounting information on the companies from 1998-2018. As the majority of the companies are private, the numbers are based on the information they are required by the government to report. Historical exchange rates from Norges Bank were gathered to convert all currencies into Norwegian Kroners as several companies occasionally report in foreign currencies. Furthermore, we have gathered information on the beta and financial information of global comparable companies using Bloomberg and Eikon (Datastream). Lastly, in order to make comparisons to the market, we have gathered and calculated the average yearly return in the dry bulk market based on monthly historical numbers from the Baltic Dry Index.

The dataset was then used as a basis for several regression analyses using Stata. This is done to investigate the explanatory power of several variables on the capital structure of Norwegian dry bulk shipping companies.

In addition, we conducted two interviews with shipping professionals. These are Annicken Kildahl who is the CFO of Grieg Star and Geir Atle Lerkerød who works as the managing director of Nordic shipping business at Nordea. The idea was to get a deeper insight into the industry and its underlying functions, as well as to further strengthen our findings throughout the thesis. We found it especially interesting to gain insight from both the ship owning side of the industry as well as the financing side. Overall these insights have assisted in explaining several aspects of the analysis.

1.4 Structure

The thesis starts with an overall introduction to the dry bulk shipping industry to obtain a general knowledge of the characteristics and drivers in the market. Following this, several theories on life cycle stages and capital structure are introduced as a basis for the analysis of the subjects. The three hypotheses will then be examined based on several calculations in excel as well as regression

analyses in Stata. These findings result in an overall conclusion regarding the hypotheses and the nature of the dry bulk shipping market.

2.0 THE DRY BULK SHIPPING INDUSTRY

The dry bulk shipping market is characterized by high risk and high volatility due to uncertainty related to the demand of world trade and the global economy (Jing, Marlow & Hui, 2008). Furthermore, the market is highly competitive and are characterized by many small-scale shipowners as there are low market barriers and the transactions tend to be transparent (Wu, Yin & Sheng, 2018). A shipping company can either own the ships it is operating in the market or charter them in from other owners. Shipowners are companies who own their vessels, while a charterer enters into a charterparty or another type of contract with a shipowner for chartering of a vessel or a part of the cargo capacity of it (EU Report, 2006). However, when we refer to shipping companies in our thesis, we refer to shipowners.

According to the report *Global Dry Bulk Shipping Market* the compound annual growth rate of the global dry bulk shipping market is anticipated to be 4,14% during 2019-2023. The growth is driven by an increasing population, economic growth, higher urbanization as well as an increase in the production of steel and coal. However, the market is also expected to experience challenges such as high transportation and infrastructure costs, as well as a higher focus on environmentally friendly solutions and zero emissions.

In the following, further characteristics of the shipping industry will be explained. First, the different shipping markets are considered as well as different forces that affect supply and demand. Then the profitability and cyclicality in the industry are examined as well as strategies and risk profiles in order to deal with the volatility in the market. At last, alternative financing methods are presented. Combined this will constitute a thorough understanding of the shipping industry and will be used as a basis for our analysis.

2.1 The different shipping markets

The shipping industry is a global industry that operates within several different markets and carries commodities, oil and gas, minerals and many other goods from importer to exporter. Thereby, we have many different markets, segments, niches, and vessels within the shipping industry. The main shipping markets are the freight market, demolition market, the sales and purchase market, and the newbuilding market (Stopford, 2009, pp. 175), where the companies studied operates within the freight market.

The freight market trades in sea transport which provides freight revenue. This is income earned from transporting cargo between ports and represents the main source of cash for shipping companies. The freight market is further divided into three sectors which are the voyage market, the time-charter market, and the freight derivatives market. The voyage market trades transport for a single voyage, the time-charter market charters out ships for a defined period, and the freight derivatives market deals in forward contracts. The demolition market also represents a cash inflow in the shipping industry. This market deals in ships for scrapping, which can be a useful source of cash especially during recessions. In the sale and purchase market, second-hand ships are traded, involving transactions between an investor and a shipowner. In this case, the money normally only transfers within the shipping industry, as the investor usually are another shipowner. Accordingly, transactions in this market do not affect the amount of cash held by the industry. In the newbuilding market, new ships are traded, and this is where the cash flows out of the industry as it is needed to pay for materials and such. Characteristics will differ according to the market the company operates in, and an overall knowledge of these are essential.

2.2 Supply and demand in the shipping market

Stopford has listed the most important variables that are affecting the demand and supply in the shipping market (Stopford, 2009, pp. 136). The demand for sea transport is affected by the world economy, seaborne commodity trades, average haul, random shocks, and transport costs. Business cycles and growth trends in the world economy determines the overall volume of goods that are traded by sea.

The growth trends may be further modified by developments in commodity trades and changes in the average haul. Variables affecting the supply of sea transport are the world fleet, fleet productivity, shipbuilding production, scrapping and losses, and freight revenue. The world fleet provides a fixed stock of transport capacity in the short run. It can be expanded by newbuilding or reduced by scrapping ships. In addition, fleet productivity in the form of speed and waiting time have an impact on the amount of transport the fleet provides. The term also includes the number of days a ship runs with no cargo after delivery of goods. The productivity of the ship increases when the shipowner is proficient at organizing cargo to transport both ways of the route. This is to reduce the amount of transportation without freight.

Cargo owners and shipping investors are the main actors on respectively the demand side and the supply side of sea transport. These parties negotiate the rates for each ship, which varies from day to day depending on the perceptions of the negotiating parties. Furthermore, freight rates are tightly linked to supply and demand. When the supply is low, the freight rates rise, which incentivises shipowners to increase the supply and it also increases the possibility of new entrants. When the freight rates decrease, the supply and inflow of new entrants also decrease. The managing director of the Nordic shipping business in Nordea further adds that the supply curves in shipping are relatively inelastic. This is due to the long waiting time between the order and delivery of a new ship. As of this, when the demand increase, it will be a time lag before the supply side can fully meet the demand and market equilibrium is reached. In this period, freight rates will increase almost exponentially, resulting in a large earning potential.

As mentioned, the dry bulk shipping sector involves a high level of competition with a large number of suppliers and demanders. As of this, it is essential to know the factors affecting supply and demand and to anticipate and adapt to these to maintain competitiveness.

2.3 Profitability and cyclicality in the shipping market

In general, the shipping sector is a highly cyclical industry which is affected by the macroeconomic picture and closely linked to business cycles. The demand in

the dry bulk shipping sector often reflects the health of the economy, and the supply of dry bulk shipping services typically represent an early phase of the global production chain (Tvedt, 2019).

Within the dry bulk shipping market, the cyclical fluctuations can be divided into three cycles which is the long shipping cycle, the short business cycle, and the seasonal cycle (Wu, Yin & Sheng, 2018). Oil prices, war and technology innovations, just to mention a few, are all influencing the shipping market cycle. The three cycles can be divided into four periods established in shipping cycle theory which is *through*, *recovery*, *peak* and *recession*. When the market is in the through stage, there is a surplus of shipping capacity which pulls down the freight rates towards the operating costs and the business is reduced. In the recovery stage, supply and demand increase and the freight rates also increase above the operating costs. As the market reaches the peak, the freight rates are several times higher than the operating costs, the liquidity improves, and business expands. In a recession, the supply exceeds the demand, and the freight rates start to fall, which also reduces the business activity again (Scarsi, 2007).

The underlying factors that affect the cycles in the shipping industry may seem complex. However, it still follows the simple economic principles of supply and demand. The cycles are caused by changes in supply and demand, where demand is the principal driver. These changes affect the second-hand prices and freight rates. (Grammenos, 2010, pp. 238). There are many different ways for how varying economic factors can change the market equilibrium, in which these can be large and compounded. In addition, there has always been a correlation between cycles in the global industrial production and seaborne trade, where the cycles for the industrial production works as an accelerator for the shipping cycles (Grammenos, 2010, pp. 250). When the industrial world economy is booming, the need for oil, gas, steel, aluminium and other commodities are increasing. Thereby, the demand for seaborne trade is increasing simultaneously.

Economic shocks in the world economy also affect the demand in the shipping industry, which influence the economic cycles of seaborne trade. The time difference between ordering a new ship and taking delivery is one of the main drivers on the supply side of shipping, and it is often called the investment

industry cycle (Grammenos, 2010, pp. 252). The time between the signing of a shipbuilding contract and the delivery of the finished ship typically takes approximately three years. Because of this cycle, there will be a lag for when the suppliers will be able to meet the increased demand. In times when the demand is higher than the supply, the freight rates will increase. In an attempt to limit the backlog, the suppliers will try to anticipate upturns in demand. This is further confirmed by the CFO of Grieg Star, explaining how they seek to time their orders of new ships to meet the demand of the market. There is also a lot of considerations regarding the type of vessel to be ordered as to life span and cost of the ship against intended operation and utilisation. As this is based on forecasts that will not always be accurate, there will be deviations of demand and supply in both directions.

The market sentiment is also worth mentioning. The market sentiment or the attitude and focus of investors is one of the factors driving the shipping cycle - or any economic cycle. When investors believe the economy is going into a recession or economic upswing, it often becomes self-fulfilling through changes in behaviour on the stock exchange and the behaviour of investors. This can build a trend in the market that is likely to affect the whole economic system (Grammenos, 2010, pp. 252). Since the shipping industry is highly influenced by the cycles in the world economy, the market sentiment has a great effect on the seaborne trade cycles.

2.4 Strategies and risk profiles

Risk management is crucial in the shipping industry due to volatility in rates and prices, which is directly linked to cyclicality in the markets. It is an extremely complex market, were owners of the shipping companies are faced with many difficult questions on how to best manage their risks. Companies have to decide on operational questions like which type of vessel to buy, whether to charter or purchase that vessel, where and how to operate it, and when to buy or sell their ships. The CFO of Grieg Star explained how they analyse and monitor both the market and their competitors in terms of these operational questions. An example is the development of technology related to the ships. Due to the rapid change, Grieg has decided to acquire older ships as of now instead of investing in new

ones. This is reasoned in the belief that newbuilding ships ordered now will be outdated in terms of technology upon delivery. They further have to consider financial questions like how to finance their operations and their ships, what type of hedging method to use, and which financial derivatives that are best suited for the different vessels and/or market they operate in (Grammenos, 2010, pp. 710).

Due to the high risk and volatility in the shipping market, companies in the industry can gain from hedging. Shipping companies must employ this risk management strategy in order to offset losses in their operations and investments. It works by taking an opposite position in a related asset. The main elements a shipping company can hedge are the freight rate, exchange rate risk, fuel price, and interest rate risk. To reduce the high risk associated with these elements various derivatives can be applied such as forward and futures contracts, options or swaps. By doing this, shipowners decrease their exposure to risk factors within the industry which further help predict future cash flows and stabilise their income.

In general, the ships represent an investment for the shipowners, where they have a portfolio of assets that generate cash flows. These cash flows are managed by operating the fleet in the best way possible and by obtaining capital gains if they decide to sell one or more of those assets. Since the risk management of the industry is so complex, shipping companies have to be very specific in how they choose to handle the risk regarding their fleet. In addition, every company has different risk profiles and strategies which is important to take into account when deciding on how to manage the risk of the industry.

The differences in vessel type and size make a large difference in determining the risk profile of a shipping company. If a shipping company has different types or sizes of vessels, the company is considered to be differentiated just like an investor has a differentiated portfolio on the stock exchange. This can be explained by the different sub-markets within the industry, in addition to the fact that each vessel size is distinct in terms of the rewards and risk they carry (Kavussanos, M. & Visvikis, I., 2016, p. 42). Thus, by holding a diversified fleet, shipping companies can decrease their risk.

There are also different types of insurance shipping companies can use to manage the risk of their ships not being operative either from loss of income after an accident or other obstacles. The three main sources of insurance are hull insurance, loss of income insurance, and liability insurance (Wilhelmsen, 2010*)*. The hull insurance is related to damage on or loss of the ship. The loss of income insurance is related to the earning capacity of the ship, whereas the loss can be divided into time-loss if the ship is damaged or freight interest if the ship is lost. The liability insurance, normally referred to as Protection and Indemnity Insurance, covers the responsibility towards third parties. This can for instance be concerning damage to or loss of cargo, oil spill, or personal injuries to passengers or crew. As of this, insurance is an important instrument for shipowners in order to manage their risk.

Another way for shipowners to manage risk is by having different contracts. The types of contracts commonly used in the freight market are voyage charter, CoA, time charter and bareboat charter (EU report, 2006). The voyage charter is an agreement related to a specific amount of quantity or cargo to be transported based on a set of strict terms and a fixed price. Contract of affreightment (CoA) is a development of the voyage charter in that it can be considered as one contract formed out of several voyage charters agreed at the same time. With a time-charter contract, the charterer hires the vessel for their own use and takes operational control of the vessel for a certain period. The time charter can be both short term and long term, where a longer contract includes less risk. Lastly, a bareboat charterer is essentially the same as a time charter, except that the charterer has full control over the vessel.

The contracts can differ in terms of time span and pricing options. Companies that operate in the spot market takes on higher risk as they only settle at single voyages and thereby are more exposed to fluctuations in prices. If the price drops, these companies are in jeopardy of being without business or having to settle on assignments at a low price. On the other hand, if the prices increase, the companies can gain from being able to realise the increased earning potential right away. The companies can take on less risk through contracts that have a fixed rate over a longer period of time. Throughout the time span of the contract, the company is shielded from market fluctuations, both ups and downs. The company

can lose possible revenue if the spot price has been higher than the fixed price in the period, but it gains if the spot price is lower than the contractual price. Thereby, shipping companies need to manage both the time period of the contracts and the price of them to best diversify themselves against the risk of being bound to unfavourable contracts. Companies can manage the differences by operating with a combination of the two contracts, in which the majority are at a fixed price over a longer time period while a portion is at spot.

All the various risk factors within the shipping industry lead to at least as many solutions on how to manage them. As presented, the most critical risk is the high volatility in freight rates and prices. The most common way to manage it is by hedging using various derivatives. Every shipowner has to manage risk related to its fleet where insurance, as well as diversification of vessels and contracts are of high importance.

2.5 The financing of shipping companies

The modern financing of shipping companies has become more innovative, complex and sophisticated to better face the dynamic and volatile global shipping market. As the industry is known for trailing the global business cycles, as well as being highly leveraged, many different factors have to be taken into account when determining shipping investments and managerial decisions for the firms. Questions regarding which method of funding that will give the best margins and which compositions of funding that will give the optimal capital structure are crucial. Companies can attain capital from public investors through the bond market as debt or through the stock exchange as equity. In addition, they can raise capital through the private from banks and contributions from owners. The different funding methods are traditionally divided into three categories which are equity, debt, and a combination of the two.

2.5.1 Equity financing

Shipping is a capital-intensive industry, and a significant amount of capital has to be invested regularly in newbuilding and second-hand acquisitions of vessels. The most common types of equity financing are public funding in terms of IPOs,

private equity funding, retained earnings, and seasoned equity offerings (SEOs) (Grammenos, 2010, pp. 818). Equity markets represent an exchange of stocks which can either be private between two counterparts or on the public stock exchange, in which the companies raise capital by selling its shares.

2.5.1.1 IPOs - Public equity funding

Initial public offerings (IPOs) concerns the process of a private company listing its shares to the public in a stock issuance. This allows the company to raise new equity capital from public investors by dividing the ownership. By performing a minority IPO, the company can raise a significant amount of equity through public investors without having to give up ownership or control of the company (Kagan, 2018). As of this, parts of the company, such as subsidiaries or divisions are made public, but the majority stake of the company is still retained by the initial owners.

2.5.1.2 Private equity funding

Private equity funding consists of direct investments in private companies from investors (Chen, 2020). For private companies, equity funding is normally attained from known associates or owners of the firm. Private equity can also be a delisting of a company, where a listed company becomes private again through a buyback of all its shares on the stock exchange. Moreover, private equity funding may vary from venture capital to more complex leveraged buyouts (LBOs).

2.5.1.3 Retained earnings

When the firm generates profit, the shareholders determine whether it should be distributed as dividends or be retained in the company at the end of the period. Thereby, retained earnings can be defined as the amount of net income that is left after a potential dividend has been paid out (Kenton, 2020). Companies may choose to use the surplus in net income for investments to facilitate further growth.

2.5.1.4 SEOs - Seasonal equity offerings

A seasoned equity offering concerns the offering of new shares by a company that already is publicly traded, which enables the company to raise additional funds (Chen, 2020). The seasoned issue can either be dilutive or non-dilutive. The dilutive issue dilutes the holdings of existing shareholders as the total amount of outstanding shares increase which decrease the amount of ownership of the existing shareholders. The non-dilutive issue prevents this problem as existing shareholders, typically the owners, who hold a large amount of stock sell all or a portion of their shares.

Many listed shipping companies are considered risky investments due to high risk within the shipping industry in general. Thereby, they may struggle to raise new equity from investors on the stock exchange or from investors who require dividends and moderate returns, such as pension funds or private equity funds. The volatility in the market makes it hard for shipping companies to obtain attractiveness among risk averse investors.

2.5.2 Debt financing

Debt financing relates to raising capital by selling fixed income products such as bonds, bills, or other financial instruments. The ships are considered to be liquid assets as they change hands rather rapidly. Due to the capital-intensive nature of the industry and the fact that the shipping assets provide highly liquid collateral, shipowners often seek financing beyond their own funds, making debt financing the leading source of financing in the shipping industry (Kavussanos & Visvikis, 2016). In recent years, a larger proportion of companies also turn to external capital markets for funding as these markets offer a wider range of capital beyond bank debt. However, the managing director of Nordic shipping business at Nordea acknowledged that bank financing is still the most common source of capital among their clients. Nordea is one of the largest banks in the world within shipping, indicating that even though firms use external capital markets to a larger extent, bank financing is still the primary and most important source of capital.

2.5.2.1 Bank financing

Bank financing provides shipping companies with flexible capital at a low cost. Despite the volatility and relatively low margins, the shipping industry is an attractive sector for the banks to do business with. Typical sources available to shipping companies through bank financing are mortgage-backed loans, newbuilding financing, unsecured corporate loans and mezzanine financing. Mezzanine financing is a combination of debt and equity, while the rest are purely leveraged capital. The financing of newbuildings is often in collaboration with Export Credit Agencies (ECA) in the county where the ships as built. Through the ECAs, companies are provided with loans and guarantees in order to reduce uncertainties such as commercial and political risks related to overseas investments (Barone, 2020). This assurance is often crucial for the financing of newbuildings.

Because vessels change hands at a regular basis, loans will typically be refinanced before their maturity which enables the banks to increase their returns on low margin financing. In addition, as the shipping assets are considered to be homogenous and highly liquid, the banks can deploy large amounts of capital with relatively low overheads (Kavussanos & Visvikis, 2016). When assessing how to possibly finance shipping companies, the managing director of Nordic shipping business in Nordea informs that they assess the composition of the company's operational and financial leverage. Financial leverage is the actual amount of leverage a company has, while operational leverage concerns the stability of the company's cash flow. This is based on whether they have operations in the spot market or at fixed rates over a period of time, where the latter represents a more stable cash flow. If a company operates the majority of its ships in the spot market, it is also required to have a higher amount of equity.

2.5.2.2. External capital markets

As the global fleet is expanding and shipping companies face an increasing need for funding, they have to a larger extent turned to capital markets for financing. In addition, the growth of global trade has increased the visibility of the shipping industry to a wider range of market participants than just traditional banks. From the external capital markets, companies can obtain financing through high yield

bonds, convertible notes, follow-on offerings, at-the-market offerings, MLPs, and SPACs. Convertibles are a combination of debt and equity and are a common form of attaining capital in the external capital markets

2.5.2.3 Other

Other sources of financing that does not relate to bank financing or external capital markets are seller's credit, finance lease, operating lease, securitization, and export agency finance.

As already mentioned, bank financing is still the most important and common source of capital for shipping companies. However, there has been developed a lot of alternatives to bank financing in the external capital markets that have become utilised to a higher degree in the last decades.

2.6 Part conclusion

Overall, the shipping market is characterized as a global, capital-intensive market with high risk and high volatility. It can be divided into four markets: the freight market, the demolition market, the sales and purchase market, and the newbuilding market, which all represent different features. The industry face a great competition with a high number of suppliers and demanders where the actors compete at the same terms on a global level. Therefore, it is crucial to predict and adapt to these in terms of maintaining competitiveness. The shipping industry is affected by various market forces such as the global economy, in which the global economic cycles have a direct impact on the shipping cycles. Companies within the industry have various tools to manage the risk associated with the volatility and the impact of the world economy. This is related to hedging, insurance, and the possession of both a diversified fleet and diversified contracts. As the shipping industry is known to be highly capital intensive, various financing alternatives are examined in terms of both debt and equity. The high risk and volatility of the industry appears also here, as sources indicate that public equity financing is quite rare among small size dry bulk companies due to the low attractiveness of the investment. This can be an explaining factor for why the majority of the Norwegian dry bulk companies are private. At last, various debt

instruments are presented, concluding that bank financing is still the most common source of financing in the shipping industry.

In the following, we are to present theories on business life cycle stages and capital structure. The knowledge of the dry bulk shipping industry combined with the theories will work as a basis for our analysis.

3.0 LIFE CYCLE THEORY

The business life cycle is the development of a business over time, indicating that a firm will move through different stages as times goes. Company size, growth, financing constraints, and competitive environment are just some of the factors that significantly differs between industries due to different life cycles (Lu and Wang, 2018). The life cycle of a business can be divided into four stages; entrepreneurial, growth, maturity, and recession. Firm characteristics will vary based on which phase of the life cycle the company is in.

The first stage of the life cycle is the entrepreneurial stage. In this phase, the operational risk is very high, and further development of the business is dependent on the market and its interest for its products or services. After the entrepreneurial stage, the company reaches the growth stage. At this stage, the company will experience high-speed development. Following increased market recognition of products or services, the company will expand its production capacity to seize the opportunity. As a result, companies gain more profits and recoup their invested capital. The third stage, defined as the maturing period, is when the company become more robust with a strong foundation of experience. The cash flows of the companies will become more stable, and they obtain self-accumulation of capital. In addition, their market status enables them to have easier access to capital from external financing institutions. The last stage of the life cycle is recession. At this stage, the products of the company have been ousted in the market and many companies face bankruptcy. Furthermore, companies may experience insufficient operating cash flows and limited financing capacity.

In the paper *A Review of the Classification of Enterprise Life Cycle* (Lu & Wang, 2018), three methods are presented to divide the life cycle of a company; the univariate method, the comprehensive index method, and the cash flow combination method.

3.1 The univariate method

According to the univariate method, companies can be divided into the different life cycle stages using their univariate retained earnings to net assets (RE/TE) or retained earnings to total assets (RE/TA). Companies with a low ratio are in the growth phase, while companies with a high ratio are more mature. Even though they are in the same life cycle, companies with a higher debt-to-asset ratio would have a smaller ratio of RE/TA. However, it is argued that a company's capital structure can influence this ratio. As the shipping industry is characterized by high debt levels, this would mean that their capital structure would influence the ratio used to determine which stage of the life cycle the company is in. Hence, we assess the univariate method to be biased in this case.

3.2 The comprehensive index method

The comprehensive index method takes into account the development in sales revenue growth, dividend payment, capital expenditure and firm age to designate companies into different stages of the life cycle. Companies are in the growth stage when the capital expenditures are higher because of investment opportunities, and the growth in revenues is also higher. Furthermore, the retained earnings are lower as surplus funds are used for further development of the business. According to the theory, companies reach the mature stage as the growth in revenue start to decline and retained earnings increase. One flaw of this theory is that it assumes a linear relationship between the operating activities of the company, which has no support from corresponding economic theory.

3.3 The cash flow combination method

The third method is the cash flow combination method, in which the corresponding cash flow of a company is used to determine what stage of the life cycle the company is in. According to the theory, the company is in the growth stage when the growth of the cash flow is increasing. The company reaches the mature stage when the growth in the cash flow slows down.

The typical pattern of the development in the selected measures is illustrated in *Figure 1*. The figure shows the common evolution of the growth in the variables and can be used as a proxy to determine which stage of the life cycle a company is in.

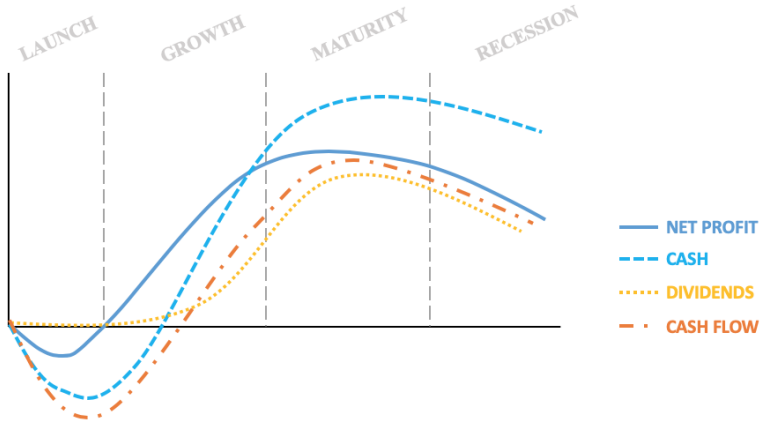


Figure 1: *Development of life cycle measures. Based on graph from https://corporatefinanceinstitute.com/resources/knowledge/finance/business-life-cycle/*

The different methods to determine the stage of the life cycle will be further applied in the analysis to help determine which stage Norwegian dry bulk companies are in. First, we will assess the theories on capital structure that we find applicable for analysing optimal capital structure. Thereafter, we will present the variables that have an effect on capital structure and the scope of their effect.

4.0 CAPITAL STRUCTURE THEORY

A firm's capital structure is the combination of debt and equity they hold. When companies are raising capital for new investments, they can either do it through equity, debt, or a combination of the two. The optimal capital structure for a firm is usually that which maximizes the market value of the firm. Normally, that means having an earnings per share ratio higher than the debt ratio. According to Chappelow (Chappelow, 2019), the optimal capital structure exists when the market value is maximized and the weighted average cost of capital (WACC) is minimized.

4.1 Modigliani and Miller theory

Modigliani and Miller are known for the Modigliani-Miller theorem, which states that a firm's financial decisions in terms of capital structure do not affect its company value. The Modigliani-Miller theorem consists of four different propositions. The first two propositions propose that the value of the company will be unaffected by its capital structure if the firm operates in an efficient market with no agency costs, bankruptcy costs, taxes or asymmetric information. However, in the modern economic world, the absence of these variables are rare. Thereby, Modigliani and Miller created two more propositions, this time including the influence of taxes. The four propositions are summarized in the following. The first of Modigliani and Miller's propositions states that a firm's debt-to-equity ratio does not affect its market value. Proposition number two established that the leverage ratio does not affect the weighted average cost of capital. The third one confirmed that the market value of a firm is independent of its dividend policy. Finally, the fourth proposition states that equity-holders are indifferent about the financial policy of the firm (Villamil, 2008, pp 1).

4.2 Trade-off theory

The trade-off theory was developed from discussions of the Modigliani and Miller theories on capital structure. It is a well-established theory regarding capital structure and is thus subject to a large portion of empirical studies (Abel, 2017, pp. 1). According to the theory, the optimal portion of debt is equivalent to the marginal benefits arising from the tax deductibility of interest payments with the

marginal cost arising from the increased risk of default (Abel, 2017, pp. 1). In other words, firms calculate the optimal capital structure after they have considered the market imperfections such as bankruptcy costs, taxes, and agency costs. The theory refers to the trade-off firms face related to their debt levels. Higher levels of debt provide a larger tax deduction which results in increased cash flow, whereas a lower debt ratio represents a more prudent position in terms of the risk of bankruptcy.

There are two different trade-off theories, the static trade-off theory and the dynamic trade-off theory. The difference in the theories is the aspect of time, where the dynamic trade-off theory has time as a variable. The theory focuses on future decisions instead of concerning the current situation. Thereby, the optimal capital structure today depends on what is expected to be optimal in the next period (Luigi & Sorin, 2009).

4.2 Pecking order theory

According to Myers (1984) companies follow the pecking order theory if they prefer internal- over external financing, and debt over equity if external financing is used (Eckbo & Eckbo, 2008, pp. 150). This follows from the assumption that the cost of financing increase with asymmetric information between the insiders of the firm and outside investors. Asymmetric information is present in all corporations and complicates managers' work of maximizing firm value (Baker & Martin, 2011). Because of the presence of asymmetric information, investors analyse information-revealing actions such as capital structure choices in an attempt to integrate indirect evidence in their evaluation of firm performance. If, for instance, a firm chooses to issue equity, this implies to external investors that the managers of the firm consider their stocks to be overvalued. If the managers, who are considered to know the true value of the firm, thinks that the firm is undervalued, they would not issue equity as this means that they would sell their stocks for less than what it is worth. The extensive information asymmetry, also referred to as an adverse selection problem, is an explanatory variable in why companies prefer other sources of funding over equity. On the opposite, retained earnings have no adverse selection problem, while debt only has a minor adverse

selection problem. This explains why these two options are more preferred by companies (Frank & Goyal, 2001).

4.3. Market timing theory on capital structure

According to the market timing theory, companies time their equity issue according to the management's assessment of whether the stocks have the correct price. Hence, if the firm is perceived to be overvalued, the company would issue new equity. In the opposite case, if the firm is perceived to be undervalued, the company would buy back its shares. As of this, fluctuations in stock prices will affect the capital structure of firms (Luigi & Sorin, 2009). The assumptions in the theory is thus that managers believe that they can time the market. Baker and Wurgler (2002) referenced in Luigi and Sorin (2009, pp. 319) have defined a market-timing measure to be the weighted average of external capital needs over the past years, with market-to-book values of the firm used as the weights. According to their study, changes in leverage are positively related to the market timing measure of firms. Hence, according to the market timing theory, the capital structure of companies is a consequence of past attempts to time the market.

The theories presented are commonly used to analyse the capital structure of companies. The trade-off theory and the pecking order theory are further applicable in order to assess the influence of various factors on a company's capital structure. The market timing theory is interesting to include as it is one of the more contemporary theories on the subject. However, as our dataset primarily contains private companies the theory is not applicable in our analysis.

4.4 Factors that influence capital structure

Factors that are frequently used in capital structure research to explain differences in leverage ratios are tangibility of assets, firm size, growth opportunities, profitability and volatility (Baker & Martin, 2011).

4.4.1 Tangibility of assets

Assets can be liquidated in the situation of bankruptcy which suggests that these can be used as collateral for the creditors of the firm. If the borrowing firm has a high ratio of fixed-to-total assets, the lender has increased security for repayment, given that these are collateralized. Conversely, a low ratio will contain less security and implies a higher risk for the lender. The collateral represented by a high fixed-to-total assets ratio reduce the expected costs of distress and lowers agency problems related to debt. As of this, a firm's portion of tangible assets is positively related to its level of leverage according to the trade-off theory. However, according to the pecking order theory, there is a negative relationship between the portion of tangible assets and leverage. First of all, one can argue that the presence of tangible assets reduces information asymmetry, which again reduces the cost of equity issuance. Moreover, firms with low collateral face higher agency costs related to consumption over the optimal level of exploitation. Bondholders of highly levered firms will monitor them closely which reduces the opportunity of excessive exploitation. Hence, it may be argued that firms with low levels of tangible assets are more inclined to take on a higher level of debts. This results from their already lower opportunity for extra gains. Overall, this implies a negative relationship between tangible assets and leverage.

4.4.2 Firm size

In accordance with the trade-off theory, firm size will be positively related to leverage. This is justified as large firms are more diversified and therefore has a lower chance of going bankrupt and lower related costs. Smaller firms are exposed to a higher probability of bankruptcy, thus smaller firms commonly have lower leverage compared to larger firms. The pecking order theory has a different approach. According to the theory, larger firms are less prone to information asymmetry as they are closely observed by analysts. As a result of this, there is a negative relationship between size and leverage as larger firms to a greater extent prefer equity financing over debt financing.

4.4.3 Growth opportunities

It is argued that agency costs related to debt are higher for firms with considerable growth opportunities. Concurrent with the trade-off theory, there is a negative relationship between growth opportunities and leverage. This is based on the assumption that levered firms are incentivised to engage in asset substitution and underinvestment, while firms with great growth opportunities are incentivised to avoid this. The pecking order theory suggests a positive relationship between growth opportunities and leverage. As investments exceed retained earnings, debt typically grows and vice versa. Hence, given profitability, firms that face great growth opportunities often have investments that exceed retained earnings, which in turn indicates increased leverage. However, the theory also suggests a negative relationship between growth opportunities and leverage. Companies will take into consideration both current and future financing costs, where firms with extensive expected growth opportunities can be capable of preserving a low-risk debt capacity. This enables them to avoid equity financing of new investments nor substantially increasing their leverage.

4.4.4 Profitability

The trade-off theory implies a positive relationship between profitability and leverage. Since interest payments are tax deductible, managers have an increased incentive to take on more debt. In addition, it is argued that higher leverage improves the control of agency problems as managers are forced to pay out more of the firm's excess cash. The pecking order theory has an opposite prediction, stating that there is a negative relationship between the two measures. According to the theory, firms prefer to raise capital through retained earnings. Higher profitability will increase retained earnings, resulting in higher funds for the firm to use for financing of new investments.

4.4.5 Volatility

As firms with volatile cash flows have higher expected costs of financial distress, higher debt-related agency costs, and reduced probability to fully utilize tax shields, the trade-off theory suggests a negative relationship between volatility and leverage. The pecking order theory consents with this conclusion. When firms

have high earnings volatility the forecasting of future earnings becomes more challenging and debtors will issue debt at a higher cost due to the increased risk. The higher external financing costs implies that there will be lower levels of debt when the volatility is high, given that all other variables are fixed.

Determinants	Trade-off theory	Pecking-order theory
Tangibility of assets	+	-
Firm size	+	-
Growth opportunities	-	+/-
Profitability	+	-
Volatility	-	-

Figure 2: *Summary of results based on the illustration from Baker & Martin (Baker & Martin, 2011, pp. 23)*

The effect that the determining factors have on a company's leverage according to the trade-off theory and the pecking-order theory are summarized in Figure 2. While the two theories share some similarities as discussed above, they are somewhat conflicting. In terms of the pecking order theory, most of the variables have a negative effect on capital structure, meaning that an increase in the respective variables will decrease the debt. According to the trade-off theory, the variables have a divergent effect on which way an increase in the variables affects the debt levels.

4.5 Part conclusion

There are four stages of the life cycle that companies can go through during their lifetime, in which they can undergo the same stage several times. The steps from start to end are launch, growth, maturity and recession. In order to determine which stage of the life cycle a company is in, three methods can be used. These are the univariate method, comprehensive index method, and cash flow combination method. All three are applied in our analysis as well as our own assortment of variables based on the methods. Furthermore, the capital structure of companies can be assessed by several theories. The most common theories in terms of the capital structure of shipping companies are the theories of Modigliani and Miller, the trade-off theory, the pecking order theory as well as the market timing theory. The trade-off theory and the pecking order theory are used to assess

the impact that several determining factors of capital structure have on a company's debt. In the following, the theories will be applied in our analysis of the Norwegian dry bulk shipping companies.

5.0 QUANTITATIVE TESTS OF PROPOSITIONS

5.1 Life cycle analysis

As previously mentioned, a company can go through four life cycle stages during its lifetime. In the following, we aim to use the theory presented above regarding the determination of life cycle stages to answer our first hypothesis:

H1: *The stage of the life cycle that a Norwegian dry bulk shipping company is in affects what it assess to be its optimal capital structure.*

When applying the univariate method to determine which stage of the life cycle Norwegian dry bulk companies are in, the results are differing. The analysis indicates that some of the companies are in the mature phase due to high ratios while others are in the growth phase due to quite low ratios. Moreover, some of the companies even have negative ratios of RE/TA and RE/TE. However, it is argued that the capital structure of the company can influence the ratios. Companies with a higher debt-to-asset ratio will have a lower RE/TA ratio, which can explain the negative values as the shipping industry are characterised by high debt levels. This indicates that the capital structure of the companies can influence the ratios in this analysis. Moreover, the development in the specific life cycle stages of each company in terms of the ratios are varying. The analysis shows that there are high fluctuations and changes from one year to another within each company. As of this, we cannot base our analysis surely on this theory.

As previously mentioned, the comprehensive index method lacks support from economic theory regarding the assumption of a linear relationship between the operating activities of the company. Thus, we conclude that the theory does not meet the requirements of theoretical validity needed. However, development in sales revenue growth is included in our final analysis corrected for market

fluctuations in order to visualise the effects. Furthermore, the time aspect of age is also present as we view the development of the variables over time.

The cash flow combination method was not adequate to use isolated in the analysis to determine which stage of the life cycle the companies were in as the changes in cash flow are fluctuating and show no stable growth nor decline. The finding corresponds with two of the previously mentioned characteristics of the dry bulk shipping market, namely high risk and high volatility. While the method was not adequate to be used isolated, the measure is included in the analysis in order to search for consistency.

Since none of the three theories isolated provides an adequate analysis that is found to be trustworthy, we have chosen to use a combination of different factors when determining which stage in the life cycle the companies are in. Based on a combination of various approaches on the subject, we decided to further focus on the growth in net income, cash, and cash flow. In addition, we included a measure for the size of the company based on its balance, and the measures from the univariate method are also included. As the shipping industry is highly cyclical, we consider it to be important to include the market cycles when assessing the life cycle of the companies in our sample. The companies in our dataset operate in the freight market which trades in sea transport, where the main source of income is freight revenue. To correct for the correlation between cycles in global industrial production and seaborne trade, the average growth in the Baltic Dry Index each year is deducted from the growth in earnings for each company. The Baltic Dry Index is an index for the global dry bulk freight rates. Correcting the data for this index, enables us to analyse growth in earnings beyond any changes that may be due to the business cycles in the market.

The growth in net income is fluctuating, similar to growth in earnings and cash. It seems to be no clear pattern for any of the companies in our analysis of their life cycles (Appendix 2). The most stable variable is the size of the company based on its balance each year. For most of the companies, there is stable growth in firm size. As stated in previously mentioned theory, this signals that these companies are in the mature stage. However, there are no other variables in the analysis validating this finding. Approximately 51% of the companies have a negative

growth in earnings when we correct for the BDI-index (Appendix 3). This means that half of the companies have earnings under the market average for all the twenty years, which indicates that the companies are in the latter part of the mature stage or possibly in a recession. However, this result is somewhat inconsistent with traditional observations of the dry bulk shipping market. When checking for correlation between growth in the BDI-index and growth in earnings, the correlation is 0,026 (Appendix 4). This is a quite weak correlation and does not correspond with the current market view. The finding can be explained by only having access to the financials which the private companies have to file with the government. As the dataset consists primarily of private companies, these may for the stated reason not be as transparent as a public company. The findings can also indicate that the companies are either in a mature, between or in the recession stage.

When aggregating the analyses of life cycles, there is no clear-cut picture of which stage they are in. One theory indicates the growth face, and another indicates the moderate stage and also a recession (Appendix 2). In addition, when we compare the graphs in our analysis with Figure 1, we see that none of the companies experiences the development in life cycle as the theory implies they should have. Furthermore, when checking for the correlation between the growth variables each year, all results show a very weak correlation implying that there are none to little relation (Appendix 5). Thereby, the data does not provide an adequate foundation to conclude that there is a correlation between the capital structure and life cycle of the companies in our sample. Based on the analysis we have conducted it seems unlikely that the life cycle of the shipping companies in the Norwegian dry bulk market affects their capital structure. Therefore, we reject our first hypothesis.

5.2 Capital structure analysis

In our analysis of capital structure, we are to test two hypotheses regarding optimal capital structure and its determinants. We will first analyse the optimal capital structure of Norwegian dry bulk shipping companies. Thereafter the determining factors of the capital structure will be analysed, in which we will check if these have changed over time.

5.2.1 Optimal capital structure

According to theory, a firm reaches its optimal combination of debt and equity when it minimizes its weighted average cost of capital (Acca, 2020). In the following we are to test the hypothesis regarding a company's optimal capital structure:

H2: *The theory of minimizing the weighted average cost of capital to obtain an optimal capital structure is applicable for Norwegian dry bulk shipping companies.*

The weighted average cost of capital is the weighted average of the expected returns that are required by the providers of debt and equity (Lin, 2018). It can be calculated using the following formula (Hargrave, 2020):

$$WACC = \frac{E}{V} * R_e + \frac{D}{V} * R_d * (1 - T_c)$$

Where: R_e = cost of equity, R_d = cost of debt, E = market value of the firm's equity, D = market value of the firm's debt, V = E+D = total market value of the firm's financing, T_c = corporate tax rate. In the following, we will look further into the calculation of the variables.

5.2.1.1 Debt and equity

In the calculation of the proportions of debt and equity for each firm, the reported numbers from the respective firm's financial statement are used. These values are used as the majority of the firms are private and therefore the market value of their debt and equity is not available. This may cause a restraint in our analysis as book values of debt and equity only represents a snapshot of the company's financial situation and can in addition be manipulated due to different accounting standards. It is therefore not directly comparable with the market value of debt and equity, but it is the closest option in order to get company-specific measures.

5.2.1.2 Cost of equity

The cost of equity represents the expected return of investing in the market and will later be used in the calculation of the WACC as a representation of the cost incurred by holding equity instead of investing it. To calculate the cost of equity the CAPM-model is applied (Hargrave, 2020) where the result can be viewed in Appendix 10.

$$R_e = R_f + \beta * (R_m - R_f)$$

Where R_f = risk-free rate, B = beta, R_m = market return.

5.2.1.2.1 Risk-free rate

The risk-free rate is based on 10-year Norwegian government bonds (Appendix 6). The rate represents the return an investor can expect when taking an investment with zero risk involved.

5.2.1.2.2 Beta

The beta represents the risk associated with the stock related to how exposed it is to market fluctuations (Cautero, 2019). A beta below one implies less risk as the stock is less volatile than the market. On the opposite side, a beta above one implies more risk as the stock is more volatile than the market. As the majority of the companies in our sample are private, the beta is calculated based on the 5-year beta of peers. We have chosen one dry bulk shipping company from each of the five largest shipping nations; Japan, China, Greece, USA and Norway (Appendix 7). The beta for each company for each year was retrieved using Bloomberg. Each of the betas was then unlevered using the debt-to-equity ratio of the companies and the respective country's corporate tax rate. We then re-levered the beta using the Norwegian corporate tax rate for each year and an industry average of the debt-to-equity ratio. This ratio was calculated by retrieving the D/E-ratio of 5-9 dry bulk shipping companies from 1998-2018 and calculating the average of these (Appendix 8). The betas have values ranging from just below 1 to above one, which reflects the volatility in the industry.

5.2.1.2.3 Market risk premium

The market risk premium is represented by the market return where the risk-free rate is subtracted. The metric represents the return of the asset beyond the risk-free rate (Cautero, 2019) which can work as an enticement for investors to place their funds in riskier assets. The market return is calculated as the growth rate of the average yearly return of the Baltic Dry Index from 1998-2018 (Appendix 9). The index is reported by the Baltic Exchange in London and works as a proxy for the price of dry bulk transportation (https://tradingeconomics.com/commodity/baltic). In 10 of the last 21 years, the market return has been negative, which depicts the high volatility in the shipping market. To correct for this a long-term market return is applied calculated as the average growth rate of the BDI-index from 1998-2018.

5.2.1.3 Cost of debt and tax rate

The cost of debt is calculated for each firm by dividing its financial costs by total debt. This gives us the net rate that the company has paid for its borrowed funds. Further, the tax rate deducted is the corporate tax rate for Norwegian companies for each year. The measure represents the advantage of holding debt due to the tax deductibility.

5.2.2 Conclusion: WACC and capital structure

The three lowest values for the weighted average cost of capital for each firm were collected together with the respective debt-to-equity ratio for each firm as this should represent their optimal capital structure (Appendix 11). We further checked for the correlation between the measures to see if there were any relationship. Correlation usually ranges between -1 to 1, where a correlation of 1 implies a perfect relationship. The correlation between the WACCs and the capital structure in our sample is 0,032, which indicates a quite weak relationship between the two variables. This means that from our findings there is approximately no relationship between the minimized WACC and the corresponding optimal capital structure. As of this, we reject the hypothesis regarding that the capital structure is optimized by minimizing the WACC.

When asked about what they assess to be an optimal capital structure, the CFO of Grieg Star stated that they do have a preferred capital structure, but this is not their primary focus when making financial decisions. Rather, they focus on break even ratios. The cyclicality of the dry bulk market makes it important to have an adequate buffer, where increasing the leverage seems enticing. However, increasing the debt also increases the costs which further affects the break even. This may push the company to be less competitive due to lower margins compared to competitors with lower leverage ratios. Moreover, the capital markets are not stable either, making companies compelled to raise capital when it is available. This can further result in companies taking on too much debt when it is available to shore up against future constrictions. There has also been developed several means of refinancing which shifts the capital structure from being a static concern to a continuously changing concern. The time span on several loans has for instance decreased from around 12 to 5 years. Furthermore, the reputation of the company has a large impact on its capital cost and therefore also its capital structure. If the company has a trustworthy reputation it suggests that they may be a safer choice for creditors and investors, which will help them attain capital at a lower cost. Important factors related to their capital structure are liquidity management as well as the age span on their fleet. The earning capacity on the ships are more or less independent of the age, but the operational costs increase when the ships ages and younger ships are more expensive to acquire. Having a diversified fleet related to age span makes the older fleet subsidize the younger ones in which the leverage is more short term.

The managing director of Nordic shipping business in Nordea states that also they are particularly interested in break-even ratios. Internally, they are looking at these ratios over a longer time span. When companies assess their capital structure they have to start with these ratios and estimate what necessity rate they need in different phases of the market. In addition to a focus on break even, liquidity management is mentioned as an important factor due to the volatility in the dry bulk market. Loan covenants which typically are applied to shipping companies are related to working capital, solidity and liquidity. Moreover, the capital allocation of shipping companies often change with the market cycles. In times when the profitability in the market is high, companies use the extra revenue to reduce their debt levels in order to sustain an availability for financing when the

profitability in the market decrease again. Moreover, it is of high importance for companies to find an optimal balance between their operational and financial leverage when constructing their capital structure as this affects the funding available. As mentioned, companies who predominantly operate in the spot market are required to have a stronger solidity. In other words, this choice regarding their operational leverage affects their capital structure as they are required to have more equity.

Overall, these insights can explain the results of our analysis, in which an optimal capital structure is not always the paramount focus of companies when making financial decisions. As one can see, there are various amounts of events that affect the proportion of debt and equity. If the weighted average cost of capital is influenced by a focus deviating from optimising firm value, it can lead to a weaker correlation between the WACC and optimal capital structure. Furthermore, the finding may have been affected by the fact that the majority of the companies in our dataset are private. This influences several parts of the calculation and requires plural assumptions to be made. Among other things, industry average numbers have to be used several times instead of company-specific information. A more in-depth analysis of the optimal capital structure of private shipping companies can be a basis for further research.

5.2.3 Determining factors of capital structure

For our last hypothesis, we want to look further into the determining factors regarding the capital structure of dry bulk companies and whether these have changed over the past two decades.

H3: *The determining factors of the capital structure of Norwegian dry bulk shipping companies have changed over the past twenty years.*

To test this hypothesis, we ran several regression analyses in Stata to examine the explanatory power of tangibility of assets, firm size, growth opportunities, profitability, and volatility on the capital structure of the companies in our dataset. We used OLS-regression based on the following equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + e$$

The variables we have chosen to test have several ways of being calculated. To find the calculation best fitted for our sample, we ran regressions with all possible combinations of these, where we ended up with the following regression model:

$$DE = Tangibility1 + Firmsize2 + Growthopportunities + Profitability1 + Volatility + e$$

Where:

$$DE = \frac{Debt}{Equity}$$

$$Tangibility1 = \frac{Fixed\ assets}{Total\ assets}$$

$$Firmsize2 = Log(Sales\ revenue)$$

$$Growthopportunities = \Delta Log(Total\ assets)$$

$$Profitability1 = ROA = \frac{Net\ income}{Total\ assets}$$

$$Volatility = \Delta\ Sales\ revenue$$

This model had the highest Adjusted R squared, meaning that this combination had the highest explanatory power on the capital structure. In addition, we ran a VIF test to check for the problem of multicollinearity. From the results, this is not an issue in our model (Appendix 12).

5.2.3.1 Divided into time intervals

To further test for the impact these variables have on the capital structure of firms in different time intervals we created three dummy variables where we have divided the time period into three groups. These are defined as int1=1998-2004, int2=2005-2011, int3=2012-2018.

$$Model\ 1: DE = Tangibility\ 1 + Firm\ size\ 2 + Growth\ opportunities + Profitability\ 1 + Volatility, if\ (int1 == 1).$$ (Appendix 13)

$$Model\ 2: DE = Tangibility\ 1 + Firm\ size\ 2 + Growth\ opportunities + Profitability\ 1 + Volatility, if\ (int2 == 1).$$ (Appendix 14)

$Model\ 3: DE\ =\ Tangibility\ 1\ +\ Firm\ size\ 2\ +\ Growth\ opportunities\ +\ Profitability\ 1\ +\ Volatility, if\ (int3 == 1)$. (Appendix 15)

Adjusted R-squared: For time interval one and three the adjusted R-squared are relatively equal, whereas it is somewhat higher in the second time interval. As of this, the explanatory power of the regression is relatively similar for all three of the time intervals.

Tangibility: The tangibility coefficient has a negative effect in all time intervals, which means it has a negative effect on the company's debt levels. However, in the first time interval, the effect of tangibility has the greatest negative effect and the weakest effect in the third time interval. This indicates that the effect tangibility has on debt levels has weakened over the years. In reality, this indicates that companies repaid a larger portion of their debt before when tangibility of assets increased. This coefficient is statistically significant for all time intervals.

Firm size: Firm size has a positive effect on debt levels in all time intervals, indicating that when the firm grows, they take on a larger portion of leverage. The positive effect is much stronger in the first time interval than in the others. This signals that companies would increase their debt levels more before than now when their firm grows. This coefficient is statistically significant for all time intervals.

Growth opportunities: The coefficient of growth opportunities is negative in the first and second time interval, meaning that increased growth leads to a decrease in leverage, where the effect is significantly larger in the first time interval. The coefficient is positive in the third time interval, implying that increased growth opportunities increase the debt levels. However, the coefficient is not statistically significant for any of the time intervals. As of this, there is not a credible evidence that growth opportunities can explain capital structure alone.

Profitability 1: For the first and third time interval the profitability coefficient is negative, with a significantly stronger effect in the first time interval. Increased profitability will as a result have a negative effect on debt levels, meaning that the

more profitable the firm gets, the more debt will it repay. In the second time interval, the coefficient is positive, indicating that increased profitability will increase the amount of leverage in the company. According to this, the effect of increased profitability on the debt has fluctuated over the years, where it seemed to be a higher risk aversion in the first and third time interval. However, the coefficient is not statistically significant for any of the time intervals. As of this, there is not a credible evidence that profitability can explain capital structure alone.

Volatility: The volatility coefficient is negative in the first and second time interval. However, the coefficient is very low which indicates a weak influence on the capital structure. In the third time interval, the coefficient is positive but still very low. The results imply that the volatility overall has a weak impact on the capital structure in all time intervals. In addition, this coefficient is not statistically significant for any of the time intervals. As of this, there is not a credible evidence that volatility can explain capital structure alone.

_Cons = Constant intercept, error term: This is the predicted value of D/E when all other variables are zero. However, this coefficient is not statistically significant for any of the time intervals. As of this, there is not a credible evidence that the capital structure of companies can be explained by ignoring the other variables in the model.

5.2.3.2 Part conclusion

Determinants	Trade-off theory	Pecking-order theory	int1	int2	int3
Tangibility of assets	+	-	-	-	-
Firm size	+	-	+	+	+
Growth opportunities	-	+/-	-	-	+
Profitability	+	-	-	+	-
Volatility	-	-	-	-	+

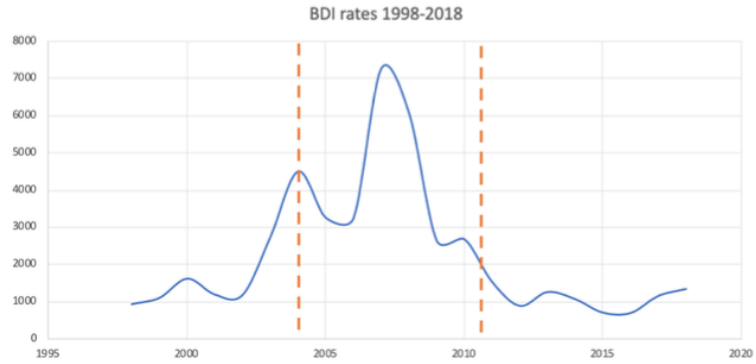
Figure 3: *Summary of results based on the illustration from Baker & Martin (Baker & Martin, 2011, pp. 23)*

A summary of the findings can be viewed in *Figure 3*. Increased tangibility results in an increased repayment of debt in all time intervals, with the strongest effect in the first time interval. This influence is coherent with the pecking-order theory. On the opposite, the coefficient of firm size implies a higher debt absorption with

a stronger effect in the first time interval than in the other two, which coincides with the trade-off theory. Furthermore, the coefficient of growth opportunities indicates an increased repayment of debt in the first and second time interval as a result of increased opportunities for growth. This effect was opposite in the third time interval, where increased growth opportunities lead to increased leverage. Also the effect of profitability fluctuates over the time intervals. Increased profitability leads to repayments of debt in the first and third time interval, and debt absorption in the second. The ambiguous results correspond to both the trade-off theory and the pecking-order theory on capital structure. As of the last coefficient, increased volatility indicates a repayment of debt in the first and second time interval and increased debt in the third interval. However, this coefficient has a weak influence in all time intervals. Overall the results can indicate that the companies had a higher risk aversion in the first time interval whereas they have turned to take on higher levels of leverage in the remaining time intervals.

5.2.3.3 Divided into market cycle periods

From the graph of the development in the BDI-index (Figure 4), we observed that there are a lot of fluctuations in the past 20 years and that our three time intervals contain several business cycles. The three time intervals previously analysed is separated by the orange lines to better illustrate the differences. Thereby, to further strengthen our findings, we wanted to analyse if the effect of the variables has changed when the market is in the same business cycle. From the article *The Dynamics of Dry Bulk Shipping Market Under the Shipping Cycle Perspective: Market Relationships and Volatility* (Wu, Yin, & Pan, 2018) different market cycles from 1994 to 2016 has been defined. Within the time-range of our dataset, the shipping market has been in two through periods. The first through period is from 1998-2002 and the last one is from 2009-2016 (Wu, Yin, & Pan, 2018). Therefore, we choose these two periods as comparison to analyse the effect of the variables over time.



Period	Time
Peak	1994-1997
Recession	1997-1998
Through	1998-2002
Recovery	2002-2004
Through	2009-2016

Figure 4: *Average of weekly BDI Index from 1998-2018. Table based on figures from The Dynamics of Dry Bulk Shipping Market Under the Shipping Cycle Perspective: Market Relationships and Volatility* (Wu, Yin, & Pan, 2018)

To analyse the two through periods separately, we created two new dummy variables for the first and second through, respectively Through 1 and Through 2. We then ran the regression of the following models in Stata.

$Model\ 4: DE\ =\ Tangibility\ 1\ +\ Firm\ size\ 2\ +\ Growth\ opportunities\ +\ Profitability\ 1 +\ Volatility, if\ (Through1 == 1)$. (Appendix 16)

$Model\ 5: DE\ =\ Tangibility\ 1\ +\ Firm\ size\ 2\ +\ Growth\ opportunities\ +\ Profitability\ 1 +\ Volatility, if\ (Through2 == 1)$. (Appendix 17)

Adjusted R-squared: Both models have similar adjusted R-squared, of 0.1897 and 0.2067 respectively. This indicates that the explanatory power of the models is relatively equal but somewhat higher in the second model.

Tangibility: In both time periods the coefficient of tangibility is negative, which means that increased tangibility of assets has a negative impact on debt levels. In the first through period the negative impact is significantly stronger than in the last through period. This indicates that increased tangibility led to significantly higher repayments of debt in the previous years. The coefficient is statistically significant in both through periods.

Firm size: In both through periods the firm size coefficient has a positive effect on the debt levels, which means that larger firms take on higher levels of leverage.

This coefficient too has a significantly larger effect in the first through than in the second. However, this time increased firm size lead to increased debt. This coefficient is statistically significant in both through periods.

Growth opportunities: In the first through period the coefficient of growth opportunities is negative, meaning that larger growth opportunities decrease the amount of firm debt. On the other hand, the coefficient is positive in the last through period, meaning that growth opportunities have an opposite effect on debt levels in the second thorough period. This indicates a higher risk aversion in the first through than in the second. It can also imply that there has been more appealing to increase the leverage over the years, for instance due to decreased cost of debt as of increased tax deductibility of interest payments. However, this coefficient is not statistically significant for any of the through periods. As of this, there is not a credible evidence that growth opportunities can explain capital structure alone.

Profitability: The coefficient of profitability is positive for both periods, meaning that firms will have increasing debt levels the more profitable they get. The positive impact that profitability has is slightly higher in the first though period than in the second. This indicates that companies would take on more debt in the earlier years. However, the difference is quite small, so the impact of profitability has not changed much over the years. This coefficient is not statistically significant for any of the through periods. As of this, there is not a credible evidence that profitability can explain capital structure alone.

Volatility: The coefficient of volatility is negative in both time periods. This indicates that increased volatility has a negative impact on debt levels. However, the coefficient is quite low in both through periods, which indicate that volatility overall has a weak impact on the capital structure. Furthermore, this coefficient is not statistically significant for any of the through periods. As of this, there is not a credible evidence that volatility can explain capital structure alone.

_Cons = Constant intercept, error term: This is the predicted value of the capital structure when all other variables are zero. However, this coefficient is not statistically significant for any of the time intervals. As of this, there is not a

credible evidence that the capital structure of companies can be explained by ignoring the other variables in the model.

5.2.3.4 Part conclusion

In both of the through periods, all the variables have the same effect on capital structure, except for growth opportunities. In the first through, growth opportunities have a negative effect on leverage, while the effect is positive in the second through. In addition, the difference in the impact of the variable in the two periods is immense. An increase in growth opportunities reduces the debt 165 times the increase in the first through, while the change will increase the debt 19 times in the second through. This indicates much higher leverage among the dry bulk companies in the last through period. Furthermore, the tangibility of assets has a much stronger negative effect on leverage in the first through, with a coefficient of -251 against -73. This again implies that the gearing is higher in the last through compared with the first one. The positive effect of firm size is greater in the first through period, indicating that the risk appetite might have been stronger in the first through period. The effect of profitability has not changed much from the first through period to the second. In addition, the effect of this variable is quite weak in both periods, which allows us to conclude that profitability has a low affect on the capital structure of dry bulk shipping companies. This also applies for the volatility variable, only that the effect is slightly negative, not positive. It further indicates that volatility also has a low affect on the capital structure of these firms.

5.2.4 Conclusion: the determinants of capital structure

All of the findings are summarised in Figure 5 together with the overall effect that the determinants have on the companies' capital structure.

Determinants	Trade-off theory	Pecking-order theory	int1	int2	int3	Through 1	Through 2	Total Effect
Tangibility of assets	+	-	-	-	-	-	-	-
Firm size	+	-	+	+	+	+	+	+
Growth opportunities	-	+/-	-	-	+	-	+	-/+
Profitability	+	-	-	+	-	+	+	+/-
Volatility	-	-	-	-	+	-	-	-

Figure 5: *Summary of results based on the illustration from Baker & Martin (Baker & Martin, 2011, pp. 23)*

From our analysis, we can see that tangibility of assets has an overall negative relationship with the debt levels of dry bulk shipping companies. In both versions of the analysis, the effect was strongest in the first time period, indicating that increased tangibility of assets led to a higher repayment of debt in the earlier years. This is in accordance with the pecking-order theory, which concludes with the same notion. The effect of firm size on leverage is unambiguously positive in all time periods. This effect is also strongest in the first time period in both analyses, where growth in firm size led to increased debt levels. This conclusion coincides with the trade-off theory. In three of the five time intervals that we tested, growth opportunities had a negative relationship with leverage, and in the two remaining intervals the relationship was positive. In both analyses the effect on leverage turns from negative to positive over time, indicating higher levels of leverage in the recent time period. Again, this finding corresponds with the pecking-order theory. The profitability has a positive relationship with leverage in three of the five time intervals, and a negative relationship in two of the intervals. In the analysis of time intervals, the effect is fluctuating, while it is consistently positive in the analysis of the through periods. This illustrates an ambiguous picture of the impact of profitability on debt-levels, and the finding is a grey-zone between the trade-off and the pecking-order theory. As the volatility had a positive effect on leverage only in one of the time intervals, whereas it is positive in the rest of the intervals and in both through periods, we concluded that volatility overall has a negative effect on debt-levels of dry bulk shipping companies. This finding agrees with both the trade-off and the pecking-order theory.

From our analysis of the effects of the determining factors on capital structure, we reach differing results over the different periods. Tangibility of assets, firm size, and growth opportunities are all variables that have a substantial influence on the capital structure of Norwegian dry bulk shipping companies. The results indicate that the leverage of the companies has increased over the years. Overall, the effects of the variables are much stronger in the earlier years indicating that there might have emerged new variables that influence the capital structure in recent years. The managing director of Nordic shipping business in Nordea states that an increased focus on break-even over the years has been observed in addition to an increased focus on sufficient liquidity. This can substantiate the idea that new

variables have gained more focus. To conclude, we find that the impact of the determining factors overall has changed over the past 20 years. Only one of the variables has changed in the opposite direction, where the impact has moved from decreasing to increasing the debt. Furthermore, two of the five variables have not changed significantly over the years, and they also have little to none overall influence on the capital structure. Overall, we conclude that the hypothesis is partly true.

6.0 SUMMARY OF THE RESULTS

The principal aspect throughout the thesis is the high risk and high volatility that characterises the Norwegian dry bulk shipping market. Moreover, it is a global market that trails international business cycles which makes it crucial for companies in the industry to analyse developments in supply and demand as well as changes in the global economy. In turn, they have to assess how these factors can influence their business. Risk management can be directed through various hedging instruments, insurance and diversifications of vessels and contracts. The dry bulk shipping industry is also recognised for being highly capital intensive, making it interesting to assess the various financing options available. Financing from external capital markets has developed throughout the years, but the high debt levels of the industry are still mainly financed by bank financing. The features of the market can further help explain the results of our analysis.

In our first analysis, we investigated if the different stages of the business life cycle affect the optimal capital structure of Norwegian dry bulk shipping companies. We analysed this by applying three theoretical methods on our data. However, the measures alone did not provide an adequate analysis. Thereby, we extended the method by applying our own variables in addition to the variables from each of the methods. Still, our first hypothesis was rejected due to high fluctuations and lack of an adequate foundation to conclude if there is a correlation between life cycles and optimal capital structure.

For our analysis of optimal capital structure, we studied if the theory of minimizing the weighted average cost of capital is sufficient to use in order to

obtain an optimal capital structure. The analysis showed more or less no relationship between the minimized WACC and the corresponding optimal capital structure of the Norwegian dry bulk shipping companies. Thereby, this hypothesis was rejected. However, we gained some insight to this analysis from the business professionals who were interviewed. They confirmed that optimal capital structure not necessarily is the main focus, where factors such as liquidity management can be of higher importance. Lastly, the analysis may have been influenced as a consequence of most of the companies studied being private. This made it necessary to make several assumptions throughout our analysis and company-specific numbers and market values were not always applicable.

The third hypothesis examined whether the determining factors of capital structure and their influence has changed over the past twenty years. Our findings of the effect that several factors have on companies' capital structure fluctuated between corresponding with both the trade-off theory and the pecking order theory. When analysing if the factors have changed over the past twenty years we achieved both corresponding and conflicting results from the different periods. The analysis indicates that the leverage of the companies has increased over the years, where the overall effects of the variables are stronger in the earlier years. This can further indicate that new variables that affect the capital structure of companies have emerged in the last couple of years. Overall, we concluded that the last hypothesis is partly true as some of the variables have changed over the tested time intervals, while others have remained more or less the same.

Overall, it does not seem to be a relationship between life cycles and the optimal capital structure of Norwegian dry bulk shipping companies, nor do a minimised weighted average cost of capital indicate an optimal capital structure. However, parts of the determining factors of capital structure seem to have changed over the past 20 years.

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8.0 APPENDIX

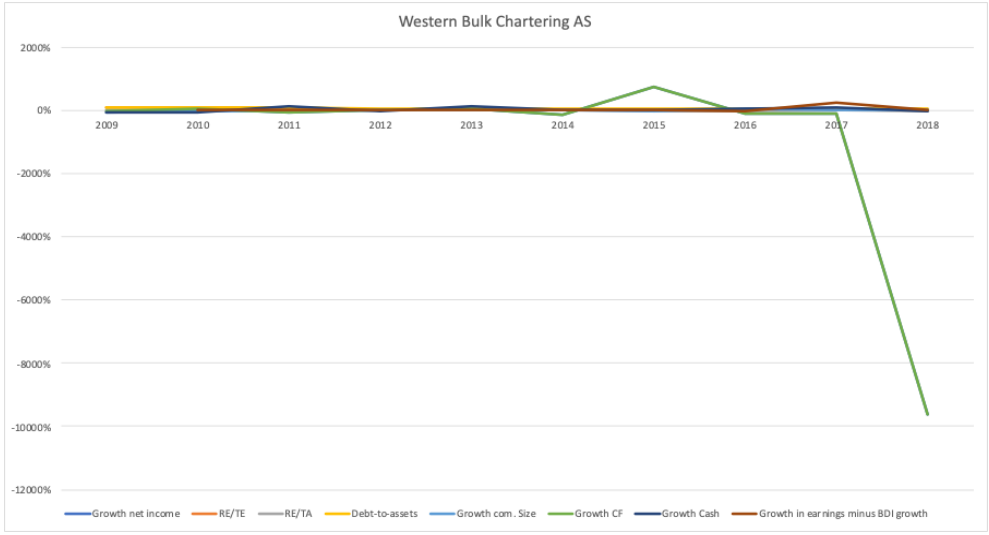
APPENDIX 1

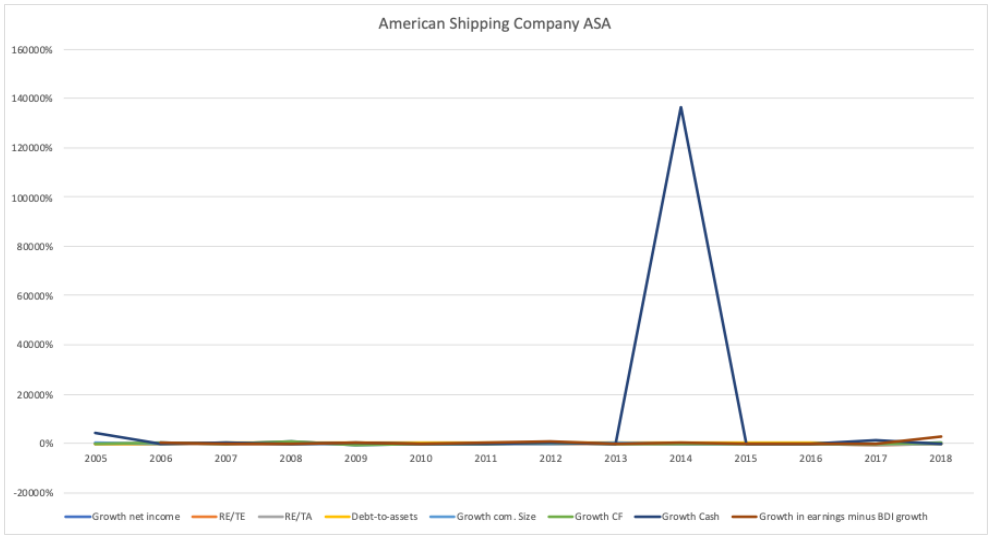
List of all companies in our analysis

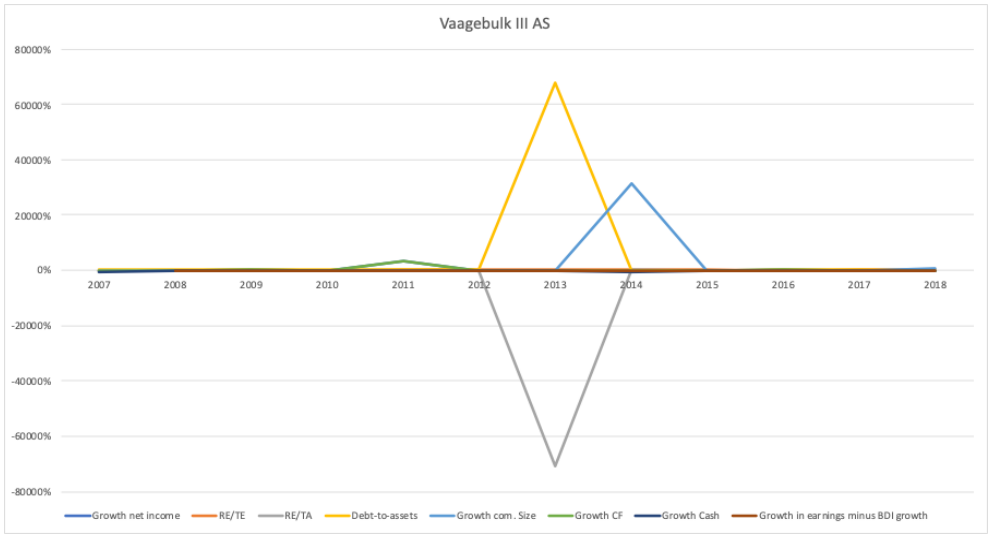
Companies with bulkcarriers and general cargo vessels		
Company	**Postal Code**	**Website**
Aasen Shipping AS	5440 MOSTERHAMN	www.aasenshipping.com
AAT Shipinvest AS	4401 FLEKKEFJORD	
Arriva Shipping AS	5588 ØLEN	www.arrivashipping.no
Awilco AS	0118 OSLO	http://www.awilco.no
Belships ASA	0216 OSLO	www.belships.com
Berge Rederi AS	7240 HITRA	www.bergerederi.no
Bulkship Management AS	0120 OSLO	www.bulkship.no
Falkeid Shipping AS	4160 FINNØY	www.falkeid.no
Fjord Shipping AS	6700 MÅLØY	www.fjordshipping.no
Fonnes Shipping AS	5953 FONNES	www.fonnesshipping.no
Grieg Star Group AS	5807 BERGEN	www.grieg.no
Hagland Shipping AS	5501 HAUGESUND	www.hagland.com
Hav Ship Management NorRus AS	0250 OSLO	www.hav.no
Jebsen Skibsrederi A/S, Kr. G.	5147 FYLLINGSDALEN	www.kgjs.no
Kopervik Ship Management AS	4250 KOPERVIK	www.kopervikgroup.no
Lorentzens Skibs AS	0112 OSLO	www.lorskibs.no
Misje Rederi AS	5817 BERGEN	www.misje.no
Mowinckels Rederi A/S, J. Ludwig	5835 BERGEN	www.jlmr.no
Myklebusthaug Management AS	5953 FONNES	www.mmred.no
Ocean Yield AS	1366 LYSAKER	www.oceanyield.no
Saga Welco AS	3163 NØTTERØY	www.sagawelco.com
Seven Seas Carriers AS	5010 BERGEN	www.sevenseas.no
Songa Container AS	0161 OSLO	www.songacontainer.no
Spar Shipping AS	5020 BERGEN	www.sparshipping.no
Torvald Klaveness	0212 OSLO	www.klaveness.com
Uglands Rederi, A/S	4891 GRIMSTAD	www.jjuc.no
Vaagebulk gruppen	5068 BERGEN	www.vaageshipman.no
Western Bulk Chartering AS	0230 OSLO	www.westernbulk.com
Wilson EuroCarriers AS	5835 BERGEN	www.wilsonship.no

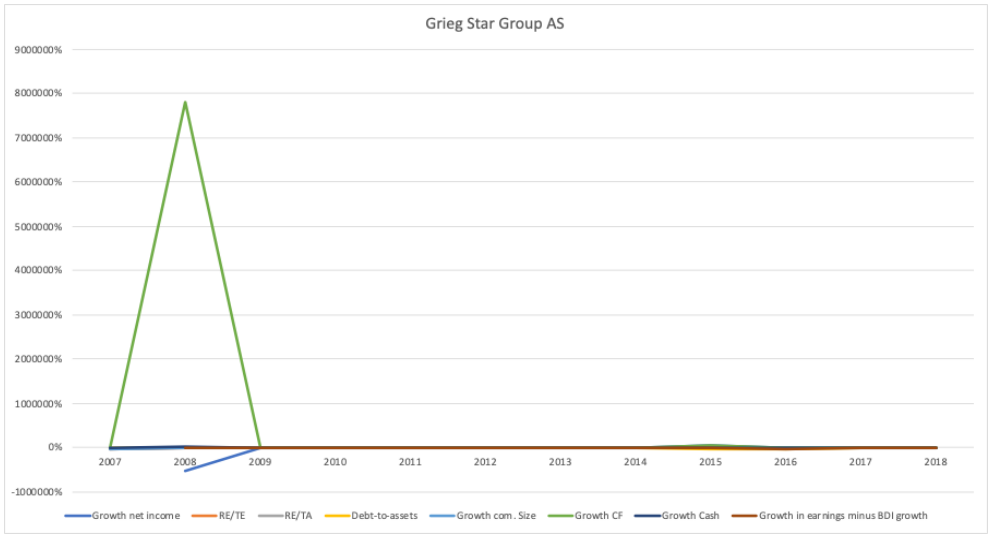
APPENDIX 2

Life cycle analysis of all companies in the dataset








Grieg Star Group AS
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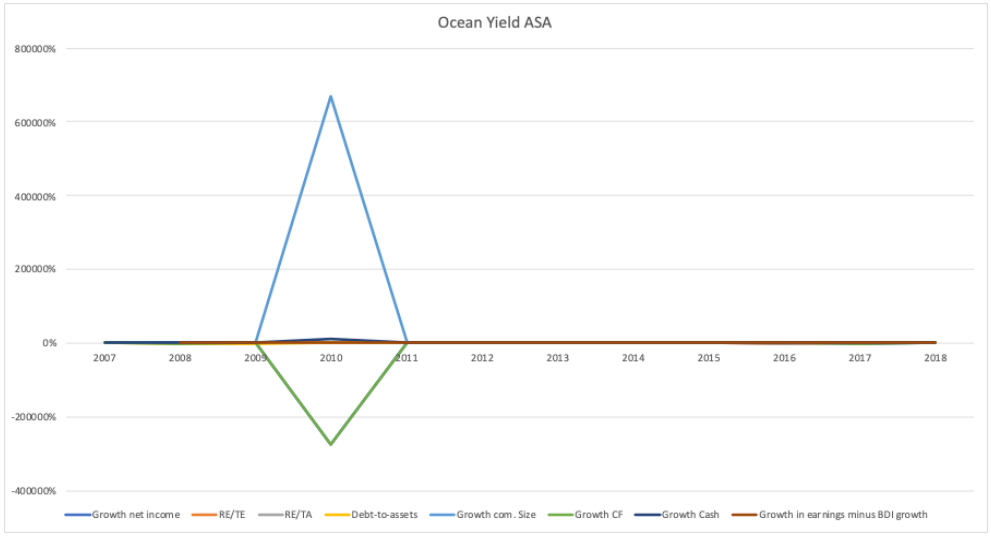
2015
2016
2017
2018
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Ocean Yield ASA
800000%
600000%
400000%
200000%
0%
-200000%
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2007
2008
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Growth net income
RE/TE
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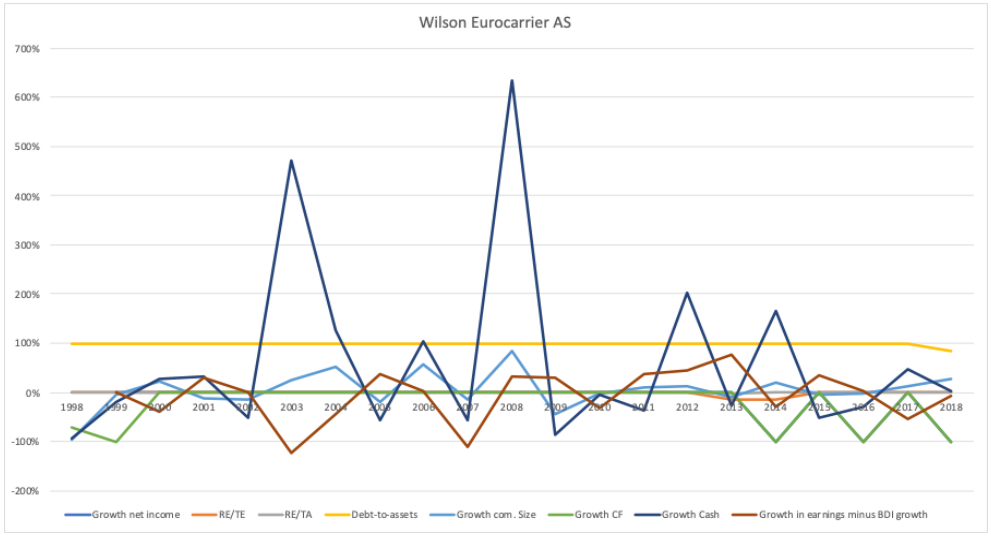
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Wilson Eurocarrier AS
700%
600%
500%
400%
300%
200%
100%
0%
-100%
-200%
1998
2003
2008
2012
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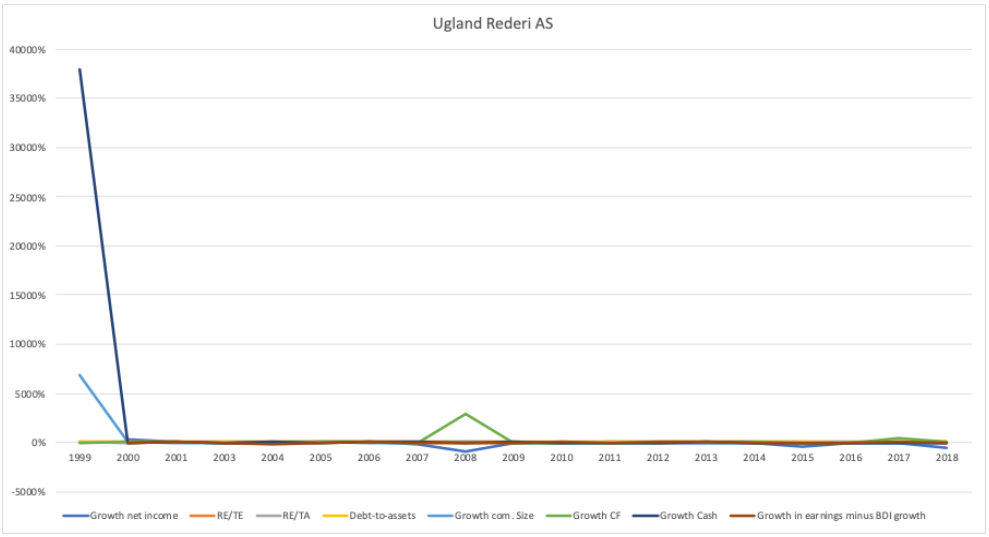
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Ugland Rederi AS
40000%
35000%
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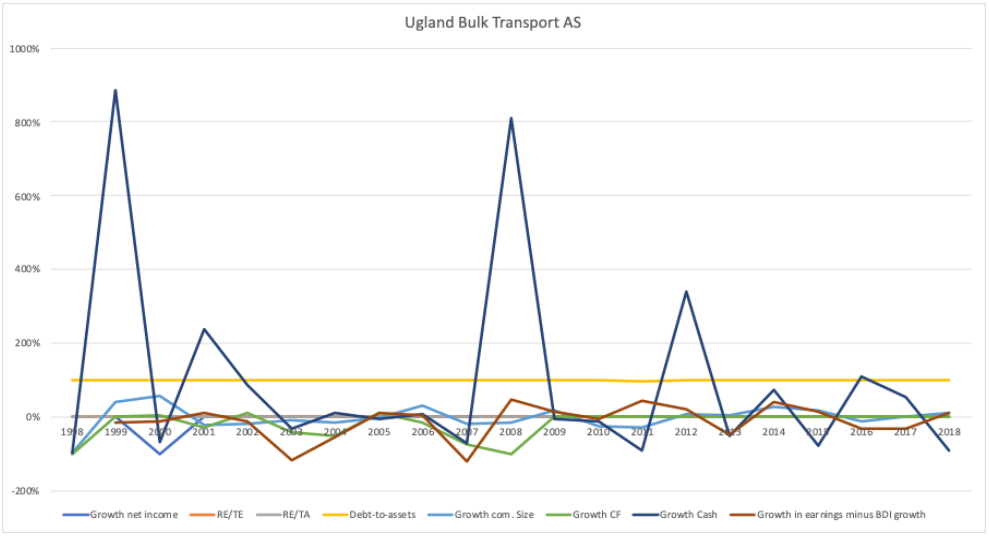
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Ugland Bulk Transport AS
1000%
800%
600%
400%
200%
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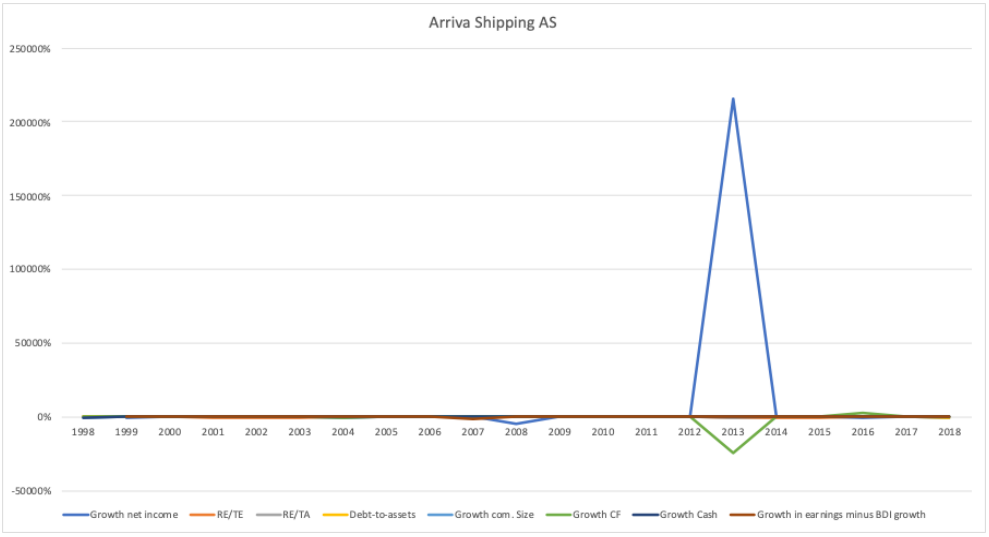
-200%
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth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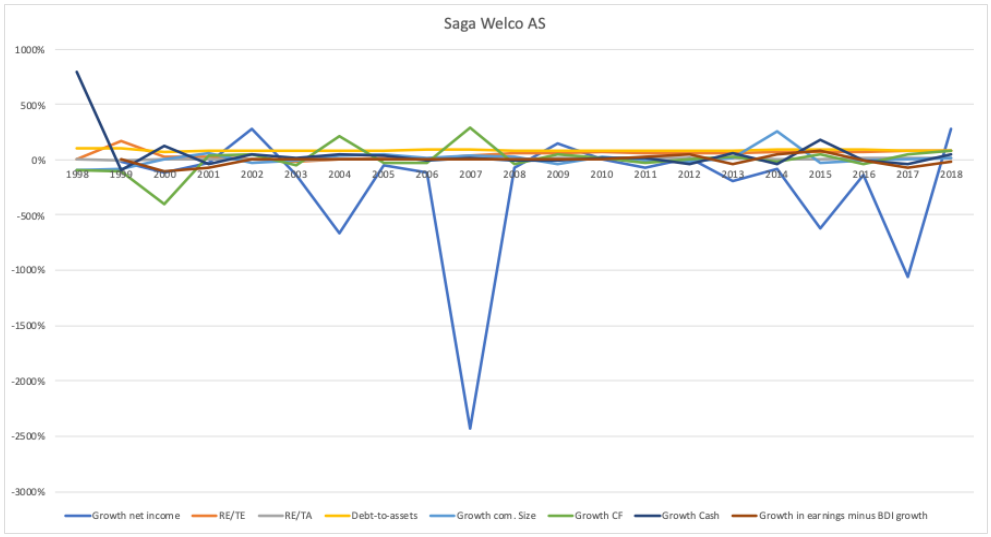
Growth CF
Growth Cash
Growth in earnings minus BDI growth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Growth net income
RE/TE
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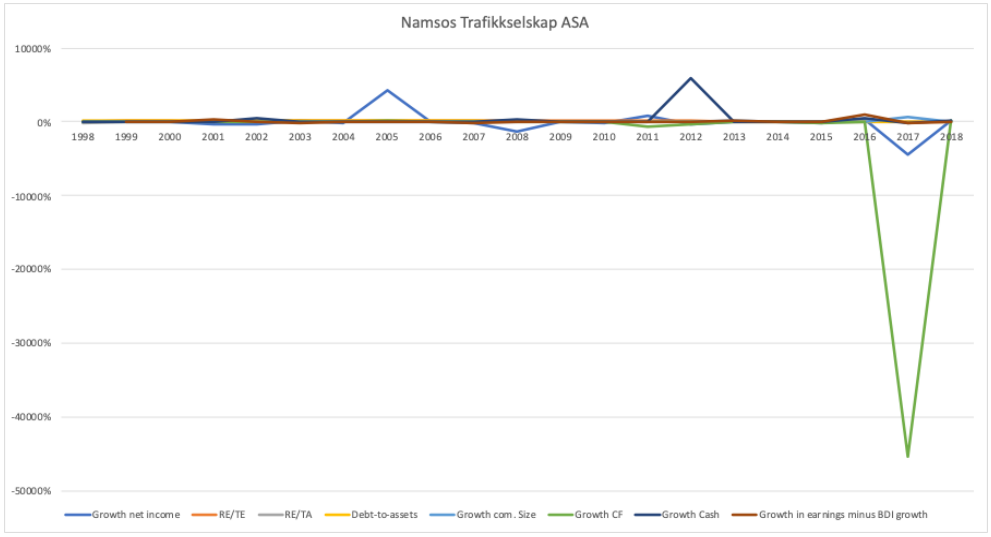
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Namsos Trafikkselskap ASA
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Growth net income
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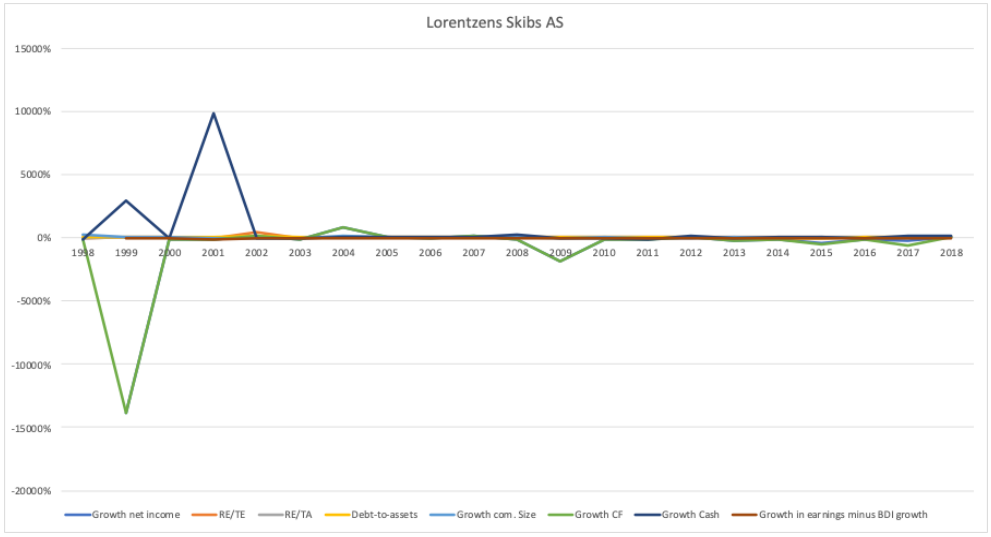
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth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Growth net income
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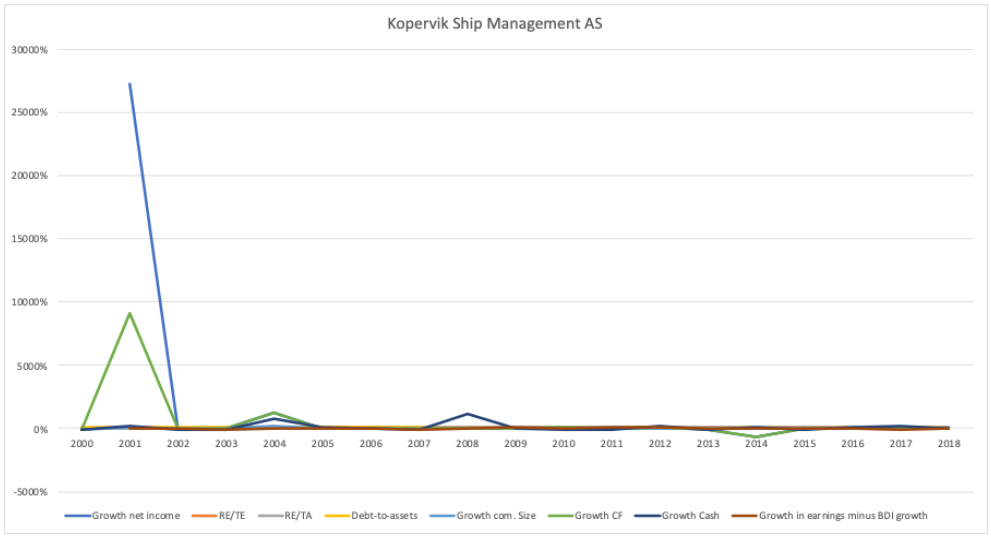
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Kopervik Ship Management AS
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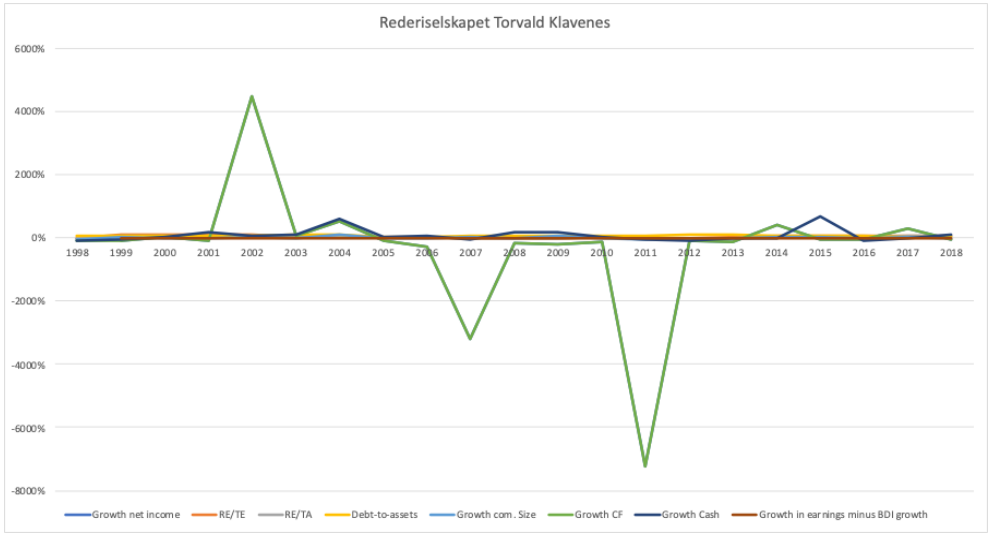
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth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Growth net income
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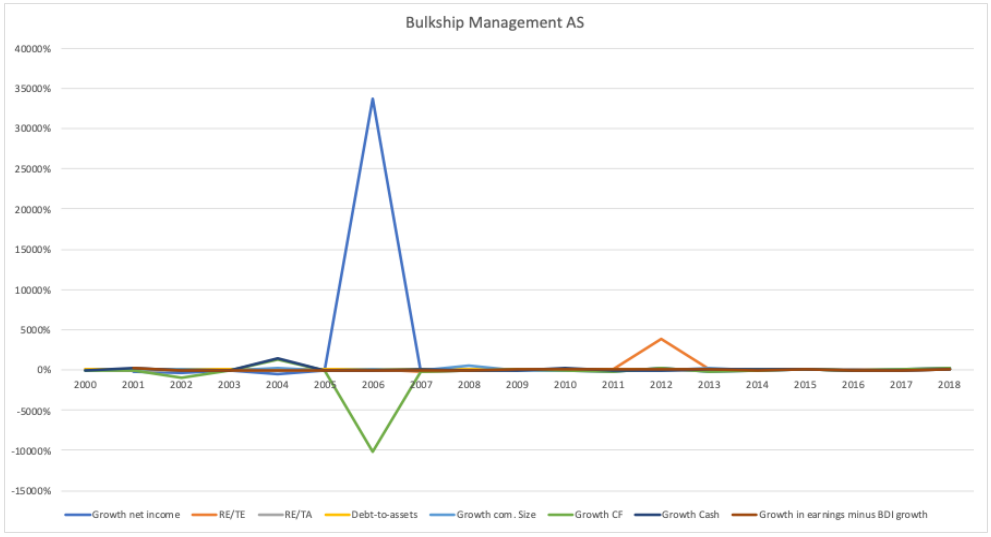
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Bulkship Management AS
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Growth net income
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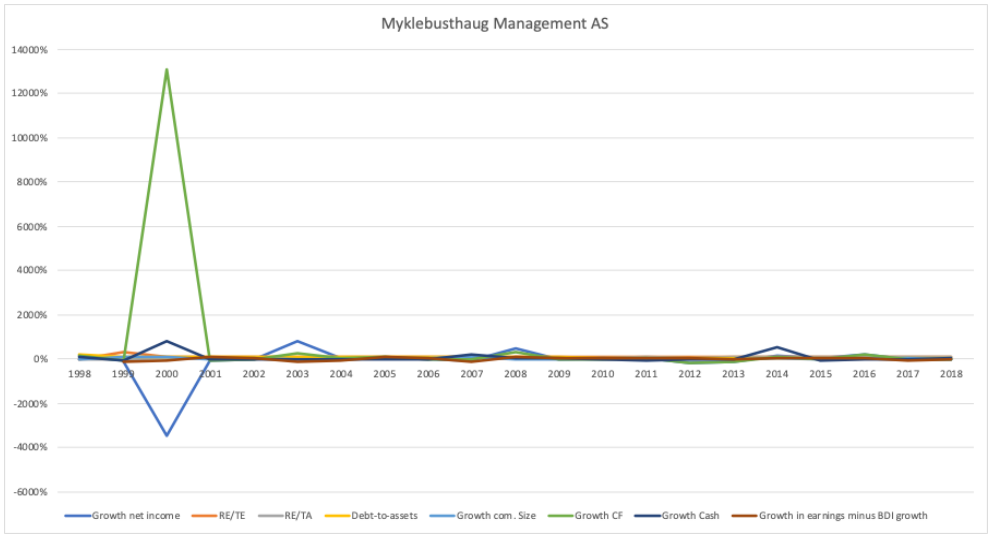
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Myklebusthaug Management AS
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Growth net income
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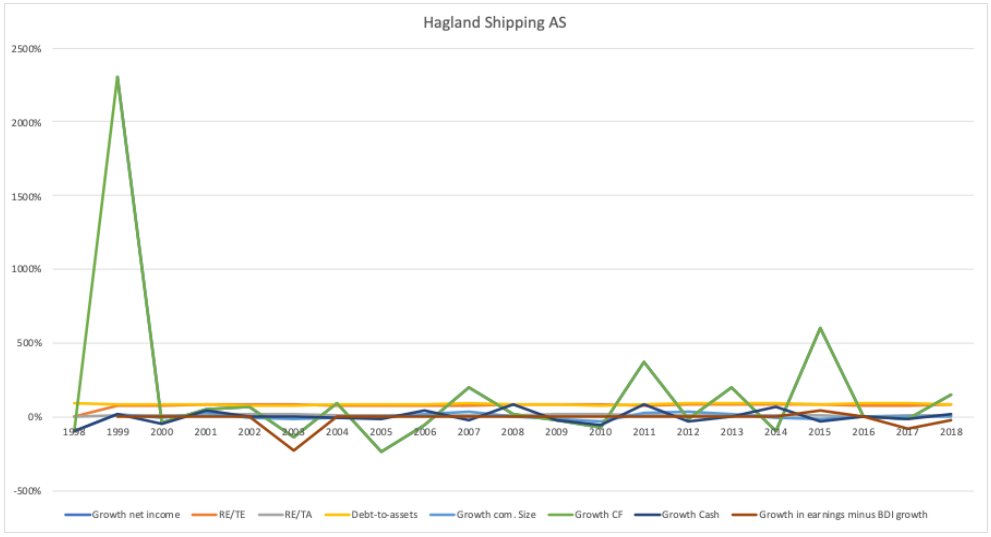
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Hagland Shipping AS
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1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Growth net income
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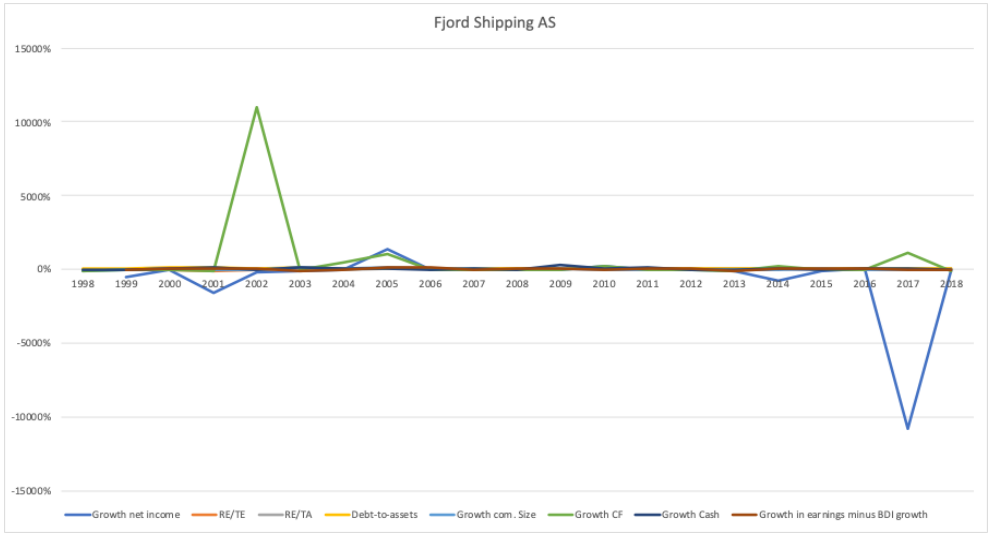
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Fjord Shipping AS
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Growth net income
RE/TE
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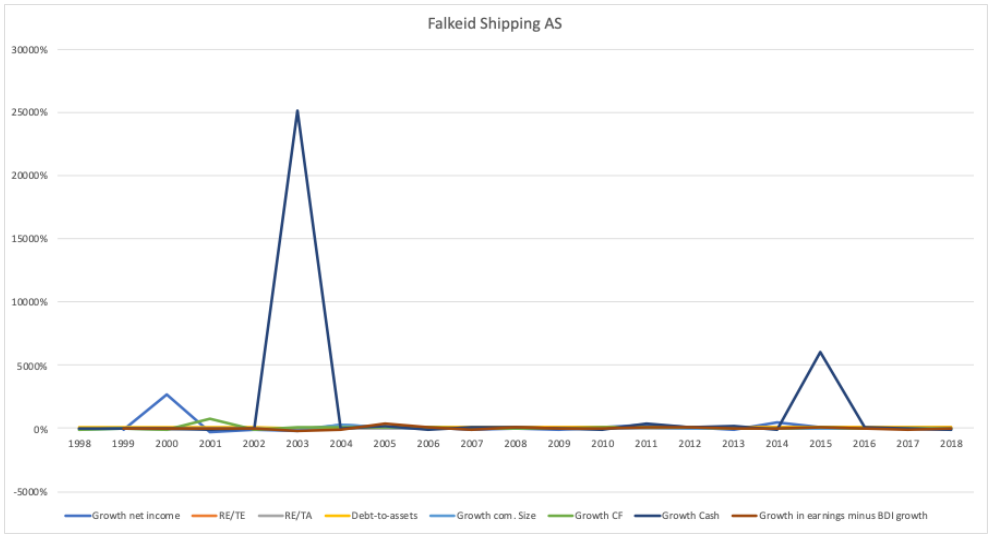
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Falkeid Shipping AS
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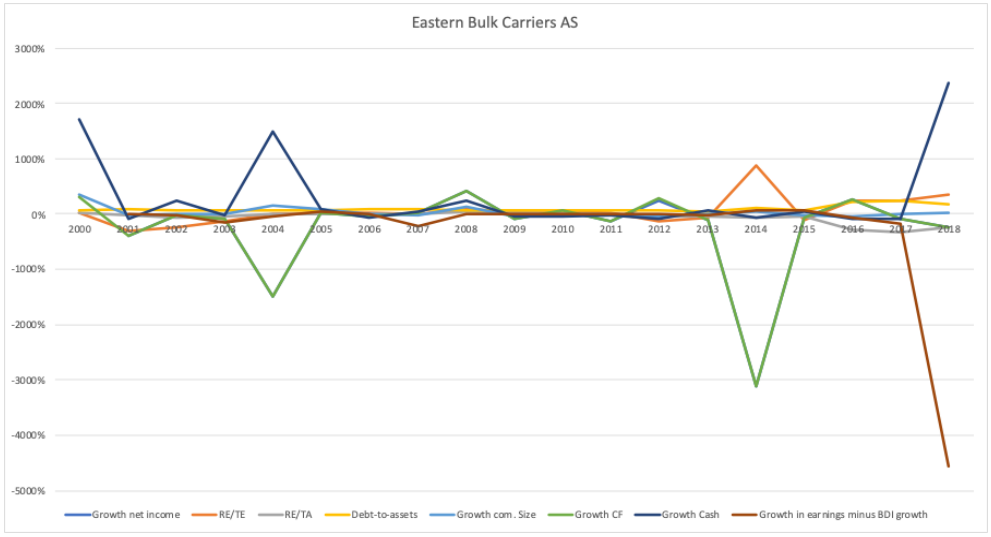
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Eastern Bulk Carriers AS
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Growth net income
RE/TE
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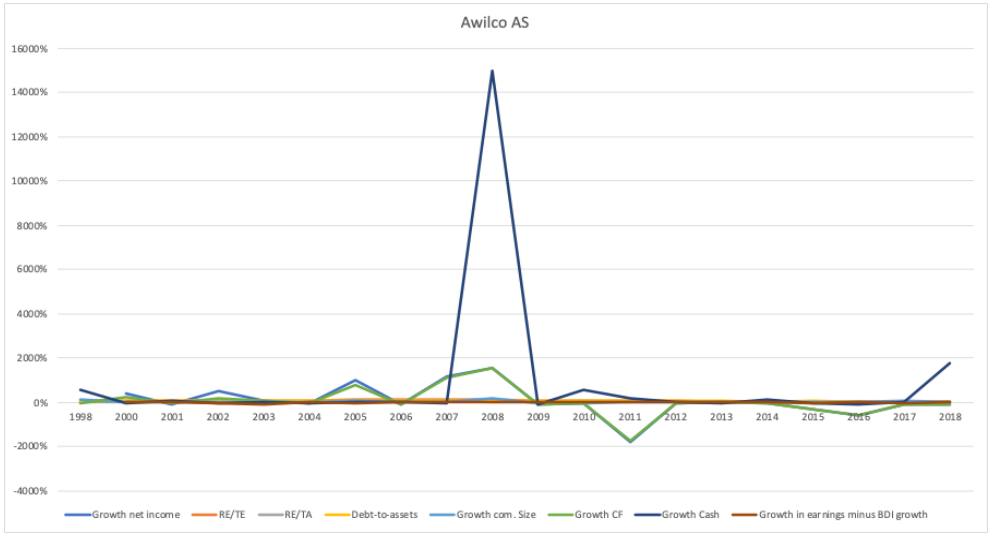
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Awilco AS
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Growth net income
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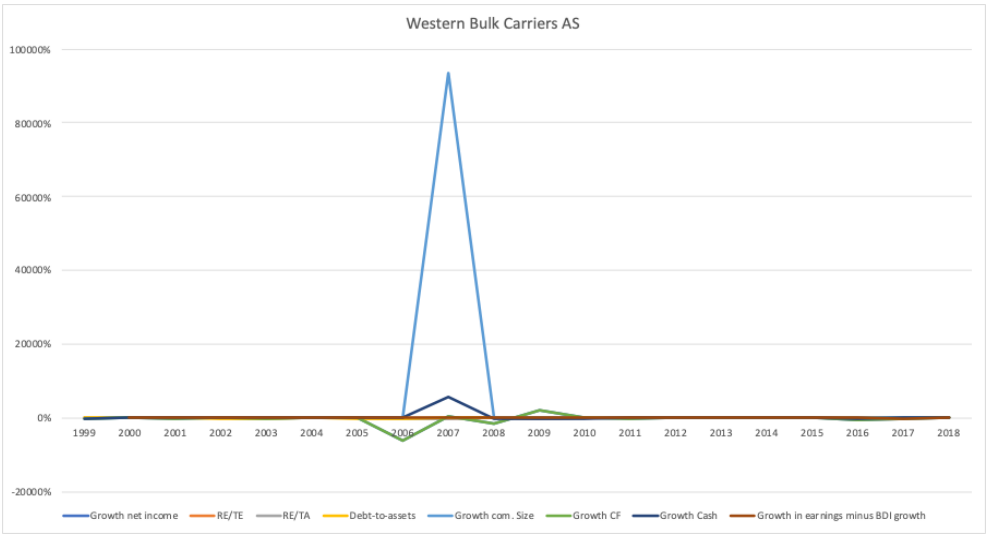
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth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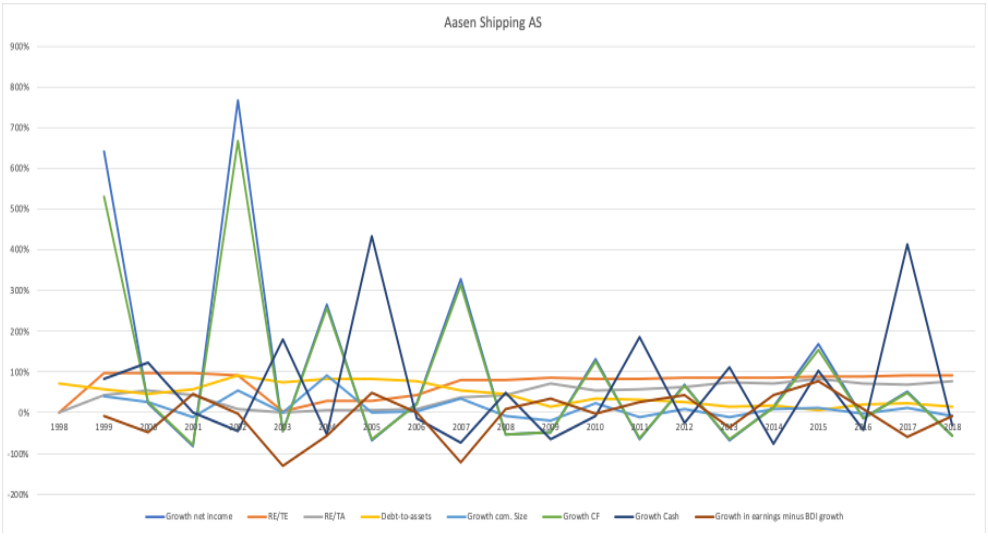
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Aasen Shipping AS
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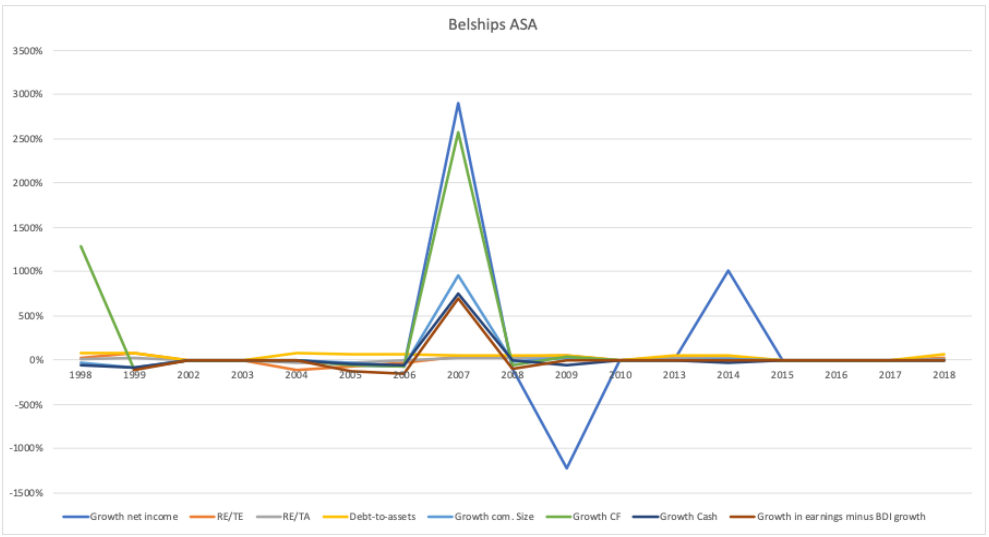
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Belships ASA
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Growth net income
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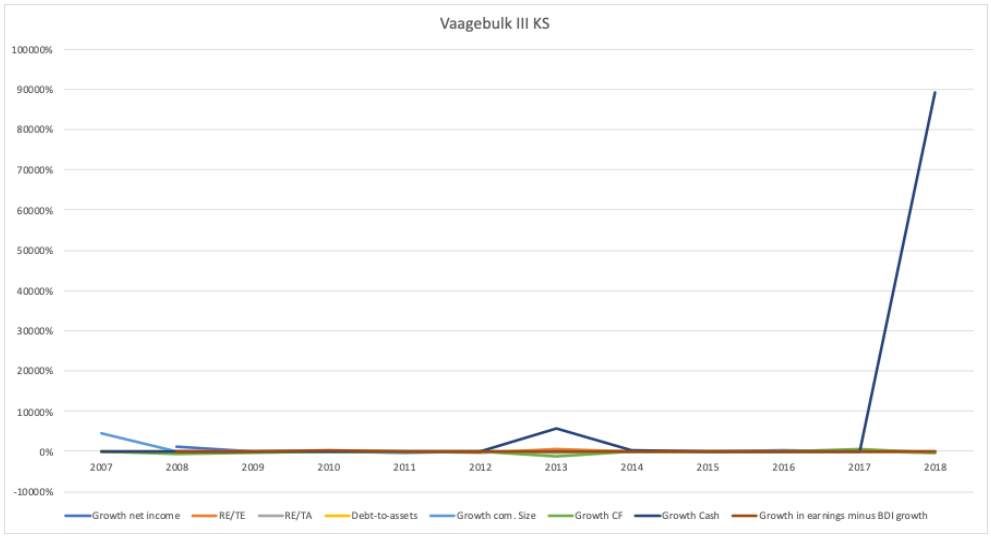
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth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Growth net income
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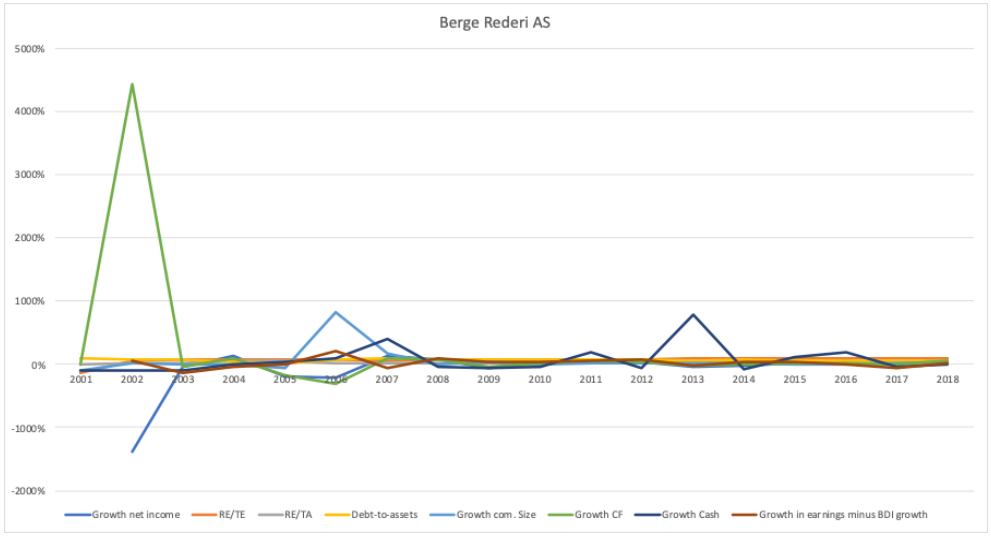
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Berge Rederi AS
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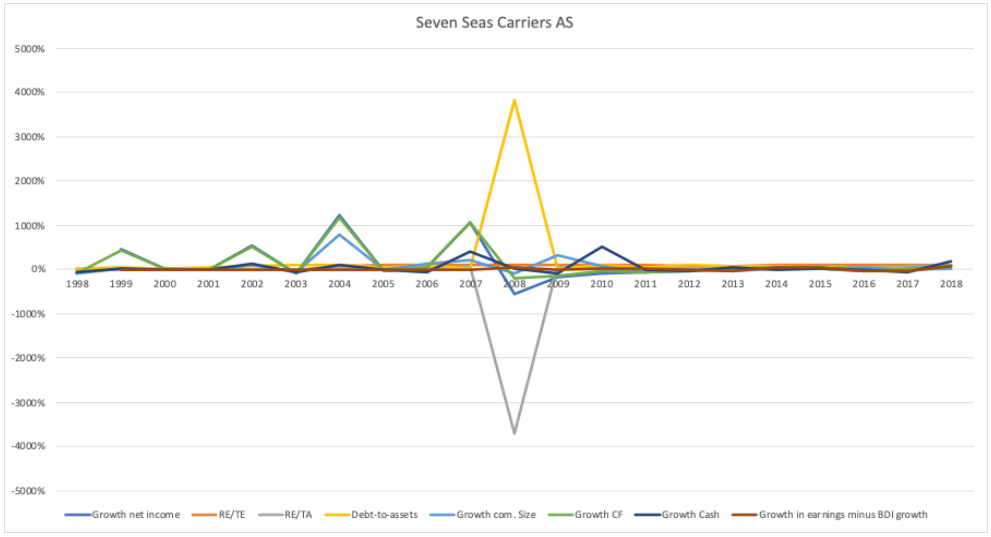
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Seven Seas Carriers AS
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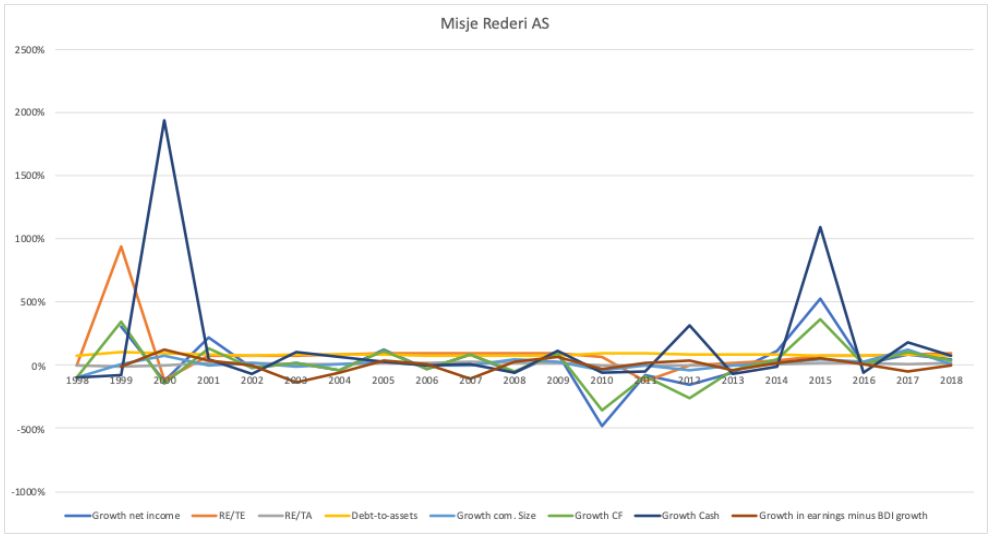
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Misje Rederi AS
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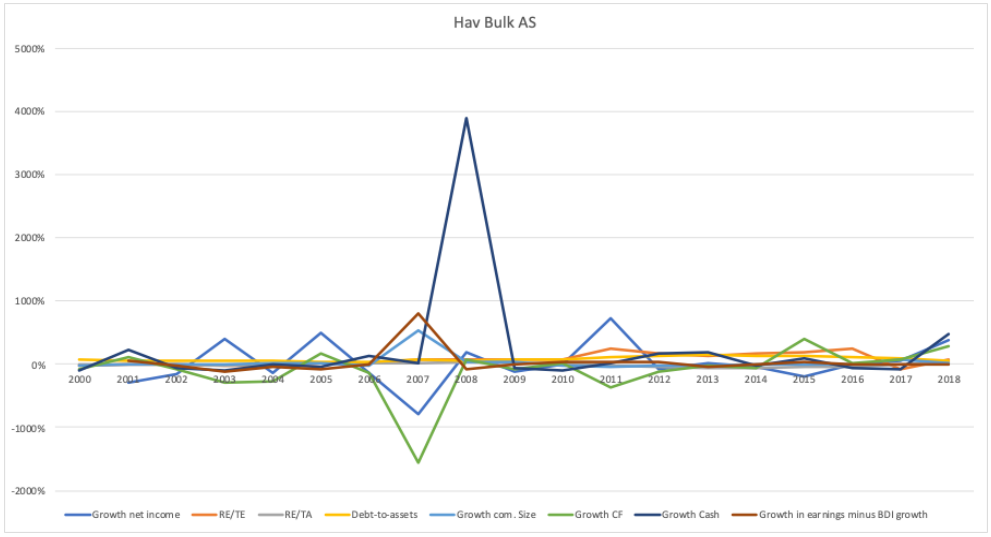
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Hav Bulk AS
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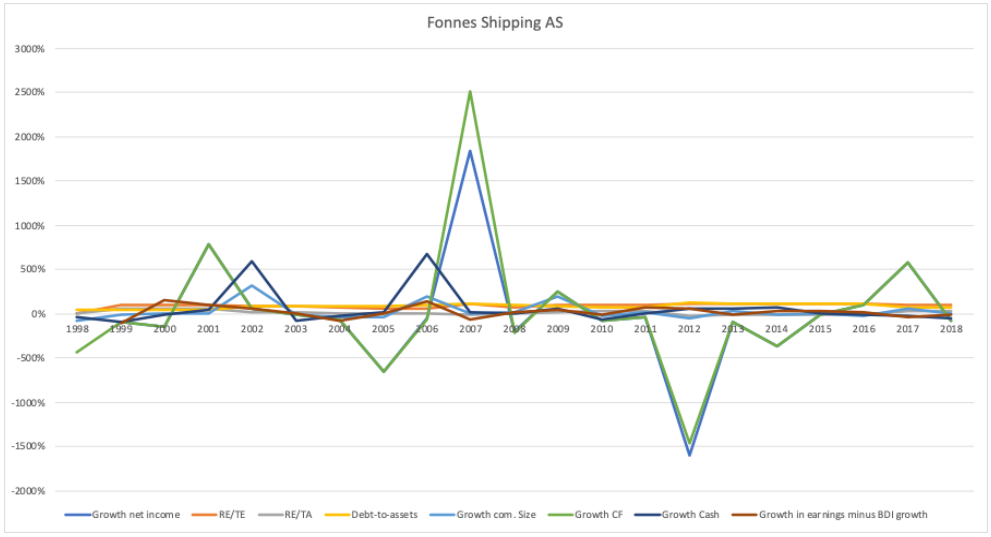
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Fonnes Shipping AS
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Growth net income
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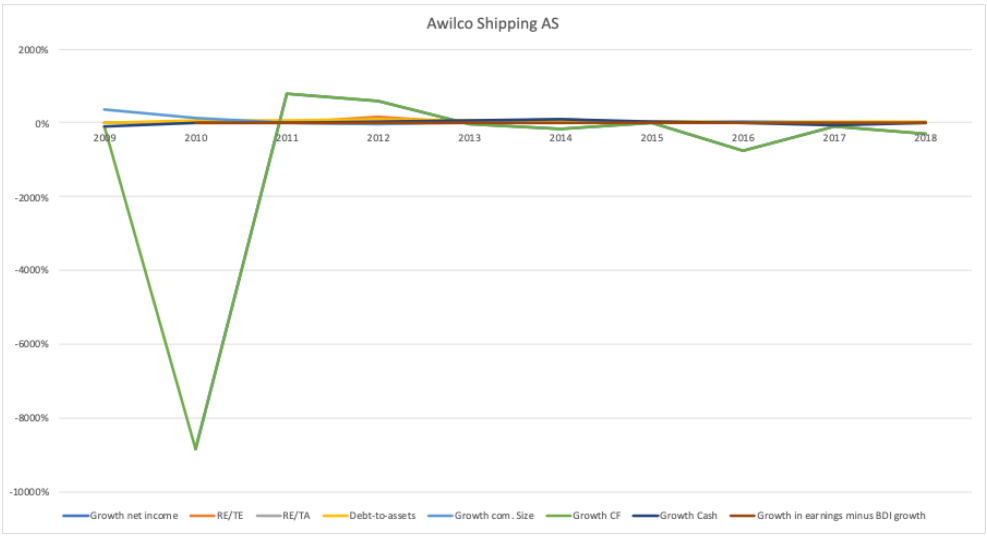
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Awilco Shipping AS
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Growth net income
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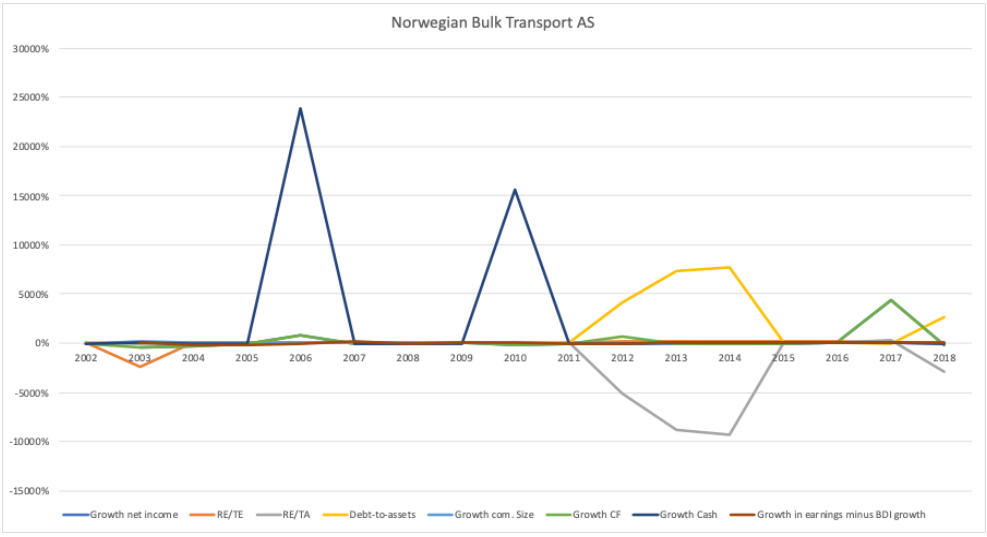
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Norwegian Bulk Transport AS
30000%
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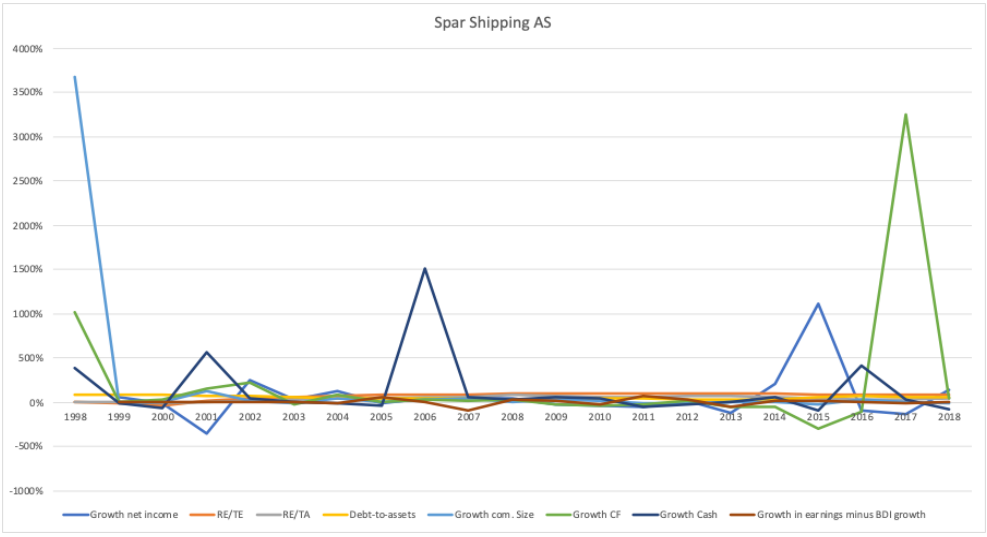
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Spar Shipping AS
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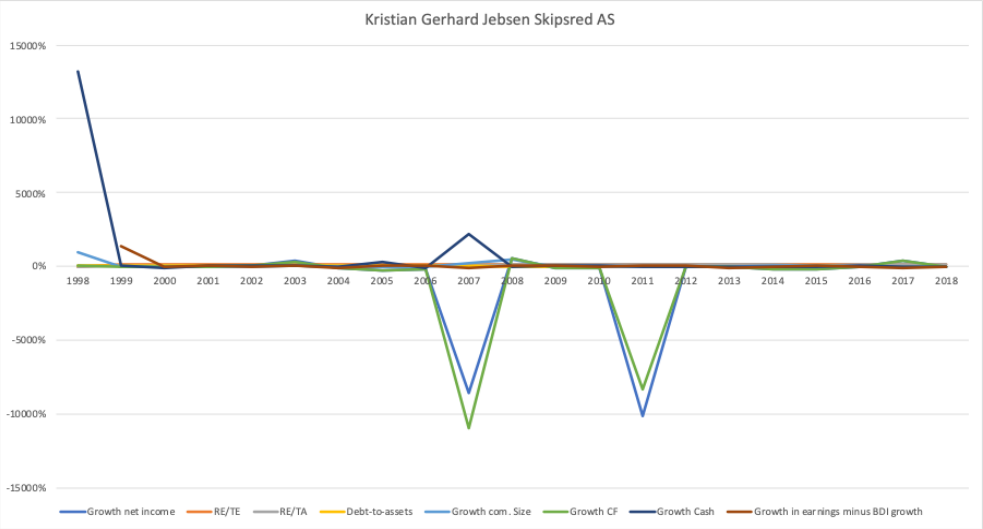
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Kristian Gerhard Jebsen Skipsred AS
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10000%
5000%
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-10000%
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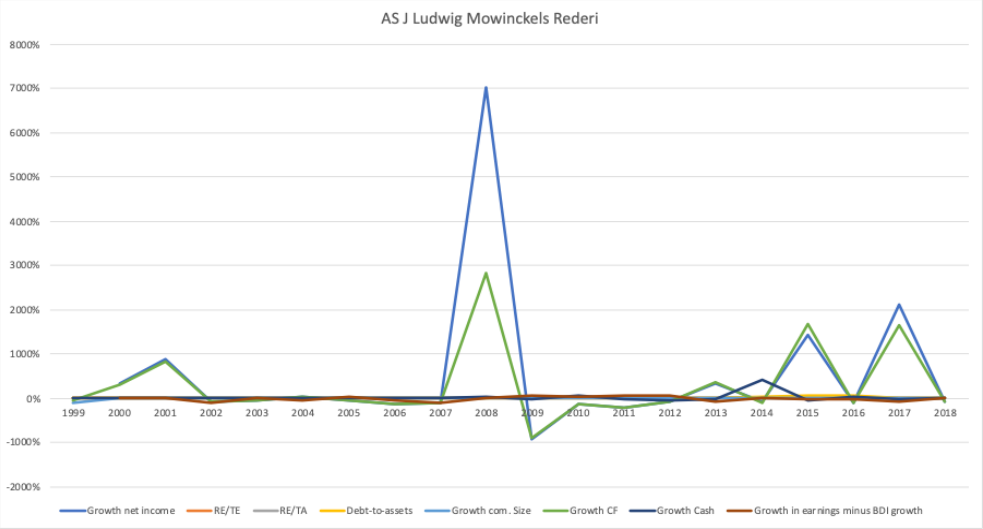
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


AS J Ludwig Mowinckels Rederi
8000%
7000%
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3000%
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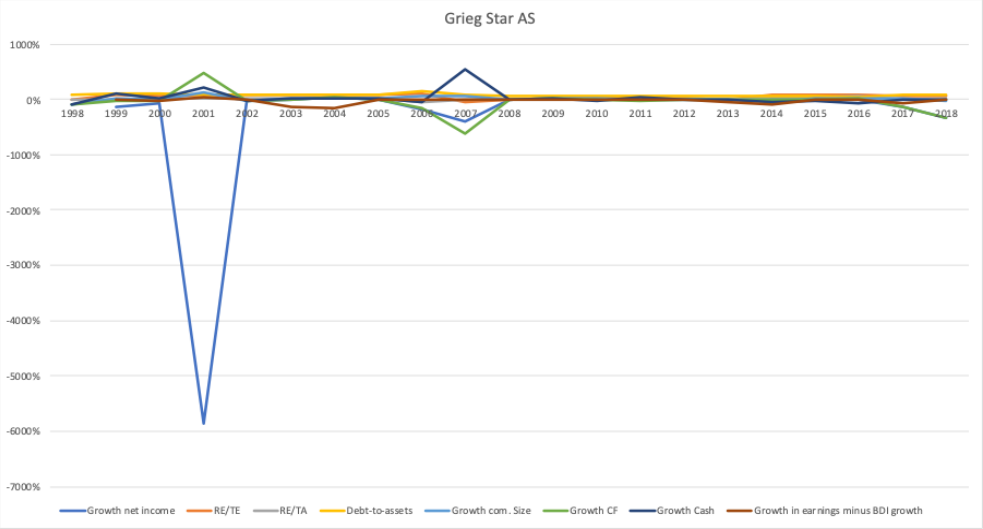
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth


Grieg Star AS
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-4000%
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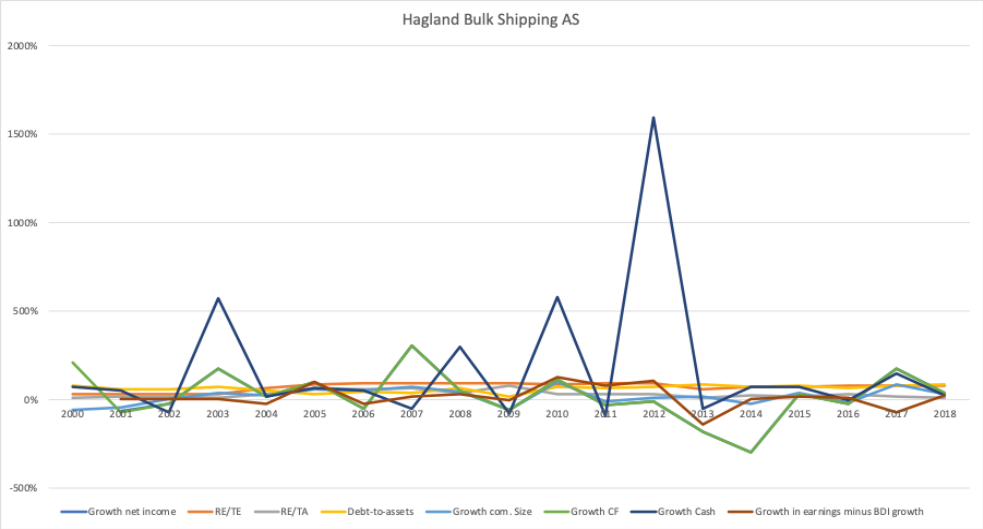
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
Growth net income
RE/TE
RE/TA
Debt-to-assets
Growth com. Size
Growth CF
Growth Cash
Growth in earnings minus BDI growth



APPENDIX 3

Number of companies with negative earnings corrected for market fluctuations

Number of rows with negative numbers for growth in earnings minus BDI
222,00
Total observastions for this key number
438,00
Number of rows with negative numbers for growth in earnings minus BDI
51%

APPENDIX 4

Correlation between growth in earnings and growth in the Baltic Dry Index

```
. correl Growthearnings GrowthBDI
(obs=445)
```

	Growth~s	Growth~I
Growthearn~s	**1.0000**	
GrowthBDI	**0.0263**	**1.0000**

APPENDIX 5

Correlation between measures of the life cycle assessment

```
. correl Year Growthnetincome RETE RETA Debttoassets GrowthcomSize GrowthCF GrowthCash GrowthinearningsminusBDI
> gro
(obs=408)
```

	Year	Growt~me	RETE	RETA	Debtto~s	Growt~ze	GrowthCF	Growth~h	Growth~o
Year	1.0000								
Growthneti~e	0.0082	1.0000							
RETE	0.0338	-0.1208	1.0000						
RETA	-0.0373	-0.0013	-0.0276	1.0000					
Debttoassets	0.0200	0.0013	0.0255	-0.9912	1.0000				
GrowthcomS~e	-0.0779	0.0020	-0.0390	0.1122	-0.1095	1.0000			
GrowthCF	-0.1042	-0.3869	0.0510	-0.0068	0.0145	-0.2101	1.0000		
GrowthCash	0.0500	-0.0075	-0.0156	0.0058	-0.0132	-0.0069	-0.0008	1.0000	
Growthinea~o	-0.0056	-0.0014	-0.0583	0.0253	-0.0189	0.0958	0.0296	-0.0165	1.0000

APPENDIX 6

10 year Norwegian government bonds representing the risk free rate of return

10 YEAR NORWEGIAN GOVERNTMENT BONDS	
Year	**Rate**
1998	5,40%
1999	5,52%
2000	6,22%
2001	6,24%
2002	6,38%
2003	5,04%
2004	4,36%
2005	3,74%
2006	4,07%
2007	4,78%
2008	4,47%
2009	4,00%
2010	3,52%
2011	3,12%
2012	2,10%
2013	2,58%
2014	2,52%
2015	1,57%
2016	1,33%
2017	1,64%
2018	1,88%

APPENDIX 7

Beta and debt-to-equity ratios for comparable companies retrieved from Bloomberg.

	BETA CALCULATION PEERS																			
	JAPAN				KINA				HELLAS				USA				NORWAY			
	Mitsui O.S.K. Lines				COSCO				Anangel-American Shipholdings				Golden Ocean				Namsos Trafikkselskap			
	Levered beta	D/E-ratio	Tax-rate	Unlevered beta	Levered beta	D/E-ratio	Tax-rate	Unlevered beta	Levered beta	D/E-ratio	Tax-rate	Unlevered beta	Levered beta	D/E-ratio	Tax-rate	Unlevered beta	Levered beta	D/E-ratio	Tax-rate	Unlevered beta
1998	1,248	7,31	52%	0,27	2,719	1,32	33%	1,441	0,528	0,83	40%	0,352	0,706	0,47	35%	0,542	0,715	3,91	28%	0,188
1999	1,230	6,82	48%	0,27	2,520	1,32	33%	1,338	0,525	0,84	40%	0,350	0,613	0,47	35%	0,469	0,591	4,37	28%	0,142
2000	1,057	6,85	42%	0,21	2,422	1,39	33%	1,253	0,515	0,83	40%	0,344	0,359	0,51	35%	0,270	0,495	5,56	28%	0,099
2001	1,000	5,44	42%	0,24	2,284	1,15	33%	1,289	0,521	0,76	38%	0,353	0,329	0,55	35%	0,243	0,489	5,53	28%	0,098
2002	0,963	5,30	42%	0,24	2,259	1,39	33%	1,171	0,505	0,77	35%	0,336	0,533	0,60	35%	0,383	0,493	4,25	28%	0,121
2003	1,946	3,48	42%	0,64	1,436	1,42	33%	0,736	0,512	0,67	35%	0,356	0,545	0,58	35%	0,395	0,341	3,58	28%	0,095
2004	0,865	2,94	41%	0,31	1,606	1,29	33%	0,862	0,497	0,62	35%	0,354	0,616	0,58	35%	0,448	0,272	3,36	28%	0,079
2005	0,922	2,31	41%	0,39	1,172	0,52	33%	0,870	0,492	0,47	32%	0,373	0,682	0,62	35%	0,487	0,269	2,60	28%	0,094
2006	0,994	1,85	41%	0,47	1,467	0,51	33%	1,094	0,536	0,45	29%	0,407	0,706	0,61	35%	0,506	0,310	2,66	28%	0,106
2007	1,023	1,69	41%	0,51	1,554	0,22	33%	1,357	0,328	0,37	25%	0,257	0,896	0,51	35%	0,674	0,193	3,08	28%	0,060
2008	1,213	1,78	41%	0,59	1,610	0,25	25%	1,352	0,572	0,35	25%	0,453	1,351	0,46	35%	1,038	0,276	1,88	28%	0,117
2009	1,202	1,71	41%	0,60	1,256	0,14	25%	1,140	0,572	0,27	25%	0,475	1,389	0,50	35%	1,049	0,298	1,03	28%	0,171
2010	1,239	1,71	41%	0,62	1,237	0,24	25%	1,046	0,572	0,30	24%	0,467	1,362	0,42	35%	1,071	0,298	0,73	28%	0,196
2011	1,280	1,93	41%	0,60	1,258	0,30	25%	1,025	0,572	0,35	20%	0,447	1,336	0,43	35%	1,046	0,321	0,96	28%	0,190
2012	1,344	2,89	38%	0,48	1,191	0,27	25%	0,991	0,572	0,33	20%	0,453	1,347	0,40	35%	1,068	0,318	0,43	28%	0,243
2013	1,350	2,33	38%	0,55	1,268	0,21	25%	1,093	0,572	0,32	26%	0,461	1,356	0,31	35%	1,129	0,349	0,68	28%	0,234
2014	1,273	2,21	36%	0,53	1,210	0,19	25%	1,058	0,572	0,31	26%	0,465	1,292	0,41	35%	1,020	0,320	0,45	27%	0,240
2015	1,298	2,91	34%	0,44	1,187	0,17	25%	1,054	0,572	0,39	29%	0,447	1,170	0,81	35%	0,896	0,358	0,40	27%	0,277
2016	1,324	2,68	31%	0,46	1,071	0,17	25%	0,952	0,572	0,43	29%	0,438	1,508	0,86	35%	0,968	0,374	0,57	25%	0,262
2017	1,291	3,09	31%	0,41	0,886	0,17	25%	0,786	0,572	0,38	29%	0,450	1,726	0,84	35%	1,118	0,318	0,23	24%	0,272
2018	1,256	2,82	31%	0,43	0,648	0,14	25%	0,588	0,572	0,36	29%	0,455	1,549	0,89	21%	0,910	0,430	0,22	23%	0,367

D/E GROWTH RATE (to calculate D/E-ratio for Anangel American Shipholdings					
1998					
1999	-0,07	0,00	0,01	0,12	**0,02**
2000	0,00	0,06	0,08	0,27	**0,10**
2001	-0,21	-0,17	0,07	0,00	**-0,08**
2002	-0,03	0,21	0,10	-0,23	**0,01**
2003	-0,34	0,02	-0,03	-0,16	**-0,13**
2004	-0,15	-0,09	-0,01	-0,06	**-0,08**
2005	-0,22	-0,60	0,07	-0,23	**-0,24**
2006	-0,20	-0,02	-0,01	0,02	**-0,05**
2007	-0,09	-0,58	-0,17	0,16	**-0,17**
2008	0,05	0,18	-0,08	-0,39	**-0,06**
2009	-0,04	-0,47	0,08	-0,45	**-0,22**
2010	0,00	0,80	-0,16	-0,29	**0,09**
2011	0,13	0,25	0,02	0,32	**0,18**
2012	0,50	-0,11	-0,06	-0,55	**-0,06**
2013	-0,19	-0,21	-0,23	0,58	**-0,01**
2014	-0,05	-0,10	0,33	-0,33	**-0,04**
2015	0,31	-0,12	0,98	-0,12	**0,26**
2016	-0,08	-0,01	0,05	0,42	**0,10**
2017	0,15	0,02	-0,03	-0,60	**-0,11**
2018	-0,09	-0,21	0,06	-0,01	**-0,06**

APPENDIX 8

Average debt-to-equity ratio calculated from the ratio of comparable companies retrieved from Eikon.

AVERAGE D/E-RATIO									
	Euroseas	FreeSeas	Golden Ocean	Diana Shipping	First Steamship	Jinhui Shipping	Norden AS	Belships	Wilson	AVERAGE D/E
1998	-	-	0,89	-	1,48	0,36	0,40	1,23	-	**0,87**
1999	-	-	0,87	-	1,56	0,56	0,27	1,76	-	**1,00**
2000	-	-	0,87	-	2,56	0,95	0,27	4,08	-	**1,75**
2001	-	-	0,83	-	2,18	0,77	0,35	1,84	-	**1,19**
2002	-	-	0,41	0,85	1,40	0,51	0,20	0,71	1,11	**0,74**
2003	-	-	0,31	0,96	1,14	0,56	0,16	0,72	1,34	**0,74**
2004	1,62	1,05	0,40	0,57	1,21	0,66	0,09	1,11	1,45	**0,91**
2005	0,41	4,67	0,43	0,49	1,15	0,71	0,08	1,25	1,55	**1,19**
2006	0,57	11,43	0,42	0,38	1,17	0,73	0,03	1,33	1,55	**1,96**
2007	0,32	2,53	0,50	0,34	1,21	0,69	0,04	0,73	1,80	**0,91**
2008	0,54	0,98	0,46	0,36	0,84	0,87	0,04	0,82	2,32	**0,80**
2009	0,44	0,96	0,51	0,31	1,36	1,51	0,06	0,77	2,25	**0,91**
2010	0,29	1,33	0,61	0,34	1,03	0,91	0,20	1,26	1,92	**0,88**
2011	0,35	0,50	0,62	0,28	0,24	0,80	0,11	0,89	1,79	**0,62**
2012	0,40	1,77	0,58	0,31	0,23	1,23	0,30	0,57	1,82	**0,80**
2013	0,31	1,67	0,58	0,12	0,40	0,94	0,79	0,93	1,88	**0,85**
2014	0,22	4,14	0,60	0,38	0,55	1,12	0,68	3,35	1,78	**1,42**
2015	0,30	-	0,55	0,04	0,82	0,67	1,46	3,34	1,38	**1,07**
2016	1,97	-	0,45	1,56	0,74	0,44	2,11	3,75	1,96	**1,62**
2017	1,80	-	0,46	1,71	1,01	0,13	1,56	4,97	4,54	**2,02**
2018	0,45	-	0,46	2,31	0,75	0,18	2,11	4,48	9,01	**2,47**

APPENDIX 9

Monthly return of the Baltic Dry Index used to calculate yearly average as well as growth in these measures

BALTIC DRY INDEX FREIGHT RATES																					
1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1367	1039	827	1319	1504	908	1530	5551	4488	2081	4225	6052	1070	2848	1107	680	760	1110	608	317	800	1152
1443	1080	964	1531	1537	1031	1764	5263	4726	2680	4765	7613	1986	2738	1251	750	757	1258	540	329	859	1192
1513	966	902	1660	1438	1082	1939	4822	4637	2496	5388	8081	1615	2998	1530	934	910	1362	602	429	1297	1055
1259	1004	1091	1628	1459	1027	2142	3958	3850	2368	6248	9356	1786	3354	1269	1155	863	943	591	703	1109	1341
1274	946	982	1566	1389	1042	2127	3286	3219	2436	5971	11440	3494	4078	1480	923	809	934	589	612	878	1090
1320	856	970	1616	1386	1005	2125	3005	2521	2964	6278	9589	3757	2406	1413	1004	1171	850	800	660	901	1385
1280	825	1003	1642	1049	968	2181	4048	1804	3285	6967	8341	3350	1967	1264	897	1062	755	1131	656	946	1747
1330	817	1038	1652	927	1036	2265	4186	2592	3847	7702	6809	2421	2713	1619	703	1132	1147	903	711	1184	1579
1277	946	1243	1739	952	1367	2993	4105	2907	3944	9474	3217	2220	2446	1899	766	2003	1063	900	875	1356	1540
1318	955	1351	1759	861	1417	4555	4922	3113	4037	10656	851	3103	2678	1965	1026	1504	1428	721	857	1522	1490
1175	941	1319	1672	868	1560	4417	6151	2770	4336	10210	715	3887	2099	1846	1086	1821	1153	584	1204	1578	1231
1231	794	1531	1599	876	1738	4765	4598	2407	4397	9143	774	3005	1773	1738	699	2277	782	478	961	1366	1271
1316	**931**	**1102**	**1615**	**1187**	**1182**	**2734**	**4491**	**3253**	**3239**	**7252**	**6070**	**2641**	**2675**	**1532**	**885**	**1256**	**1065**	**704**	**693**	**1150**	**1339**

MARKET RETURN			
	Yearly avg.	Return	w/market avg.
1997	1316		
1998	931	-29%	10%
1999	1102	18%	18%
2000	1615	47%	47%
2001	1187	-27%	10%
2002	1182	0%	0%
2003	2734	131%	131%
2004	4491	64%	64%
2005	3253	-28%	10%
2006	3239	0%	0%
2007	7252	124%	124%
2008	6070	-16%	10%
2009	2641	-56%	10%
2010	2675	1%	1%
2011	1532	-43%	10%
2012	885	-42%	10%
2013	1256	42%	42%
2014	1065	-15%	10%
2015	704	-34%	10%
2016	693	-2%	10%
2017	1150	66%	66%
2018	1339	17%	17%

APPENDIX 10

Calculation of the cost of equity

CAPM CALCULATION				
	Risk-free rate	Levered BETA	Market risk premium	CAPM (Re)
1998	5,40%	0,911	4,95%	9,91%
1999	5,52%	0,885	12,85%	16,90%
2000	6,22%	0,983	40,39%	45,93%
2001	6,24%	0,827	4,11%	9,64%
2002	6,38%	0,689	-6,84%	1,67%
2003	5,04%	0,683	126,28%	91,30%
2004	4,36%	0,681	59,94%	45,16%
2005	3,74%	0,823	6,61%	9,18%
2006	4,07%	1,246	-4,49%	-1,52%
2007	4,78%	0,945	119,11%	117,34%
2008	4,47%	1,121	5,88%	11,07%
2009	4,00%	1,135	6,35%	11,22%
2010	3,52%	1,108	-2,25%	1,03%
2011	3,12%	0,956	7,23%	10,04%
2012	2,10%	1,021	8,25%	10,53%
2013	2,58%	1,117	39,27%	46,45%
2014	2,52%	1,349	7,83%	13,09%
2015	1,57%	1,110	8,78%	11,33%
2016	1,33%	1,367	9,02%	13,67%
2017	1,64%	1,541	64,30%	100,72%
2018	1,88%	1,593	14,62%	25,18%

APPENDIX 11

Lowest WACC and respective capital structure

Name	Year	WACC	D/E
Aasen Shipping AS	2002	0,52%	8,620
	2010	0,88%	0,452
	2006	0,99%	1,074
AAT Shipinvest AS	2014	7,01%	0,508
	2016	8,39%	0,160
	2015	8,41%	0,179
American Shipping Company ASA	2006	-1,45%	0,012
	2010	3,79%	0,011
	2011	7,72%	0,014
Arriva Shipping AS	2000	-3,45%	- 8,630
	1999	-0,40%	- 15,133
	2006	0,04%	15,231
AS J Ludwig Mowinckels Rederi	2018	7,11%	5,801
	2016	11,63%	28,239
	2014	15,26%	10,156
Awilco AS	2002	0,37%	2,776
	2006	1,68%	0,194
	2008	2,97%	3,239
Awilco Shipping AS	2015	7,87%	0,002
	2014	9,29%	0,000
	2011	9,70%	0,000
Belships ASA	2006	1,85%	0,342
	2005	6,13%	0,578
	1999	7,41%	0,263
Berge Rederi AS	2006	2,67%	0,353
	2010	4,38%	0,245
	2002	4,69%	1,062
Bulkship Management AS	2002	0,39%	13,676
	2008	0,46%	39,433
	2005	0,89%	27,807
Eastern Bulk Carriers AS	2017	-128,77%	- 0,233
	2018	-20,94%	- 0,142
	2016	-16,53%	- 0,149
Falkeid Shipping AS	2006	1,60%	1,085
	2002	2,18%	0,931
	2010	2,44%	0,275
Fjord Shipping AS	2006	0,68%	1,933
	2010	2,19%	1,659
	2009	2,88%	6,234
Fonnes Shipping AS	2007	-14,11%	- 6,238
	2014	-1,56%	- 7,615
	2015	-1,12%	- 8,961
Grieg Star AS	2002	0,29%	8,913
	2010	0,48%	1,400
	2005	0,94%	8,828
Grieg Star Group AS	2010	1,06%	0,037
	2011	9,64%	0,013
	2008	9,70%	0,143
Hagland Bulk Shipping AS	2006	-0,51%	0,566
	2015	0,91%	3,188
	2008	1,57%	1,440
Hagland Shipping AS	2010	0,33%	3,093
	2012	1,19%	7,790
	2006	1,25%	6,039
Hav Bulk AS	2013	-6,63%	- 0,833
	2012	-2,30%	- 1,571
	2006	0,94%	0,453
Hav Ship Management Norrus AS	2017	-103,40%	- 1,891
	2013	-65,60%	- 0,461
	2018	-39,98%	- 1,030
Kopervik Ship Management AS	2006	-0,76%	0,901
	2002	0,48%	9,012
	2010	1,28%	0,428
Kristian Gerhard Jebsen Skipsred AS	2002	2,92%	0,078
	2006	3,17%	0,461
	2010	4,95%	0,020
Lorentzens Skibs AS	2001	3,75%	8,307
	1998	3,93%	1,129
	2005	5,90%	0,607
Misje Rederi AS	2006	0,50%	3,758
	2011	1,77%	19,501
	2012	1,99%	8,075
Myklebusthaug Management AS	1998	-0,15%	- 2,268
	2010	2,06%	1,378
	2005	4,03%	7,504
Namsos Trafikkselskap ASA/NTS AS/	2006	1,16%	1,169
	1998	2,71%	1,399
	2010	4,10%	0,574
Norwegian Bulk Transport AS	2013	-3344,64%	- 0,324
	2014	-1001,54%	- 0,364
	2018	-645,77%	- 0,950
Ocean Yield ASA	2010	2,05%	0,000
	2011	5,17%	0,001
	2016	6,06%	0,113
Rederiaksjeselskapet Torvald Klaven	2006	0,00%	0,003
	2010	2,62%	0,139
	2012	3,66%	0,615
Saga Welco AS	2018	-2,38%	1,980
	1999	-0,68%	- 16,684
	2015	0,46%	6,065
Seven Seas Carriers AS	2009	-32,42%	0,274
	2010	-15,55%	9,001
	2012	1,26%	8,983
Spar Shipping AS	2006	0,54%	0,080
	2010	1,14%	0,125
	2002	1,82%	0,086
Ugland Bulk Transport AS	2006	0,00%	373,660
	2002	0,00%	437,420
	2001	0,01%	646,740
Uglands Rederi AS	2011	1,31%	0,087
	2007	2,78%	0,185
	2003	3,84%	0,199
Vaagebulk III AS	2010	0,04%	1,149
	2009	0,57%	0,429
	2008	0,75%	0,096
Vaagebulk III KS	2010	2,58%	0,059
	2012	3,68%	0,134
	2011	4,95%	3,888
Western Bulk Carriers AS	2010	0,76%	0,369
	2012	1,55%	5,922
	2011	1,72%	5,332
Western Bulk Chartering AS	2009	1,22%	0,243
	2010	3,15%	6,370
	2011	8,02%	3,793
Wilson Eurocarrier AS	2016	1,26%	145,516
	2017	2,40%	167,645
	2004	3,24%	152,684

Correlation
0,032

APPENDIX 12

Regression analysis and vif-test of the determining factors

```
. regress DE Tangibility1 Firmsize2 Growthopportunities Profitability1 Volatility
```

Source	SS	df	MS	Number of obs	=	471
				F(5, 465)	=	15.61
Model	1475625.6	5	295125.121	Prob > F	=	0.0000
Residual	8792951.76	465	18909.5737	R-squared	=	0.1437
				Adj R-squared	=	0.1345
Total	10268577.4	470	21848.0369	Root MSE	=	137.51

DE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Tangibility1	-111.6613	19.02957	-5.87	0.000	-149.0559	-74.26672
Firmsize2	34.07758	7.001376	4.87	0.000	20.31933	47.83583
Growthopportunities	-83.02381	83.9029	-0.99	0.323	-247.8996	81.852
Profitability1	1.74069	2.882634	0.60	0.546	-3.923912	7.405292
Volatility	-.1172612	.8719644	-0.13	0.893	-1.83074	1.596217
_cons	-63.87329	36.2908	-1.76	0.079	-135.1876	7.440992

```
. estat vif
```

Variable	VIF	1/VIF
Tangibility1	1.07	0.931095
Firmsize2	1.07	0.937034
Growthoppo~s	1.04	0.961739
Profitabil~1	1.04	0.963173
Volatility	1.01	0.992638
Mean VIF	1.05	

APPENDIX 13

Regression analysis time interval 1

```
. regress DE Tangibility1 Firmsize2 Growthopportunities Profitability1 Volatility if (int1==1)
```

Source	SS	df	MS	Number of obs	=	117
				F(5, 111)	=	5.91
Model	1627645.09	5	325529.018	Prob > F	=	0.0001
Residual	6117212.87	111	55110.0259	R-squared	=	0.2102
				Adj R-squared	=	0.1746
Total	7744857.96	116	66766.0169	Root MSE	=	234.76

DE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Tangibility1	-207.1783	68.42195	-3.03	0.003	-342.7609	-71.5956
Firmsize2	81.79047	25.92042	3.16	0.002	30.42742	133.1535
Growthopportunities	-175.6948	227.1472	-0.77	0.441	-625.8021	274.4126
Profitability1	-121.8641	152.6674	-0.80	0.426	-424.3847	180.6565
Volatility	-.7876504	1.654186	-0.48	0.635	-4.06553	2.490229
_cons	-188.818	134.9442	-1.40	0.165	-456.219	78.58297

APPENDIX 14

Regression analysis time interval 2

```
. regress DE Tangibility1 Firmsize2 Growthopportunities Profitability1 Volatility if (int2==1)
```

Source	SS	df	MS	Number of obs	=	152
				F(5, 146)	=	9.18
Model	331582.136	5	66316.4272	Prob > F	=	0.0000
Residual	1054156.33	146	7220.24882	R-squared	=	0.2393
				Adj R-squared	=	0.2132
Total	1385738.46	151	9177.07592	Root MSE	=	84.972

DE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Tangibility1	-95.65995	20.82573	-4.59	0.000	-136.8188	-54.50112
Firmsize2	23.4835	6.968367	3.37	0.001	9.711598	37.2554
Growthopportunities	-34.37071	129.9946	-0.26	0.792	-291.285	222.5436
Profitability1	1.40994	1.913001	0.74	0.462	-2.370811	5.190692
Volatility	-.1365225	3.064034	-0.04	0.965	-6.192112	5.919067
_cons	-27.70497	36.69595	-0.75	0.451	-100.2289	44.81891

APPENDIX 15

Regression analysis time interval 3

```
. regress DE Tangibility1 Firmsize2 Growthopportunities Profitability1 Volatility if (int3==1)
```

Source	SS	df	MS	Number of obs	=	202
				F(5, 196)	=	8.80
Model	179440.843	5	35888.1685	Prob > F	=	0.0000
Residual	799677.236	196	4079.9859	R-squared	=	0.1833
				Adj R-squared	=	0.1624
Total	979118.079	201	4871.23422	Root MSE	=	63.875

DE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Tangibility1	-67.35528	13.60072	-4.95	0.000	-94.17782	-40.53274
Firmsize2	17.32343	5.384415	3.22	0.002	6.704603	27.94226
Growthopportunities	9.985977	64.92325	0.15	0.878	-118.0518	138.0238
Profitability1	-1.991454	17.17361	-0.12	0.908	-35.86024	31.87733
Volatility	.2466945	1.135587	0.22	0.828	-1.992844	2.486233
_cons	-25.82679	28.0816	-0.92	0.359	-81.20767	29.55408

APPENDIX 16

Regression analysis through 1

```
. regress DE Tangibility1 Firmsize2 Growthopportunities Profitability1 Volatility if (through1==1)
```

Source	SS	df	MS	Number of obs	=	76
				F(5, 70)	=	4.51
Model	1769680.64	5	353936.128	Prob > F	=	0.0013
Residual	5491984.06	70	78456.9152	R-squared	=	0.2437
				Adj R-squared	=	0.1897
Total	7261664.7	75	96822.196	Root MSE	=	280.1

DE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Tangibility1	-251.9066	107.382	-2.35	0.022	-466.0732	-37.74002
Firmsize2	111.7833	39.50528	2.83	0.006	32.99256	190.5741
Growthopportunities	-165.7047	286.7141	-0.58	0.565	-737.5379	406.1285
Profitability1	2.579339	231.5472	0.01	0.991	-459.227	464.3857
Volatility	-.8969399	2.007679	-0.45	0.656	-4.90113	3.10725
_cons	-279.9873	206.3605	-1.36	0.179	-691.5604	131.5858

APPENDIX 17

Regression analysis through 2

```
. regress DE Tangibility1 Firmsize2 Growthopportunities Profitability1 Volatility if (through2==1)
```

Source	SS	df	MS	Number of obs	=	209
				F(5, 203)	=	11.84
Model	251021.08	5	50204.216	Prob > F	=	0.0000
Residual	860802.081	203	4240.40434	R-squared	=	0.2258
				Adj R-squared	=	0.2067
Total	1111823.16	208	5345.30366	Root MSE	=	65.118

DE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Tangibility1	-73.74614	13.50471	-5.46	0.000	-100.3736	-47.11865
Firmsize2	19.71601	5.17108	3.81	0.000	9.520096	29.91193
Growthopportunities	19.58391	65.48857	0.30	0.765	-109.5411	148.709
Profitability1	1.060791	6.435957	0.16	0.869	-11.62911	13.75069
Volatility	-.0536865	2.418385	-0.02	0.982	-4.822061	4.714688
_cons	-31.18442	26.98657	-1.16	0.249	-84.39434	22.02551