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ACCOUNTING POLICIES & ESTIMATES IN SHIPPING SECTOR (IFRS & US GAAP), IMPACT ON FINANCIAL PERFORMANCE AND AUDIT PRACTICES

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Contents

Accounting Policies and Estimates in Shipping Sector (IFRS & US GAAP), Impact on Financial Performance and Audit Practices

Abstract

The purpose of this master thesis is to provide an analysis and insights of the accounting policies commonly used in shipping industry, which involve significant judgment and estimates by management of shipping companies. In particular, given the substantial amounts invested in long lived assets, we focus our interest on "Vessels" accounts and provide a thorough view of differences and similarities of accounting policies under the two major accounting frameworks, used in shipping sector, IFRS and US GAAP. In addition, with the use of a sample of listed shipping companies it is attempted to present the effect of different accounting conventions on profitability KPI's and their variations under different accounting standards in order to highlight the importance of transparent and comparable financial reporting. In this context this thesis, underlines the role of auditing profession and present a profound analysis and practical examples of auditing approaches used, based on auditing standards in order to meet the expectations of relevant, reliable, comparable and consistent accounting information.

Keywords: Financial Statements, shipping companies, accounting estimates, accounting policies, KPI's, IFRS, US GAAP, audit

Preface

During the process of writing this thesis, I have found support from a lot of different people. First, I would like to express my gratitude to professor Merikas, for providing feedback, comments and suggestions during the writing process. Second, my thanks go to my fellow students and friends who provided me with suggestions and advice. Third, my special thanks to my family for their support.

INTRODUCTION

Shipping is a capital intensive industry where non-current assets represent a significant portion of shipping companies' balance sheets. Financial reporting frameworks attempt to face the major challenges raised by the dynamics of shipping sector and embed a culture of financial reporting transparency and comparability of information. Undoubtedly, significant risks associated with investments in long lived assets of shipping companies and the extent to which they are successfully managed has a significant impact on the financial performance of ship owners. Taken into consideration the choices existed and assumptions required in the world of shipping accounting, it is of a paramount importance to ensure that the exposure of shipping entities to these risks, and their relative success in managing them, is properly reflected and disclosed in the financial statements.

The present dissertation is organized in four chapters. The first chapter provides an overview of the financial reporting, describing its objectives and the main standard setting bodies of accounting guidance and presenting financial statements and their elements with a reference to the Conceptual Framework of Financial Reporting, as the main tools for the analysis of an entity's financial condition and business performance.

The second chapter highlights the key accounting areas that merit significant interest from the financial reporting and accounting departments of shipping companies, due to the considerable value of reported amounts, the extent of estimation uncertainty of the underlying assumptions and the availability of choices under the different financial reporting frameworks. The analysis provided is concentrated on fixed assets – "Vessels" - accounting treatment throughout their lifecycle, from acquisition to disposal and ended up to a comparative presentation of the accounting differences between IFRS and US GAAP. This chapter exploits, also, the impact of the flexibility provided by the accounting policies, to the financial performance of a shipping companies, as depicted in key financial profitability ratios. In particular, we investigated the effect of dry-docking different accounting treatments on Du Pont disaggregated component KPI's through the application on a sample of five listed shipping companies.

Chapter 3 includes an analysis of the importance of estimates and judgements made by the preparers of financial statements and aims at shed light on the main accounting estimates developed in shipping industry and underpins the financial reporting of shipping companies which are Useful Economic Life and Residual Value of Vessels, as well as revenue cash flow projections used in impairment assessment of Vessels. Through the analysis of a case study listed shipping company, we attempt to assess the comparability and consistency of the assumptions underlie these estimates by perform meaningful comparisons with other peer companies and by reference to industry available relevant market data.

The fourth chapter is devoted to audit practices and procedures used by audit professionals, based on relevant auditing standards and authoritative guidance, in order to address the estimation uncertainty and lack of precision of data supporting accounting estimates. Their pivotal role in ensuring credibility, transparency and uniformity in financial reporting is highlighted. The chapter is concluded by conducting a thorough analysis and evaluation, from an auditor's perspective, of assumptions used for one of the most critical accounting policies, this of impairment, for our case study shipping company. Sensitivity analysis of impairment's exercise main assumptions and scenarios analysis is performed in order to assess the reasonability and robustness of the judgements and estimates made and present the magnitude of a possible change in the outcome of this test.

1. FINANCIAL REPORTING REGULATORY FRAMEWORK AND BASIC CONCEPTS OF ACCOUNTING

1.1 The objective of financial reporting and importance of accounting standards

As stated in Conceptual Framework for financial reporting which is the outcome of a joint project of IASB and FASB, published in September 2010, the objective of financial reporting is to provide financial information about the reporting entity that is useful to existing and potential investors, lenders and other creditors in making decisions about providing resources to the entity.

The users of financial statements require information about the economic resources of the entity, the claims against the entity and changes in the entity's economic resources and claims. Information about the entity's economic resources and the claims against it supports intended users to assess the entity's liquidity and solvency and its likely needs for additional financing. Information relating to the company's financial performance (the changes in its economic resources and claims) contribute to their understanding the return that the entity has produced on its economic resources. This is an indicator of how efficiently and effectively management has exploit the resources of the company and is helping in predicting future prospects.

In order for the financial information to be useful to the intended users and serve as a proper basis of financial decision making process, it must be relevant and faithfully represent what it purports to represent. The usefulness of financial information, according to framework, is enhanced if it bears the fundamental qualitative characteristics of comparability, verifiability, timeliness and understandability. These concepts and the necessity for consistent and transparent recording and reporting of business transactions, have led to codification and standardization of accounting principles, to what we call accounting or financial reporting standards.

IFRS Foundation highlights the link between reporting financial condition and accounting guidance by defying that accounting standards are a set of principles that companies follow when they prepare and publish their financial statements, providing a standardized way of describing the company's financial performance. Publicly accountable companies

(those listed on public stock exchanges) and financial institutions are legally required to publish their financial reports in accordance with agreed accounting standards.

Financial reporting standards is the lifeblood of capital markets as they ensure transparency by enhancing the international comparability and quality of financial information, enabling investors and other market participants to make informed economic decisions. Furthermore, they strengthen accountability by reducing the information gap between the providers of capital and the people to whom they have entrusted their money. Also, as a source of globally comparable information, accounting standards are also of vital importance to regulators around the world. Finally financial reporting standards contribute to economic efficiency by helping investors to identify opportunities and risks across the world, thus improving capital allocation.

Globalization of capital markets leads for the need of convergence & harmonization of accounting standards worldwide since the use of a uniform, reliable accounting language reduces the inconsistencies arose when the facts and circumstances surrounding two transactions are the same, but the accounting treatment varies under the different accounting frameworks. The G20[1] and other major international organizations, as well as very many governments, investors and members of the worldwide accountancy profession support the goal of a single set of high quality, global accounting standards. Modern economies rely on cross-border transactions and the free flow of international capital. More than a third of all financial transactions occur across borders, and that number is expected to grow. Investors call for diversification and investment opportunities across the world, while multinational companies raise capital, undertake transactions or have international operations and subsidiaries in numerous countries. In the past, such cross-border activities were performed by different countries maintaining their own sets of national accounting standards. This patchwork of accounting requirements often added cost, complexity and ultimately risk both to companies preparing financial statements and investors and others users of those financial statements who to make economic decisions.

In an ideal world, there would only be one set of accounting standards globally, which would all be applied uniformly in every country, and regulators would consider the

[1] G20 Leaders Declaration, Los Cabos, 18-19 June 2012, paragraph 43

outputs on a consistent basis. Based on statistics published on IFRS Foundation's official web site, in 2017 the IASB profiled 150 jurisdictions[2]:

- 95% (142/150 jurisdictions) have made a public commitment to IFRS as the single set of global accounting standards; and
- 84% (126/150 jurisdictions) already require the use of IFRS by all or most domestic public companies, with most of the remaining jurisdictions permitting their use.

Also, more than 27,000 of the approximately 49,000 domestic listed companies on the 88 major securities exchanges in the world use IFRS Standards and of those domestic listed companies that do not use IFRS Standards, nearly 90 per cent are listed in China, India, Japan, and the United States. Of the nearly 3,000 foreign listed companies on the 88 major securities exchanges, we are aware of nearly 900 of those companies using IFRS Standards.

In shipping industry IFRS is the dominant financial reporting framework as it is used by the majority of listed shipping company. According to a survey published in 2012 by Moore Stephens[3] consulting firm, from a sample of 100 listed shipping entities studied, 72% of them prepare their financial statements under IFRS, 14% under US GAAP and the remaining used reporting framework of other GAAPs. Therefore, our analysis and presentation of accounting practices and policies, conducted on the following chapters of this thesis, will be based on both IFRS and US GAAP financial reporting frameworks, as the most commonly encountered in shipping sector.

1.2 Financial reporting standard-setting bodies and regulatory authorities

1.2.1 International Financial Reporting Standards Foundation (IFRS Foundation)

IFRS Standards are set by the IFRS Foundation's standard-setting body, the International Accounting Standards Board. The IFRS Foundation is the legal entity under which the

[2] IFRS Foundation official website, Analysis of IFRS Standards Around the world, Analysis of the 150 profiles section
[3] Moore Stephens LLP (2012), Comparative Study On Accounting Policies & KPIs in the Shipping Industry

International Accounting Standards Board (IASB) operates. The Foundation is governed by a board of 22 trustees. The foundation was formerly named the International Accounting Standards Committee (IASC) Foundation until a renaming on 1 July 2010. The IFRS Foundation is a not-for-profit, public interest organization established to develop a single set of high-quality, understandable, enforceable and globally accepted accounting standards and to promote and facilitate adoption of the standards.

1.2.2 International Accounting Standards Board (IASB)

IASB is an independent group of experts with an appropriate mix of recent practical experience in setting accounting standards, in preparing, auditing, or using financial reports, and in accounting education. The IASB operates under the oversight of the IFRS Foundation and it was formed in 2001 to replace the International Accounting Standards Committee. Currently, the IASB has 14 members. Members are appointed by the Trustees through an open and rigorous process that includes advertising vacancies and consulting relevant organizations. Under the IFRS Foundation Constitution, the IASB has complete responsibility for all technical matters of the IFRS Foundation including:

- full discretion in developing and pursuing its technical agenda, subject to certain consultation requirements with the Trustees and the public
- the preparation and issuing of IFRSs (other than Interpretations) and exposure drafts, following the due process stipulated in the Constitution
- the approval and issuing of Interpretations developed by the IFRS Interpretations Committee

1.2.3 IFRS Interpretations Committee (IFRIC)

The IFRS Interpretations Committee (Interpretations Committee) is the interpretative body of the Board. The mandate of the Interpretations Committee is to review on a timely basis implementation issues that have arisen within the context of current IFRS and to provide authoritative guidance (IFRIC Interpretations) on those issues. Interpretation Committee meetings are open to the public and webcast. In developing interpretations,

the Interpretations Committee works closely with similar national committees and follows a transparent, thorough and open due process.

The Interpretations Committee comprises 14 voting members drawn from a variety of countries and professional backgrounds. They are appointed by the Trustees of the IFRS Foundation and are selected for their ability to maintain an awareness of current issues as they arise and the technical ability to resolve them.

1.2.4 Standards Advisory Council (SAC)

The Advisory Council is the formal advisory body to the International Accounting Standards Board (the Board) and the Trustees of the IFRS Foundation. It consists of a wide range of representatives from groups that are affected by and interested in the Board's work. These include investors, financial analysts and other users of financial statements, as well as preparers, academics, auditors, regulators, professional accounting bodies and standard-setters. The Advisory Council meets at least two times a year for a period of two days, in London.

IASB staff normally provide an update for the Advisory Council, and invite questions and comments from Council members. In particular, IASB consults the IFRS Advisory Council on its technical agenda, project priorities and project issues related to application and implementation of IFRS Standards.

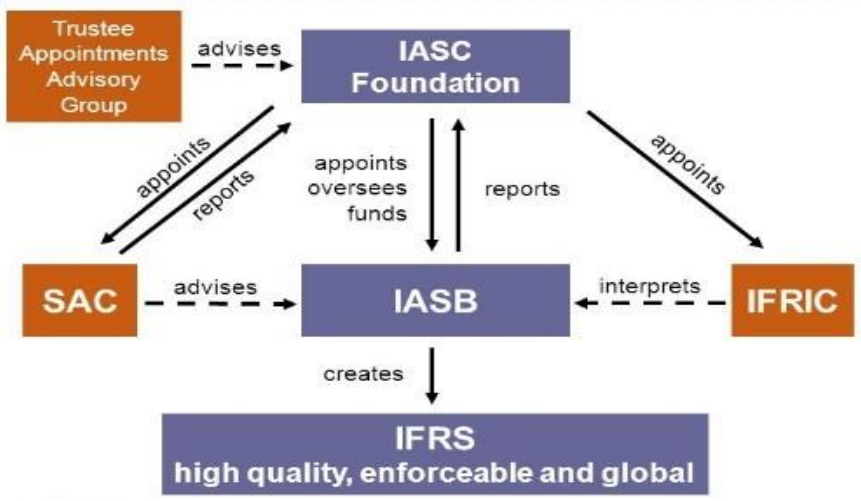

Figure 1: IASB Structure (Source: Grant Thornton LLP)

1.2.5 Financial Accounting Foundation (FAF)

The Financial Accounting Foundation (FAF), established in 1972, is the independent, private-sector, not-for-profit organization based in Norwalk, Connecticut responsible for the oversight, administration, financing, and appointment of the Financial Accounting Standards Board (FASB) and the Governmental Accounting Standards Board (GASB). The FAF comprises the FAF Board of Trustees, two standard-setting Boards (the FASB and the GASB), and the FAF management team. The FAF is a non-stock Delaware corporation that operates as a non-profit as defined by the IRS.

1.2.6 Financial Accounting Standards Board (FASB)

Established in 1973, the Financial Accounting Standards Board (FASB) is the independent, private-sector, not-for-profit organization based in Norwalk, Connecticut, that establishes financial accounting and reporting standards for public and private companies and not-for-profit organizations that follow Generally Accepted Accounting Principles (GAAP).

The FASB is recognized by the Securities and Exchange Commission as the designated accounting standard setter for public companies. FASB standards are recognized as authoritative by many other organizations, including state Boards of Accountancy and the American Institute of CPAs (AICPA). The FASB develops and issues financial accounting standards for public and private companies and not-for-profit organizations through a transparent and inclusive process intended to promote financial reporting that provides useful information to investors and others who use financial reports.

1.2.7 Governmental Accounting Standards Board (GASB)

Established in 1984, the Governmental Accounting Standards Board (GASB) is the independent, private-sector organization based in Norwalk, Connecticut, that establishes accounting and financial reporting standards for U.S. state and local governments that follow Generally Accepted Accounting Principles (GAAP).

1.2.8 Financial Accounting Standards Council (FASAC)

The Financial Accounting Standards Advisory Council, FASAC or "the Council" for short, was formed in 1973 concurrent with the establishment of the Financial Accounting Standards Board (the FASB or the Board). The primary function of FASAC is to advise the Board on issues related to projects on the Board's agenda, possible new agenda items, project priorities, procedural matters that may require the attention of the FASB, and other matters as requested by the chairman of the FASB. FASAC meetings provide the Board with an opportunity to obtain and discuss the views of a very diverse group of individuals from varied business and professional backgrounds.

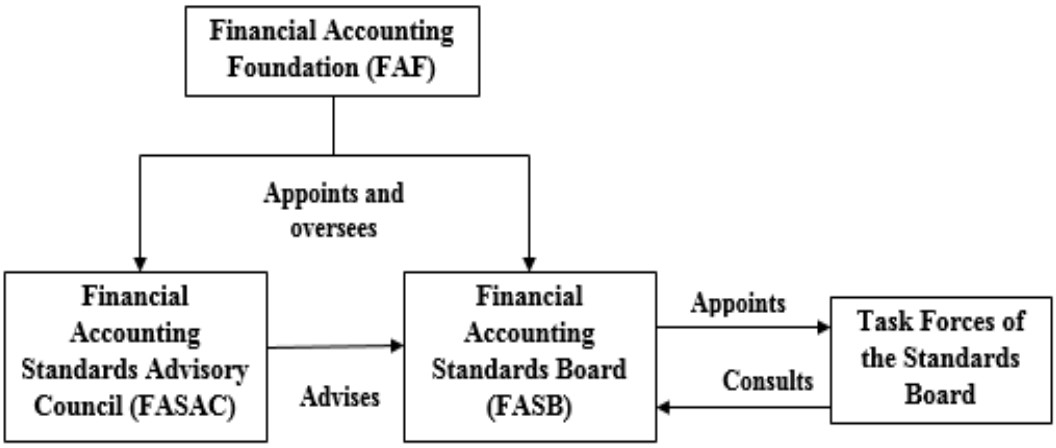

Figure 2: FASB Structure (Source: Nikolai, Bazley & Jones, Intermediate Accounting, 11th Edition, 2010

1.3 Financial statements and their elements

The objective of financial statements is to provide information about an entity's assets, liabilities, equity, income and expenses that is useful to users of financial statements in assessing the prospects for future net cash inflows to the entity and in assessing management's stewardship of the entity's resources[4].

Financial statements provide information about the financial effects of transactions and other events of a specified period. Those transactions and other events give rise to changes in the entity's assets, liabilities and equity. These changes, combined with the effects of

[4] Conceptual Framework for Financial Reporting, Exposure Draft, May 2015

transactions and other events from previous periods, give rise to the entity's assets, liabilities and equity at the end of the period.

Financial statements consist of statements, including a statement of financial position and statement of financial performance, and notes to the financial statements.

1.3.1 Balance sheet / Statement of Financial Position

The objective of this statement is to present in a formal and generally accepted way the sources and the uses of shareholders' capital. It presents assets, liabilities and equity, which relate to the reporting entity's financial position at a given point of time. To note that the balance sheet constitute a "snapshot" of the firm's position and its figures are representative only for a specific time / date, usually the end of the accounting period.
In this way, the balance sheet is formed under the basic accounting equation:

Assets = Liabilities + Owners' Equity

1.3.2 Income Statement / Profit & Loss Account / Statement of Comprehensive Income

The purpose of this report is to present, in a summary but formal form, the financial results of the entity concerning a specific time period. As a result, P&L statement describe the financial performance of the company by defining the main determinant factors of the financial result: revenues & expenses. These components are indicative of the financial and operational transactions that have contributed to the change in the firm's owner's equity during the accounting period.

1.3.3 Statement of Cash Flows

The aim of this statement is to present the firm's total net cash flow which is the balance of the firm's cash flows related to operating, investing and financing activities during a period of time. Net Cash Flows is the difference between the total amounts received (cash inflows) and the total amounts paid out (cash outflows) over a period of time. The structure and the format of Statement of Cash Flows are imposed by the rules of

International Accounting Standard (IAS) 7 and by ASC 230 issued by FASB. The objective of this standard is to ensure that all entities provide information about historical changes in cash and cash equivalents by means of statement of cash flows and also to classify cash flows during the period under consideration into the three aforementioned categories.

1.3.4 Elements of Financial Statements according to Conceptual Framework

We present below the five elements of financial statements, as defined in Conceptual Framework of Financial Reporting developed by IASB and FASB on September 2010. The IFRS Framework describes the basic concepts that underlie the preparation and presentation of financial statements for external users. It an be described as a theoretical base, a statement of principles, a philosophy and a map. By setting out the very basic theory of accounting the Framework points the way for the development of new accounting standards.

An asset is defined as a resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity. Assets are presented on the statement of financial position as being noncurrent or current. They can be intangible, that is, without physical presence – for example, goodwill. Examples of assets include property plant and equipment, financial assets and inventory. An asset is recognized in the balance sheet when it is probable that the future economic benefits will flow to the entity and the asset has a cost or value that can be measured reliably.

A liability is defined as a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits. Liabilities are also presented on the statement of financial position as being noncurrent or current. Examples of liabilities include trade payables, tax creditors and loans. It should be noted that in order to recognize a liability there does not have to be an obligation that is due on demand but rather there has to be a present obligation. A liability is recognized in the balance sheet when it is probable that an outflow of resources embodying economic benefits will result from the settlement of a present obligation and the amount at which the settlement will take place can be measured reliably.

Equity is defined as the residual interest in the assets of the entity after deducting all its liabilities. The effect of this definition is to acknowledge the supreme conceptual importance of identifying, recognizing and measuring assets and liabilities, as equity is conceptually regarded as a function of assets and liabilities, i.e. a balancing figure. Equity includes the original capital introduced by the owners, i.e. share capital and share premium, the accumulated retained profits of the entity, i.e. retained earnings, unrealized asset gains in the form of revaluation reserves and, in group accounts, the equity interest in the subsidiaries not enjoyed by the parent company, the non-controlling interest (NCI).

Income is defined as the increases in economic benefits during the accounting period in the form of inflows or enhancements of assets or decreases of liabilities that result in increases in equity, other than those relating to contributions from equity participants.

The definition of income encompasses both revenue and gains. Revenue arises in the course of the ordinary activities of an entity and is referred to by a variety of different names including sales, fees, interest, dividends, royalties and rent. Gains represent other items that meet the definition of income and may or may not, arise in the course of the ordinary activities of an entity. Gains represent increases in economic benefits and as such are no different in nature from revenue. Hence, they are not regarded as constituting a separate element in the IFRS Framework.

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Expenses are defined as decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or incurrences of liabilities that result in decreases in equity, other than those relating to distributions to equity participants.

The definition of expenses encompasses losses as well as those expenses that arise in the course of the ordinary activities of the entity. Expenses that arise in the course of the

ordinary activities of the entity include, for example, cost of sales, wages and depreciation. They usually take the form of an outflow or depletion of assets such as cash and cash equivalents, inventory, property, plant and equipment. Losses represent other items that meet the definition of expenses and may or may not, arise in the course of the ordinary activities of the entity. Losses represent decreases in economic benefits and as such they are no different in nature from other expenses. Hence, they are not regarded as a separate element in this Framework

The reference to 'other than those relating to distributions to equity participants' refers to the payment of dividends to equity shareholders. Such dividends are not an expense and so are not recognized anywhere in the statement of profit or loss and other comprehensive income. Rather they represent an appropriation of profit that is as reported as a deduction from Retained Earnings in the Statement of Changes in Equity.

Examples of expenses include depreciation, impairment of assets and purchases. As with income most expenses are recognized in the Income Statement section of the statement of profit or loss and other comprehensive income, but in certain circumstances expenses (losses) are required by specific standards to be recognized directly in equity and reported in the Other Comprehensive Income Section of the statement of profit or loss and other comprehensive income. An example of this is an impairment loss, on a previously revalued asset, that does not exceed the balance of its Revaluation Reserve.

2. SIGNIFICANT ACCOUNTING POLICIES FOR PROPERTY, PLANT & EQUIPMENT (PPE) IN SHIPPING INDUSTRY

This chapter addresses the key accounting issues and financial reporting challenges faced by shipping companies in relation to their fixed assets and presents relevant accounting guidance under the two most commonly used financial reporting frameworks, IFRS and US GAAPs. Vessels as the most significant part of Property, plant and equipment (PP&E), represents a major balance sheet caption for shipping companies and consequently they should be properly monitored and accurately depicted in financial statements, through their life cycle from purchase to disposal or scraping.

The shipping industry has invested substantial funds in the acquisition of new ships and management of shipping companies makes detailed calculations of the expected return on investment before deciding which project to approve and anticipate a fast and lucrative payback. The shareholders are primarily interested in the maximization of their wealth as expressed by net profits gained over their equity investment. Elements of these performance measures could be affected by different accounting conventions. In particular, the acquisition costs are capitalized and depreciated over the assets' useful lives. Therefore, the initial cost of a vessel to be recognized could differ according to the provisions of allowed capitalized items under different accounting standards. IAS 23, Borrowing Costs, also, allows capitalization of borrowing costs that are directly attributable to the construction period. Net profits could be influenced by estimates of scrap value and useful lives. IFRS in contrast to US GAAP, for example, prescribes the component approach to PP&E to separate it into items with different useful lives. This may have a direct effect on a shipping company's bottom line, because it may result in a changed depreciation figure for vessels. Provision for scheduled maintenance should also not be made before the obligation arises, under IFRS, on the time that other GAAPs allow for such a treatment. The purchase of vessels is not a simple matter, even when financing is available. Orders have to be placed with the major shipyards well ahead of actual delivery. Significant time is put into negotiating pricing, delivery conditions and on board equipment. As a result it is often difficult to determine how the contract price compares with the deals obtained by others. During their lives vessels require major maintenance and the replacement of key components. Owners spend substantial time managing these maintenance requirements to ensure the optimal balance of operational efficiency while incurring the lowest possible dry-dock and special survey costs. The extent to which they are effective in doing this will have a substantial impact on their reported results.

Without doubt, vessels are complex items and expensive to build. As a result there are significant risks in these investments and the extent to which they are successfully managed has a substantial impact on the long-term profitability of both owners and lessors. Therefore, it is important to ensure that the exposure of entities to these risks, and their relative success in managing them, is properly reflected in financial statements.

2.1 Acquisition of a vessel – Pre-delivery installments: Assets or prepayment?

A company has the option to acquire a vessel either by entering into a contract with a yard for a new-built or by purchasing a second-hand vessel. A vessel's acquisition price is agreed via contractual terms which are often years in advance. There are generally different arrangements where the vessel is delivered, either early or late. Pre-delivery Instalments (PDI's) are used to secure the purchaser's place in the delivery timetable for the vessel, and to provide part of the finance for the construction of the vessel. They form part of the standard contractual terms of most major shipyards. Under IFRS, it is necessary to consider what type of asset the PDI represents.

There are normally two possible ways of accounting for PDIs, which is accounting as part of the vessel under construction or accounting as a prepayment for a future vessel acquisition.

The appropriate accounting treatment is likely to depend on the specific details of the arrangement entered into by the purchaser and shipyard and we have seen both approaches being adopted by shipping companies. However, under the terms of most current vessel delivery contracts with the major shipyards the second of these options is likely to be the most appropriate. This is because it is difficult to see why the item should be classified as a fixed asset when the ship owning entity has no rights of ownership over the vessel at the time the PDI is paid.

In order for an asset to be included within property, plant and equipment, it must meet the definition of property, plant and equipment as prescribed by IAS 16, paragraph 6, which provides for the following characteristics: Property, plant and equipment are tangible items that:

a) are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes; and

b) are expected to be used during more than one period.

Since the ownership of the vessel is unlikely to be transferred to the purchaser until the point of delivery, the pre-delivery payments could be recorded as prepayments towards the future purchase of an asset. The amount paid will be recorded as a prepayment within

non-current assets. Upon delivery of the vessel the balance should be included as part of the cost of the asset within Property, Plant and Equipment.

PDIs may meet the definition of property, plant and equipment if the payments made represent the part payment towards an asset in the course of construction by the shipyard for the purchaser: in other words, if in substance ownership of the underlying asset already rests with the purchaser and it is being constructed by another party on the purchaser's behalf.

There is no specific guidance in IFRSs on when it is appropriate to regard a vessel that is being constructed as an asset of the purchaser, rather than an asset of the seller. However, we consider that the principles in IFRIC 15 Agreements for the Construction of Real Estate could be considered relevant on this point. IFRIC 15 provides guidance on when revenue should be recognized by companies engaged in the construction of real estate and we believe its principles are inherently relevant for PDI accounting. Applying this guidance to vessels it would be necessary to consider whether the buyer is able to specify the major elements of the design of the vessel to such a degree that the asset is specific to that customer rather than being a generic product that could be sold to a number of customers. Therefore, it is important to understand the precise terms of the contract. If the payments meet the definition of PPE and when the aggregate amount of PDIs is material they should be presented separately under the caption called "Vessels under construction" or "Advances for vessels under construction".

2.2 Borrowing Cost on Pre-delivery installments (IAS 23 & ASC 835-20)

The key underlying concept and pre-requisite for the application of this accounting treatment is the qualifying asset in which to capitalize borrowing costs. Under IAS 23 Borrowing Costs[5] a qualifying asset is defined as an asset that necessarily takes a substantial period of time to get ready for its intended use or sale. According to US GAAP (ASC 835 – Capitalization of Interest) qualifying assets are the assets that are constructed or otherwise produced for an entity's own use including assets constructed or produced for the entity by others for which deposits or progress payments have been made and

[5] International Accounting Standard 23 Borrowing Costs, paragraphs 4 & 5

assets intended for sale or lease that are constructed or otherwise produced as discrete projects (e.g., ships or real estate developments). As a result under US GAAP, there is not a specific requirement that the period of time to construct or produce the assets be substantial. In case vessels under construction as described in section 2.2 above are considered as qualified assets. Nevertheless, where an entity is accounting for the PDI as a prepayment, this would not be considered a qualifying asset.

The borrowing costs under IAS 23[6] may include:

• Interest expense calculated using the effective interest method;

• Finance charges in respect of finance leases; and

• Exchange differences arising from foreign currency borrowings to the extent that they are regarded as an adjustment to interest costs.

US GAAP, 835-20-10-2 and 835-20-20 prescribe that only interest costs (including interest recognized on obligations having explicit interest rates, interest on certain types of payables and interest related to capital leases) are eligible for capitalization. Interest cost includes amounts resulting from periodic amortization of discounts or premiums and issue costs on debt. Foreign exchange gains or losses are not included in capitalized interest.

It's obvious that borrowing costs under IFRS guidance, reflect a broader definition than interest costs and as a result certain costs may be eligible for capitalization under IFRS that are not eligible for capitalization under US GAAP.

IAS 23, paragraph 17 and ASC 835-20-25-3 clarify that the commencement day for the capitalization of the PDI should be, when the entity first meets all of these conditions:

- Incurs expenditures for the asset
- Incurs borrowing costs
- Undertakes activities necessary to prepare the asset for its intended use or sale

IFRS (IAS 23.20) relevant guidance provides that capitalization should cease when the vessel is substantially complete. Note that if there are prolonged periods of suspension of active development of the vessel, capitalization of the borrowing costs should be

[6] International Accounting Standard 23 Borrowing Costs, paragraph 6

suspended for that period. Similar to IFRS, ASC 835-20-25-4 & 5 states that an entity should suspend capitalization of borrowing costs during extended delays in construction and ceases capitalization of borrowing costs once the asset is ready for use.

Following the guidance of IAS 23, paragraph 12, we noted that to the extent that the purchaser borrows funds specifically for the purpose of obtaining a qualifying asset (i.e. the vessel), the purchaser should determine the amount of borrowing costs eligible for capitalization. These will be the actual borrowing costs incurred on that borrowing during the period less any investment income on the temporary investment of those borrowings.

Another paragraph of IAS 23 (IAS 23.14) mentions that to the extent that the purchaser borrows funds generally and uses them for the purpose of obtaining a qualifying asset (i.e. PDIs), the purchaser should determine the amount of borrowing costs eligible for capitalization by applying a capitalization rate to the expenditures on that asset. The capitalization rate should be the weighted average of the borrowing costs applicable to the borrowings of the purchaser that are outstanding during the period, other than borrowings made specifically for the purpose of obtaining a qualifying asset. The amount of borrowing costs that the purchaser capitalizes during a period should not exceed the amount of borrowing costs it incurred during that period.

Under US GAAP (ASC 835-20-30-4) when identifying the borrowings to be included in the weighted average rate, the objective is a reasonable measure of the cost of financing acquisition of the asset in terms of the interest cost incurred that otherwise could have been avoided. Judgment is required to make a selection of borrowings that best accomplishes that objective in the circumstances.

Differences may result in the measurement of costs to be capitalized when an entity borrows funds specifically for the purpose of obtaining a qualifying asset. Under US GAAP, an entity applies a capitalization rate (which may not necessarily be equivalent to the interest rate on the specific borrowings) to average accumulated expenditures during the period to determine the amount of interest to capitalize. Under IFRS, an entity capitalizes the actual borrowing costs incurred on the specific borrowing (regardless of expenditures during the period) reduced by any income earned on the temporary

investment of borrowings obtained in advance of expenditure. As a result, the different methods used will likely result in different capitalization amounts.

With respect to disclosure, under both reporting frameworks, the purchaser should disclose the amount of borrowing costs capitalized in the period and the capitalization rate used to determine the amount of borrowing costs eligible for capitalization.

2.3 Depreciation of property, plant and equipment - Component approach (IAS 16 & ASC 360)

Vessels comprise a number of components with different useful lives. According to accounting guidance of IAS 16[7] "Each part of an item of property, plant and equipment with a cost that is significant in relation to the total cost of the item shall be depreciated separately". This is often referred to as the component approach. Shipping companies applying IFRS should perform a break down analysis of their assets and identify such components. For example, the cost of a complete vessel includes the hull, the engines, the gear boxes, the communication and navigation equipment, the hatch covers and the dry-docking costs, each of which has a different useful life. Management should identify further components to achieve accurate results. When the engines are replaced during the vessel's life, the cost of the replacement engines is added to the vessel's carrying amount and the remaining unamortized amount of the old engines, if any, is written off. Components of vessel that should be separately identified include not only the physical items that will require replacement during the life of the vessel, but also the notional overhaul element for items that require major overhaul in the future, during the life of the vessel.

The fair value of each of these components should be identified at the date of acquisition of the vessel. Prices for each of these individual components are often not specified in the purchase agreement for the vessel. It will therefore be necessary to estimate the fair value of the dry-docking component taking into account the vessel's last and next scheduled dry-docking. The fair value could be estimated by obtaining values from other sources

[7] International Accounting Standard 16 Property, Plant and Equipment, paragraph 43

such as the shipyards, in-house specialists, the maintenance providers or independent vessel appraisers. The fair value will be the actual value at which the entity is able to obtain these components, including any discounts from list price it receives from the component or service provider. Other vessel types, such as cruise ships or ferries, will generally also have hotel type components which are expected to be replaced at regular intervals.

A vessel will require seaworthiness checks, under water inspections, intermediate surveys as well as special surveys throughout its useful economic life. An asset should be carved out from the main vessel asset for each type of these checks. In practice, only the dry-docking and special survey checks will be sufficiently material to warrant separate capitalization. For instance, a tanker may require a special survey every 5 years and an intermediate survey in between. Separate assets for each of these should be created when the initial componentization of the vessel is done, if expected to be material. Typically a new vessel will be assumed to be supplied with each of these components "brand new". In other words the vessel will be assumed to be in the condition that it would be had it just been through each of the checks and overhauls required so that the full cost of each of these will be carved out as separate components in the initial allocation.

Component accounting is mandatory, however the standard[8] also allows that if the useful life and depreciation method of two components are materially the same they may be grouped together. Therefore, a shipping company should not necessarily split its assets into an infinite number of components if the effect on the financial statements would be immaterial. Based on publications issued by KPMG[9] & Moore Stephens[10] auditing firms, it is noted that shipping companies are pragmatic in the approach to componentization with the base assumption that these elements have approximately the same engineering lives and therefore depreciable lives. This practice is also compliant with paragraph 45 of IAS 16 mentioned that "A significant part of an item of property, plant and equipment may have a useful life and a depreciation method that are the same as the useful life and the depreciation method of another significant part of that same item. Such parts may be

[8] International Accounting Standard 16 Property, Plant and Equipment, paragraph 45
[9] KPMG International Cooperative ("KPMG International") (2012), Impact of IFRS: Shipping
[10] Moore Stephens LLP (2012), Comparative Study On Accounting Policies & KPIs in the Shipping Industry

grouped in determining the depreciation charge". Companies only move away from this assertion if persuasive evidence exists to the contrary which would result in a material impact. One area of challenge is around navigation equipment, where the operational service life may be longer than the period up to which the technology becomes obsolete.

In most cases a company acquires a vessel (either new or second-hand) for a fixed sum without necessarily knowing the cost of the individual components, and accordingly these should be estimated either by reference to current market prices, in consultation with the contractor or by some other reasonable method of approximation such as relative values.

On the other hand US GAAP, unlike IFRS Standards, through the provisions of accounting standard for PPE ASC 360, subtopic 10 has no requirement for a component depreciation, but doesn't prohibit it either. Therefore, US listed companies reporting under US GAAP are not required to recognize a separate dry-docking component in the initial acquisition of a vessel and amortize it until the next one, as it is the case in IFRS but they have the option to do so as they are allowed to. In the case that a company with US GAAP reporting framework choose to follow component approach, they should separately present this item on the face of the balance sheet under other non-current assets financial statements line usually called "Deferred charges".

On the contrary, IAS 16 para 14 provides for recognition of overhaul expenditure as part on the carrying amount of PPE line by stating "a condition of continuing to operate an item of property, plant and equipment may be performing regular major inspections for faults regardless of whether parts of the item are replaced. When each major inspection is performed, **its cost is recognized in the carrying amount of the item of property, plant and equipment** as a replacement if the recognition criteria are satisfied".

In conclusion, componentization approach in IFRS impose a larger expense in contrast to US GAAP, in relation to dry-docking component identified, since this asset would be amortized over a shorter period (2,5 years or 5 years) than the rest of the vessel (usually 20-25 years). In case that component approach would be adopted under both standards, the difference between IFRS and US GAAP typically is a presentation difference in the balance sheet and does not impact the income statement.

2.4 Subsequent maintenance costs

Vessels experience wear and tear through use. Shipping companies maintain performance standards of vessels and other assets by repairs and by replacing components of the assets.

During a vessel's useful life three types of maintenance work will be undertaken:

- Planned major maintenance work (dry-docking and special surveys,
- Unplanned or emergency major maintenance work, and
- Day to day maintenance work

Dry docking is a term used for repairs or when a ship is taken to the service yard. In dry docking, a ship is removed from the water to enable maintenance and inspection work to be performed on the exterior part of the ship that stays below the waterline. Usually, vessels are required to be dry-docked at periodic intervals, approximately every 30 to 36 months for major repairs and maintenance that cannot be performed while the vessels are operating. There are regulations that also mandate inspections of the ship's bottom to be carried out at regular intervals to ensure safety of the vessels. Companies in shipping industry and other companies which use vessels for their activities, such as oil and gas companies, often incur significant expenditure towards dry dock expenditure.

It is likely that the cost of major planned maintenance will increase over the life of a vessel due to inflation and the age of the vessel. This additional cost will be capitalized when incurred and therefore the depreciation charge on these components will be greater in the later stages of a vessel's life. In IFRS, when **major planned maintenance** work is undertaken the cost should be capitalized. For instance when an engine overhaul is undertaken the cost of the overhaul will be capitalized as a new asset that will then be depreciated over the period to the next overhaul. The depreciation of the previous overhaul will typically have been calculated such that it had a net book value of nil when the current overhaul was undertaken. If this was not the case, e.g. because the work was required earlier than expected, then any remaining net book value of the old component should be expensed immediately, as per requirements of IAS 16, paragraph 14.

The accounting treatment for **unplanned maintenance work,** according to the provisions of IAS 16, paragraph 13 depends upon the work undertaken. If it replaces a component

which has been separately identified for depreciation purposes and therefore fully restores this previously partially depreciated component then it will be accounted for as a replacement of that component. If the unplanned maintenance work replaces a component which has not previously been depreciated separately, then it should accounted for the disposal of the existing component anyway.

The accounting treatment under **US GAAP** deviates from the respective provisions of IFRS, in the sense that they provide alternative options. In particular, ASC 908-360- 25-2 ("ASC 908") relating to the Airline Industry and in the absence of relevant guidance for shipping industry, it is used by analogy, adds clarity to the issue. ASC 908 permits two acceptable methods for the treatment of major maintenance costs:

a) The direct expense method, where planned maintenance costs are expensed and charged to profit and loss account as incurred

b) The deferral method, including capitalization of the costs associated with dry-dockings as they occur and amortize these costs on a straight-line basis over the period through the date the next dry-docking is scheduled to become due. Unamortized dry-docking costs of vessels that are sold are written off and included in the calculation of the resulting gain or loss in the year of the vessel's sale. Costs deferred as part of the dry-docking, usually, include actual costs incurred at the yard and parts used in the dry-docking.

Other GAAPs allow also another method to accounts for major maintenance expenses, "the accrual in advance method" which creates a liability that is built up over dry-dock cycle, based on the estimated cost that will be incurred in the future. According to US GAAP 360-10-25-5 the use of the accrue-in-advance (accrual) method of accounting for planned major maintenance activities is prohibited in annual and interim financial reporting periods.

Provisions for scheduled overhauls are not permitted under neither under IFRS. Provisions are recorded under IFRS when an entity has a present obligation as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation, and a reliable estimate can be made of the amount of the obligation. A present obligation may exist when an operating lease agreement requires

the overhauls or inspections of leased assets to be conducted on a periodic basis. A present obligation does not exist when the shipping company can avoid the overhauls or inspections by its future actions.

All **day to day maintenance** work which does not materially enhance the asset will be expensed as incurred, as clearly prescribed by IAS 16, paragraph 12 – subsequent costs "an entity does not recognize in the carrying amount of an item of property, plant and equipment the costs of the day-to-day servicing of the item. Rather, these costs are recognized in profit or loss as incurred. Costs of day-to-day servicing are primarily the costs of labor and consumables, and may include the cost of small parts. The purpose of these expenditures is often described as for the 'repairs and maintenance' of the item of property, plant and equipment". The accounting treatment under US GAAP concerning these routine day to day maintenance work is identical to IFRS.

To sum up, dry-docking maintenance works create reporting diversity among shipping companies that follows different accounting frameworks. US GAAP provides greater flexibility in relation to their treatment and allows for more expenses to be recorded in the reporting result of the year that the dry-docking will be performed, in comparison to IFRS which prescribe an allocation of these costs along time until the next scheduled maintenance. From the analysis of data obtained from published annual financial statements of US listed shipping companies reporting under US GAAP, we concluded that the majority of shipping companies shows a preference for the deferral method of accounting for dry-docking expenditure. Nevertheless, we noted that many entities with large fleets, use the direct expense method for their planned major maintenance activities. When a company owns a large number of vessels, the direct expense method would typically smooth out the profit and loss charges, as it each period they will be conducting major maintenance activities for different vessels. In fact Dryships, Starbulk and Paragon changed their accounting policy in respect of these maintenance costs, during the year 2008, from deferral method to direct expense method and they continue to apply this method consistently since then, on the grounds that that the new direct expensing method eliminates the significant amount of subjectivity that is needed to determine which costs and activities related to dry-docking should be deferred.

In the table below, we present the accounting method for dry-docking and special surbey maintenance works followed by certain of the major shipping market players. We selected only listed shipping companies so as to be based on publicly available financial statements disclosures. In addition, our sample is consisted only from companies reporting under US GAAP, since IFRS prescribe one treatment only.

Company Name	Stock Market	Method of accounting for maintenance works
Aegean Marine Petroleum	NYSE	Deferral method
Capital Product Tankers L.P.	NASDAQ	Including in management fees
Costamare inc.	NYSE	Deferral method
Danaos Corporation	NYSE	Deferral method
Diana Containerships Inc.	NYSE	Deferral method
Diana Shipping Inc	NYSE	Deferral method
Dryships Inc.	NASDAQ	Expense method
Dynagas LNG Partners	NYSE	Expense method
Eagle Bulk Shipping	NASDAQ	Including in management fees
Euroseas Ltd.	NASDAQ	Expense method
Free Seas Inc.	NASDAQ	Expense method
Matson Inc	NYSE	Deferral method
Navios Maritime Holdings	NYSE	Including in management fees
NewLead Holdings Ltd.	Over the Counter	Deferral method
Paragon Shipping Inc.	NASDAQ	Expense method
Pyxis Tankers Inc.	NASDAQ	Deferral method
Safe Bulkers Inc.	NYSE	Expense method
Seanerg Maritime Holdings	NASDAQ	Deferral method
SeaSpan Corporation	NYSE	Deferral method
Star Bulk Carriers Corp.	NASDAQ	Expense method
StealthGas Inc.	NASDAQ	Expense method
Tsakos Energy Navigation	NYSE	Deferral method

Table 1: Accounting treatment of DD/SS per shipping company

2.5 Impairment (IAS 36 & ASC 360)

Impairment is one of the most critical accounting policies in considering the strength of the balance sheet and something that debt holders, equity owners and the supply chain

are intently focused on. The considerable capital investment of shipping industry in vessels, along with the inherent uncertainty surrounding the assumptions of their recoverable value and the multiple macro-economic factors affecting the majority of them, requires for a sound reporting framework that support comparability and consistency among different shipping entities.

The turmoil in the shipping markets since the dramatic fall in charter rates occurred at the end of the year 2008 has brought the topic of impairments to the front fore of the industry and the financial information published. We analyze in detail the practical challenges and key areas of judgement surrounding impairment reviews in shipping industry in chapter 4. In this chapter, we present the accounting treatment and special considerations regarding impairment under US GAAP & IFRS.

Both US GAAP, under the provisions of ASC 360 and IFRS under the guidance of IAS 36, require an asset's recoverability to be tested if indicators exist that an asset may be impaired, with the IFRS be more precise and set as the time for assessment of impairment indicators each reporting period. Additionally, they require that an asset found to be impaired be written down and an impairment loss recognized.

The indicators of impairment are similar for both US GAAP and IFRS and include items such as:

- A significant decrease in the market price of a long-lived asset
- A significant adverse change in the extent or manner in which a long-lived asset is used
- Evidence of obsolescence or physical damage to a long-lived asset
- A significant adverse change in legal factors or in the business climate (e.g., technological, market or economic factors) that could affect the value of a long-lived asset, including an adverse action or assessment by a regulator
- A current-period operating or cash flow loss combined with a history of operating or cash flow losses or a projection or forecast that demonstrates continuing losses associated with the use of a long-lived asset

However, US GAAP and IFRS impairment standards differ in two main ways: 1) the timing of recognition, and 2) the loss measurement. The time lag is caused by the fact that US GAAP requires a two-step approach for the assessment of an impairment charge, whereas IFRS performs a single exercise, where the amount compared with net book value of vessels is determined by the use of **discounted projected cash flows**, hence resulted in a lower recoverable amount in comparison to US GAAP, which accelerates impairment. On the other hand, the extent of loss is usually greater under US GAAP since the impairment charge is calculated by comparing vessels carrying values directly with their fair values and not with future cash flows, as it is the case in IFRS model. A common view is that impairments under US GAAP are less timely and larger than those under IFRS because of the two-step impairment test and use of fair value. Therefore, US GAAP impairments should be more rare but at the same time more intense in their outcome, when occur.

2.5.1 Impairment test calculation under US GAAP

In particular, for the preparers of financial statements under US GAAP, the guidance of ASC 360-10-35 prescribes the following actions: At first estimate the future net undiscounted cash flows expected to be generated from the use of the long-lived asset (group) and its eventual disposal.

Then, compare the estimated undiscounted cash flows to the carrying amount of the long-lived asset (group):

a. If the estimated undiscounted cash flows exceed the carrying amount (i.e., net book value) of the long-lived asset (group), the long-lived asset (group) is recoverable; therefore, an impairment does not exist and a loss cannot be recognized.

b. If the estimated undiscounted cash flows are less than the carrying amount of the long-lived asset (group), the long-lived asset (group) is not recoverable, therefore, the fair value of the long-lived asset (group) must be determined.

2.5.2 Impairment test calculation under IFRS

The impairment test is a one-step process and it is ruled by IAS 36.59, which prescribes that an impairment loss should be recognized in income statement for the amount by which the carrying amount of the long-lived asset exceeds its recoverable amount. According to IAS 36, paragraph 6, recoverable amount is the higher of: (1) fair value less costs to sell, and (2) value in use (the present value of future cash flows to be generated through the asset's use and eventual disposal).

2.5.3 Grouping of assets

Although both US GAAP and IFRS contain specific guidelines for grouping long-lived assets, the underlying principle in both is that long-lived assets are grouped at the lowest level for which cash flows relating to the long-lived assets can be separately identified (360-10-35-23).

For accounting purposes it is not normally possible to determine impairment of a particular vessel component separately from that of the other components of that vessel unless there has been specific physical damage to that component. An individual vessel may be considered as an individual cash generating unit which can be assessed for impairment, in conformity with IAS 36, paragraph 6, which provided that in cases where there is no possibility e to estimate the recoverable amount of an individual long-lived asset, the recoverable amount of a cash generating unit (CGU) to which the individual asset belongs is evaluated. With the CGU having the meaning of "the smallest group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets". However, where vessels are operated as a fleet, for instance with individual vessels being inter-changeable in accordance with the charter party or contract of affreightment, it may be more appropriate to consider each fleet as a cash generating unit.

2.5.4 Reversal of impairment

Another point of divergence is the different approach regarding the possibility of reversing an impairment loss previously charged. US GAAP framework clearly doesn't allow it through the guidance of ASC 360-10-35-20 stating that "Restoration of a previously recognized impairment loss is prohibited".

For entities reporting under IFRS in addition to assessing evidence of possible impairment, they must also assess whether there is any indication that a previously recognized impairment loss for an asset (other than goodwill) no longer exists or may have decreased. If an indication of possible reversal is identified in accordance with the provisions of IAS 36.110, the entity must estimate the recoverable amount of that asset. When the recoverable amount is recalculated and exceeds the asset's carrying value, the carrying amount is increased to the recoverable amount subject to a 'ceiling', an upper limit. The increased carrying amount cannot exceed the carrying amount that would have been determined (net of amortization or depreciation) had no impairment loss been recognized for the asset in prior years (IAS 36.117).

2.5.5 Fair value determination

According to applicable reporting guidance provided by IFRS 13 – Fair value measurements, fair value less costs of disposal represents the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date less costs of disposal. Identifying fair value. The best evidence of fair value is a binding sale agreement in an arm's length transaction. In the absence of liquid markets, entities use the best information available to estimate the amount that could be obtained through the disposal of the asset at the reporting date. There is significant volatility in market prices for vessels generally. While it is relatively easy to forecast vessel supply, based on production rates of the major shipyards, demand is directly linked to wider economic conditions. There is therefore cyclicality in vessel prices.

There is also significant volatility in demand for particular vessel types. This will depend upon factors such as the availability of substitutes or the development of new vessels in that class, the liquidity of the market in that type of vessel and the fortunes of particular market segments. Brokers can provide vessel values by reference to transactions of which they are aware and where there are no transactions for a particular model of vessel they will normally extrapolate a value from transactions for similar types of vessel. In such situations it is important to understand the judgements involved and, if necessary, obtain a second independent valuation.

2.5.6 Discount Rate

The discount rate to be applied to the projected cash flows reflects the current market assessment of the risks specific to the asset or CGU and the time value of money. It is generally rare that a discount rate is observable directly from the market, and therefore one needs to be calculated. The most common point starting point in practice is company's WACC which is then adjusted to build up a market participant discount rate. Factors to consider to arrive at an appropriate rate include the: a) nature of the chartering arrangement - in the case of spot and time charters the owner is exposed to both operational and credit risk, whilst for bareboat charters only credit risk may be relevant, b) terminal value – risks associated with vessel scrapping are likely to be different to re-sale and/or a purchase option and c) the nature of the assets – forecasting and liquidity risk associated with the different types (dry-bulk, container, tanker etc.) and different sizes of vessels. To note also that IFRS requires the discount rate for value-in-use calculations to be determined on a pre-tax basis. Thus, a CGU's pre-tax cash flows should be discounted at the pre-tax discount rate.

2.6 Assets Held-for-sale (IFRS 5 & ASC 360)

When vessels are to be sold, and the criteria provided in applicable accounting guidance are satisfied, the vessels are reclassified on the balance sheet as held for sale assets. The vessel may still be operated while in this category, as long as they are available for

immediate sale and being actively marketed, resulting in revenues with no associated depreciation charge on the vessel. Therefore, there is an effective depreciation "saving" on vessel classified as held for sale compared with the vessels which remain in fixed assets caption. Consequently, both accounting frameworks under consideration has developed a detail set of conditions that should be thoroughly examined by preparers of financial statements and external auditors.

2.6.1 Held for sale criteria

The criteria for classifying a long-lived asset or disposal group (herein referred to as a disposal group) as held for sale are similar. A disposal group is a group of assets to be disposed of together in a single transaction and the liabilities directly associated with those assets that will be transferred in the transaction. A disposal group is classified as held for sale if its carrying amount will be recovered principally through a sale transaction rather than through continuing use and the disposal group meets the held-for-sale criteria. For this to be the case, the disposal group must be available for immediate sale in its present condition subject only to terms that are usual and customary for sales of such assets, and its sale must be probable (US GAAP) or highly probable (IFRS). In addition, the appropriate level of management must be committed to a plan to sell and an active program to locate a buyer and complete the plan must have been initiated. Further, the disposal group must be actively marketed for sale at a price that is reasonable in relation to its current fair value, the sale should be expected to be completed within one year from the date the disposal group was classified as held for sale with limited exceptions, and the plan should indicate that it is unlikely that significant changes to the plan will be made or that the plan will be withdrawn. Although the "Impairment or Disposal of Long-Lived Assets" Subsections of ASC 360-10 use the term probable and IFRS 5 highly probable, the Basis for Conclusions in IFRS 5 states that the criteria for classification as held for sale is fully converged with the "Impairment or Disposal of Long-Lived Assets" Subsections of ASC 360-10.

2.6.2 Measurement of a disposal group

A disposal group that has been classified as held for sale should be carried at the lower of its carrying amount or fair value less costs to sell. If a newly acquired disposal group meets the criteria to be classified as held for sale at the acquisition date, it should be carried at fair value less costs to sell and not at fair value like the other assets and liabilities acquired. Assets in a disposal group are not depreciated while classified as held for sale.

2.6.3 Changes to a plan of sale

If circumstances arise that management previously considered unlikely and, as a result, a disposal group ceases to meet the criteria to be classified as held for sale, the disposal group should be reclassified as held and used in the period in which the held-for-sale criteria are no longer met.

A disposal group reclassified to held and used should be carried at the lower of:

• its carrying amount before the disposal group was classified as held for sale, adjusted for any depreciation, amortization or impairment losses (considering revaluations for IFRS) that would have been recognized had the disposal group not been classified as held for sale, or

• its fair value under US GAAP or its recoverable amount under IFRS.

2.7 Summary of differences for vessels accounting between IFRS & US GAAP

Based on the aforementioned analysis regarding the accounting treatment of major considerations and issues in relation to owned vessels, we present below a summary table with the main differences identified, under the two most commonly used financial reporting frameworks, IFRS and US GAAP. This comparison is the outcome of study of relevant publications issued by the major auditing and accounting firms (Deloitte[11], Ernst & Young[12] and Grant Thornton[13])

[11] Deloitte (2011), IFRS for Shipping, Accounting for owned vessels by shipping companies
[12] Ernst & Young (2016), US GAAP/IFRS accounting differences identifier tool
[13] Grant Thornton (2016), Comparison between US GAAP & International Financial Reporting Standards

Areas	IFRS Treatment	US GAAP Treatment
Vessel Recognition Basis	Cost or revaluation basis permitted.	Cost basis must be used. Revaluation basis is prohibited.
Depreciation of Vessels	Component depreciation required if components of an asset have differing patterns of benefit.	Component depreciation permitted but not common.
Major Maintenance / Overhaul Costs (DD and SS Costs)	Costs are generally capitalized in asset costs and depreciated according to the component approach.	Costs are either expensed as incurred, deferred and amortized until the next overhaul, or accounted for as a part of the cost of the asset.
Borrowing Cost for Vessels under Construction	Eligible borrowing costs include exchange rate differences from foreign currency borrowings to the extent that they are regarded as an adjustment to interest costs. For borrowings associated with a specific qualifying asset, actual borrowing costs are capitalized offset by investment income earned on those borrowings.	Eligible borrowing costs do not include exchange rate differences. Interest earned on the investment of borrowed funds generally cannot offset interest costs incurred during the period. For borrowings associated with a specific qualifying asset, borrowing costs equal to the weighted-average accumulated expenditures times the borrowing rate are capitalized.
Method of determining impairment — long-lived assets	One-step approach requires that impairment loss calculation be performed if impairment indicators exist.	Two-step approach requires that a recoverability test be performed first (carrying amount of the asset is compared with the sum of future undiscounted cash flows generated through use and eventual disposition). If it is determined that the asset is not recoverable, an impairment loss calculation is required.
Impairment loss calculation — long-lived assets	The amount by which the carrying amount of the asset exceeds its recoverable amount; recoverable amount is the higher of: (1) fair value less costs to sell and (2) value in use (the present value of future cash flows in use, including disposal value).	The amount by which the carrying amount of the asset exceeds its fair value, as calculated in accordance with ASC 820, Fair Value Measurement.
Reversal of vessels impairment loss	Prohibited for goodwill. Other assets must be reviewed at the end of each reporting period for reversal indicators. If appropriate, loss should be reversed up to the newly estimated recoverable amount, not to exceed the initial carrying amount adjusted for depreciation.	Prohibited for all assets to be held and used.

Table 2: Main differences between IFRS and US GAAP for vessels accounting

2.7 Accounting policies and effect on financial performance–Dry docking accounting

The audited financial statements constitute the most reliable source of information in order to evaluate a company's financial viability and future prospects. They are the starting point for financial analysts, creditors and current and potential investors when conducting a financial analysis for assessing companies' performance in terms of liquidity, leverage, operating efficiency and profitability. Therefore, the quality, integrity and reliability of the data presented in the financial statements is of paramount importance since they form the basis for operational, investment and financing decisions made from all interested parties. Accounting frameworks that prescribe policies and conventions should be serve this objective by enhancing comparability and consistency of financial information. Every meaningful analysis will begin with a qualitative inquiry as to the strategy and policies of the subject company, creating a context for the investigation. Next, goals and objectives of the analysis will be established, providing a basis for interpreting the results. Given that the ultimate purpose of a company is the maximization of its shareholders wealth, various key performance indicators constitute components of the most comprehensive indicator of financial wealth creation and profitability which is Return on Equity (ROE). In this section of chapter 2, we will use ROE and its ingredients in order to demonstrate the effect of the different accounting method used from management of shipping companies in relation to Dry-docking under the two, more common, reporting frameworks (US GAAP & IFRS). ROE is the final outcome of all the firm's activities and decisions made during a reporting period (i.e. a year), as it reflects operating, investing and financing aspects of management decisions. (Hawawini & Viallet, 2007). In this context, DuPont disaggregates return on equity in profit margin, asset turnover and leverage. The DuPont ratio can be used as a compass in this financial analysis process by directing the analysts toward significant areas of strength and weakness evident in the financial statements. Net profit margin, total asset turnover, and return on assets are usually reviewed together because of the direct influence that the net profit margin and the total asset turnover have on the return on assets (Gibson, 2013). Furthermore, the total asset turnover ratio is considered as financial ratio for evaluating both the financial position and business performance (Zager et. al., 2008).

Operating decisions involve the acquisition and disposal of fixed assets and the management of the firm's operating assets (such as inventories and trade receivables) and operating liabilities (i.e. trade payables). Net profit margin and ROA (return on Assets) are not appropriate measures of profitability generated by the firm's operating activities, as they are calculated with net profit. Net profit derives after deducting interest expenses, which are the outcome of financing decisions, from reporting entity's operating profit. Therefore, as a relevant measure of **operating profitability** we use the **Return on Capital Employed** (ROCE) which is the ratio of Earnings before Interest and Tax (EBIT) to the relevant investments that were used to generate EBIT, ie. Fixed Assets plus Working Capital.

In accordance to the basic accounting equation the denominator of ROCE (also called Invested Capital or Net Assets) could be expressed to either of the following ways:

Capital Employed = Non-current Assets + Working Capital = Total Assets – Current liabilities = Equity + Non-current Liabilities

For the purposes of our analysis we disaggregate ROCE to its main elements which constitute the main drivers of operating profitability:

A high operating profitability could be the outcome of either an increase in EBIT for the same level of invested capital, which is an improvement of **operating profit margin** or a reduction of invested capital for same level of EBIT, that is an improvement of **net asset (capital) turnover**, an efficiency measure of revenue/sales generating capacity of invested funds. Consequently the following relationship could be used to calculate ROCE:

ROCE = Operating Profit Margin (Operating Profit/Sales) X Capital Turnover (Sales/ Capital Employed)

Finally, the effects of financing decisions are incorporated in Leverage ratio which is the link between ROCE and widely acknowledged profitability measure of ROE. The higher proportion of debt financing increases the entity's financial gearing which could have an unpredictable impact on ROE in the sense that the risen interest charged decrease the ratio as decrease net profit but benefit the financial structure as decrease on the same time the equity portion which is the denominator, and as a result the ratio increases. A research

conducted by Thalassinos, Liapis & Politis (2015), examining the efficiency of shipping companies to create profit from the equity used in the investment, clearly proves that returns are positively correlated with earnings from the operation of the asset and negatively with the capital structure of the company. Actually, their model penalizes the use of leverage and estimates lower ROE. The Financial leverage is captured with two ratios from income statement's and balance sheet's view which are respectively:

Financial cost ratio = Earnings before Tax (EBT) / Earnings before interest and Tax (EBIT)

Note: In our subsequent analysis of shipping companies tax is ignored since no income tax is applicable and tonnage tax is immaterial for further consideration

Financial Gearing = Capital Employed / Equity

The outcome of all the aforementioned individual key performance indicator is the following composition of ROE where the first two ratios capture the effect of the firm's operating and investing decisions on its overall operating profitability, whereas the third and the fourth ratios reflect the effect of the entity's financial policy on its overall profitability.

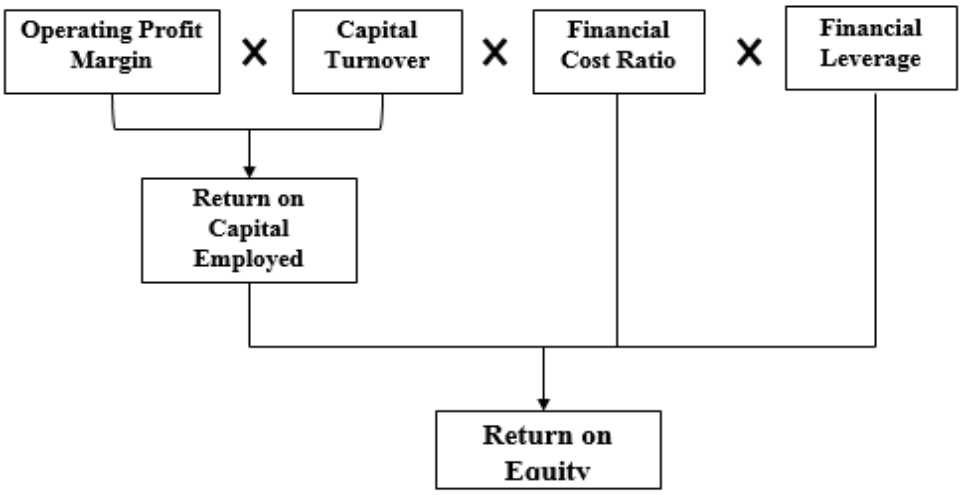


Figure 3: Du Pont formula illustration

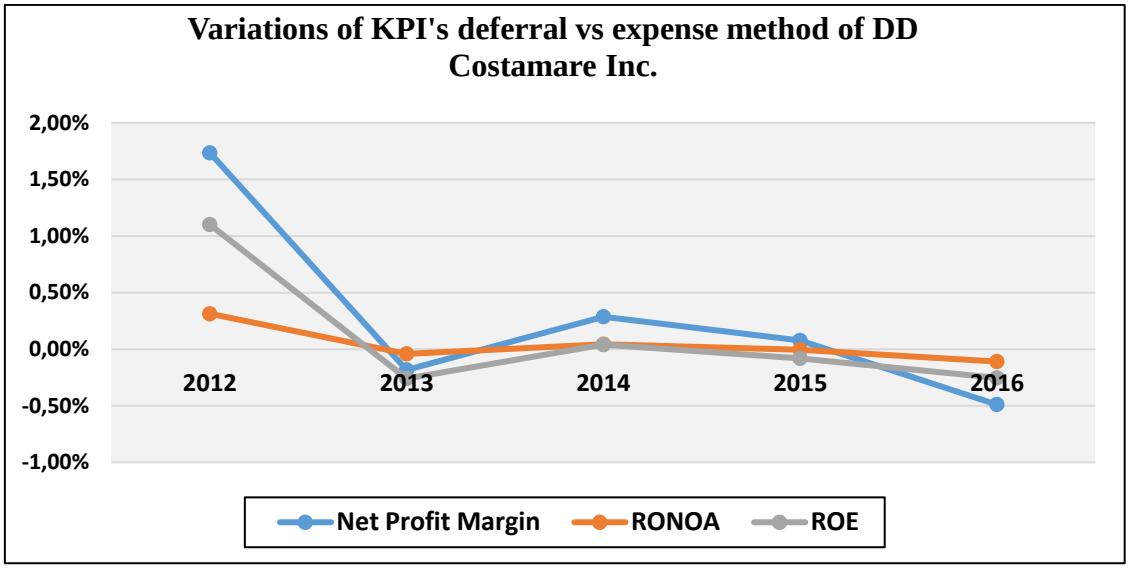
With the view to examine the impact of a potential change in respect of dry-docking accounting treatment, to financial performance of a company we selected a sample of five US listed companies reporting under US GAAP, and calculated the variation in the financial ratios presented in Dupont formula above for the last five years. As referred in

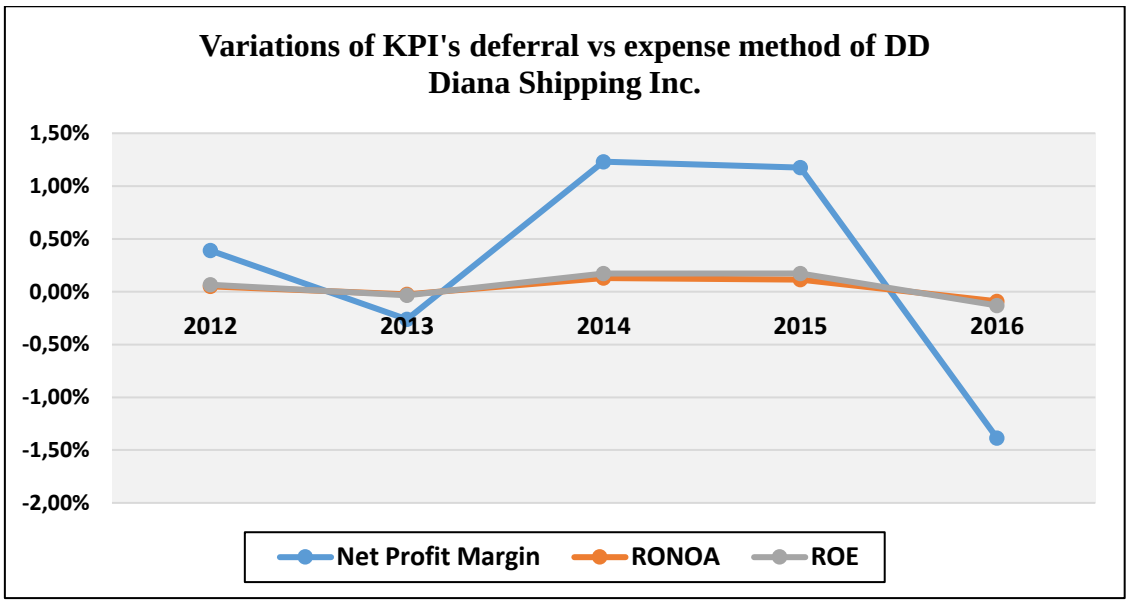
Chapter 2.4 for companies preparing their financial statements under US GAAP reporting guidance, there is a flexibility regarding major overhaul expenditure, i.e. dry-docking & special surveys. The option to treat DD costs as deferred charges and capitalize them under non-current assets has the effect to increase the asset base and decrease the profit and loss charge that would have been incurred in the case of application of direct expense method. In other words, deferral method favors net income in comparison to direct expense recording.

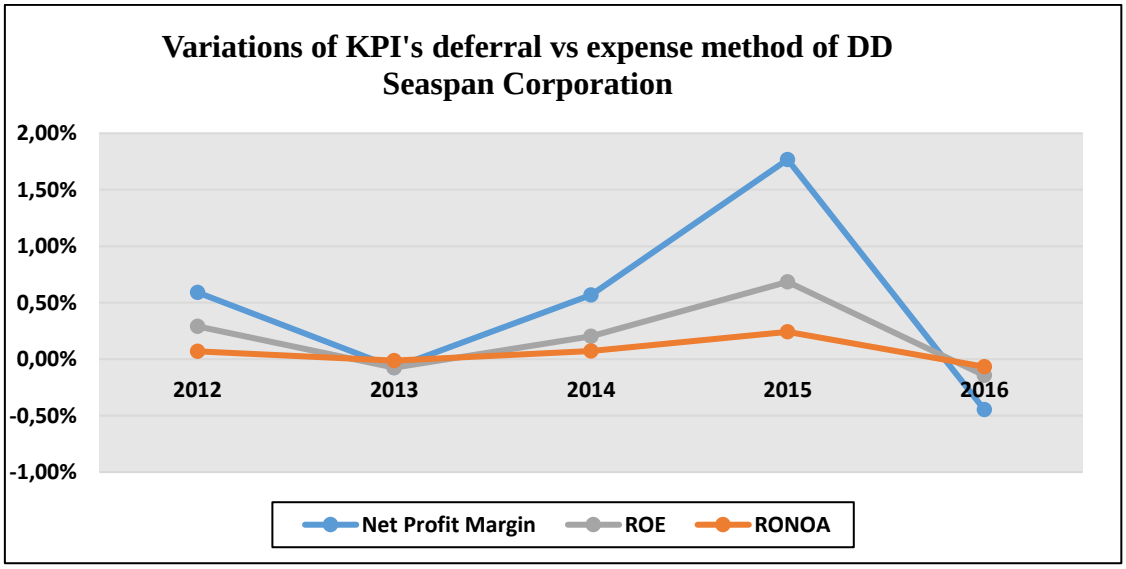
Actually, this is the case for the recording of the initial dry-docking of a vessel or for the year that all previous dry-dockings have been fully amortized. Since, in the context of a large fleet, new additions of dry-dockings that would be realized each year and would create a relief on income statement in the deferral method scenario, could be counterbalanced by the amortization charge of the current and previous dry-dockings which should be accounted for on a yearly basis. Therefore, even the result on income statement is unpredictable due to the uncertainty of exact time and amount of major overhauls that the shipping companies will be conduct.

From the table included in Appendix III and the graphs below and in Appendix II, it is obvious that Net Profit margin change follows the pattern of DD expenditure. For instance, when the expenditure – additions increases from one year to the next[14], the positive effect in net income of the deferral method, is more intense, since the discharge of these significant expenses from P/L outweighs the extra amortization of current and previous year's, led to a more advantageous figure for results of the period. On the other hand, when there are major negative fluctuations to DD costs and actually Net Profit Margin favorable difference narrowed and usually for these years of limited investment in DD, it is proved that profitability, as indicated by net profit margin, would be better if management had selected to follow the direct expense method.

[14] For the annual DD additions per company please refer to Appendix I


Variations of KPI's deferral vs expense method of DD
Costamare Inc.
2,00%
1,50%
1,00%
0,50%
0,00%
-0,50%
-1,00%
2012
2013
2014
2015
2016
Net Profit Margin
RONOA
ROE


Variations of KPI's deferral vs expense method of DD
Diana Shipping Inc.
1,50%
1,00%
0,50%
0,00%
-0,50%
-1,00%
-1,50%
-2,00%
2012
2013
2014
2015
2016
Net Profit Margin
RONOA
ROE



In cases of consecutive years with relatively stable amounts of additions for DD, which is achieved in cases of large fleets, the effects of deferred or expense selection of DD are smoothed. In respect of Return on net assets ratio it is influenced with the same manner as Net profit margin measure but to a less extent. This is a result of the increase of assets in case of deferral method application vs expense method since the denominator of the ratio rise, the ratio declines but on the same time the positive impact of enhanced net income figure outperforms this effect and led to a more moderate increase in contrast to Net profit margin. Finally, the effect of leverage reinforces the aforementioned consequences in profitability as it is incorporated in Return on equity major performance indicator. As we noted from the comparative analysis of the sample shipping companies, for high leveraged cases the positive effect of deferral method is multiplied, leading to further favorable variations for defendants of deferral method. Therefore, given that that shipping companies have higher leverage than other firms, as suggested by Drobetz, Gounopoulos, Merikas and Schröder (2013), the impact of different accounting treatment on ROE for the majority of shipping companies could be significant.

At this point, we could further develop our rational of accounting treatment selection in relation to its financial repercussions by thinking about factors and drivers of managements' decisions. For example, when low charter rates and negative prospects prevailing the sector where a shipping company operates (i.e. Containers) and the management is aware of major schedule maintenance works that should be performed to a number of vessels in the next years, could opt for a deferral method so as the relief from

direct P/L expense that would recorded, offset the downward trend of revenues. Therefore, the stage of shipping cycle and the market trends, as well as the budgeted figures for planned overhauls, as provided by technical departments and class survey reports, could influence the decision of management regarding DD accounting treatment. On the other hand from the ratios calculated under both scenarios it is evident that the comparative deviation is unlikely to be material in an extent to influence users' decisions, but the absolute effect in line items figures could be considerable due to the large amounts related to such maintenance works. The inherent subjectivity implied by the flexibility provided to management and to preparers of financial statements from certain accounting standards it is "cured" to some extent by the provisions of others. In particular, IAS 8 dictates that in case of a change in an accounting policy (for example from direct expense to deferral method) the management should explain the reason for the change and also apply it retrospectively by restating prior years' figures. As a result, it is not at the discretion of each company's management to arbitrarily change approach each year or whenever market conditions would benefit a relevant change.

3. ACCOUNTING ESTIMATES AND ASSUMPTIONS IN SHIPPING INDUSTRY

3.1 Theoretical background and accounting standards for accounting estimates

Many strategic and operational decisions are made on the grounds of qualitative and reliable information. Therefore, objective and understandable accounting data is a prerequisite for proper decision making. Since financial statements, as discussed in Chapter 1, present financial position and performance of a company, their items should be measured by applying international or national financial reporting standards, so as to enhance consistency and comparability of each company's financial statements over time and with the financial statements of other entities. The preparation of those financial statements requires management to make estimates and judgments that affect the reported amounts of assets and liabilities, revenues and expenses and related disclosure of contingent assets and liabilities at the date of the financial statements. Actual results may differ from these estimates under different assumptions and conditions. Depending on the method of the measurement of these items, they are more or less subject to estimates made

by management. Even “Conceptual Framework for Financial Reporting” issued on 2010, which is the product of a joint project of IASB and FASB acknowledges that "to a large extent, financial reports are based on estimates, judgements and models rather than being exact depictions". Accounting estimates can be assessed from different interested parties’ point of view. First of all, standard-setters take into consideration accounting estimates when developing accounting standards. They should ‘’create standards which allow judgement within a principles-based framework ’’. Also the exercise of judgement is necessary in accounting where management make accounting estimates while accountants record business events resulting from such estimates in accounting records. In addition, auditors should assess its client’s accounting estimates when performing the audit of financial statements and forming an opinion about the fair presentation of them. Finally, many regulators and other financial statements’ users will be interested in information about applied accounting estimates.

The Conceptual Framework for Financial Reporting, as a part of IFRS, "establishes the concepts that underlie those estimates, judgements and models. The IFRS Framework understands relevance and faithful representation as fundamental qualitative characteristics in order to be useful for its users. The relevance of financial information can be affected by the level of measurement uncertainty that, according to the Framework, arises when an asset or a liability cannot be measured directly so must instead be estimated. According to the IASB "an estimate can provide relevant information, even if the estimate is subject to a high level of measurement uncertainty. Nevertheless, if measurement uncertainty is high, an estimate is less relevant than it would be if it were subject to low measurement uncertainty. Measurement uncertainty arises when a measure for an asset or a liability cannot be observed directly and must instead be estimated." In addition, the IASB in Exposure Draft of new Framework gives an example where an estimate can be faithfully represented. This is the case where the reporting entity has applied an appropriate process, suitably described the estimate and explained any uncertainties that significantly affect the estimate. In order to be faithfully represented accounting estimates should be described, the nature and level of uncertainties need to be illustrated and disclosed in the notes to the financial statements.

Making estimates implies a certain level of subjectivity and judgement. Two different estimates for an item can result with different accounting information which could lead the users of the financial statements to different financial decisions. Based on the definition of the exposure draft issued on September 2017 of IAS 8 "Accounting Policies, Changes in Accounting Estimates and Errors" the term of an accounting estimate are inseparably linked with the application of accounting policies. As a result of the uncertainties inherent in business activities, many items in financial statements cannot be measured with precision. Thus, an entity may need to use accounting estimates in applying its accounting policies for some items. Accounting estimates are based on the latest available, reliable information. It is important to note at this point that the use of reasonable estimates is an essential part of the preparation of financial statements and does not undermine their reliability, as emphasized by relevant accounting guidance. An estimate may need revision if changes occur in the circumstances on which the estimate was based or as a result of new information or more experience. By its nature, the revision of an estimate does not relate to prior periods and is not the correction of an error. There is specific accounting guidance that deals with changed in accounting estimates and policies, IAS 8 and ASC 250 – Accounting Changes and Errors Corrections which prescribe that the effect of a change in an accounting estimate, shall be recognized prospectively by including it in profit or loss in either the period of the change, if the change affects that period only, or in the period of the change and future periods, if the change affects both. On the other hand a change in accounting policy should be applied retrospectively, with an adjustment to the opening balance of retained earnings in the statement of changes in equity.

From the discussion above it is evident that developing accounting estimates is a very complex process that requires to take into consideration all required information about the topic, to obtain an understanding of different accounting estimates' alternatives resulting from accounting standards and national laws, recognizing the consequences of such alternatives and identifying the need of judgment's reassessment in the future. Therefore, the appropriate disclosures in financial statements regarding a possible revision of an accounting estimate are of paramount importance for the uniformity and

reliability of information. According to relevant accounting guidance[15], an entity shall disclose the nature and amount of a change in an accounting estimate that has an effect in the current period or is expected to have an effect in future periods, except for the disclosure of the effect on future periods when it is impracticable to estimate that effect. If the amount of the effect in future periods is not disclosed because estimating it is impracticable, an entity shall disclose that fact.

The need for explicit disclosures is emphasized, also, by the guidance of SEC[16] relating to Critical Accounting Estimates where it is stated that management should provide disclosure about the critical accounting estimates or assumptions in their Management Discussion & Analysis (MD&A) report which should supplement, not duplicate, the description of accounting policies that are already disclosed in the notes to the financial statements. The disclosure should provide greater insight into the quality and variability of information regarding financial condition and operating performance. While accounting policy notes in the financial statements generally describe the method used to apply an accounting principle, the discussion in MD&A should present a company's analysis of the uncertainties involved in applying a principle at a given time or the variability that is reasonably likely to result from its application over time.

A company should address specifically why its accounting estimates or assumptions bear the risk of change. The reason may be that there is an uncertainty attached to the estimate or assumption, or it just may be difficult to measure or value. Equally important, companies should address the questions that arise once the critical accounting estimate or assumption has been identified, by analyzing, to the extent material, such factors as how they arrived at the estimate, how accurate the estimate/assumption has been in the past, how much the estimate/assumption has changed in the past, and whether the estimate/assumption is reasonably likely to change in the future. Since critical accounting estimates and assumptions are based on matters that are highly uncertain, a company should analyze their specific sensitivity to change, based on other outcomes that are reasonably likely to occur and would have a material effect. Companies should provide

[15] International Accounting Standard 8 Accounting Policies, Changes in Accounting Estimates and Errors, paragraphs 39 & 49
[16] US Securities and Exchange Commission (2003) guidance 501.14 Critical Accounting Estimates

quantitative as well as qualitative disclosure when quantitative information is reasonably available and will provide material information for investors.

Due to the fact that in shipping industry, non-current tangible assets – vessels - represent a significant proportion of assets of the majority of shipping companies, and could be prone to manipulation, we are going to concentrate our analysis of accounting estimates, on assumptions that influence the recognition and measurement of such assets. For each critical accounting estimate, relating to vessels, as presented in the annual report of the year 2016 of our case study listed shipping company, we will critically assess the soundness and reasonability of the underlying assumptions and also the consistency with other peer companies operating in the same sector.

3.2 Significant accounting estimates that affects non-current assets in shipping industry

According to the published financial statements of a number of major listed shipping companies, the most common recognized accounting estimates relating to vessels are vessels' estimated **useful life** and **scrap value** as well as the estimated **undiscounted projected net operating cash flows** used in critical accounting policies of depreciation and impairment, respectively.

Critical accounting policies are those that reflect significant judgments of uncertainties and potentially result in materially different results under different assumptions and conditions. Critical accounting policies, generally involve a comparatively higher degree of judgment in their application and as a result they are inherently associated with the development of estimates. Given the significant impact that these estimates have on company's reported profit and to the value of its assets as displayed in balance sheet we perform a comparative analysis below among similar companies to our case study entity, regarding these three critical estimates. We attempt, also to assess the validity and reasonability of the related assumptions made by the management of our case study company with reference to market available relevant data and to relevant academic and business literature and studies.

3.2.1 Economic Useful Life (EUL) of Long Lived Assets (Vessels)

Apart from the general accounting guidance for estimates and how to account for a change in estimates mentioned above, each separate accounting standard provide for specific considerations for the development of estimates in order to be applied to the particular accounting policy governed by them. Useful life of non-current assets are defined and ruled by the International Accounting Standard 16 and ASC 360-10-05 which are both referred to the "subsequent measurement of Property Plant and Equipment".

More specifically, IAS 16 in paragraph 6 defines the term "useful life" as:

a) the period over which an asset is expected to be available for use by an entity, or

b) the number of production or similar units expected to be obtained from the asset by an entity.

Economic useful life is an integral part of depreciation policy since it represents the timeline over which the depreciable amount of an asset (cost less residual value) will be allocated on a systematic basis, so as a depreciation charge to be recorded on an annually in profit and loss statement. As a result, the longer the useful life is assessed to be, the less the depreciation amount that burdens each annual period. In other words, depreciation applies the accruals concept to the capitalized cost of a non-current asset and matches this cost to the period that it relates to and to the benefits from its use.

As noted in paragraph 56 of IAS 16, the future economic benefits embodied in an asset are consumed by an entity principally through its use. However, other factors, such as technical or commercial obsolescence and wear and tear while an asset remains idle, often result in the diminution of the economic benefits that might have been obtained from the asset. Consequently, all the following factors are considered in determining the useful life of an asset:

a) Expected usage of the asset. Usage is assessed by reference to the asset's expected capacity or physical output.

b) Expected physical wear and tear, which depends on operational factors such as the number of shifts for which the asset is to be used and the repair and maintenance program, and the care and maintenance of the asset while idle.

c) Technical or commercial obsolescence arising from changes or improvements in production, or from a change in the market demand for the product or service output of the asset. Expected future reductions in the selling price of an item that was produced using an asset could indicate the expectation of technical or commercial obsolescence of the asset, which, in turn, might reflect a reduction of the future economic benefits embodied in the asset.

(d) Legal or similar limits on the use of the asset, such as the expiry dates of related leases.

In addition, the paragraph 57 of the same accounting guidance distinguishes economic life on an asset from its useful life used for depreciation purposes, clarifying that the useful life of an asset is defined in terms of the asset's expected utility to the entity. The asset management policy of the entity may involve the disposal of assets after a specified time or after consumption of a specified proportion of the future economic benefits embodied in the asset. Therefore, the useful life of an asset may be shorter than its economic life. The estimation of the useful life of the asset is a matter of judgement based on the experience of the entity with similar assets. Complementary, based on provisions of US accounting standard ASC 360-10-5 when determining an asset's useful life, an entity should consider its experience regarding loss or damage to depreciable assets, along with other factors such as wear and tear, obsolescence, and maintenance and replacement policies.

Vessels are stated at cost, which consists of the purchase price and any material expenses incurred upon acquisition, such as initial repairs, improvements, delivery expenses and other expenditures to prepare the vessel for her initial voyage. Any subsequent expenditure, when it does not extend the useful life of the vessel, increase the earning capacity or improve the efficiency or safety of the vessel, is expensed as incurred.

The cost of each of the Company's vessels is depreciated beginning when the vessel is ready for its intended use, on a straight-line basis over the vessel's remaining economic

useful life, after considering the estimated residual value (vessel's residual value is equal to the product of its lightweight tonnage and estimated scrap rate per ton). A decrease in the useful life of a vessel or in its salvage value would have the effect of increasing the annual depreciation charge. When regulations place limitations on the ability of a vessel to trade on a worldwide basis, the vessel's useful life is adjusted at the date such regulations are adopted.

The age of vessels scrapped and the level of scrapping activity is generally a function of scrapping prices in relation to current and prospective charter market conditions, as well as operating, repair and survey costs. To note that the heightened level of environmental and quality concerns among insurance underwriters, regulators and charterers is leading to greater inspection and safety requirements on all vessels and may accelerate the scrapping of older vessels throughout the dry-bulk shipping industry. In this respect, the age that a vessel will be scrapped is a management's decision depending mainly from the cycle that the shipping industry will be at the time that a vessel usually is demolished.

Case study of a shipping company operating in dry market - assessment of the use of useful life estimate

From the review of the disclosures accompanied the financial statements of the year ended December 31, 2016 of the US listed shipping company Diana Shipping Inc., we noted that the our case study company depreciates its fleet of dry bulk vessels on a straight-line basis over their estimated useful lives, estimated to be **25 years** from the date of initial delivery from the shipyard which management believes is a common practice in the dry bulk shipping industry. For more information regarding the fleet and the operations Diana Shipping Inc. please refer to Chapter 4.

For verify the management's assessment of useful life used for consistency with peer companies, we reviewed the most recent publicly available annual reports of other SEC filers in the shipping industry, and noted that for bulkers the estimates used range from 25 to 30 years. Please refer to Table 4 below. We shall note though that for bulkers only one entity use an estimate different than 25 years. In addition, in order to produce a range of acceptable amounts and determine the reasonableness of estimations used by the management, we obtained a report with average age of vessels of similar characteristics

(i.e. deadweight) as those of the Company's fleet, demolished within the last 30 years (since such data are provided and are available in Clarksons' website). We used only the last 15 years and not all historical data, since we consider that technological improvements in ships' construction have significantly changed the useful life of vessels since 1985 (year from which demolition data are available). This report indicates that average age of scrapped vessels has ranged in that period between 20.2 years and 28.7 years for Capesizes and New Castlemaxes, and between 20.5 and 30.1 years for Panamaxes, Post-Panamaxes and Kamsarmaxes. The average age of demolished vessels in those years is 25.0 years for Capesizes and New Castlemaxes and 26.8 years for Panamaxes, Post-Panamaxes and Kamsarmaxes. The average age for all types of vessels is 25.9 years. As above discussed, the level of scrapping activity and the age of vessels scraped is generally a function of scrapping prices in relation to current and prospective charter market conditions, as well as operating, repair and survey costs. Thus, we note that the scrapping age of bulkers have reached extremes during the market peak in 2007 and 2008 with scrapping ages well above 30 years old. Again as above we conclude that the age that a vessel will be scrapped is a management's decision, depending mainly from the cycle that the shipping industry will be at the time that a vessel usually is demolished which in all cases exceeds the age of 20 years. As the cycle that the shipping industry will be when the Company's vessels will approximate the usual age of demolition is not known as of to date, we consider that a range of acceptable ages would have been those incurred within the last 15 years as well useful life estimates commonly used in the industry (Table 1 below). More specifically, between 20 years and 29 years for Capesize and New Castlemax vessels and between 24 and 30 years for Panamaxes, Post-Panamaxes and Kamsarmaxes.

In this respect, we conclude that management's estimate of 25 years is within our range of acceptable amounts. It seems that the management of the Company is prudent in the selection of its policies and prefers to take the conservative side.

The outcome of our analysis of peer companies and vessels historical observable demolition ages as reported by clarksons.net in Shipping Review and outlook published during autumn 2016, is presented below, along with the data used (Table 3) for their determination:

Types of bulk carrires	Capesize - New Castlemax	Panamax - Post Panamax - Kamsarmax	both types
min	20,2	20,5	**20,2**
max	28,7	30,1	**30,1**
Average 2002-2016	25,0	26,8	**25,9**

Bulk Carrier Demolition ***million dwt***

Year End	BULKCARRIER DEMOLITION BY SIZE					DEMO	AVERAGE AGE				
	Over 100	65-100	40-65	10-40	Total Orders	AS % OF FLEET	Over 100	65-100	40-65	10-40	Total Fleet
2002	1,3	1,5	0,5	2,8	**6,1**	2,1%	26,2	24,9	26,2	27,6	**27,0**
2003	0,8	0,7	0,5	2,2	**4,2**	1,4%	28,7	27,2	27,0	28,0	**27,9**
2004	0,0	0,0	0,1	0,3	**0,4**	0,1%	0,0	0,0	38,9	28,9	**29,6**
2005	0,2	0,2	0,1	0,4	**1,0**	0,3%	25,5	30,1	29,5	32,3	**31,2**
2006	0,3	0,5	0,1	0,9	**1,8**	0,5%	26,2	27,7	29,0	31,1	**30,3**
2007	0,0	0,1	0,1	0,3	**0,5**	0,1%	0,0	27,6	31,1	34,7	**33,5**
2008	2,2	1,1	0,5	1,8	**5,6**	1,4%	27,2	28,5	28,0	31,2	**29,9**
2009	1,4	2,1	1,4	5,6	**10,6**	2,5%	26,1	28,6	30,9	32,2	**31,5**
2010	2,7	0,7	0,4	2,7	**6,5**	1,4%	28,6	26,6	29,8	32,8	**31,6**
2011	10,5	5,2	2,2	5,3	**23,3**	4,3%	26,3	29,3	30,2	32,4	**30,5**
2012	11,7	8,7	4,7	8,3	**33,4**	5,4%	22,9	28,6	27,2	30,3	**28,5**
2013	7,9	5,0	3,5	6,7	**23,1**	3,4%	23,2	26,8	26,9	30,0	**28,2**
2014	4,2	4,8	3,1	4,2	**16,3**	2,2%	23,5	25,1	26,9	29,2	**27,4**
2015	15,4	6,8	3,1	5,2	**30,5**	4,0%	20,8	23,0	26,0	28,4	**25,2**
2016*	11,8	6,4	3,0	2,7	**24,0**	3,1%	20,2	20,5	22,6	28,4	**23,3**

Source: Clarksons Publications - Shipping Review and Outlook (published Autum 2016)

Table 3: Bulk Carriers Demolition historic activity in terms of dwt and average age

Company Name	Useful life (years)	Scrap Rate ($/Lwt)
Diana Shipping Inc.	25	250
Dryships Inc.	25	250
Eagle Bulk Shipping Inc.	25	300
Euroseas Ltd.	25	*
Freeseas Inc	28	*
Genco Shipping & Trading Ltd.	25	310
Globus Maritime Inc	25	200
Golden Ocean Group	25	*
Navios Maritime Holdings Inc	25	340
Navios Maritime Partners LP	25	340
Paragon Shipping Inc.	25	300
Safe Bulkers Inc	25	182
Seanergy Maritime	25	*
Scorpio Bulkers	25	*
Ship Finance International	25	*
Star bulk Carriers	25	300
Average	**25**	**277**

**Not disclosed*

Table 4: Useful Life and Scrap Rate per company – data from published annual reports

3.2.2 Residual Value of Long Lived Assets (Vessels) – determination of scrap value estimate

The applicable accounting guidance for the residual or terminal or salvage value (terms are used interchangeably) of an asset is IAS 16 and ASC 360-10-5, as it was the case for useful economic life estimate. More specifically, based on the definition included in paragraph 6 of IAS 16, the term residual value characterized the estimated amount that an entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal, if the asset were already of the age and in the condition expected at the end of its useful life.

Depreciation is based on the depreciable amount which is calculated as the cost of the vessel less its estimated salvage value. Each vessel's salvage value is equal to the product of its lightweight tonnage and estimated scrap rate. As disclosed in the annual financial statements of our case study company (Diana Shipping Inc.) the management estimate

the salvage values of our vessels based on historical average prices, which they believe is common in the dry bulk shipping industry. They also acknowledge that a possible decrease in the salvage value of vessels would have the effect of increasing the annual depreciation charge. In the formula used for the calculation of vessels' residual value the figure that involves estimation uncertainty is solely the scrap value which is dependent on the drivers and forces of demand and supply prevailing on the ship recycling industry, since its light weight is part of vessel's particulars and is not subject to estimation.

Case study of a shipping company operating in dry market - assessment of the use of scrap value estimate

As with the estimate of useful life, we present below the main factors affecting the estimate of scrap value and we critically assess the suitability and reliability of management assumptions regarding the scrap rate used to develop the estimate of salvage value. In this context, we perform a comparative analysis between the Company under review and the other market players in order to verify consistency of financial information with reference to scrap value estimate in the dry bulk market.

It should be noted that historical market data (Appendix IV) indicate that for scrap rates per light-weight ton there is no general increase trend within the years but these are in direct line with the trends in the shipping market and relate to current and prospective market conditions. The shipping industry is cyclical with attendant volatility in charter hire rates and profitability and the length of shipping cycles cannot be predicted. In times of shortfall in rates, there is an increased level of scrapping activity with the opposite effect in times of strength. The greater the scrapping activity, the lowest the scrap rates and vice versa. In this respect, scrap rates per light-weight ton depend mainly from the time that the vessel will be demolished and the cycle that the shipping industry will be at that time.

The management of the Diana Shipping Inc. has estimated the scrap rate of its dry-bulk vessels taking into consideration market data (i.e. average age at which dry-bulk vessels were scrapped, historical average prices of the cost of the light-weight ton of vessels being scrapped) and peer group analysis. The Company has established procedures for monitoring and identifying changes in its operating environment that would raise the need

for change of its depreciation estimates. Given that Company's vessels are new (with an average age of 8,11 years while none of them exceeds 16 years age), and in this respect not close to be scrapped, the management of the Company believes that there should be significant changes to the market in order to change such estimates. The management also believes that given the volatility of the market any such assessment should be made as close as practicable to the scrapping of its vessels and there is no need to reassess its estimates at each and every reporting period. In particular, the Company's policy is to adjust the vessels' remaining useful life when market conditions and or regulations place limitations over the ability of a vessel to trade on a worldwide basis and revisit its estimations on the scrap values when significant changes have incurred in the scrap steel rates. For newly acquired vessels, the Company reviews its estimations on the scrap values based on the type, age, size of the vessel, as well as the current average scrap values at the time of acquisition.

As regards scrap rate estimate, the Company's management, taking into consideration the changes in the scrap steel rates in demolition markets as well as peer group analysis, has reassessed its estimate, and effective January 1, 2013, has changed the value of scrap steel used for the purpose of estimating the residual values of its vessels, from $150 per light-weight ton (rate used in prior years) to $250 per light-weight ton. The Company had properly disclosed for the aforementioned change in estimate in prior years. Since no other significant change to the market has occurred, no change of the value of scrap steel took place in 2016.

We reviewed the most recent publicly available annual reports of other SEC filers in the shipping industry (Table 4 above) and noted that the vast majority of the filers include an estimate of residual value based on the product of the scrap rates and the lightweight tonnage of the vessel. An exception of this practice is Euronav that assigns no residual value to its vessels. In Table above we accumulated the estimates used by other SEC filers and we developed a range of 182-340 per lightweight ton that is considered acceptable.

In addition, in order to produce a range of acceptable amounts and determine the reasonableness of estimations used by the management, we obtained available reports with average scrap rates per year since 1995 (the first date that such data are provided, and are available in Clarksons' website) for vessels of similar characteristics (i.e.

deadweight) as those of the Company's fleet (Appendix IV). This report indicates that scrap rates have historically (from Q4' 1995 and onwards) ranged between $100 and $680 per light-weight ton, for dry-bulk vessels with an average of Far East & India demolition markets for the period Q4' 1995- 2016 standing at $269 per light-weight ton. As discussed above these data indicate that there is high volatility in scrap prices with no general increase trend (as for example in consumer prices) and depend on market fundamentals such as, among others, the demand for steel, age of worldwide fleet, technological innovations and charter rates. To highlight this we should state in the third quarter of 2008, when charter rates reached then historical lows (in far east markets) and since when the shipping industry faces its current recession, the scrap rates declined significantly as older tonnage was no longer profitable to operate and the increase in scraping activity drove the scrap rates lower (the scrap rate for the third quarter of 2008 was $450). During subsequent years, scrap rates dropped significantly as older tonnage was no longer profitable to operate and increase in scrapping activity drove the scrap rates lower. Hence, during the subsequent years, the scrap rates were increased significantly reaching pre-2008 levels and remained at high levels despite the fact that the charter rates have not improved similarly, mainly driven by the increased demand for steel and the limited availability of tonnage for scrapping, whereas the reached decreased levels again within 2015 which has overall been a historically strong demolitions' volume year. In particular, scrap rates dropped to $200 in the fourth quarter of the same year, increased significantly again to a historical high of $465 in the second quarter of 2011 to drop again to $310 in the second quarter of 2013 and have further dropped to $140 in the fourth and first quarter of 2015 and 2016, respectively. It should be noted that, despite the continuing depressed market conditions, the scrap rates presented an increase trend since 2008 reaching $465 per light-weight ton for dry-bulks in the second quarter of 2011, as mentioned above, mainly as a result of the decreased availability of tonnage, currency fluctuations and the increased steel prices.

Notwithstanding, the aforementioned increase trend in scrap rates has changed since the beginning of 2012 due to changes in the market as quoted below:

"Demolition prices on a per lwt basis have also undergone a downwards correction since the early part of this year. Given the weakness of freight markets, sales may well pick up

in the coming months, but it may take a short while for the current uncertainty to be overcome, so that cash buyers do not face the risk of renegotiations on delivery into the subcontinent, something which has been evident recently. At the same time, demolition price levels spent a prolonged period above $450/ldt, so it may take a while before owners recalibrate their expectations to the lower levels which now seem likely over the coming months" (Source: Clarksons - World Shipyard Monitor, September 2012). Meanwhile, demolition activity hit record highs and outpaced contracting activity for the first time on record. 1,247 vessels, of a combined 56.3m dwt were sold for scrap through the course of 2012. Recycling activity increased across the major shipbreaking nations, aided in part by the Bangladeshi breakers' return to the market, following environmental disputes in 2011. Poor earnings, oversupply and weak secondhand values coupled with comparatively buoyant scrap prices saw owners scrap 3.7% of the start year fleet, with average scrap vessel ages trending downwards as the year progressed (Source: Clarksons - World Shipyard Monitor, February 2013).

The market has seen a quieter pace of activity this week, with a relatively slow supply of tonnage evident. It would be expected that price levels would increase in response to this shortage of tonnage however, this has not happened due to the various economic, political and religious events affecting demolition activity in the key recycling locations (Source: Clarksons – Weekly Publication November 1, 2013).

Despite a 22.2% year-on-year decline in the volume of tonnage demolished, 2013 still proved to be an active year for demolition with 45.3m sold for recycling. This is the second highest volume of tonnage demolished on record (Source: Clarksons - World Shipyard Monitor, February 2014).

Activity in India and Bangladesh is continuing at a weaker pace. In India, price levels are subject to constant pressures. Despite the negative sentiment coming from some quarters in the industry, very firm prices are still being achieved for certain vessels which have good specifications. Speculation is definitely the current trend, the market therefore continues to present confusing signs and current activity is certainly on a "ship-by-ship" basis (Source: Clarksons – Weekly Publication August 08 & 29, 2014).

All parties involved in the demolition industry digesting the current poor state of the market as it continues to weaken. The major problem is the price relationship between shredded scrap and actual ship prices which are completely out of sync, hence the negative corrections to scrap prices. In addition, the supply of cheap billets to domestic steel mills continue to suppress local demand. Where this will all end is difficult to answer (Source: Clarksons – Weekly Publication February 13, 2015).

Sellers have started to be more realistic in the valuation of their ships and are facing the reality of current price levels; the result of this is more tonnage entering the market. Whether owners are really ready to accept the current rates will be reflected by how many of the units offered to the market are actually sold. Overall, this is encouraging news and prices are starting to increase slightly, providing some long needed optimism for the industry. Whilst there is certainly more enquiry, we are unlikely to see the levels in the low $400s achieved earlier this year for some time. Source: Clarksons – Weekly Publication August 21, 2015).

It has been a while since any sign of optimism was last seen in the demolition market and despite the fact that some would argue that last week's positive price movement was just a correction long due, the net effect is that the reversal of the negative trend has given the market a much needed breath. We expect prices to remain around current levels in the short-term, while the fact that cheap Chinese scrap steel is still flooding the markets, is the reason why we expect any further positive price movement to be within a fairly tight range (Source: Intermodal Research & Valuations– Weekly Market Report, September 2, 2015)".

This week, supply is once again outstripping demand. With further disparity in pricing, the feeling is that this is one of the most temperamental markets in recent memory, with cash buyers finding it difficult to find interested end-recyclers. With an expected tidal wave of tonnage on the horizon, it would appear that the market has still not reached a 'bottom' level. We have already seen about ten Panamax and Capesize units sold for recycling this year, and it looks like 2016 could be another record breaker. (Source: Intermodal Research & Valuations– Weekly Market Report, January 22, 2016)".

Whilst it has been another week of subdued activity in the recycling market, some interesting sales are still coming to light that make it difficult to gauge current rates. Price levels for Handysize bulkers, for example, are being quoted by some sources at levels as low as $230-240/ldt. However, as recent sales show, vessels that fit the requirements of a given recycling yard can achieve a significant premium. In general, it is being reported that there are still many units unsold by cash buyers, who are finding it difficult to resell their tonnage in hand. (Source: Intermodal Research & Valuations– Weekly Market Report, July 01, 2016)".

On the back of this, some cash buyers are starting to take a speculative stance once again and are offering prices this week that looked inconceivable through most of the summer months. As always with price increases, there must an air of caution as improved rates often entice more owners to bring their tonnage into the market, which can sometimes cause prices to decrease just as quickly due to oversupply. It will be interesting how far rates increase in the forthcoming weeks and whether the $300/ldt level will once again be seen for specific vessels. In addition to this the number of units that arrive onto the market as definite sales candidates will be closely followed, as well as how this extra supply affects sentiment. It does appear that at this time, the rates witnessed are being supported by local markets as steel prices have also improved recently (Source: Clarksons – Weekly Publication September 2, 2016)

Given the above and as the timing of demolition is not known, given that Company's vessels have approximately 16 average remaining years before they scrapped, we consider that a range of acceptable scrap rates would have been all rates actually incurred as of to-date as well as rates commonly used in the industry (Table above). If we were to further reduce our range of acceptable amounts we could say that values incurred in last five to ten years on average by combining demolition prices from Far East, Indian Sub-Continent and Bangladesh, extracted by clarksons.net, as well as rates most commonly used provide a more possible range of acceptable amounts. Such range would have a low end of $140 and a high end of $680 per lwt. In the Table 5 below we present the higher, lower and average observed scrap price in each demolition market historically from 1995 and during the last 5 and 10 years. In fact, Company's estimate rests even below the average of the last five years. To note that we have excluded Bangladesh market from

historical data of the last 20 years due to the absence of available information. (Quotes from Bangladesh demolition market could be retrieved only from Q2 of 2004 and onwards). In this respect we conclude that management's estimate of $250 is within our range of acceptable amounts. To note that management's estimate is in the low point of the range of the scrap rates used by its peer group (Table 4 above).

Dry-bulks	**Scrap Values from Q4' 1995 to 2016**		
	Far East	**India**	**All Yards**
Min	100	106	**100**
Max	465	630	**630**
Average (Far East & India for the period Q4' 1995-	237	301	**269**

	Scrap Values for the last five (5) years:			
	Far East	**India**	**Bangladesh**	**All Yards**
Min 5yrs	140	240	255	**140**
Max 5yrs	430	495	505	**505**
Average 5yrs	284	383	389	**352**

	Scrap values for the last ten (10) years			
	Far East	**India**	**Bangladesh**	**All Yards**
Min 10yrs	140	240	255	**140**
Max 10yrs	465	630	680	**680**
Average 10yrs	300	403	407	**370**

Table 5: Scrap Value Historical data (Source Appendix IV)

3.2.3 Impairments estimates - Future cash flows generated by hire revenues assumption

Impairment of long-lived assets is a critical accounting policy which implies undoubtedly a significant extent of judgement and uncertainty, due to the large number of assumptions and estimates used in its determination. The impact of a possible underestimation or overestimation of the estimated parameters in an impairment exercise could be so pervasive in the financial statements, that could influence the decision making process of their users. As a result, impairment assumptions have attracted the interest of regulators and consequently an increased level of scrutiny by auditors. Indicative of the increased attention to impairment's assumptions is the report on current developments in SEC comment letters issued on November 3026 by PwC consulting firm which highlights that impairments continue to be among staff's priority areas. In particular, it is mentioned that additional information

about the level of uncertainty and sensitivity of key assumptions related to at risk assets or asset groups has been a point of focus by the SEC staff. In fact, in some instances, the SEC staff requested details of the impairment analysis and challenged registrants' conclusions relative to how they considered economic challenges, operating losses at a specific segment, or the impairment of similar assets as potential triggering events. In this context, another publication of Deloitte accounting and auditing firm issued on November 2012 refers that the themes of SEC staff comments related to impairment of long lived assets are the following:

- The adequacy and frequency of the registrant's asset impairment tests.
- The factors or indicators (or both) used by management to evaluate whether the carrying value of other long-lived assets may not be recoverable.
- The methods and assumptions used in impairment tests.
- The timing of the impairment, especially if events that could result in impairments occurred in periods before the registrant recorded the impairment. Under these circumstances, the SEC staff may ask registrants to justify why the impairment was not recorded in the previous period.
- The types of events that could result in impairments.
- In the critical accounting policies section of MD&A, the registrant's process for assessing impairments.
- The facts and circumstances leading to impairments, along with a reminder that a registrant may be required to disclose in MD&A risks and uncertainties associated with the recoverability of assets in the periods before an impairment charge is recorded.

The SEC staff has encouraged shipping companies to provide tabular disclosures about assets at the individual-vessel level within the critical accounting policies section of MD&A. The staff has noted that asset values in the shipping industry have been significantly depressed and often requests a more thorough discussion of the factors and conditions that would lead a registrant to record an impairment loss. Although registrants generally do not intend to dispose of their fleet (i.e., they are using a "held for use" model to assess their vessels for impairment), the objective of the requested disclosures is to present differences between the carrying value and fair value of these vessels.

Taken into consideration the increased importance that the shipping market participants place to impairment tests, we focus our analysis in one of its most critical assumptions as proved by sensitivity analysis conducted in case study Company in Chapter 4, which is the estimation of future charter rates in order to determine future operating cash inflows generated by hire revenues. Our analysis will have as a point of reference the case study US listed company Diana Shipping Inc. and its disclosures made in the last annual published financial statements for the year ended December 31, 2016. A comparative analysis among other listed shipping entities, it is used in order to verify the reasonability and appropriateness of undiscounted projected operating cash flows generated by hire revenues.

A popular definition of "forecast" is that it is a reference to future trends usually in the form of probability that is realized by processing and analyzing available data. Then a set of questions slip into mind: In a volatile market such as the one of shipping freight rates, is it possible to acquire information regarding its future evolvement? How can we predict the events that will influence the future state of the market? Future shipping market risk has always been an attractive thematic issue for many maritime economists.

It is important to begin by discussing the mechanisms of shipping cycle. Understanding the shipping cycles plays an important role in the decision making process. Shipping cycles are not regular as they follow a loose sequence of ups and downs caused by the interaction between supply and demand in the maritime transport sector. Supply will lag behind when facing extremely dynamic exogenous demand. In this situation, the industry needs to adapt the shipping fleets to changes in demand. When there is low cumulative demand, shipbuilding slows and the number of vessels under detention (idle) or marked for scrap rises. When cumulative demand increases - which can be caused by many exogenous factors, related mainly to changes in the world economy- supply is unable to adapt in a fast pace, freight rates increase and shipbuilding enhanced activity, ultimately causing an oversupply which then pushes rates back down. In other words, shipping cycle is a combination of price incentives and the typical inelasticity of supply within this market. The cycle operates due to a lack of synchronization in ship production (changes in supply), in a context of very dynamic demand (that responds to changes in production and trade). When prices (freight rates) are low, there is less construction in the maritime sector and increasing numbers of ships are scrapped. As demand increases and more transport services are needed, the supply (in terms of the number of ships and/or

availability of effective transport capacity) cannot be adjusted rapidly, freight rates rise and construction begins again, which subsequently produces excess supply and a lowering of freight rates.

Assessment of the estimate of future revenues in cash flow test of impairment – case study of Diana Shipping Inc.

The Company is using historical average time charter rates based on available market date as indicative rates to estimate future revenues generated by the vessels' operation in the impairment exercise. In order to take account of a full business cycle in the shipping sector a 10 year average of the historical time charter rates is commonly used. A question was raised (a) whether historical time charter rates are appropriate estimate on future charter rates and (if so), (b) whether the 10 year period can indeed be considered as representative of a full business cycle in shipping.

Use of historical rates

The shipping industry is cyclical with attendant volatility in charter hire rates and profitability. Historical market data indicate that for charter rates there is no general increase trend but charter rates experience fluctuations resulting from changes in the supply and demand for vessel capacity and changes in the supply and demand for the major commodities carried by water internationally. When a shortage of ships develops, rising freights lead to a massive construction of new ships. There comes a point either when demand subsides or when deliveries of new vessels overtake a still increasing demand. At this stage freights collapse, vessels are condemned to idleness in laying up berths and a shortage of ships is developing again leading to a new cycle. Given that the mechanics of supply and demand are expected to work similarly in the future, creating the same demand and supply conditions, management's belief that historical rates capturing a full shipping cycle are the best way to estimate the future rates seems reasonable.

Alternative available methods that could be used to predict trading in future level rates might be the Forward Freight Rates (FFAs) or current time charter rates. Both methods have limitations. FFAs are not available for periods more than 3 to five years and all types

and sizes of vessels; volume of transactions on these types of contracts is limited, especially when the market is depressed. Thus their use is not considered to be a better estimate than the historical market rates. If one can argue that historical market rates for an extended period of time (such as 10 years) is not indicative of future rates, using historical market rates for a shorter period of time (i.e. last year or as at balance sheet date) would be considered as a much weaker estimate.

Various filers disclose that they use a combination of current market rates (i.e. current 1 year time charter rates or FFAs) for the first couple of years following the balance sheet date and the historical average time charter rate for the remaining period. This practice by itself implies the limited power of prediction that the current market rates have, especially in a highly cyclical industry as shipping, as they have been driven by short-term disruptions or seasonal issues. One should also consider the economical useful life of the assets under consideration, which may vary from 25 to 40 years depending on the type of vessel, in concluding whether this method would provide a reasonable estimate for such a long period.

Length of shipping cycle

Economic historians have devoted much effort to analyzing and classifying cycles into categories, usually focusing on their length .The first systematic exposition of periodic economic crises, in opposition to the existing theory of economic equilibrium was the 1819 Nouveaux Principes d'économie politique by Jean Charles Leonard de Sismondi. Prior to that point classical economics had either denied the existence of business cycles, blamed them on external factors, notably war, or only studied the long term. A business cycle was first defined by Clement Juglar. In his research (C. Juglar, Des Crises commerciales et leur retour periodique en France, en Angleterre, et aux Etats-Unis, 1862) Juglar defined a full business cycle to range between seven and 11 years (Juglar fixed investment cycle). A recent research (Korotayev, Andrey V., & Tristel, Sergey V., A Spectral Analysis of World GDP Dynamics: Kondratieff Waves, Kuznets Swings, Juglar and Kitchin Cycles in Global Economic Development, and the 2008-2009 Economic Crisis, 2010) confirmed the conclusions of Juglar on the duration of a business cycle.

Respective literature historically refers that a complete economic cycle in the shipping industry is approximately 10 years. Such references to this length of a cycle are found on ship brokers' reports since early 1900's (J.C Gould, Anger & Co, Angier Brothers Steam Shipping Market Report as of December 31, 1900). According to a broker's annual report dated January 1901 it was noted that 'the comparison of the last four cycles (ten year periods) brings out a marked similarity in the salient features of each component year, and the course of prices'. He went on to observe that the cycles seemed to be getting longer 'a further retrospect shows that in the successive decades the periods of inflation gradually shrink, while the periods of depression correspondingly stretch out'.

Although the length of cycles is of great interest, it soon became evident to observers of the shipping business that the cycles were far more complex than a sequence of regular fluctuations in freight rates. Kirkaldy (1913), saw the cycle as a consequence of the market mechanism. The peaks and troughs in the cycle are signs that the market is adjusting supply to demand by regulating the cash flow.

Martin Stopford (Maritime Economics, published 2009) in his research of the 22 shipping cycles during the period 1741-2007 calculated the average length in the shipping cycle to 10.4 years. The standard deviation deriving from the data, being 4.9 years, revealed that 95% assurance can be obtained that shipping cycles could last from 0 to 20 years. By further disaggregating the data and separating the cycles in three eras (1741-1871, 1872-1947 and 1948-2007), Stopford concludes that the average length of shipping cycles varies from 8 to 14.9 years. He also notices that the length of the cycle is by itself cyclical and the analyzed data revealed longer cycles (12-15 years each) to be separated by a sequence of shorter cycles (that may last in certain cases less than 5 years).

It is widely believed that historical market rates are not necessarily indicative of future market rates and relevant disclosures are included in risk factors and forward looking statements made by the filers. Martin Stopford indicates in his research that predicting cycles and the timing of changes is difficult, especially in the heightened sentiment that accompanies the peaks and troughs of each cycle.

However an estimate has to be made for future performance in the context of ASC 360; throughout FASB Codification, the concept of using the best estimate is called for.

Practice in the industry:

It is a common practice by shipping industry market participants to use the 10 year historical time charter rates as a rule of thumb to capture a full business cycle in the shipping sector as a predictive tool for future rates. This practice presents great consistency among market participants irrespectively of the type of vessels owned. The Table 6 presented below includes a summary analysis of market participants that are implementing this practice is presented, based on the publicly available information disclosed in their 2016 annual reports (SEC filers).

Other SEC filers (six in the aggregate) are also using average historical charter rates as an indication of future rates but assuming a slightly different time period. These are Top Ships Inc. that uses 8 year average historical time charter rates, Stealthgas Inc. that uses 9 year average historical time charter rates, Overseas Shipholding Group Inc. that uses 12 year average historical time charter rates, and Euroseas Ltd. that uses 7-12 year average historical time charter rates. Only a few filers are using a significantly different time period to calculate average time charter rates, namely Eagle Bulk Shipping Inc. that along with Frontline Ltd. use 20 year average historical time charter rates.

Other shipping industry participants are disclosing on their annual reports that they are following the same methodology, which is using historical rates as an indication of future rates, although no disclosure on the exact time period used to assess these future rates is made (i.e. Global Ship Lease Inc., International Shipholding Corp., Nordic American Offshore Ltd., Pangaea Logistics Solutions Ltd, Teekay Corp., Ultrapetrol Bahamas Ltd. and Star Bulk Carriers Corp.).

Regulator's comments:

In November 2014, Tsakos Energy Navigation Ltd. ("TEN" - EY client-owner of tankers) received a comment from SEC as part of the then ongoing review of its annual report on form 20-F for the year ended December 31, 2013, regarding whether the 10-year historical average is an appropriate average to be used or a shorter average would be more appropriate, taking into consideration (a) the then recent charter rates (since 2010) that

were below breakeven for some cased, (b) the charter policy of the entity (fixed rates contracts) and (c) expected expiration of certain charter parties within the next year. The Staff asked for TEN's consideration of a shorter average such as 5-year or 3-year historical average. TEN argued that using a shorter period would only encompass part of the cycle (downside) and that would not be in line with the remaining useful life of its fleet. SEC then completed its review with no further comments.

In September 2015, Navios Maritime Holdings Inc ("NMM" - PwC client-owner of bulk carriers) received a comment from SEC as part of the then ongoing review of its annual report on form 20-F for the year ended December 31, 2014, regarding whether the 10-year historical average is an appropriate average to be used or a longer average would be more appropriate, taking into consideration (a) the relative young age of the Company's fleet and (b) the passage of time since the last peak on the shipping cycle (2008). The Staff asked for NMM consideration of a longer average such as 15-year or 20-year historical average. NMM presented an illustration of the last 40 years of dry bulk rates (adjusted for inflation) and calculated the average duration of the last 3 shipping cycles to be 10.5 years. SEC then completed its review with no further comments.

The above examples further enhance the belief that the use of the 10-year average is appropriate as it was also accepted by the SEC.

Based on the prevailing practice in the industry, on research results on duration of shipping business cycles and the time horizon for which the estimate will be used, we conclude that the use of the historical market rates as an indication for future rates is the best among the available estimates. In addition, we consider the use of a 10 year historical average as a base scenario as reasonable and supportable, as such average takes into account the volatility and the cyclicality of the market on both the up and down market. Similarly, alternative estimates are used if historical market data for a specific vessel type are not available for a shorter period of time.

Company Name	Vessels' Type	Public Accountants	CF Assumption for the unfixed days (extract of the annual report)
Ardmore Shipping Corp.	Tankers	EY	Combination of internally forecasted rates and the **trailing 10-year historical average one-year time charter rates**.
Box Ships Inc.	Containers	Deloitte	Prevailing market charter rates for the first two years, and **ten year historical average of one year time charter rates** from year three. Utilization of the standard deviation in order to eliminate the outliers of the sample before computing the historic ten-year average of the one-year time charter rate.
Capital Product Partners L.P.	Tankers	Deloitte	Estimated gross daily time charter equivalent based on the **10-year average historical one year time charter equivalent**.
Costamare Inc.	Containers	EY	Estimated daily time charter rate based on the **most recent 10 year historical average rates**.
Danaos Corp.	Containers	PwC	Estimated daily time charter equivalent rates based on a combination of recent charter market rates, conditions existing in the containership market as of balance sheet date in relation to laid up vessels, **10-years historical average time charter rates** and estimated future time charter rates.
DHT Holdings Inc.	Tankers	Deloitte	Estimated time charter equivalent rates used based on **the 10-year historical average one-year time charter rate** and reduced by 20% for vessels above the age of 15 years.
Diana Containerships Inc.	Containers	EY	Estimated daily time charter equivalent based on **the most recent ten-year blended,** for modern and older vessels, average historical 6-12 months' time charter rates.
Dorian LPG Ltd	LPG Carriers	Deloitte	Combination of internally forecasted rates and the **trailing 10-year historical average spot market**, or less if the remaining useful life of the vessel is less than 10 years.
Dryships Inc.	Bulkers	EY	Estimated daily time charter equivalent based on **the most recent ten year historical average** for similar vessels and other available market data.
Euronav NV	Tankers	KPMG	Estimated daily time charter equivalent rates **based on the trailing 10-year historical average rates**, based on quarterly average rates.
Freeseas Inc.	Bulkers	RBSM	Forward Freight Agreements (FFAs) and **ten year historical average time charter rates**.
Genco Shipping & Trading Limited	Bulkers	Deloitte	Estimated daily time charter equivalent based on the **most recent ten year historical one year time charter average**.
Globus Maritime Inc.	Bulkers	EY	**Historical ten-year blended average one-year time charter rates** substituting for the years 2007, 2008 and 2016 that were considered as extreme values, with the years 2004, 2005 and 2006.
Navios Maritime Acquisition Corp.	Tankers	PwC	Estimated daily time charter equivalent based on a combination of the company's remaining charter agreement rates and the **10-year average historical one year time charter rates**.
Navios Maritime Holdings Inc.	Bulkers	PwC	Estimated daily time charter equivalent based on **the 10-year average historical one-year time charter rates adjusted for outliers**.

Navios Maritime Midstream Partners L.P.	Tankers	EY	Estimated daily time charter equivalent based on **the 10-year average historical one year time charter rates**.
Navios Maritime Partners L.P.	Bulkers/ Containers	PwC	Estimated daily time charter equivalent based on a combination of the remaining charter agreement rates and the **10-year average historical one year time charter rates adjusted for outliers**.
NewLead Holdings Ltd	Containers/Tankers	Eisner Amper LLP	The **most recent ten-year average historical one-year time charter rates (adjusted for market conditions)**.
Paragon Shipping Inc.	Bulkers	EY	Estimated daily time charter equivalent based on **the most recent ten year historical average** of similar size vessels. Utilization of the standard deviation in order to eliminate the outliers of the sample before computing the historic ten-year average of the one-year time charter rate.
Safe Bulkers, Inc.	Bulkers	Deloitte	Estimated daily time charter equivalent based on the company's budgeted charter rate for the first 12 months and **the most recent 10 year historical average** of similar size vessels for the period thereafter.
Scorpio Bulkers Inc	Bulkers	PWC	Utilization of an estimated daily TCE using the five year time charter average in effect as of balance sheet date for the next five years and the **ten year historical average** for the remainder of the vessels' useful lives.
Seaspan Corp	Containers	KPMG	Estimated time charter rate based on **10-year average time charter rates** as well as recent market charter rates relevant to future periods.
Ship Finance International Ltd	Tankers/Bulkers/Containers	MSPC	Five-year and **ten-year historical** trends and performance, as well as any known future factors.
Tsakos Energy Navigation Ltd.	Tankers	EY	Estimated daily average hire rate per vessel category based on the **most recent ten year historical averages**.

Table 6: SEC filers in shipping industry using 10 year average

4. AUDITING PRACTICES FOR ACCOUNTING ESTIMATES IN SHIPPING COMPANIES

4.1 The role of audit profession and its importance for ensuring credibility in financial reporting

Investor confidence is fundamental to the successful operation of the world's financial markets. That confidence depends on investors having credible and reliable financial information when making decisions about capital investments. Timely and meaningful

information underpins the effective functioning of every organization. Financial statements capture much of the information that organizations prepare, publish, and use. And while it's becoming more important to report other, non-financial information that stakeholders find relevant to their decision making, financial statements prepared in accordance with internationally accepted financial reporting standards are a crucial instrument for the effective functioning of markets.

The objectives of securities regulation include the protection of investors, ensuring that markets are fair, efficient, and transparent, and the reduction of systemic risk. In pursuit of these objectives, in the area of reporting to investors, there should be full, timely, and accurate disclosure of financial results and other information that is material to investors' decisions. Full and fair disclosure and fair presentation of financial statements is essential to investor protection, enhances investor confidence, and promotes market liquidity and efficiency.

Corporate governance as defined in Cadbury report of 1992 is a system by which firms are directed and controlled. The corporate governance structure specifies the distribution of rights and responsibilities among different participants in the corporation, such as, the board, managers, shareholders and other stakeholders, and spells out the rules and procedures for making decisions on corporate affairs.[17] Within the framework of the corporate governance, management is responsible to prepare the annual financial statement detailing the operating results as well as the financial position of a company. The financial statements are presented to shareholders to account for the stewardship of the management. However, such financial statements may lack credibility and shareholders may hardly believe the information contain therein. In order to overcome the problem of credibility of financial statements, an auditor who is independent of the management is appointed to investigate the information in the financial statements and report his findings to the shareholders (Al-Thuneibal *et al.*, 2011; Millichamp, 2010). Undoubtedly, the principal characteristics of ensuring effective corporate governance such as transparency, accountability and integrity are enhanced with conduct of audit into the affairs of a corporation.

[17] OECD Principles of Corporate Governance, April 1999

For the shareholders and other stakeholders to believe in the financial statements, it is imperative to appoint independent expert to audit the financial statements (Coyle, 2010), hence the role of external auditors in corporate governance. The role of the external auditors in sustaining good corporate governance is widely acknowledged. Indicative of this is Cadbury report (1992) declaration that "the annual audit is one of the cornerstone of corporate governance".

The external auditor is highly regarded in the corporate governance framework because unlike the internal auditor, is appointed by the shareholders and as result they are considered objective. The external auditor is an independent person or firm of auditors appointed according to statutory requirement to investigate the financial statements of an entity and express his opinion in form of report on the true and fair view of such financial statements. OCED (2007) describes external auditors as "auditors of an organization which are not under the control of the organization and may not report to objectives set by the organization"

External audit of corporate operations and financial statements in most countries has statutory backing. Corporate audit by external auditor is made compulsory by laws to address agency problem arising from the separation of ownership from corporate management (Coyle, 2010 & Solomon, 2010). At the same, the audit is regulated to ensure quality of work and minimize abuse in the audit process. External audit is regulated in most countries through the mechanisms of self-regulation and external regulation.

The **PCAOB** is the regulator with responsibility for ensuring that auditors of public companies and brokers-dealers are faithfully carrying out their duties on behalf of investors. High profiled financial and audit scandals of Enron (2002) and WorldCom, and the restatements of financial statements of numerous other companies in the late 1990s and early 2000s led to the passage of the Sarbanes-Oxley Act in 2002, the creation of the PCAOB, and the end of the era of self-regulation by the audit profession in the United States. The PCAOB's role in investor protection is indicative of the role of audit profession "to protect investors by improving the accuracy and reliability of corporate disclosures." Section 101 of the Act states that the PCAOB oversees the audits of public companies "in order to protect the interests of investors and further the public interest in the preparation of informative, accurate, and independent audit reports."

The International Auditing and Assurance Standards Board (**IASB**) is an independent standard-setting body that serves the public interest by setting high-quality international standards for auditing, assurance, and other related areas, and by facilitating their adoption and implementation. In doing so, the IAASB enhances the quality and consistency of practice throughout the world and strengthens public confidence in the global auditing and assurance profession.

According to ISA 200[18] as issued by IASB, the purpose of an audit is to enhance the degree of confidence of intended users in the financial statements. This is achieved by the expression of an opinion by the auditor on whether the financial statements are prepared, in all material respects, in accordance with an applicable financial reporting framework. In the case of most general purpose frameworks, that opinion is on whether the financial statements are presented fairly, in all material respects, or give a true and fair view in accordance with the framework. An audit conducted in accordance with ISAs and relevant ethical requirements enables the auditor to form that opinion.

The financial statements subject to audit are those of the entity, prepared by management of the entity with oversight from those charged with governance. ISAs do not impose responsibilities on management or those charged with governance and do not override laws and regulations that govern their responsibilities. However, an audit in accordance with ISAs is conducted on the premise that management and, where appropriate, those charged with governance have acknowledged certain responsibilities that are fundamental to the conduct of the audit. The audit of the financial statements does not relieve management or those charged with governance of their responsibilities.

As the basis for the auditor's opinion, ISAs require the auditor to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error. Reasonable assurance is a high level of assurance. It is obtained when the auditor has obtained sufficient appropriate audit evidence to reduce audit risk (that is, the risk that the auditor expresses an inappropriate opinion when the financial statements are materially misstated) to an acceptably low level. However, reasonable assurance is not an absolute level of assurance, because there

[18] ISA 200 – Overall Objectives of the Independent Auditor and conduct of an audit in accordance with International Standards on Auditing, paragraph A1

are inherent limitations of an audit which result in most of the audit evidence on which the auditor draws conclusions and bases the auditor's opinion being persuasive rather than conclusive.

4.2 Authoritative guidance and auditing standards for accounting estimates

Nowadays audits of financial statements are conducted internationally in accordance with auditing standards established by the International Audit and Assurance Standards Board (IAASB), as adopted and supplemented by national auditing standard setters, so as to be tailored to local needs. As a result global audit profession is ruled by International Standards on Auditing (ISAs) which prescribe detailed guidance about the performance of a high quality audit of financial statements.

In particular, in the US where the majority of shipping companies are listed, this general approach is followed only for non – US SEC (US Securities and Exchange Commission) registered entities as ISA's are being substantially adopted by the American Institute of Certified Public Accountants (AICPA), responsible for developing standards for audits of private companies. For US SEC listed companies auditing standards are issued by the Public Company Accounting Oversight Board (PCAOB) and these auditing standards are obligatory for all public companies subject to the SEC's jurisdiction irrespective of location of their headquarters (Knechel & Salterio, 2017). Due to the significant number of public shipping companies operating in various sectors that are listed in US stock markets, we present below the main points of applicable relevant standards and professional practices for audit of accounting estimates under both ISAs and PCAOB framework.

ISA 540 "Auditing estimates, including fair value accounting estimates, and related disclosures" addresses auditor's responsibilities relating to accounting estimates and related disclosures in an audit of financial statements and by acknowledging the lack of precision in measurement of certain of financial statements items and the inherent uncertainties in business activities, defines the term of accounting estimate as an approximation of a monetary amount in the absence of a precise means of measurement[19].

[19] ISA 540, paragraph 7 - Definitions

In this context the standard introduces the concept of "**estimation uncertainty**" as the susceptibility of an accounting estimate and related disclosures to an inherent lack of precision in its measurement and emphasizes its importance as a determinant factor of the assessment of the risk of material misstatement associated with an accounting estimate.[20] Estimation uncertainty arises when the required monetary amount for a financial statement item cannot be determined with precision and the outcome of the estimate is not known before the date the financial statements are finalized.

Estimation uncertainty may give rise to variation in the possible methods, data sources and types of assumptions that could be used to make the accounting estimate and therefore may give rise to the need for the use of judgment in making estimates. This in turn may give rise to variation in the possible outcomes of the estimation process (both in the amount of the accounting estimate and in information developed about the sensitivity of that amount to variations in the data or assumptions used). Such variation is relevant in considering how to depict accounting estimates in the financial statements, in accordance with the recognition, measurement, presentation and disclosure requirements of the applicable financial reporting framework. A higher degree of estimation uncertainty, increases the possibility of identifying a significant risk related to this estimate and consequently to certain accounts and therefore requires more intensified and detailed audit procedures in order to respond to this risk. The link of estimation uncertainty as a risk element with the audit strategy, as highlighted by this applicable guidance, has led auditing firms to categorize accounting estimates as low and high risk estimates and tailor their substantive audit procedures accordingly (please refer to sections below).

At this point the guidance underlines the central role of **professional skepticism** in identifying circumstances or conditions that increase the susceptibility of accounting estimates to, or indicate the presence of, possible management bias. The application of professional skepticism by the auditor is particularly important to the auditor's work relating to accounting estimates. Professional skepticism also is important because there is a particular risk of management bias affecting accounting estimates due to their subjective, potentially complex and uncertain nature. The auditor's professional skepticism assists in identifying such circumstances or conditions and in determining the

[20] ISA 540, paragraph 10 – identifying and assessing the risks of material misstatements

nature, timing and extent of further audit procedures. Audit procedures consisting primarily of management inquiry generally do not provide sufficient appropriate audit evidence. Auditors obtain a sufficient understanding of the particular methods/models and assumptions used by management to develop accounting estimates. They also obtain an understanding of the data that is applied to those methods/models and assumptions, and consider all available meaningful information related to those estimates – both corroborative and contrary.

In addition, the standard recognizes the need for auditors to understand the entity's process for identifying accounting estimates[21]. In particular, when the auditors perform risk assessment procedures and related activities in order to provide a basis for the identification of risks of material misstatement for accounting estimates they shall perform the following:

•Understand the requirements of the applicable financial reporting framework relevant to the accounting estimate, including related disclosures

•Determine how management identifies those transactions, events and conditions that may give rise to the need for accounting estimates to be recognized or disclosed in the financial statements.

In obtaining this understanding, they make inquiries of management about changes in circumstances that may give rise to new, or the need to revise existing, accounting estimates. As a common practice they meet with management early in the audit to identify aspects of the financial statements that are subject to estimation. They also obtain an understanding of how the estimate will be prepared, who is responsible for preparing it and who will approve the amount to be recorded. They consider whether there have been changes in the business or in the financial reporting framework which may give rise to new estimates, and discuss these with management.

Furthermore special consideration it is given to **management's assumptions**[22] as integral components of accounting estimates. More precisely when the auditors obtain an

[21] ISA 540, paragraph 8 – risk assessment procedures and related activities
[22] ISA 540, paragraph A31

understanding of the relevant factors underlying the assumptions, they consider factors such as:

•The nature of the assumptions, including which are likely to be significant
•How management assesses whether assumptions are relevant and complete (i.e., that all relevant variables have been considered)
•How management determines assumptions are internally consistent
•Whether assumptions relate to matters that are either under management's control (e.g., assumptions about maintenance programs that may affect the estimation of an asset's useful life, how assumptions align with the entity's business plans and the external environment) or outside management's control (e.g., assumptions about interest rates, mortality levels, future cash flows)
•The nature and extent of documentation, if any, supporting assumptions
•The relevance and reliability of the information source (i.e., information used to support assumptions, such as internal and external documentation)
•How management has evaluated new information and factored that information into the estimation process
•Whether and, if so, how, management considered alternative assumptions or outcomes (i.e., contrary information) and why management rejected them, or how management otherwise addressed the estimation uncertainty of the assumptions used
•For fair value accounting estimates, whether management considered what knowledgeable, willing arm's-length parties would use in determining fair value when exchanging an asset or settling a liability
•The degree of estimation uncertainty, which is influenced by the level of subjectivity (such as whether an assumption or input is observable). As a result, this affects auditors' assessment of the risks of material misstatement for such an estimate
•The process by which management approves the use of assumptions in the final calculations

Another important aspect of inherent risk in accounting estimates, as noted by the standard is **management bias,** defined as a lack of neutrality by management in the

preparation of information[23]. Management's judgment may involve unintentional or intentional management bias (for example, as a result of motivation to achieve a desired result). The susceptibility of an accounting estimate to management bias increases with the subjectivity involved in making it.

Auditors must remain alert to the possibility that management's involvement in the preparation of the financial statements, and its responsibility for the judgments and assumptions relating to significant estimates, increases the risk of material misstatement due to fraud. Where possible, they should corroborate management's assumptions with third party sources.

The nature and extent of the review depends on the nature of the accounting estimate and whether the information obtained is relevant to identify and assess risks of material misstatement of accounting estimates. The information includes:

•Information about the effectiveness of management's prior period estimation process that may indicate the effectiveness of management's current process
•Audit evidence pertinent to the re-estimation in the current period of prior period accounting estimates
•Audit evidence of disclosure matters such as estimation uncertainty
When they become aware of judgments and decisions made by management which give rise to indicators of possible management bias, they should consider the effect on the risk assessment and related responses.

Management bias may be difficult to detect at an account level or within a single period. It may only be identified by considering the accounting estimates in aggregate or over a number of accounting periods.

Indicators of possible management bias include:

•Changes in an accounting estimate, or the method for making it, when management subjectively assesses a change in circumstances
•Use of an entity's own assumptions for fair value accounting estimates when they are inconsistent with observable marketplace assumptions

[23] ISA 540, paragraph 7 - Definitions

•Selection or construction of significant assumptions that yield a point estimate favorable for management objectives
•Selection of a point estimate that may indicate a pattern of optimism or pessimism

Auditors must be alert to the possibility that management's recorded estimates are clustered at one end of their ranges of acceptable amounts. They must consider whether this indicates that management has applied bias to achieve a certain result and evaluate this in concluding on whether a material misstatement has occurred. They should also be mindful of the possibility that management's recorded estimates are clustered at one end of the range of acceptable amounts in the prior period and are clustered at the other end in the current period, indicating potential income smoothing by management. If management's estimates cluster at different ends of the acceptable range in the current and prior periods, they have to inquire of management about the reasons for the change and challenge whether our range remains appropriate based on the explanation provided. Finally, they must document indicators of possible management bias identified.

The guidance of **PCAOB Auditing Standard No.14** (Evaluating Audit Results/ Evaluating the Qualitative Aspects of the Company's Accounting Practices, "Evaluating Bias in Accounting Estimates" states that the auditor should evaluate whether the difference between estimates best supported by the audit evidence and estimates included in the financial statements, which are individually reasonable, indicate a possible bias on the part of the company's management. If each accounting estimate included in the financial statements was individually reasonable but the effect of the difference between each estimate and the estimate best supported by the audit evidence was to increase earnings or loss, the auditor should evaluate whether these circumstances indicate potential management bias in the estimates. Bias also can result from the cumulative effect of changes in multiple accounting estimates. If the estimates in the financial statements are grouped at one end of the range of reasonable estimates in the prior year and are grouped at the other end of the range of reasonable estimates in the current year, the auditor should evaluate whether management is using swings in estimates to achieve an expected or desired outcome, e.g., to offset higher or lower than expected earnings.

In addition, the same guidance of Auditing Standard No.14 (Evaluating Audit Results/Accumulating and Evaluating Identified Misstatements) in another paragraph[24] "Misstatements Relating to Accounting Estimates" prescribes that in cases where the auditor concludes that the amount of an accounting estimate included in the financial statements is unreasonable or was not determined in conformity with the relevant requirements of the applicable financial reporting framework, he or she should treat the difference between that estimate and a reasonable estimate determined in conformity with the applicable accounting principles as a misstatement. If a range of reasonable estimates is supported by sufficient appropriate audit evidence and the recorded estimate is outside of the range of reasonable estimates, the auditor should treat the difference between the recorded accounting estimate and the closest reasonable estimate as a misstatement.

Although, if an accounting estimate is determined in conformity with the relevant requirements of the applicable financial reporting framework and the amount of the estimate is reasonable, a difference between an estimated amount best supported by the audit evidence and the recorded amount of the accounting estimate ordinarily would not be considered to be a misstatement".

Furthermore, **PCAOB AS 2501 "Auditing Accounting Estimates",** respectively refers to accounting estimate as an approximation of a financial statement element, item, or account[25]. It identifies circumstances where accounting estimates are often included in historical financial statements as a result of either the fact that the measurement of some amounts or the valuation of some accounts is uncertain, pending the outcome of future events or because relevant data concerning events that have already occurred cannot be accumulated on a timely, cost-effective basis. In respect of auditor's duties and the importance of exercise of professional judgement, there is reference about their responsibility for evaluating the reasonableness of accounting estimates made by management in the context of the financial statements taken as a whole.

As estimates are based on subjective as well as objective factors, it may be difficult for management to establish controls over them. Even when management's estimation

[24] Auditing Standard No.14 - Evaluating Audit Results/Accumulating and Evaluating Identified Misstatements, paragraph 13
[25] PCAOB AS 2501 "Auditing Accounting Estimates", paragraph 1

process involves competent personnel using relevant and reliable data, there is potential for bias in the subjective factors. Accordingly, when planning and performing procedures to evaluate accounting estimates, the auditor should consider, with an attitude of professional skepticism, both the subjective and objective factors. In relation to the risk based audit approach the PCAOB auditing standard similarly to ISA 540 above notes the following factors that influence the risk of material misstatement of accounting estimates[26]: a) complexity and subjectivity associated with the process, b) the availability and reliability of relevant data, c) the number and significance of assumptions that are made, and d) the degree of uncertainty associated with the assumptions.

In accordance to this guidance in evaluating reasonableness of accounting estimates, the auditor should obtain an understanding of how management developed the estimate, as it was also provided by ISA 540. Based on that understanding, the auditor should use one or a combination of the following approaches: a) Review and test the process used by management to develop the estimate, b) Develop an independent expectation of the estimate to corroborate the reasonableness of management's estimate *and c)* Review subsequent events or transactions occurring prior to the date of the auditor's report.

The following are procedures the auditor may consider performing when review and test the process used by management and we list them below so as to draw the attention to their importance and facilitate the reference to this relevant authoritative guidance when analyzing the auditing practices used currently for shipping companies (please refer to section below):

a. Identify whether there are controls over the preparation of accounting estimates and supporting data that may be useful in the evaluation.
b. Identify the sources of data and factors that management used in forming the assumptions, and consider whether such data and factors are relevant, reliable, and sufficient for the purpose based on information gathered in other audit tests.
c. Consider whether there are additional key factors or alternative assumptions about the factors.

[26] PCAOB AS 2501 “Auditing Accounting Estimates”, paragraph 5

d. Evaluate whether the assumptions are consistent with each other, the supporting data, relevant historical data, and industry data.
e. Analyze historical data used in developing the assumptions to assess whether the data is comparable and consistent with data of the period under audit, and consider whether such data is sufficiently reliable for the purpose.
f. Consider whether changes in the business or industry may cause other factors to become significant to the assumptions.
g. Review available documentation of the assumptions used in developing the accounting estimates and inquire about any other plans, goals, and objectives of the entity, as well as consider their relationship to the assumptions.
h. Consider using the work of a specialist regarding certain assumptions.
i. Test the calculations used by management to translate the assumptions and key factors into the accounting estimate.

4.3 Inherent risk assessment and categories of estimates in the audit practice of shipping companies

In accordance to auditing standards[27] the identification and assessment of risks that could cause the financial statements and the related accounts to be materially misstated consist the primary concern of auditors of financial statements and form the basis of their audit strategy. Therefore, we present below (Figure 3) the factors influencing the inherent risk of an accounting estimate that the auditors should take into consideration during the risk assessment phase of the audit and the relevant categorization of this estimate resulted from the degree of risk associated with it. Furthermore, we apply these criteria to shipping sector with reference to the critical accounting policy of impairment of vessels and to the underlying estimates of recoverable amount (undiscounted cash flows).

[27] ISA 315: Identifying and Assessing the Risk of Material Misstatement through understanding the entity and its environment

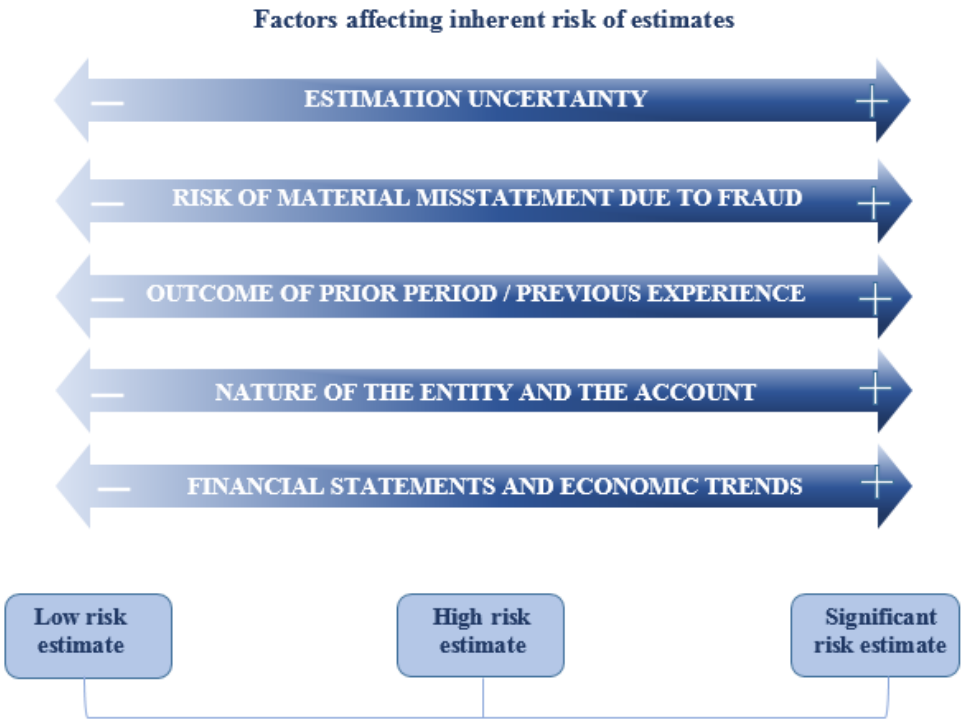


Figure 3: Factors affecting inherent risk of estimates, ISA 540

4.3.1 Estimation Uncertainty

As the **estimation uncertainty** consists the major determinant of the inherent risk of estimates as it incorporates the main feature of the concept of estimates, which is the inherent lack of precision of their measurement, we analyze below specific considerations in order to assess the degree of estimation uncertainty:

a) **Complexity of the method, model or calculations:** The estimation uncertainty is greater when management uses a complex model/method to develop the estimate. A method is a measurement technique used by management to apply the measurement basis in the financial reporting framework. A model is a tool used to make the accounting estimate that applies assumptions and data, and a set of relationships between them as specified by the method. The complexity of a model depends on the following factors[28]:

• The requirement for specialized skills or knowledge,

• The availability of relevant and reliable data needed for use in the model

[28] Proposed International standards on auditing 540 (Revised), paragraph A29

• The difficulty of maintenance of the integrity of the data

• The degree of complexity in its design or operation, which may, for example, involve more extensive use of information technology or large volumes of data,

•The usage of multiple data sources or assumptions with complex-interrelationships.

Impairment case: The model used for impairment test conducted by a shipping entity which financial statements is prepared under US GAAP, employs the calculation of undiscounted projected net operating cash flows expected to be generated from the use and eventual disposal of vessels on an individual basis. As aforementioned noted in chapter 3, this model incorporates a number of significant assumptions from various sources such as future revenues and operating expenses, remaining estimated life of each vessel, brokerage and address commissions, outflows foe scheduled vessels' maintenance (dry-dockings), projected fleet utilization of by taking into account off hire days, dry docking and special surveys days, inflation rate and the probability of a vessel's sale. Therefore according paragraph A80 of Revised ISA 540 stating that "Complex methods are often applied using a complex model, particularly when the measurement basis requires the use of discounted cash flow techniques, projected or expected future cash flows and historical and forward looking data and assumptions obtained or developed from a combination of internal and external sources", the attribute of complexity of the model used for impairment of our case study could be assessed as high.

The complexity is also triggered by the fact that calculations are performed for a large number and for different types and sizes of vessels, such as containers, tankers, dry bulkers etc., especially in large listed shipping companies. Thus, in our case the presence of complexity of calculations increases further the estimation uncertainty.

b) **Involvement of a specialist** due to the complexity of the estimate. During the course of the audit of accounting estimates the auditor may identify, in light of the experience of the auditor and the circumstances of the engagement, the need for specialized skills or knowledge to be applied in relation to one or more aspects of

the accounting estimates. Matters that may affect the auditor's decision of whether specialized skills or knowledge is required include, for example[29]:

• The nature of the underlying asset, liability or component of equity in a particular business or industry (for example, mineral deposits, agricultural assets, complex financial instruments).

• A high degree of estimation uncertainty.

• Complex calculations or specialized models are involved, for example, when estimating fair values when there is no observable market.

• The complexity of the requirements of the applicable financial reporting framework relevant to accounting estimates, including whether there are areas known to be subject to differing interpretation or practice is inconsistent or developing.

• The procedures the auditor intends to undertake in responding to assessed risks. The involvement of an independent third party may reduce the potential for management bias, and therefore, reduce estimation uncertainty.

Impairment of vessels case: Usually specialists are not involved in the calculation of recoverable value of vessels of the shipping companies that prepare their financial statements under US GAAP (undiscounted net operating cash flows). Management may involve specialists (brokers/ external valuators) in order to obtain vessels' valuations at each reporting date. Valuations are used to determine vessel's fair value in order to calculate the impairment charge for those vessels for which the recoverable amount is less than the vessel's carrying value. The work of specialist is examined in conjunction with other similar valuations of vessels provided by third parties, as well as the examination of available relevant market data and data from peer companies.

c) **Subjectivity of assumptions.** Assumptions are a pivotal component of accounting estimates since they relate to the inputs used for models required by the different financial reporting frameworks. The more judgment required from management in the development of the appropriate assumptions the more subjective they are. Their reasonability is associated with the reliability and

[29] ISA 540, paragraph A96

availability of underlying data on which they are based. In these context the quality of data is linked with the following considerations: Whether the assumptions relate to matters within the control of management (for example, assumptions about the maintenance programs that may affect the estimation of an asset's useful life), and how they conform to the entity's business plans and the external environment, or to matters that are outside its control (for example, assumptions about interest rates, mortality rates, potential judicial or regulatory actions, or the variability and the timing of future cash flows).The more judgment required in determining which assumptions apply or determining amounts to apply within an assumption, the higher the estimation uncertainty.

Impairment of vessels case: The input data for the operating cash flows of impairment exercise is based on either internal or various external publically available industry sources depending on the assumption:

- **Future revenues** are usually calculated for the fixed days (duration provided under time charter contracts), using the fixed charter rate of each vessel from existing time charters (as per the fleet employment table available in the Companies' website and as stated in the Charter Parties/Fixture Re-caps) and for the unfixed days, the most recent 10 year average historical 1 year time charter rates available for each type of vessel (as per the market data available in Clarksons' database) over the remaining estimated life of each vessel, net of brokerage commissions which is common practice to be estimates based on the historical percentage (average of 1-5 years) charged by brokers over each company's operating revenues
- **Expected outflows for scheduled vessels' maintenance (Dry-dockings-DD and special surveys-SS** are usually based either on internally information/budgets provided by the technical department or with reference to market data, om reports provided by well-known, reputable consulting firms such as Drewry Shipping Consultants Ltd, which conduct an annual market research for the current and future trends in operating expenses (including DD/SS costs) of vessels of all maritime sectors and sizes

- **Vessel operating expenses** are again based on internal or external sources with a preference for internal data in order to reflect each company's ability to control costs and be more representative and customized. In particular either recognized consultants are used (as referred above) or historical data (average of 1-5 years) of companies accounting books for operating expenses combined with forecasted figures as depicted in their annual/ quarterly budgets. With this process the shipping companies and the auditors usually determines/estimates the next year's operating daily operating expenses which are increasing annually by an annual inflation rate which approximates current projections for global inflation rate as published from global institutions and organizations such as IMF etc.
- **Future effective fleet utilization rate** which is the ratio of the number of operating days during a period divided by the number of available days during the same period is estimated by considering the historical performance of each company, so as to reflect the competence of their chartering departments and the competiveness of their fleet. The shipping industry uses fleet utilization to measure a company's efficiency in finding suitable employment for its vessels and minimizing the amount of days that its vessels are off-hire for reasons other than scheduled repairs or repairs under guarantee, vessel upgrades, special surveys or vessel positioning for such events.
- **Vessel's useful life and scrap value** used in the undiscounted cash flows are in accordance with the Company's accounting policy for depreciation and varies according to vessels type (UEL usually has a range from 20 to 35 years depending on vessels operating segment – tankers, containers etc.) Due to the significance of these estimates a separate analysis of the respective aspects and factors to consider is presented in the following chapter 3 of this thesis.

As the shipping companies obtain information from various industry and other sources, their estimates of charter-free market value are inherently uncertain. In addition, vessel values are highly volatile, as such, their estimates may not be indicative of the current or future charter-free market value of their vessels or prices that they could achieve if they were to sell them. Furthermore, since the applicable financial reporting framework (US GAAP and IFRS), and specifically IAS 36 and ASC 360 do not specify the appropriate assumptions, data or source of data to be used in the estimation method of

operating cash flows, their determination requires a significant degree of judgement and subjectivity. As a matter of fact as per revised ISA 540, paragraph A84, accounting estimates that are based on expected future cash flows for which there is uncertainty regarding the amount or timing and these with a long forecast period form part of the examples presented of accounting estimates that are likely to be subject to a high degree of judgment

d) **Sensitivity to changes in assumptions.** Management may evaluate alternative assumptions or outcomes of the accounting estimates through a number of methods, depending on the circumstances. One possible method and commonly used by management is to undertake a **sensitivity analysis**. This might involve determining how the monetary amount of an accounting estimate varies with different assumptions. A sensitivity analysis could lead to the development of a number of outcome scenarios, sometimes characterized as a range of outcomes by management, such as "pessimistic" and "optimistic" scenarios. A sensitivity analysis may demonstrate that an accounting estimate is not sensitive to changes in particular assumptions. Alternatively, it may demonstrate that the accounting estimate is sensitive to one or more assumptions that then become the focus of the auditor's attention.[30]

   When the sensitivity analysis provides outcome that does not have significant variations with each other the management confidently use the assumptions taken, but in the case there will be a significant variation, the management is alert and searches for alternative information while reassessing the assumptions and the data used. After this procedure and in case that alternative information and data come into light, the estimate will be recalculated to conclude in a different more appropriate value. Also, it's common practice for the auditors to use sensitivity analysis in order to develop a range with which to evaluate management's point estimate. When the estimate is highly sensitive, even a minor change in assumptions may lead to a material misstatement, which would indicate higher estimation uncertainty.

[30] ISA 540, paragraph A103 & A104

Impairment of vessels case: The results of net operating cash flows are highly sensitive to changes in assumptions regarding future revenues, such as future charter rates, effective utilization rate, off-hire days etc.. Change in the remaining assumptions would unlikely lead to significant variation which may result in a material misstatement in the Financial Statements. For detailed review of sensitivity analysis performed by management and auditing firms so as to quantify the possible effect of changes in certain assumptions to operating cash flows and consequently to impairment figure, please refer to section of 4.6 "Practical examples of audit procedures for significant accounting policy of impairment and its assumptions"

e) **Extent of reliance on IT systems and their effectiveness.** When an effective IT system is used extensively to help generate the estimate, this may reduce the estimation uncertainty.

Impairment of vessels case: There is no reliance on IT systems in order to develop the critical estimates of operating cash flows related to revenues forecasted inflows, since they are usually obtained from external sources. This is only involvement of IT systems is in the context of operating expenses and dry docking expenditure through budgeting process where the companies might use an ERP system. Nevertheless, we conclude that even in this case the contribution of IT systems is so little that it doesn't reduce the estimation uncertainty, especially for the highly sensitive assumptions of charter revenues.

f) Existence of recognized measurement techniques. The existence of recognized measurement techniques may mitigate the estimation uncertainty, although the subjectivity of assumptions used as inputs may indicate higher estimation uncertainty.

Impairment of vessels case: A US listed shipping company reporting under US GAAP has to follow the guidance of ASC 360-10 "Impairment or Disposal of Long-Lived Assets" which provides for the use of undiscounted cash flows expected to

result from the use and eventual disposition of the asset. Therefore, measurement technique related to calculation of undiscounted net operating cash flow arising from use and disposal of a vessel, in order to assess its recoverable amount, is a common practice in shipping industry and as a result its use reduces the estimation uncertainty. Regarding the eventual sale of a vessel, the use of possible sale scenarios / outcomes weighted by their probability as assessed by management, is also prescribed by the aforementioned authoritative guidance and as a result it is unquestionable and widely used among market participants. This applicable standard also covers the possibility of a subsequent sale by referring "Estimates of future cash flows are based on the conditions that existed at the date the test is undertaken (e.g., the balance sheet date), including any assessment made at that date as to the likelihood and timing of sale, the assessment would not be revised solely because of the entity's subsequent decision to sell the assets or other conditions that arise after the testing date". Therefore, we conclude that there are recognized measurement techniques that decrease the uncertainty of estimation of impairment figure but the inherent uncertain nature and variability of the possible outcomes based on judgements made by management such as the likelihood and timing of a disposal of a vessel reinforce estimation uncertainty. The degree of this impact may be determined by a sensitivity analysis to these probabilities, as described above. For the illustration of sale scenarios and their impact on impairment figures please refer to section of 4.6 "Practical examples of audit procedures for significant accounting policy of impairment and its assumptions".

g) **Length of forecast period.** The nature of long-term contracts or useful lives may affect the likelihood that the profits originally anticipated will not be realized, and therefore, indicate higher estimation uncertainty.

Impairment of vessels case: The shipping company generally according to the type of ships that they own (Containers, Tankers, Bulkers etc.) assume useful life of their vessels to be from 20 to 35 years, which is in line with each industry practice. The net operating cash flows are calculated over the remaining useful life of a vessel. The shipping industry is cyclical with attendant volatility in charter hire rates and profitability. Because the majority of shipping companies charter some of their vessels pursuant to short-term or medium time charters, they are exposed to changes in spot

market and short-term charter rates and such changes would affect their projections for revenue cash flows. Following the re-delivery of their vessels they can't assure that they will be successful in seeking new employment and in chartering their vessels in the future or renew existing charters at rates sufficient to cover the relevant projected cash outflows. Fluctuations in charter rates result from changes in the supply and demand for vessel capacity and changes in the supply and demand for the major commodities carried by water internationally. Because the factors affecting the supply of and demand for vessels are outside of their control and are unpredictable, the nature, timing, direction and degree of changes in industry conditions are also unpredictable. As a result, due to the fact that revenues and expenses are assumed and the length of forecast period is long, we can conclude that this can lead to higher estimation uncertainty.

h) **Accuracy of data.** Availability of reliable data from internal and external sources reduces the estimation uncertainty**.**

Impairment of vessels case: The input data for the impairment exercise is based on either internal or external sources depending on the assumption (see above how the assumptions are determined). Internal data such as fixed charter rates based on contracts or historical figures of operating and dry docking expenditure are considered reliable and therefore does not increase estimation uncertainty. On the other hand, some external inputs such as historical daily charter rates may incorporate an element of unpredictability in terms of each relevance since for certain types and sizes of vessels there is not exactly "matched" available historical values for charter rates and the management and auditors have to use the best available data of proxies vessels which might not reflect the entities specific characteristics. So, for certain circumstances the estimation uncertainty is increased with reference to the accuracy of data, but overall we could conclude that external and internal sources used are reliable and are consistently used among shipping industry. The valuations used to determine the fair values of vessels are obtained from reputable unrelated third parties (shipping brokers) and also assessed against available market data, and therefore are also considered reliable information.

i) **Whether estimate is based on observable or unobservable inputs.** Observable inputs" are based on quoted prices and active markets and "unobservable inputs" involve an entity's own judgments about assumptions that marketplace participants would use. Estimates based on factors that can be observed in the market place (such as demographic trends) may have lower estimation uncertainty than those where the assumption is not observable (such as the effect of an unpredicted disaster on the clean-up costs).

Impairment of vessels case: Most of the estimates are determined based on unobservable inputs, and internal data of the client. This mainly relates to operating expenses, dry-docking costs, commissions. Therefore, this factor contributes to a high degree of estimation uncertainty of impairment value.

j) Relevance of past data to forecast future periods. In some cases, the existence of past data can be used to make an estimate about future events and, therefore, reduce the estimation uncertainty. An example is the estimation of a warranty reserve based on the % or product returns and repairs in the previous years.

Impairment of vessels case: As we have already mentioned the reasonability of cash inflows generate by charter revenues estimates may be challenged by using publicly available historical data for similar types of vessels. The management uses market historical data in determining its estimate regarding future charter rate since is it commonly assumed that full shipping business cycle covers 10 years. Management also uses internal historical data regarding fleet utilization when determining the relevant assumption. For the remaining estimates past data are considered less relevant, resulted to a moderate degree of estimation uncertainty for the overall estimates taken into consideration for concluding on the impairment figure.

The consideration of the effect of all the aforementioned factors leads to a high degree of estimation uncertainty, relating to the impairment figure of our case study shipping company. The combination of these drivers is depicted in the picture below, which

isolated would result to a significant risk estimate. The analysis of the rest determinants of the degree of the risk associated with an estimate will be conducted in the next sections of this chapter.

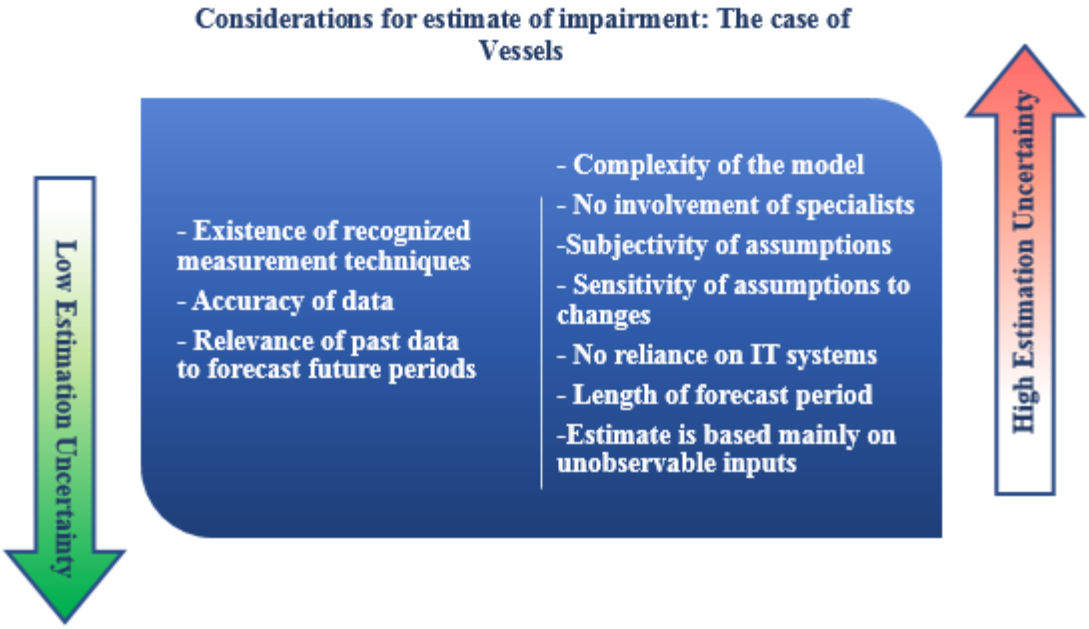


Figure 4: Factors affecting the impairment of vessels estimate

4.3.2 Risk of material misstatement due to fraud

Indicators of possible management bias themselves do not constitute misstatements for purposes of drawing conclusions on the reasonableness of individual accounting estimates. However, in some cases the audit evidence may point to a misstatement rather than simply an indicator of bias. For example, when management has changed an accounting estimate, or the method of making it, from the prior period based on a subjective assessment that there has been a change in circumstances, the auditor may conclude based on the audit evidence obtained that the accounting estimate is misstated as a result of an arbitrary change by management, or may regard it as an indicator of possible management bias that increases significantly the estimation uncertainty.

In addition, in applying ISA 240[31], the auditor is required to evaluate whether management's judgments and decisions in making the accounting estimates included in financial statements indicate a possible bias that may represent a material misstatement due to fraud. Fraudulent financial reporting is often accomplished through intentional misstatement of accounting estimates, which may include intentionally understating or overstating accounting estimates.

In assessing the risk of material misstatement due to fraud in the context of impairment of vessels the auditors should take into account the following considerations:

- **Use of specialist:** Management using a qualified specialist may reduce the risk of material misstatement due to fraud. Usually, in estimating future operating cash flows, the shipping companies, don't use any expert. A specialist and in particular an independent external valuator is only employed by management in order to determine market value of ships, which are then compared to carrying values of vessels as reported in financial statements, in cases where carrying values have been already assessed by company as not recoverable. Therefore, there is room for management intentionally bias in the estimation of recoverable value of vessels.

- **Degree of segregation of duties:** Management having sole responsibility to make or review important accounting estimates or limited segregation of duties between personnel involved in the estimation may result in higher risk of material misstatement due to fraud. The strict regulatory environment (SOX requirements and COSO framework) of listed shipping companies require a robust system of internal controls that are designed and operating effectively so as to prevent detect and correct material misstatements in financial statements. As a result, the vast majority of listed shipping companies have a high degree of segregation of duties, which constitute the main element of internal controls effectiveness. In this way, the process of

[31] ISA 240, The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements, paragraph 32(b)(i)

developing the accounting estimate of impairment is prepared usually by highly qualified employees of accounting or finance department and are thoroughly reviewed by a responsible high level executive, such as the chief accounting officer, financial controller or chief financial officer. Therefore, well established and effectively operating internal controls which are also audited in the context of issuing ICFR reports (Internal controls financial reporting), leads to high segregation of duties in shipping companies and reduce risk of material misstatement due to fraud.

- **Changes in assumptions or the method for making accounting estimate:** Significant unexpected changes in assumptions or the method for making accounting estimates may be an indication of fraud. In shipping industry the main assumption of operating cash flows estimate, which is the 10 year average of historical rates of similar vessels for each subsector (containers, tankers, bulk carriers, LNGs etc.) is widely used by the majority of shipping companies and as a result a deviation from this rule is very rare. Also, since it is required to disclose the assumptions and methods used in the financial statements it is uncommon to change them from the previous reporting period and if they do so, management should provide explanations about the reasons of this change. In general terms, shipping companies are consistent with the assumptions used for developing the accounting estimate of impairment from period to period. Regarding the method used it is clearly prescribed by the relevant accounting policy and standards and it is not a matter of choice. Consequently, it is difficult for the shipping companies to arbitrarily change impairment assumptions.

- **Degree of management's conservatism:** A history of 'aggressive' application of accounting policies may increase the likelihood of management bias in the preparation of the financial statements and indicate a higher risk of material misstatement due to fraud. For US SEC listed shipping companies, the possibility of aggressive application of accounting policies it's remote due to the existence of stringent regulatory framework and corporate governance, part of which is the external auditors. Nevertheless, auditors should remain

alert for the cases of unjustifiable optimistic approaches from management for future operating cash flows by corroborating impairment's assumptions with other evidences obtained during the course of the audit. For example, assumptions for future revenues, operating expenses, inflation rates etc. should be consistent for impairment determination purposes as well as for going concern assessment.

- **Management's motivations:** A management team with over-ambitious expectations may be more likely to develop unrealistic estimates and indicate a higher risk of material misstatement due to fraud. It is common practice in shipping industry that the majority of covenants imposed by financial institutions are based on market values of vessels and not on book values, as reflected in financial statements, therefore it seems that an impairment loss would not be the primary focus of lenders, but to the extent that bonuses and other compensations are provided to executives based on KPI's for which carrying values of vessels are an integral part, a motive for its manipulation could be identified. In addition, it's certainly significant for investors as it influences important ratios such as Price to earnings ratio (P/E).

4.3.3 Outcome of prior period accounting estimate

The auditors' review of management's judgment and assumptions related to accounting estimates in the prior period (retrospective review) may help identify circumstances or conditions that increase the susceptibility of accounting estimates to, or indicate the presence of, management bias. However, their review is not intended to question the judgments made in the prior period based on information that was known to management at that time.

Through performing a retrospective review, the auditor may obtain:

• Information regarding the effectiveness of management's previous estimation process, from which the auditor can obtain insight about the likely effectiveness of management's current process.

• Audit evidence that is pertinent to the re-estimation, in the current period, of previous period accounting estimates.

• Audit evidence of matters, such as estimation uncertainty, that may be required to be disclosed in the financial statements.

• Information regarding the complexity and estimation uncertainty pertaining to the accounting estimates.

• Information regarding the susceptibility of accounting estimates to, or that may be an indicator of, possible management bias. The auditor's professional skepticism assists in identifying such circumstances or conditions and in determining the nature, timing and extent of further audit procedures.

A retrospective review of management judgments and assumptions related to significant accounting estimates is required by ISA 240.45 As a practical matter, the auditor's review of previous period accounting estimates as a risk assessment procedure in accordance with this ISA may be carried out in conjunction with the review required by ISA 240.

The auditor may judge that a more detailed review is required for those accounting estimates that have changed significantly from the previous period, or for those accounting estimates for which the inherent risks were not low in the previous periods. As part of the detailed review, the auditor may pay particular attention, when possible, to the effect of significant assumptions used in making the previous estimates. On the other hand, for example, for accounting estimates that arise from the recording of routine and recurring transactions, the auditor may judge that the application of analytical procedures as risk assessment procedures is sufficient for purposes of the review.

For fair value accounting estimates, and other accounting estimates based on current conditions at the measurement date, more variation may exist between the fair value amount recognized in the prior period financial statements and the outcome of its assumptions, or the amount re-estimated for the current period. This is because the measurement objective for such accounting estimates deals with perceptions about value at a point in time, which may change significantly and rapidly as the environment in which the entity operates changes. When assessing the outcome of the prior period

estimates, we may, therefore, consider management's track record for effectively determining an appropriate estimate when considering the risks of material misstatement in the current period.

A difference between the outcome of an accounting estimate and the amount recognized in the previous period's financial statements does not necessarily represent a misstatement of the previous period's financial statements. However, it may do so if, for example, the difference arises from information that was available to management when the previous period's financial statements were finalized, or that could reasonably be expected to have been obtained and taken into account in the preparation of those financial statements.

We list below certain matters for consideration regarding prior years' auditors' experience with an accounting estimate's assessment and repercussions for inherent risk associated with it:

- **Outcome of prior period estimates:** When their review of the outcome of an estimate made in the prior period suggests the estimate was reasonably accurate, they may determine the inherent risk is lower.
- **Misstatements identified in prior periods:** When they observe misstatements to estimates in the prior period, they consider whether this increases the risk of misstatements, and their assessment of inherent risk, in the current year.
- **Indications of management's bias identified in prior periods:** When their review of the outcome of prior period estimates indicates significant variations between the estimate and the actual, they consider whether this increases our assessment of inherent risk in the current period.
- **Qualification and changes in key personnel engaged in making the estimate:** Changes in key personnel who calculate or review estimates recorded in the financial statements may change their assessment of inherent risk from our previous experience.
- **Reliability of sources of information used previously:** Information from recognized external specialists used in the prior year may help to reduce the

uncertainty within the estimation process, and therefore, decrease their assessment of inherent risk.

Impairment of vessels case: The volatility and uncertainty that governs charter rates since the abrupt and dramatic downturn in charter market occurred during December 2008, calls for a close monitoring of assumptions used for developing impairment's estimate. For example, the management of many shipping companies had changed their assumptions regarding the use of 10-year average charter rates, since then, by excluding "outlier years", as years with extremely high prices (for example 2007 and 2008) in comparison to the rest of the years and replace them with other years of more modest and representative values of charter rates (i.e. 2005 & 2006). Moreover, they appeared more prudent in relation to the utilization rate's estimate. Nowadays, it is a common phenomenon that vessels remain idle more and more often and in many cases they ended up on laid-up status and as a result auditors should remain alert in assessing prior period's estimate of utilization by considering the actual rate versus the estimated and investigating the reasons of possible deviations. The same approach should be followed regarding the outcomes of operating expenses and dry-docking expenditure projections based on budgeted figures, since variations of actual versus budgeted results may indicate that these types of input data are not reliable and should not continue to be used in the current year's estimate assessment.

Another important factor is the consistency with which the Company has been calculating projected net operating cash flows throughout its operating history, by using the aforementioned assumptions. Furthermore, the management should assess the suitability of prior's year assumptions and their reasonableness for the current year impairment exercise, by evaluating the estimates outcome of prior years in order to identify any discrepancies in assumptions used (when actual figures differed from those assumed and used in the exercise) and provide the auditor with sufficient and appropriate audit evidence in order to support their assessment. For example if the Company continuous to believe that the current phase the shipping market is going through is not more than a cycle repeating itself and they have re-assess the assumption of 10-year average during current year with concluding that no amendment is required they should provide the auditor with a relevant memo. In this respect, it is important to perform comparisons

(management and the auditors) with the market and peer shipping companies so as to conclude on the reasonableness of the estimate.

4.3.4 Nature of the entity and of the account

Another parameter for auditors to consider when assessing the inherent risk of an accounting estimate is the specific characteristics of the audited company and of the account affected by the estimate. We present below certain matters and examples for consideration regarding this factor:

- **Nature of the entity or industry:** The entity's susceptibility to market-price fluctuations and technological change may increase the inherent risk related to the valuation of inventory.
- **Entity's practices and policies:** Cash collection practices and the nature of the customers may decrease the inherent risk related to the allowance for doubtful accounts.
- **Nature of the underlying item:** The nature of the item may result in a higher need for allowances or reserves, and therefore, have higher inherent risk. Alternatively, the underlying product may not be susceptible to misappropriation, obsolescence, impairment or warranty repairs and therefore, have lower inherent risk.
- **Whether an immaterial estimate may be understated because of fraud or error:** Provisions and liabilities may appear to be immaterial, but may be understated because of fraud or error, which may increase the inherent risk related to the account.
- **Inherent precision of the estimate:** Some significant accounts may be derived from simple calculations based on observable historical data, whereas others may be inherently imprecise as they depend upon assumptions regarding future events or circumstances (e.g., judgments about fair value).
- **Effectiveness of IT environment:** An ineffective IT environment may produce inaccurate reports that are then used in making accounting estimates.

Impairment of vessels case: It's a common knowledge that shipping sector is experiencing turbulent times from December 2008 with a continuing negative trend in charter rates and fair values of vessels. The shipping industry is cyclical with attendant volatility in charter hire rates and profitability. Historical market data indicate that for charter rates there is no general increase trend but charter rates experience fluctuations resulting from changes in the supply and demand for vessel capacity and changes in the supply and demand for the major commodities carried by water internationally. When a shortage of ships develops, rising freights lead to a massive construction of new ships. There comes a point either when demand subsides or when deliveries of new vessels overtake a still increasing demand. At this stage freights collapse, vessels are condemned to idleness in laying up berths and a shortage of ships is developing again leading to a new cycle. Given that the mechanics of supply and demand are expected to work similarly in the future, creating the same demand and supply conditions, as well as the influence exerted by the global economic drivers, it is extremely difficult for managements' of shipping companies to predict with certainty the future charter rates. Nevertheless, the assumption of 10 years average of historical rates of similar vessels capturing a full shipping cycle as the best way to estimate the future rates seems reasonable. Also, due to the large number of underlying assumptions of vessels determination of recoverable value as described above, we conclude that the estimate of impairment is prone to manipulation from management given its high inherent precision. Certainly, the existence and the effective use of integrated IT systems and internal controls would counterbalanced to some extent the estimation uncertainty of assumptions developed since it would be based on more accurate inputs and would be more thoroughly reviewed.

4.3.5 Financial and non-financial information

The last factor that auditors should take into account for conclude on the type of accounting estimate with reference to its risk profile is quantitative and qualitative information derived from the general audit work and analytical procedures with the use of ratio and identified trends. Special attention should be paid to the following:

- **Observations from the analysis of financial and non-financial information:** Observations from the analysis of financial and non-financial information may reveal unexpected changes or no changes when a change is expected. This may indicate higher inherent risk.
- **Economic conditions:** Poor economic conditions may affect various assumptions for estimates (inventory turnover, collectability of receivables, financial forecasts). In addition, increases in inflation may affect the profitability of long term contracts, and therefore, increase inherent risk.

Impairment of vessels case: Aggregated and disaggregated analytical procedures on core estimates of impairment of vessels, for example to utilization rates of fleet including off-hire days, to charter revenues and voyage expenses, as well as to operating expenses could reveal a possible deterioration of cash generating ability of certain vessels and consequently to consist indicators of impairment. Comparisons between sister vessels of the same shipping company and between similar vessels of peer companies could identify deviations from average values for the aforementioned accounts and figures which could indicate a decrease in vessels value and their recoverable amount through use or through disposal. Finally, the current downturn of global economy directly affect the need for carrying services and consequently the shipping industry, as discussed above.

Conclusion for the risk of impairment of vessels estimate:

Based on all the factors identified above that increase the estimation uncertainty, the existence of indications of impairment given the prevailing depressed market conditions and the fact that if a need of impairment arises it will result in material amounts being recorded in the significant account of vessels, we conclude that the magnitude of a potential wrong estimate development, as well as the high likelihood of an occurrence of such an event, calls for the designation of recoverable value of vessels and market value of vessels accounting estimates as significant risk estimates.

4.4 Internal Controls and their role in audit of accounting estimates

For all categories of estimates irrespective of their risk the audit guidelines required that the auditors should obtain an understanding of the entity and its environment, including the entity's internal control, as provided by ISA 315 and ISA 540[32]. Also, they have to obtain an understanding of controls, whether or not they take a controls reliance strategy.

Matters that the auditor may consider in obtaining an understanding of relevant controls include, for example, the experience and competence of those who make the accounting estimates, and controls related to[33]:

• How management determines the completeness, relevance and accuracy of the data used to develop accounting estimates.

• The review and approval of accounting estimates, including the assumptions or inputs used in their development, by appropriate levels of management and, where appropriate, those charged with governance.

• The segregation of duties between those committing the entity to the underlying transactions and those responsible for making the accounting estimates, including whether the assignment of responsibilities appropriately takes account of the nature of the entity and its products or services (for example, in the case of a large financial institution, relevant segregation of duties may include an independent function responsible for estimation and validation of fair value pricing of the entity's proprietary financial products staffed by individuals whose remuneration is not tied to such products).

For estimation procedures, the auditors recognize that the controls and control documentation may be less formal than for routine processes. Nevertheless, the entity can implement various controls over its accounting estimates, such as requiring the review and approval of the estimates by personnel who are objective and have the requisite experience and knowledge to assess the appropriateness of the methods and assumptions used and adequacy of the estimate made.

[32] ISA 540, paragraph 8
[33] ISA 540, paragraph A27

4.4.1 Higher and significant risk estimates, lower risk estimates – controls reliance strategy

Based on the definition of relevant auditing standard ISA 315[34], **internal controls** are the processes designed, implemented and maintained by those charged with governance, management and other personnel to provide reasonable assurance about the achievement of an entity's objectives with regard to reliability of financial reporting, effectiveness and efficiency of operations, and compliance with applicable laws and regulations. The term "controls" refers to any aspects of one or more of the components of internal control.

For higher and significant risk estimates, and in cases that the auditors follow a controls reliance strategy for lower risk estimates, they identify relevant controls over estimation processes and understand whether they have been effectively designed and implemented to prevent, or detect and correct, material misstatements on a timely basis. Given the risk of material misstatement arising from higher and significant risk estimates it is important to understand management's controls over the estimation process to determine whether this increases or reduces risks of material misstatement. If management does not have appropriate controls over a significant risk estimate, they design and perform other substantive procedures with more skepticism and recognition that they require higher quality audit evidence on which to base their conclusions.

Relevant controls may include those established over:

- The design and development, or selection, of a particular model for a particular purpose
- The use of the model
- The maintenance and periodic validation of the integrity of the model
- Security, such as controls that prevent changes to the model or the data without authorization.

If the entity uses specific models for making accounting estimates, management may put into place specific policies and procedures around such models.

[34] ISA 315, paragraph 4

When audit professionals obtain an understanding of relevant controls over estimation processes, they consider factors such as:

- The experience, knowledge and authority of managers who make and review accounting estimates, and their degree of separation from the event that created the need for the estimate.
- The comprehensiveness of the manager's review, and whether it is precise enough to identify a misstatement that could be material.
- Whether management monitors the reasonableness of the estimates, and what action they take in response to the results of the monitoring.
- Whether the estimation process is refined and the accounting estimate is revised when comparisons of the actual to the estimated results indicate such a need.
- Whether a specialist is used by management. However, the use of a management specialist is not a control and does not relieve management of its responsibility for the amount of the estimate recorded.
- Whether the bases for the key assumptions is documented and supported by available information.
- Whether other SCOTs provide relevant and reliable data for use in the estimation SCOTs.
- Whether management provides guidelines to the personnel who apply the assumptions.

4.4.2 Determine preliminary audit strategy

Once auditors obtain an understanding of the estimation process, they determine a preliminary audit strategy for the relevant estimation process[35].

Their decision as to whether to rely on controls for estimation processes depends on various factors, including the observations from our understanding of the control environment and the nature of specific controls used by the entity.

[35] ISA 315.26, ISA 330.6 & 540.13

A controls reliance strategy is required in an integrated audit (when the auditors is required to issue an ICFR – Internal control over financial reporting report) and may be an appropriate audit strategy when:

- Specific controls exist for the review and approval of accounting estimates by management or, where applicable, those charged with governance
- The accounting estimate is derived from the routine processing of data by the entity's accounting system

A substantive only strategy may be required or appropriate when:

- Controls are ineffective
- The estimate is performed once at period end
- There is lack of segregation of duties

4.5 Audit procedures for accounting estimates

Regardless of auditors' strategy to test controls, they perform substantive procedures to determine whether:

- Management has appropriately applied the requirements of the applicable financial reporting framework relevant to the accounting estimate.
- The method of measurement used is appropriate and has been applied consistently, and whether changes, if any, in accounting estimates or in the method for making then from the prior period are appropriate in the circumstances.
- Contrary or new information exists that management has not considered in determining the accounting estimate

4.5.1 General audit procedures for high and lows accounting estimates

Auditors' substantive procedures include one or more of the following:

a) **Determining whether events occurring up to the date of our auditor's report provide audit evidence regarding the accounting estimate.**

Events occurring up to the date of the auditor's report may provide audit evidence for an accounting estimate when such events are expected and the audit evidence confirms, or contradicts, the accounting estimate.

The conditions or events relating to some accounting estimates develop over an extended period. In addition, because of the measurement objective of fair value accounting estimates, information after the period end may not reflect the events or conditions existing at the balance sheet date and therefore may not be relevant to the measurement of the estimate.

Some events taking place up to the date of the auditor's report may not provide audit evidence regarding the estimate and do not result in an adjustment to the estimate.

In some cases, events occurring up to the date of the auditor's report that contradict the accounting estimate may indicate management has an ineffective process – or that there is management bias in making the accounting estimates.

b) **Testing how management made the accounting estimate and the accuracy, completeness and relevance of the data on which it is based.** This includes an evaluation of whether the:

- **Method of measurement used is appropriate in the circumstances.** The auditors have to evaluate whether the method of measurement used is appropriate, i.e., whether: Management's rationale for the method selected is reasonable, whether management has sufficiently evaluated and appropriately applied the criteria, if any, in the financial reporting framework, if the method is appropriate, given the nature of the asset or liability being estimated and the requirements of the financial reporting framework and if the method is appropriate for the business, industry and environment in which the entity operates.
- **Model used to develop the estimate, when applicable, is appropriate**. Management may use a model to develop its accounting estimate. Whether a model is appropriate may depend on various factors, such as the nature of the entity and its environment, including its industry, and the specific asset or liability being measured. The extent to which considerations are relevant depend on the circumstances, including whether the model is commercially

available for use in a particular industry or a proprietary model. In some cases, an entity may use a specialist to develop and test a model.

- **Assumptions used by management are reasonable given the measurement requirements of the applicable financial reporting framework**. When evaluating a model, we consider whether it is:
    - Validated prior to usage, with periodic reviews to determine if its continued use is suitable, including: Theoretical soundness, mathematical integrity, appropriateness of parameters, consistency and completeness of inputs with market practices and output compared to actual transactions
    - Whether it is subject to change control policies (e.g., approvals to model changes)
    - Periodically calibrated and tested
    - Providing outputs that are subsequently adjusted by management. In particular, for fair value accounting estimates, whether adjustments reflect assumptions the market would use in similar circumstances
    - Adequately documented, including its applications and limitations, key parameters, inputs and results of validations
- **Assumptions used by management are reasonable given the measurement requirements of the applicable financial reporting framework**. For relevant considerations please refer above to section 4.2.
- **Data on which the estimate is based is accurate, complete and relevant**. In respect of data auditors should perform test of the accuracy, completeness and relevance of the data on which the accounting estimate is based and whether the accounting estimate was properly determined using such data and management assumptions. They should also consider the source, relevance and reliability of external data or information, including that received from management's external specialist, as well as information that is new or may contradict management's assertions and finally they have to recalculating the estimate, and reviewing information for consistency.

c) **Developing their own point estimate or a range to evaluate management's point estimate.** This may be an appropriate response when:
   - An accounting estimate is not derived from the routine processing of data by the accounting system
   - Similar accounting estimates in the prior period suggest management's current process is unlikely to be effective
   - Entity controls within and over management's processes for determining accounting estimates are not well designed or properly implemented
   - Events or transactions between the period end and the date of auditor's report contradict management's point estimate
   - There are alternative sources of relevant data to use for making a point estimate or range

4.5.2 Additional procedures for higher and significant risk estimates

As accounting estimates that give rise to higher and significant risks have a higher likelihood of giving rise to a material misstatement, auditors pay particular attention to how management assesses the effect of estimation uncertainty, both on an accounting estimate, and on the appropriateness of the recognition of the estimate in the financial statements. They also consider the adequacy of related disclosures.

They recognize that, although the nature of the auditing procedures we perform are similar to those for lower risk estimates, we apply our professional judgment to address the greater complexity and estimation uncertainty inherent in higher risk and significant risk estimates.

According to international auditing standard, ISA 540, paragraphs 15-17, additional audit procedures have to be designed in order to address higher and significant accounting estimates in order to evaluate and obtain sufficient appropriate audit evidence relating to:

- Whether the significant assumptions used by management are reasonable, including changes (or lack of changes) to assumptions as compared to prior periods

- How management has evaluated new information and factored that information into the estimation process
- Whether and how management has evaluated alternative assumptions or outcomes, and why management rejected them
- Management's intent to carry out specific courses of action and its ability to do so, where relevant to the reasonableness of the significant assumptions used by management or the appropriate application of the applicable financial reporting framework
- Whether management's decision to recognize, or to not recognize, the accounting estimate in the financial statements and the selected measurement basis for the accounting estimate are in accordance with the requirements of the applicable financial reporting framework

For higher and significant risk estimates, auditors have to understand how management evaluated alternative assumptions or outcomes, and why management selected one set of assumptions and rejected others. When management does not consider alternative assumptions or outcomes, it may be necessary for audit professionals to discuss this with them, and request support for how they address the effects of estimation uncertainty on the estimate. It may also be necessary to perform additional substantive procedures, such as more detailed analysis of key assumptions, developing their own range or performing sensitivity analysis.

A sensitivity analysis may demonstrate that an accounting estimate is not sensitive to changes in particular assumptions. Alternatively, it may show that an estimate is sensitive to one or more assumptions that we focus on.

Finally in accordance to relevant auditing guidance of ISA 540, paragraph A50 if the auditor determines that an accounting estimate gives rise to a significant risk, the auditor is required to obtain an understanding of the entity's controls, including control activities.

The following diagram (Figure 5) summarizes the procedures that the auditors perform on each accounting estimate in accordance with the relevant auditing standards guidance:

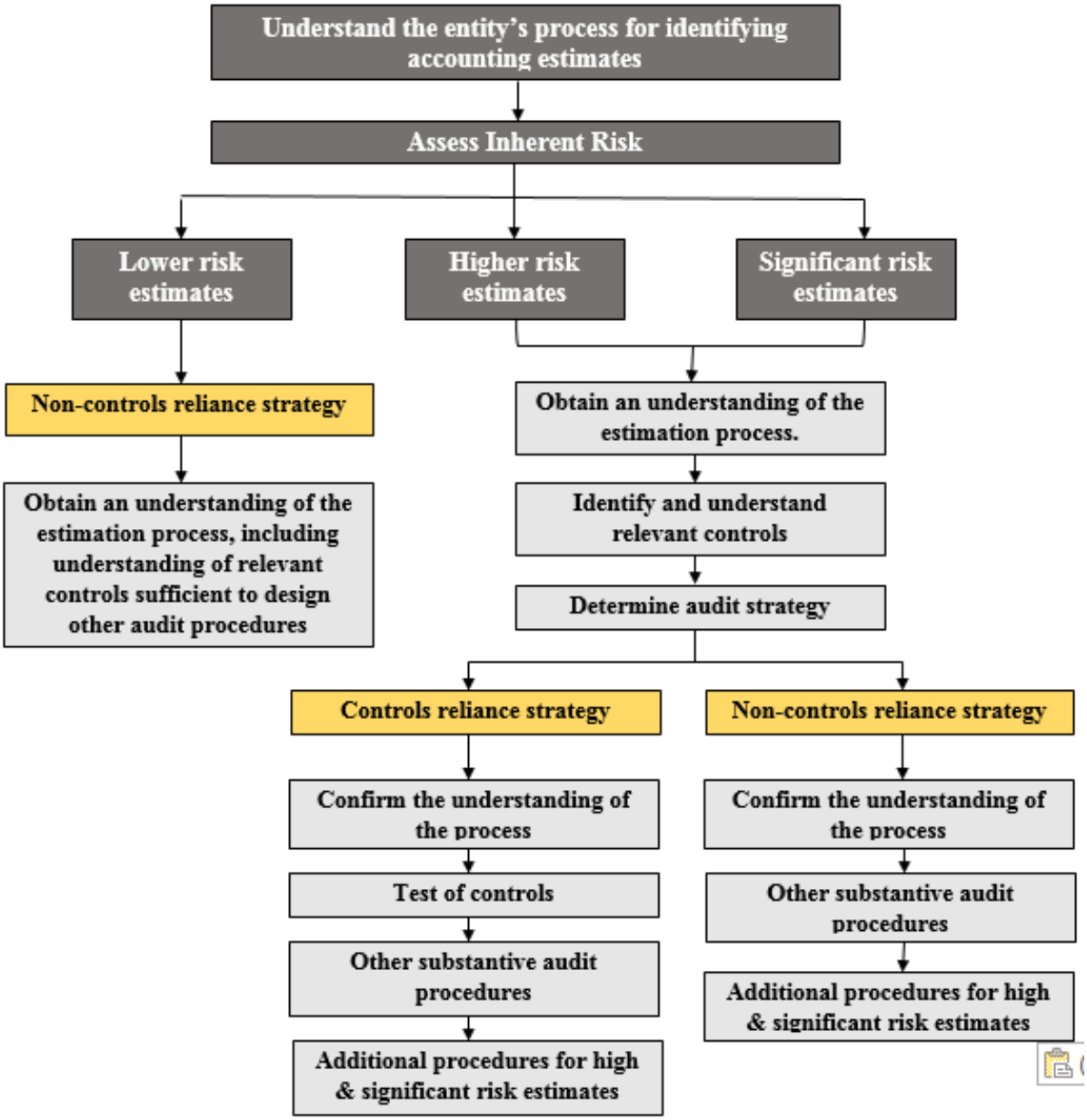


Figure 5: Decision Tree for audit strategy of accounting estimates

4.6 Practical examples of audit procedures for significant accounting policy of impairment and its assumptions

4.6.1 Presentation of the case study company:

In order to apply the aforementioned audit guidance on the significant accounting policy of impairment, we selected one of the vessels from the fleet of the listed shipping company **Diana Shipping Inc.** We present below certain information, as extracted from

its corporate website, regarding the corporate profile of the Company under consideration: Diana Shipping Inc. is a global provider of shipping transportation services, specialized in the ownership of dry bulk vessels. As of September 8, 2017 its fleet consists of 51 dry bulk vessels (4 Newcastlemax, 14 Capesize, 5 Post-Panamax, 5 Kamsarmax and 23 Panamax). As of the same date, the combined carrying capacity of its fleet, is approximately 5.9 million dwt with a weighted average age of 8.11 years. We opt for a US listed (NYSE: DSX) shipping company and not a private so as to be able to obtain publicly available data from its annual and quarterly financial statements, and also in order to perform meaningful comparisons with other peer companies which stocks are publicly traded.

For the purposes of our analysis we selected from Company's fleet list, the Capesize vessel, Boston, 177.828 dwt and built on November 2007. Vessel's particulars as published in Company's website are presented below:

Boston

TYPE	CAPESIZE BULK CARRIER
FLAG	MARSHALL ISLANDS
IMO NO.	9445966
GROSS TONNAGE	91,373
NET TONNAGE	58,745
BUILT	NOVEMBER 2007
BUILDER	SHANGHAI WAIGAOQIAO SHIPBUILDING CO. LTD
CLASS	BUREAU VERITAS (BV)
DEADWEIGHT	177,828 M/T ON SUMMER DRAFT
LIGHTSHIP WEIGHT	24,884 M/T
DRAFT (SUMMER)	18.30 m
SPEED	ABT 14.00 KNOTS
HOLDS/HATCHES	9/9
CARGO CAPACITY	194,000 m^3
LENGTH	292.00 m
BEAM	45.00 m
MAIN ENGINE	MAN B & W 6S70 MC 16,860 KW X 91 RPM
INSTRUMENTS	ALL MODERN NAVIGATIONAL AND RADIO EQUIPMENT

Diana Shipping Inc. as a US listed company prepares its financial statements in accordance with U.S. generally accepted accounting principles (US GAAP) and as a result for reporting purposes it follows the guidance of **ASC 360-10 "Impairment or Disposal of Long-Lived Assets"** subject to which an impairment loss shall be recognized only if the carrying amount of a long-lived asset (asset group) is not recoverable and exceeds its fair value. The carrying amount of a long-lived asset (asset group) is not recoverable if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset (asset group). That assessment shall be based on the carrying amount of the asset (asset group) at the date it is tested for recoverability, whether in use or under development. An impairment loss shall be measured as the amount by which the carrying amount of a long-lived asset (asset group) exceeds its fair value.

Based on the disclosures that the Company made in respect of critical accounting policy of impairment, on the financial statements for the year ended December 31, 2016 (SEC filing date: February 17, 2017), we are going to present and critical assess from an auditor's point of view the assumptions developed by the Company and perform a sensitivity analysis, as well as present a range of estimated values for certain underlying assumptions under different methods.

We list below the assumptions, made by the Company, as disclosed in its filed 20-F for the year ended December 31, 2016, in order to determine the undiscounted projected net operating cash flows, excluding interest charges, expected to be generated by the use of the asset over its remaining useful life and its eventual disposition.

4.6.2 Case study company impairment's assumptions:

In accordance to the factors analyzed above for the categorization of accounting estimates, impairment usually constitutes a significant risk estimate mainly due to the high estimation uncertainty implied to it and to the large number of assumptions used. The first step of the accounting estimate's audit is to assess the inherent risk associated with the each estimate and then to understand the underlying assumptions and the

estimation process used by the entity. In line with this methodology we reviewed the impairment's exercise assumptions, which are presented below:

a) Years – Useful Economic Life: DSI calculated projected net operating cash flows for the remaining years beginning from December 31, 2016 until the end of the useful life of its dry-bulk vessels estimated at 25 years.

b) Scrap rate: The salvage value of all of Company's vessels is $250 per lightweight ton.

c) Hire Rates: The Company used actual rates provided by the time charter agreements from existing time charters (as of the date of test performance) for the fixed fleet days and an estimated daily time charter rate for the unfixed days (based on the 10 year (2007-2016) 1 year time charter average rate available for each type of vessel over the remaining estimated life of each vessel, net of brokerage commissions of 5%.

d) Utilization rate / Off-hire Days: Except for off-hire periods due to schedule maintenance (Dry-Dockings / DD and Special Surveys / SS), DSI has assumed that 1% of ownership days each year will be lost due to off-hire. Effective fleet utilization assumed is in line with the Company's historical performance and management's expectations for future fleet utilization under our current fleet deployment strategy

e) Dry-Dockings and Special Surveys: The Company uses expected outflows for scheduled vessels' maintenance (DD/SS), based on budgeted figures from technical department.

f) Daily Operating expenses: The Company uses actual average daily operating expenses of the year ended 31.12.2016 for Panamax, Kamsarmaxes, Post Panamaxe, Capesize and Newcastlemax increasing annually by an annual inflation rate of 3%. The average annual inflation rate applied on vessels' maintenance and operating costs approximates current projections for global inflation rate.

4.6.3 Auditor's assessment of impairment's assumptions reasonability:

After the initial identification of assumptions used by management, the audit professionals have to demonstrate professional skepticism and critically assess the reasonability and validity of assumptions and reliability of source of input data.

a) **Years – Useful Economic Life:** According to relevant analysis performed in chapter 3 - UEL estimate based in accordance with report with average age of Panamaxes and Capesizes demolished since 1986 extracted by clarksons.net, we conclude that management's estimate of 25 years does not fall outside our range of acceptable amounts and it is also consistent with industry's practices. In our base case scenario the vessel Boston under consideration it is assumed to have 16 years remaining useful life, since based on its particulars the vessel was built on November 2007.

b) **Scrap rate:** Based on reports obtained from clarksons.net website with average scrap rates per year since 1995 (the first date that such data are provided by Clarksons) for vessels of similar characteristics (i.e deadweight) as those of the Company's fleet, we conclude that management's estimate of $250 is within our range of acceptable amounts. For relevant study please refer to Chapter 3 – Scrap rate estimate. For the estimation of vessels under consideration salvage value we assume that it is the product of light weight ton (24.884 M/T), as presented in vessel's particulars table above, multiplied by the scrap rate of $250.

c) **Hire rates:** The selection of hire rates data for 1year Time Charters seems reasonable since the Company does not usually enter in shorter period T/C and the 1year period represents more clearly than longer-term T/C the current hire rate conditions. As regards to the period used to estimate the average hire the 10 years' average is considered to capture a full shipping cycle. To note in this respect that based on the annual reports for 2016, almost all listed shipping companies operating in dry sector are using the 10 year historical average in order to assess future rates. Therefore, the company's selection is consistent with the market common practice. For the relevant consideration and analysis of peer companies please refer to chapter 3. In this context, we present, in the table below historical

data for 1 year TC rates of 170.000 dwt dry bulk vessels, as extracted from clarksons.net time series, which are used for the calculation of daily operating revenues.

Period	1 Year Timecharter Rate 170,000 dwt Bulkcarrier
	$/Day
Year 2005	51.036
Year 2006	45.086
Year 2007	106.921
Year 2008	110.994
Year 2009	33.365
Year 2010	33.095
Year 2011	16.936
Year 2012	13.749
Year 2013	15.811
Year 2014	21.778
Year 2015	9.989
Year 2016	7.324
10Y-Average Rates	**$36.996**
10Y-Average Rates (excluding outliers)	**$24.817**

Table 7: 1 Year TC Rate for 170,000 dwt bulk carrier Source: clarsksons.net time series

d) **<u>Utilization rate / Off-hire Days</u>**: Based on data publicly available from SEC filed annual financial statements the Company's utilization rate as of December 31, 2007-2016 (last 10 years) stands for 99.3%, 98.6%, 98.9%, 99.8%, 99.4%, 98.7%, 99.3%, 99.4%, 99.3% and 99.4%, respectively. Consequently the assumption regarding off-hire days at 1% is in line with its historical performance.

e) **<u>Dry-Dockings and Special Surveys:</u>** The estimation of future dry-docking and Special Survey costs based on the historical and budgeted costs of such maintenance expenditure, seems a logical assumption taken into consideration the increased bargaining power of a company with approximately 50 vessels and the competence and expertise of a technical department of such a high profiled and

reputable shipping company. In our base case scenario analysis that follows, we assume that next dry-docking of vessel Boston to be from **June 1, 2017 to June 23, 2017,** as disclosed in Company's 6-K, published within SEC on July 26, 2017, where DSI announces its financial results of the second quarter and six months ended June 30, 2017. Also, we assume that Dry-dockings are carried out every 2,5 years and Special Surveys every 5 as it is industry's practice. Finally, since historical and budgeted figures of Company's DD and SS are not publicly available, the estimated cost of each scheduled DD and SS expenditure in our base case scenario is in accordance with Drewry's annual report of "Ship operating cost – Annual review and forecasts" for the years 2016-2017. In particular, as per Drewry maritime consultants 2016-2017 report[36], the annual cost of Intermediate / Special Survey of a 10 year old, 170-180.000 dwt dry bulker, for the year 2016 amounted to $334.100. As a result we calculated based on the assumption of evenly apportionment of DD and SS expenditure its year, the relevant costs occurred every 2,5 and 5 years, respectively and then we applied an annual inflation rate of 3%, as explained below, for the next years. Therefore, we used for next SS of 2017 of vessel Boston a figure of $835.250 as cash outflow and for next DD that would be performed on 2020, an amount $417.625.

f) **Daily Operating expenses:** We concur with management's decision to use inflated actual OPEX by 3% inflation each year. As regards to the inflation rate we should note that 1) the estimated inflation for 2017-2041 (25 years) is on average 2.93%, as provided by the Oxford Economics database and on average 3.26% as provided from IMF for the period 2017-2021. For the purposes of the development base case scenario, we used as a starting point of daily opex for applying the 3% inflation rate, the last published annual financial statements of Diana Shipping Inc. quoted a figure for daily operating expenses amounting to $5.196/day[37].

[36] Drewry's annual report of "Ship operating cost – Annual review and forecasts" for the years 2016-2017, page 85

[37] Diana Shipping Inc, filed 20-F for the year ended 31.12.2016, page 60

4.6.4 Performance of impairment test base scenario – case study of vessel Boston

After the careful consideration of the underlying assumptions the auditor should verify the arithmetical accuracy of calculations performed by the audit client and also the proper application of the relevant accounting guidance. We present below a typical example of impairment exercise, customized for the case of vessel Boston. At the bottom of the table it is evident that the undiscounted net operating cash flows that they are estimated to be generated during its UEL significantly exceed, by $83.139 million, vessel's net carrying value as of December 31, 2016[38], and thus Boston carrying value is considered recoverable and should no impairment charge should be recorded..

The **base case scenario** impairment exercise below depicted all the variables that affect the operating cash flows generated by a vessel and estimated future values for each of next years of its useful economic life and also assumes a terminal value due to the final scrapping of the vessel. Despite the significant headroom by which the undiscounted future operating cash flows outweigh the net book value of this asset under review (M/V Boston) the impairment test exercise is highly sensitive to variances in the time charter rates and fleet effective utilization. To capture the uncertainty caused by the variability of the outcomes of the different assumptions, the Company's analysis also involves a sensitivity analysis by assigning possible alternative values into these two significant inputs (i.e 1 year, 3- year and 5-year average blended rates). For the relevant analysis please refer to Company's filed 20-F for the year ended December 31, 2016.

[38] As per Diana Shipping Inc., filed 20-F for the year ended December 31, 2016

TEST OF CASH FLOWS - BASE CASE SCENARIO

BOSTON - Capesize bulk carrier - 177.828 dwt

Period	Available Days	Off hire	SS/ DD Days	Net Days	TCE RATE	Commissions	Running Costs	Inflation Factor	Operating CFs	DD SS	Scrap Value	Net Operating CFs
									(in '000 of US dollars)			
		1%			$36.996							
2017	365	-4	-15	**346**	$16.999	5,00%	$5.352	3,00%	$3.640	($835)		$2.805
2018	365	-4	0	**361**	$36.996	5,00%	$5.513	3,00%	$10.688			$10.688
2019	365	-4	0	**361**	$36.996	5,00%	$5.678	3,00%	$10.628			$10.628
2020	366	-4	-10	**352**	$36.996	5,00%	$5.848	3,00%	$10.243	($418)		$9.825
2021	365	-4	0	**361**	$36.996	5,00%	$6.024	3,00%	$10.501			$10.501
2022	365	-4	-15	**346**	$36.996	5,00%	$6.204	3,00%	$9.908	($968)		$8.940
2023	365	-4	0	**361**	$36.996	5,00%	$6.391	3,00%	$10.368			$10.368
2024	366	-4	0	**362**	$36.996	5,00%	$6.582	3,00%	$10.326			$10.326
2025	365	-4	-10	**351**	$36.996	5,00%	$6.780	3,00%	$9.874	($484)		$9.390
2026	365	-4	0	**361**	$36.996	5,00%	$6.983	3,00%	$10.151			$10.151
2027	365	-4	-15	**346**	$36.996	5,00%	$7.193	3,00%	$9.548	($1.123)		$8.425
2028	366	-4	0	**362**	$36.996	5,00%	$7.408	3,00%	$10.023			$10.023
2029	365	-4	0	**361**	$36.996	5,00%	$7.631	3,00%	$9.915			$9.915
2030	365	-4	-10	**351**	$36.996	5,00%	$7.860	3,00%	$9.480	($561)		$8.919
2031	365	-4	0	**361**	$36.996	5,00%	$8.095	3,00%	$9.745			$9.745
1/11/2032	305	-3	0	**302**	$36.996	5,00%	$8.338	3,00%	$8.069		$6.221	$14.290
	5.783	**-58**	**-75**	**5.650**	**$35.746**	**5,00%**	**$6.742**	**3,00%**	**$153.107**	**($ 4.389)**	**$6.221**	**$154.939**

COST	**$71.800**
DD/SS	**$0**
Excess	**$83.139**

4.6.5 Performance of impairment test with alternative scenarios – case study of vessel Boston

With the purpose to demonstrate the significant impact of the variable of hire rates to recoverable amount of vessel and as result to the estimate of impairment, we develop below two alternative available methods that could be used to predict trading in future level rates: Forward Freight Rates (FFAs) and adjusted, for outliers, 10 years average rates in order to eliminate the effect of extreme values noted during the year 2007 and 2008. We focus our interest to these two methods as they are the most commonly

encountered alternatives to the standard 10 year average assumption, among peer listed shipping companies, as discussed in chapter 3 above.

4.6.5a Future hire rates estimated with the use of Forward Freight Agreements

A forward freight agreement (FFA) is a contract between two counterparties to settle a freight rate or hire rate, for a specified quantity of cargo or type of vessel, for one or a basket of the major shipping routes in the dry-bulk or the tanker markets at a certain date in the future. The underlying asset of FFA contracts is a freight rate assessment for an underlying shipping route or basket of routes which is produced by the Baltic Exchange or by other providers of market information. FFAs are settled in cash on the difference between the contract price and an appropriate settlement price (Alizadeh & Nomikos, 2009. FFAs actually provide a mechanism for hedging freight rate risk in the shipping market.

Undoubtedly, FFAs have historically been the main instrument providing hedging ability to the shipping market participants, thus their trading behavior is of high importance for the maritime industry but academic literature[39] and recent empirical studies[40] have concluded that their forecast ability is of limited value, particularly when referring to long-term forecasts which would be clearly of higher importance for the market. The quality of the forecasts is improved for shorter periods of projection and smaller size of vessels. Although there seems to be a small superiority compared to naïve models, which are simply based on historical values, this is not found to be statistically significant. The fact that FFAs are not good predictors is a well-documented result in all future/derivative markets since new information incorporated and events unfold every day or minute. Nevertheless, given the fact that they have been proved to be a better estimate of short term time charter rates than the historical average rates, we performed below the impairment test for case study vessel Boston, with the assumption that FFAs would be a better estimate until the end of 2018. Therefore, for the unfixed days of the next two years

[39] Batchelor, Akizadeh & Visvikis, 2007- "Forecasting spot and forward prices in the international freight market" International Journal of Forecasting 23: 101-114 and Kavussanos & Visvikis. 2004 - "Market interactions in returns and volatilities between spot and forward sipping freight markets." Journal of Banking & Finance 28: 2015-2049.

[40] Economic Analysis and Research Department of bank of Greece, Kasimati & Veraros, 2017

following the year ended December 31, 2016 (2017 & 2018) we base our future operating revenues on FFAs daily rates for capsize vessels, as indicated in the below Table 8, provided by publications of clarksons.net website.

FFA Indications*				
$/day 20-Apr	Index	May-17	Q3 17	Cal 18
BCI 7 Bolivar-Rott.	8.11	8.20	8.28	
BCI 4 R.Bay-Rott.	7.01	6.95	7.10	
BPI 2A USG/F.East	19,159	17,500		
BPI 3A T/P R/V	11,534	9,750		
Cape TC Avg.	14,660	12,250	14,400	13,900
P'max TC Avg.	12,448	10,100	9,200	9,150
S'max TC Avg.	10,090	9,225	8,775	8,825

*FFA Indications basis closing mid-price

Table 8: FFA Indications 2017-2018 Source: Clarksons research, Shipping Intelligence Weekly, Issue No. 1,268 21-Apr-2017 ISSN: 1358-8028

From the exercise presented below, that incorporates the alternative scenario of FFAs daily hire rate for the next two years (from November 2017 and onwards since until October the vessel is chartered under TC agreement with charterer Clearlake Shipping Pte.[41]), we noted that the effect of more conservative hire rates is a decrease $9.168 million (representing a 11% reduction) of the excess value of projected operating cash flows over net book value of vessel, which doesn't cause the need for a write down of its value, given the fact that all the other factors of the model remain stable. At this point it's worth mentioning that if we replace the 10year average assumption with a moving 10 year average, in the base case scenario the result would be almost marginal, since the excess value would be only $6.063 million. Whereas in the case of a combination of alternative scenario of FFAs best estimate assumption with a moving average from 2019 and onwards an impairment charge should be recorded since the undiscounted projected net operating cash flows would fall below the carrying of vessel Boston by $28.954 million. Therefore, in this case the value of vessel as presented in Company's books would not be considered as recoverable and should be written down to its market value.

[41] As per fleet employment table disclosed in 20-F for the year ended December 31, 2016, page 36

TEST OF CASH FLOWS - FFAs ALTERNATIVE CASE SCENARIO

BOSTON - Capesize bulk carrier - 177.828 dwt

Period	Available Days	Off hire	SS/ DD Days	Net Days	TCE RATE	Commissions	Running Costs	Inflation Factor	Operating CFs	DD SS	Scrap Value	Net Operating CFs
									(in '000 of US dollars)			
		1%			$36.996							
2017	365	-4	-15	**346**	$13.233	5,00%	$5.352	3,00%	$2.401	($835)		$1.565
2018	365	-4	0	**361**	$13.900	5,00%	$5.513	3,00%	$2.760			$2.760
2019	365	-4	0	**361**	$36.996	5,00%	$5.678	3,00%	$10.628			$10.628
2020	366	-4	-10	**352**	$36.996	5,00%	$5.848	3,00%	$10.243	($418)		$9.825
2021	365	-4	0	**361**	$36.996	5,00%	$6.024	3,00%	$10.501			$10.501
2022	365	-4	-15	**346**	$36.996	5,00%	$6.204	3,00%	$9.908	($968)		$8.940
2023	365	-4	0	**361**	$36.996	5,00%	$6.391	3,00%	$10.368			$10.368
2024	366	-4	0	**362**	$36.996	5,00%	$6.582	3,00%	$10.326			$10.326
2025	365	-4	-10	**351**	$36.996	5,00%	$6.780	3,00%	$9.874	($484)		$9.390
2026	365	-4	0	**361**	$36.996	5,00%	$6.983	3,00%	$10.151			$10.151
2027	365	-4	-15	**346**	$36.996	5,00%	$7.193	3,00%	$9.548	($1.123)		$8.425
2028	366	-4	0	**362**	$36.996	5,00%	$7.408	3,00%	$10.023			$10.023
2029	365	-4	0	**361**	$36.996	5,00%	$7.631	3,00%	$9.915			$9.915
2030	365	-4	-10	**351**	$36.996	5,00%	$7.860	3,00%	$9.480	($561)		$8.919
2031	365	-4	0	**361**	$36.996	5,00%	$8.095	3,00%	$9.745			$9.745
1/11/2032	305	-3	0	**302**	$36.996	5,00%	$8.338	3,00%	$8.069		$6.221	$14.290
	5.783	**-58**	**-75**	**5.650**	**$34.067**	**5,00%**	**$6.742**	**3,00%**	**$143.939**	**($ 4.389)**	**$6.221**	**$145.771**

COST	**$71.800**
DD/SS	**$0**
Excess	**$73.971**

4.6.5b Future hire rates estimated by excluding extreme historical values

It is well known that the charter rates are experiencing great volatility throughout the years and especially since their abrupt fall during the year 2008. In particular, the Baltic Dry Index, or the BDI, which has long been viewed as the main benchmark to monitor the movements of the dry bulk vessel charter market and the performance of the entire dry bulk shipping market declined 94% in 2008 from a peak of 11,793 in May 2008 to a low of 663 in December 2008 and has remained volatile since then. As result, there is a small number of shipping companies that opt for a more prudent approach for the

estimation of the future revenue cash flows through the adjustment of 10 year average historical hire rates for significantly increased values such which were 2007 and 2008 quoted TC rates. More specifically, daily average 1year TC rate for capsize vessels for these years stands at $106.921 and $110.994 respectively, which are approximately 3 times more the 10 years average rate of 1 year TC. As a result, when replacing the years 2007 & 2008 with more modest years 2005 & 2006 in terms of hire rates, the excess of the undiscounted future cash flows over vessel's net book value has been significantly narrowed to $21.105 million, given that all the other factors remain stable. Despite the reduction of headroom the recoverable amount of its value is still unquestionable and no impairment expense should be charged in the statement of operations (profit and loss statement) for the current year of 2016.

TEST OF CASH FLOWS - EXCLUDING EXTREME VALUES SCENARIO

BOSTON - Capesize bulk carrier - 177.828 dwt

Period	Available Days	Off hire	SS/ DD Days	Net Days	TCE RATE	Commissions	Running Costs	Inflation Factor	Operating CFs	DD SS	Scrap Value	Net Operating CFs
									(in '000 of US dollars)			
		1%			$24.817							
2017	365	-4	-15	**346**	$14.970	5,00%	$5.352	3,00%	$2.972	($835)		$2.137
2018	365	-4	0	**361**	$24.817	5,00%	$5.513	3,00%	$6.507			$6.507
2019	365	-4	0	**361**	$24.817	5,00%	$5.678	3,00%	$6.447			$6.447
2020	366	-4	-10	**352**	$24.817	5,00%	$5.848	3,00%	$6.166	($418)		$5.749
2021	365	-4	0	**361**	$24.817	5,00%	$6.024	3,00%	$6.321			$6.321
2022	365	-4	-15	**346**	$24.817	5,00%	$6.204	3,00%	$5.901	($968)		$4.933
2023	365	-4	0	**361**	$24.817	5,00%	$6.391	3,00%	$6.187			$6.187
2024	366	-4	0	**362**	$24.817	5,00%	$6.582	3,00%	$6.133			$6.133
2025	365	-4	-10	**351**	$24.817	5,00%	$6.780	3,00%	$5.809	($484)		$5.325
2026	365	-4	0	**361**	$24.817	5,00%	$6.983	3,00%	$5.970			$5.970
2027	365	-4	-15	**346**	$24.817	5,00%	$7.193	3,00%	$5.540	($1.123)		$4.418
2028	366	-4	0	**362**	$24.817	5,00%	$7.408	3,00%	$5.831			$5.831
2029	365	-4	0	**361**	$24.817	5,00%	$7.631	3,00%	$5.734			$5.734
2030	365	-4	-10	**351**	$24.817	5,00%	$7.860	3,00%	$5.415	($561)		$4.853
2031	365	-4	0	**361**	$24.817	5,00%	$8.095	3,00%	$5.564			$5.564
1/11/2032	305	-3	0	**302**	$24.817	5,00%	$8.338	3,00%	$4.576		$6.221	$10.797
	5.783	**-58**	**-75**	**5.650**	**$24.202**	**5,00%**	**$6.742**	**3,00%**	**$91.073**	**($ 4.389)**	**$6.221**	**$92.905**

COST	**$71.800**
DD/SS	**$0**
Excess	**$21.105**

From a comparative analysis of the different assumptions used by the shipping companies to determine the future operating cash flows generated by hire revenues it is evident that the use of 10 years average historical rates by Diana Shipping Inc. is the less prudent approach. But considering all the three commonly used alternative methods of 10 year average, FFAs for short term periods and adjusted 10 year average with extreme values, we noted that even under these assumptions no impairment charge should be recorded. Therefore, the auditor would concur with Company's assessment regarding the recoverability of carrying value of vessel Boston. We further test the model by introducing the concept of moving average in order to present the possible effect of the possibility of the continuance of recession in shipping market in vessels value. In fact the use of moving average for the estimation of future hire rates for impairment exercise purposes isn't a common practice among listed shipping companies, as per our analysis in chapter 3.

The outcome of all the aforementioned alternative scenarios regarding the assumption of TC hire rates is depicted in the table below:

Scenarios	Assumption for TC rates	Net Operating CFs	Vessel Net Book Value	Excess / (Deficit)	Impairment
Base case	10Y historical average	154.939	71.800	83.139	**NO**
FFAs case	FFAs until 2018	145.772	71.800	73.972	**NO**
Moving Average Base case	10Y historical moving average	77.863	71.800	6.063	**NO**
Moving Average FFA case	FFAs until 2018 & 10Y moving average	42.846	71.800	-28.954	**YES**
Extreme values case	exclude outliers of 2007 & 2008	92.905	71.800	21.105	**NO**

4.6.6 Sensitivity Analysis of assumptions of impairment test

With the view to assess the susceptibility of the impairment exercise to every single assumption we perform a sensitivity analysis the summary of which is presented in the following table. In particular, we assumed an unfavorable change of 10% of each

parameter that affects the outcome of undiscounted net operating cash flows we noted the percentage impact on the excess value of operating cash flows over the vessel's carrying value.

We concluded that the estimate of impairment is sensitive mainly to variations in TC rates since a decrease of 10% in hire rates would cause a reduction of 22% in excess value. For the rest of the assumptions a 10% change creates a smaller fluctuation.

Assumptions	10% change in TC rates	10% change in off hire days	10% change in OPEX	10% change in inflation rate	10% Change in commissions rate
Reduction in excess value	-22%	-0,2%	-6,4%	-1,2%	-1,2%

Finally in order to reinforce the aforementioned conclusions we present in the table below the Break Even point of every assumption separately, i.e. the value of each input that would lead the undiscounted net future operating cash flows to be equal to the carrying value of the vessel Boston. From that point every negative change would have as a result the Company to record an impairment charge in the statement of operations for the year ended December 31, 2016. From the table below it is evident that the more uncertain assumption is TC rates since with a decrease of 44,1% would break even. This is not in fact a remote scenario given the sharp fluctuations that the dry bulk market have experienced during the last decade. For the remaining assumptions the breakeven analysis reveals that it is highly unlikely that their change could cause, in isolation, the Company to write down the value of vessel Boston. Certainly, the combined detrimental effect of all parameters simultaneously could have a serious negative impact in the recoverable amount of vessel.

Assumptions	TC rates	Off hire days	Operating Expenses	Inflation rate	Commissions rate
Break Even Point	20.673 $/day (decrease of 44,1%)	43,0%	16.792 $/day (increase of 213%)	16,08% (increase of 436%)	46,1%

Therefore, for the auditors the careful consideration of the reasonability of assumptions used by management of shipping companies with the use of sensitivity and scenario analysis is of paramount importance for the determining the fair value of vessels.

CONCLUSION

The present thesis constitutes a study of the accounting challenges faced by the majority of shipping companies in the context of the two most commonly encountered financial reporting frameworks (IFSR & US GAAP) that govern the preparation of their financial statements. Vessels are expensive assets with various reporting complexities and requirements throughout their life cycle that require knowledgeable and competent financial reporting and accounting departments. The alternative accounting policies used under the different accounting standards leave space for reporting inconsistencies across the shipping sector which undermine the financial transparency and credibility of accounting information and render comparisons difficult among shipping companies.

Financial statements portray entity's financial condition and performance as they have an immediate effect on companies' key performance measures. As a result the accurate, reliable and uniform presentation of business transactions and events forms the basis of analysts' conclusions and decision making process for all intended users of financial statements. Also, to disclose that the financial statements of an entity are in conformity with financial reporting standards requires from management to make estimates and assumptions that affect the amounts reported in these statements and accompanying notes. Since each judgement is by its nature subjective, the results of the estimation can differ. Given the existed options provided by accounting policies and the inherent uncertain nature of accounting estimates, management should be prudent and consistent to the application of policies and use all available and sufficient information when making accounting estimates. Persons in estimation processes should also react ethically and avoid any conflicts of interest.

Auditors should act as the gatekeepers of financial transparency and fulfil their duties by scrutinizing the assumptions used for the development of estimates and performing detailed procedures, according to auditing standards in order to obtain reasonable assurance about "the true and fair view" of financial statements and meet the expectations of stakeholders, including investors, regulators and creditors who seek for relevant, reliable, comparable and consistent accounting information.

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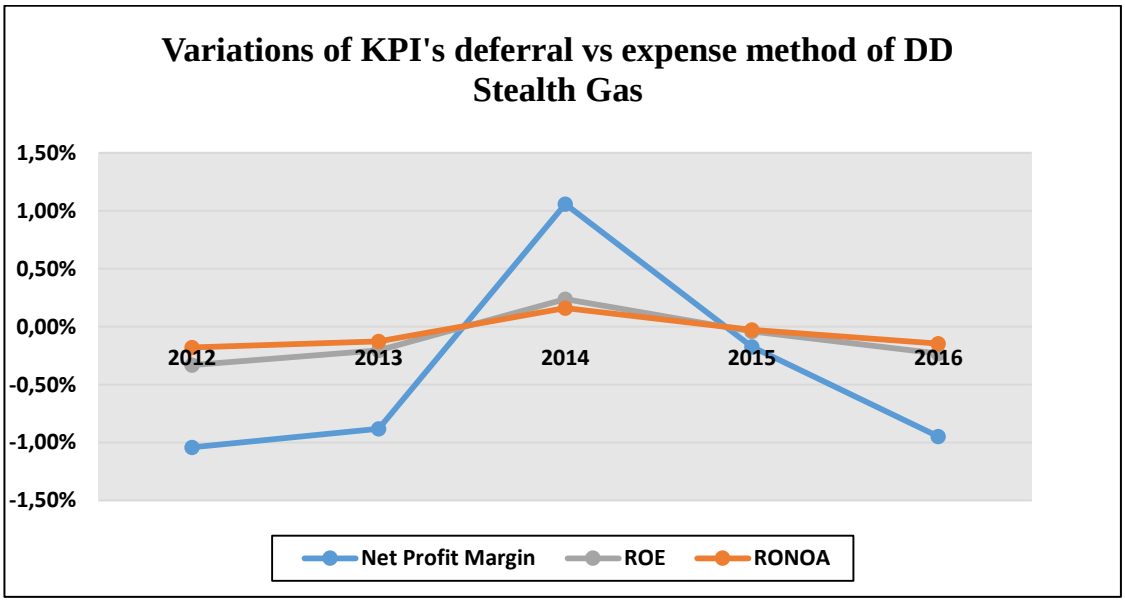
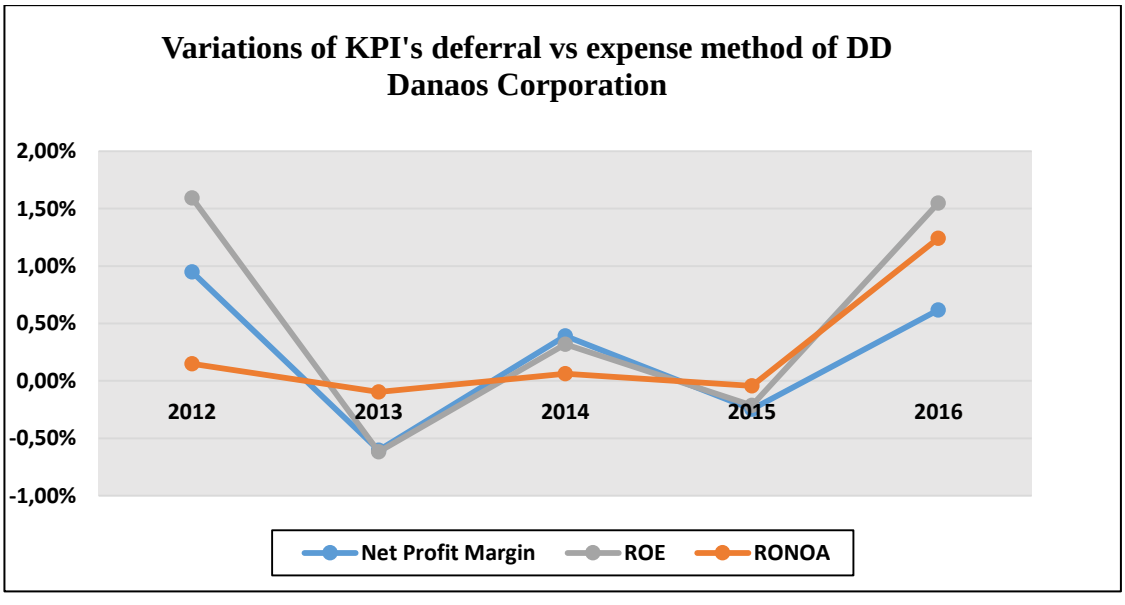
Appendix I: Additions of dry-docking for five listed shipping companies reporting under US GAAP

Years (Amounts in thousands $)	2012	2013	2014	2015	2016
Danaos Corporation	9.308	283	6.887	2.341	8.976
Costamare Inc.	11.171	6.189	10.150	9.461	5.868
Diana Shipping Inc.	1.454	254	4.256	6.009	2.786
Stealth Gas	2.067.393	3.160.251	465.681	1.774.905	3.613.230
Seaspan Corporation	6.520	3.500	11.318	32.837	19.119

Appendix II: Diagrams for profitability KPI's variations between DD different accounting treatments





Appendix III: Five years data of Financila Ratios for listed shipping companies

		2012			2013			2014			2015			2016		
		Deferral	Expense	Diff.	Deferral	Expense	Diff.	Deferral	Expense	Diff.	Deferral	Expense	Diff.	Deferral	Expense	Diff.
Company	Financial Ratios															
DANAOS	Net Profit Margin	-17,86%	-18,81%	0,95%	6,38%	6,98%	-0,60%	-0,71%	-1,10%	0,39%	20,60%	20,85%	-0,25%	-73,48%	-74,10%	0,62%
	Capital turnover	15,31%	15,33%	-0,02%	15,91%	15,92%	-0,01%	15,67%	15,69%	-0,02%	16,78%	16,79%	-0,01%	88,86%	89,80%	-0,94%
	RONOA	-2,73%	-2,88%	0,15%	1,02%	1,11%	-0,10%	-0,11%	-0,17%	0,06%	3,46%	3,50%	-0,04%	-65,30%	-66,54%	1,24%
	Leverage	8,737	8,836	-0,10	6,177	6,194	-0,02	5,120	5,145	-0,03	4,021	4,031	-0,01	1,150	1,152	0,00
	ROE	-23,89%	-25,49%	1,59%	6,27%	6,89%	-0,62%	-0,57%	-0,89%	0,32%	13,90%	14,11%	-0,21%	-75,08%	-76,63%	1,55%
COSTAMARE	Net Profit Margin	21,01%	19,27%	1,74%	24,89%	25,07%	-0,18%	23,78%	23,49%	0,29%	29,32%	29,24%	0,08%	17,45%	17,94%	-0,49%
	Capital turnover	18,73%	18,79%	-0,06%	17,33%	17,37%	-0,04%	19,96%	20,02%	-0,06%	20,76%	20,83%	-0,07%	20,55%	20,60%	-0,05%
	RONOA	3,93%	3,62%	0,31%	4,31%	4,35%	-0,04%	4,75%	4,70%	0,04%	6,09%	6,09%	0,00%	3,59%	3,70%	-0,11%
	Leverage	3,962	4,000	-0,04	3,639	3,663	-0,02	3,020	3,039	-0,02	2,452	2,463	-0,01	2,121	2,126	-0,01
	ROE	15,59%	14,49%	1,10%	15,69%	15,95%	-0,26%	14,34%	14,30%	0,04%	14,92%	15,00%	-0,08%	7,60%	7,86%	-0,25%
DIANA SHIPPING	Net Profit Margin	24,48%	24,09%	0,39%	-12,89%	-12,63%	-0,26%	-5,85%	-7,08%	1,23%	-41,03%	-42,21%	1,17%	-66,44%	-65,06%	-1,39%
	Capital turnover	13,28%	13,28%	-0,01%	10,03%	10,03%	0,00%	10,40%	10,41%	-0,02%	8,87%	8,89%	-0,02%	7,18%	7,20%	-0,01%
	RONOA	3,25%	3,20%	0,05%	-1,29%	-1,27%	-0,03%	-0,61%	-0,74%	0,13%	-3,64%	-3,75%	0,11%	-4,77%	-4,68%	-0,09%
	Leverage	1,328	1,328	0,000	1,308	1,308	0,000	1,317	1,318	-0,001	1,459	1,461	-0,002	1,505	1,507	-0,001
	ROE	4,31%	4,25%	0,07%	-1,69%	-1,66%	-0,03%	-0,80%	-0,97%	0,17%	-5,31%	-5,48%	0,17%	-7,19%	-7,05%	-0,13%
STEALTH GAS	Net Profit Margin	25,33%	24,29%	1,04%	18,35%	17,47%	0,88%	8,55%	9,61%	-1,06%	1,99%	1,82%	0,17%	6,36%	5,41%	0,95%
	Capital turnover	18,10%	18,14%	-0,03%	15,37%	15,42%	-0,05%	15,03%	15,05%	-0,02%	15,11%	15,13%	-0,02%	15,61%	15,66%	-0,04%
	RONOA	4,59%	4,41%	0,18%	2,82%	2,69%	0,13%	1,29%	1,45%	-0,16%	0,30%	0,27%	0,03%	0,99%	0,85%	0,15%
	Leverage	1,918	1,922	0,00	1,664	1,667	0,00	1,480	1,481	0,00	1,601	1,602	0,00	1,601	1,604	0,00
	ROE	8,80%	8,47%	0,33%	4,69%	4,49%	0,20%	1,90%	2,14%	-0,24%	0,48%	0,44%	0,04%	1,59%	1,36%	0,23%
SEASPAN	Net Profit Margin	18,36%	17,77%	0,59%	44,16%	44,24%	-0,08%	18,30%	17,73%	0,57%	24,34%	22,58%	1,77%	-15,84%	-15,39%	-0,45%
	Capital turnover	12,08%	12,09%	-0,01%	12,48%	12,48%	-0,01%	13,09%	13,11%	-0,02%	14,41%	14,47%	-0,06%	16,97%	17,03%	-0,06%
	RONOA	2,22%	2,15%	0,07%	5,51%	5,52%	-0,01%	2,40%	2,32%	0,07%	3,51%	3,27%	0,24%	-2,69%	-2,62%	-0,07%
	Leverage	4,489	4,501	-0,01	3,453	3,458	-0,01	3,139	3,148	-0,01	3,200	3,227	-0,03	2,961	2,981	-0,02
	ROE	9,95%	9,66%	0,29%	19,03%	19,10%	-0,07%	7,52%	7,32%	0,20%	11,23%	10,54%	0,68%	-7,96%	-7,81%	-0,14%

Appendix IV

Shipping Intelligence Network Timeseries

Date	41333 Far East Demolition Prices: Capesize/Panamax $/ldt	41335 Indian Sub Continent Demolition Prices: Capesize/Panamax $/ldt	56863 Bangladesh Demolition Scrap Prices - Drycargo (Cape/Panamax) $/ldt
2007 - Q1	230,00	435,00	420,00
2007 - Q2	230,00	430,00	440,00
2007 - Q3	230,00	430,00	520,00
2007 - Q4	230,00	470,00	480,00
2008 - Q1	290,00	630,00	680,00
2008 - Q2	370,00	620,00	650,00
2008 - Q3	450,00	530,00	550,00
2008 - Q4	200,00	270,00	260,00
2009 - Q1	230,00	285,00	335,00
2009 - Q2	260,00	260,00	260,00
2009 - Q3	260,00	280,00	290,00
2009 - Q4	305,00	330,00	310,00
2010 - Q1	350,00	400,00	410,00
2010 - Q2	335,00	350,00	360,00
2010 - Q3	350,00	420,00	370,00
2010 - Q4	420,00	460,00	370,00
2011 - Q1	440,00	495,00	370,00
2011 - Q2	465,00	495,00	500,00
2011 - Q3	460,00	510,00	510,00
2011 - Q4	430,00	460,00	505,00
2012 - Q1	430,00	460,00	465,00
2012 - Q2	345,00	360,00	375,00
2012 - Q3	330,00	395,00	395,00
2012 - Q4	370,00	410,00	405,00
2013 - Q1	375,00	425,00	425,00
2013 - Q2	310,00	395,00	410,00
2013 - Q3	365,00	405,00	390,00
2013 - Q4	355,00	430,00	425,00
2014 - Q1	330,00	470,00	450,00
2014 - Q2	320,00	465,00	460,00
2014 - Q3	280,00	495,00	490,00
2014 - Q4	235,00	440,00	440,00
2015 - Q1	210,00	380,00	390,00
2015 - Q2	210,00	365,00	375,00
2015 - Q3	155,00	310,00	295,00
2015 - Q4	140,00	285,00	295,00
2016 - Q1	140,00	240,00	255,00
2016 - Q2	155,00	245,00	275,00
2016 - Q3	215,00	305,00	310,00

41333: Far East Demolition Prices: Capesize/Panamax : As at End of Period Specified.

41335: Indian Sub-Continent Demolition Prices: Capesize/Panamax : As at End of Period Specified.

56863: Bangladesh Demolition Scrap Prices - Drycargo (Cape/Panamax): As at End of Period Specified.