



Economic Analysis on Ship Investment and Management Strategy of Dry Bulk Shipping

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論文内容の要旨

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論文題目 (外国語の場合は、その和訳を併記すること。)

Economic Analysis on Ship Investment and Management Strategy of Dry Bulk
Shipping

(ドライバルク SHIPPING における船舶投資と船舶管理の経済分析)

Maritime transportation is undoubtedly one of the most fascinating industries in the world transportation systems and it goes back to as early as 45,000 years ago. From that time to the present, the maritime transportation has been developed and modified in accordance with technological development, new sailing route, different cargo type and capacity. Since the demand of raw materials has been increased particularly after the industrial revolution in 19th century, the maritime transportation has been more indispensable to transport it from one point to another. In the last few decades, shipping market has arrived about 80 billion dollars per year for financing new building alone and there exists more than 30,000 worldwide shipping companies in shipping industry (Unctad, 2010).

Shipping industry is extremely volatile and highly cyclical business, where make the right decision to be taken in good time allows the owners to grow their company while the wrong decision caused the total lost and high risk. By having an extensive understanding of the way the shipping market and its components work we can generate a better decision support system for shipping investor (Lun, et al., 2010). For this purpose, entrepreneurs or ship owners are expected to analyze the alternatives of the ship investment and management in shipping market to make an effective decision for the investment strategy. Before entering the shipping market, three major and significant decisions, namely the market entry-exit decision (asset play), ship investment decision (the type of ship and size), and the proper ship management strategy decision, should be considered (Figure

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1.2). In this paper, the empirical study is based on the entrepreneurs' own ships and it does not consider the time charter ship and its different period selection.

In the last decades, the ship investment strategy selection is one of the most attractive study fields. The earliest studies go back the beginning of the twentieth century and they basically based on the economic analysis of shipping market and freight rates (Eulenburg, 1932; Isserlis, 1938; Matsumoto, 1929; Tinbergen, 1931). One of the first indications in the classical econometric analysis for ship investment is Koopmans' study which investigated the deterministic factor of freight rates in terms of a supply and demand model (Koopmans, 1939). Beenstock (1985) stated a theoretical model in which freight markets and ship building markets have high correlation and which is applied to analyze the dry bulk cargo market and the tanker market (Beenstock & Vergottis, 1989a, 1989b).

Marcus et al. (1991) propose an estimator of relative price level for general ship based on the NPV method to compare market price with a cost-based nominal price and thus identifies relative highs and lows in a bulk shipping market. In other words, they compare the nominal and actual price to determine the purchasing and selling of bulk carriers. They defined two different measure of relative ship price to use as investment signals in the spreadsheet. First is the ratio between actual price and nominal price. When the ratio is positive, the nominal price is greater than the actual price and the ship could be construed as "under-valued." Thus it's time to consider adding a ship to the investment portfolio. Conversely, a negative ratio signal indicates an "overvalued" ship and therefore suggests it's time to consider selling. Second one is related to the change signal of current ratio. When the change signal is positive, ships are becoming more attractive. When the change signal is negative, ships are becoming less attractive.

Study of Andreas Merikas & George Koutroubousis (2008) investigated the relative price ratio second-hand price over the new building price (SH/NP) to define the investment timing. They investigated the determinants of this ratio across different ship sizes in the tanker sector and show that it can be used as an effective tool in investment decision as well as in ship appraisal.

Alizadeh and Nomikos (2003, 2007) investigate the performance of trading strategies based on the combination of technical trading rules and fundamental analysis in the sale and purchase market for dry bulk ships. The authors reveal the existence of a long-run cointegration relationship between ship price and earning and use this relationship as an indicator of investment or divestment timing decisions in the dry bulk shipping sector by using a sample of ship price and charter rates over the period January 1976 to September 2004. Their results reveal that trading strategies based on earnings-price ratios significantly out-perform buy and hold strategies in the second-hand market, especially for larger ships, due to higher volatility in these markets.

NPV method has long been advocated as the applicable theoretical support for maritime investments (Evans, 1984; Gardner, Göss, & Marlow, 1984). However, the limitations of the

financial and econometrics methods are also well known, while their results are practical to use for a confirmatory role (Grammenos, 2010; Trigeorgis, 1995). There are also some significant factors that influence ship investment decision making and they are not clearly financial or cannot be easily quantified in financial terms (H. Bendall & Stent, 2003; Rousos & Lee, 2012). In order to close existing gap, several studies applied the different methods such as multi criteria decision making and real option analysis than classical economic approaches, not only for ship investment analysis but also for different markets (H. B. Bendall & Stent, 2007; Bulut, Duru, Keçeci, & Yoshida, 2012; Chou & Liang, 2001; Dimitras, Petropoulos, & Constantinidou, 2002; Lyridis, Zacharioudakis, Mitrou, & Mylonas, 2004).

Management is extremely significant in the volatile and competitive shipping industry (Mitroussi, 2003). The origin of today's professional ship management company model can be traced back to the time after the Second World War, consciously to develop commercial activities of the old family-owned ship management companies (Sletmo, 1986). In the mid-1960s, the demand for the professional ship management was considerably increased by major oil companies who employed third party ship management companies for their ships (Panayides & Gray, 1997). The BIMCO standard ship management document called BIMCO Shipman was established in 1988 and revised to constitute standard and principle of ship management.

In the existing literature, the limited number of studies investigates the ship management to determine factors and criteria which influence to make a decision for the selection of the type of ship management and develop the ship management model for the shipping companies. Panayides and Cullinane (2002) investigate to define the dimensions in ship manager selection and evaluation. They used personnel interview and questionnaire as a research method to identify the choice selection and evaluation criteria as used by the ship managers.

The study was specified as follows;

- *To identify ship manager's perceptions with respect to ship manager selection and service evaluation criteria,*
- *To identify the importance attached to each criterion by ship managers;*
- *To identify the criteria (dimensions) actually used by shipowners (clients) in selecting ship management companies and evaluating the service provided;*
- *To identify the importance attached to each criterion by the shipowners (clients); and*

- *To identify any perceptual gap which exists between the perspective of ship managers and shipowners and to analyze the implications of this.*

The result of their study shows that the price/cost variable is important but not at the expense of quality. Hence, the price/cost ratio might be considered as the deterministic variable when all other things are equal. However, if service quality is low that the customers assume acceptable, the price will not do much in attracting a particular customers to the ship manager. Experience, qualifications and the technical ability of personnel also are considered to be selected as a criteria agenda. The cost-effectiveness in ship operation and trust between parties were found as a particular importance for the ship marketing strategy. In the study of Mitroussi (2003, 2004a), the revolutionary of third party ship management is analyzed and outline some of the basic factors that contribute to the separation of ownership and management in the modern business system. These factors can be considered instrumental in the decision of a ship-owning firm to employ third party ship management. He found that issues like the size, type and age of the company can have a major influence on the separation of ownership and management and whether the employment or not of professional, independent ship management companies.

Cariou and Wolff (2011) analyzed 45,456 ships belonging to 9580 different ship-owners to investigate the extent of outsourcing in shipping and to identify the key factors affecting the likelihood of outsourcing. According to their results, ship-owners' decisions to outsource are explained by the characteristics of the ships in question (age, type and size) and the characteristics of the ship-owner (country of domiciliation and number of ships).

In the study for the ship management companies in UK and Cypriot, Panayides and Gray (1999) point out the different perspective of ship management that achieving a competitive advantage or reducing the risk of losing a competitive advantage over their competitors is based on co-operation and long-term customers relationship which borings skills, competence, capabilities and strategic assets from different cooperating businesses;

The each study in the literature as mentioned above investigated the part of the ship management not all of the structure of the shipping business management from first step to last one. However, all parts such as management department, investment department, chartering department and crew department of shipping business should be considered for the ship investment and management analysis. In this study, we handled all these issues of shipping business to investigate the economic analysis on the ship investment and management strategy decision for the dry bulk shipping market.

In this study, three major shipping investment decisions that are clearly interrelated with each other are investigated (Figure 1.3). The first one is related with market entry-exit decision from the

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point of business cycles in the dry cargo shipping. One of the critical problems of the shipping business is based on the market entry-exit decision and the investment timing for ship allocation. There are many indicators which define the investment climate in the shipping business and the optimized market entry may extremely contribute the cumulative financial results of a shipping asset (i.e. vessel). A number of indicators are investigated under the business cycle perspective and the fluctuations of the return on equity (here after ROE) is figured out in the long-run framework. The fluctuations of ship prices and ROE indicate that the ship investor tends to place the investment at the time of peaks of ship prices (new building or second hand) which extremely causes the loss of ROE rates in long-run. The statistical significance is tested and the market entry decision is investigated according to the maximum ROE constraint (Bulut, Duru, & Yoshida, 2013).

The second is the decision on the ship investment of different type of ships in new building, or second hand ships. Particularly in the rapid growth of the world economy, shipping capacity is more important and a certain size of ship has advantages on employment and profit margins. An investor is basically asked to define characteristics of his ships. The ship size is one of the critical dimensions of ship investment. Investors have three optional entry strategies: a new building ship, purchasing a second hand hull or hiring an existing ship for a period of time. In practice in the shipping business, charterers of ships are large-scale industry players or their intermediaries. A shipping investor usually tends to purchase a new construction or an existing ship (Duru, Bulut, & Yoshida, 2012).

The ship management decision is another focus of the present study. When a ship owner purchases a merchant ship, management of the fleet is another problematic point of the ship management process. The owner may prefer to manage the fleet by himself; management outsourcing is another option. An experienced investor may choose to manage his fleet by senior managers of the corporation or if the investor is an entrepreneur, management outsourcing can be a reasonable solution. Depending on the size of the fleet, it may be feasible to establish management at the headquarters or through third party management companies (Bulut, et al., 2012).

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要 旨			
本論文は、バルク SHIPPING における船舶投資および船舶管理に関する研究である。具体的には、船舶投資のタイミング、どの船型が利潤最大化に有利か、どのような船舶管理方法がよいか、という三つの基本問題を分析している。論文の構成と各章の概要は、以下の通りである。 第1章は、本研究の背景を船舶投資と船舶管理の歴史的変遷ならびに文献研究を通して明らかにし、本論文の目的、研究領域および論文構成について述べている。 第2章は、市場参入・退出の決定、すなわち船舶投資（船舶売買）のタイミングについて分析している。まず、船舶投資における古くて新しい問題「好況期に高い船を買い不況期に船を安く売る」という非合理的行動を発注量、船価、定期用船料等の統計データによって確認する。つぎに、1980 年から 2010 年までの海運市況変動を前提に、いつ新造船を発注し、いつ買船するのが最も高い ROE (Return on Equity) が得られるかを一定のシナリオのもとで計算し、投資行動の Herd 行動を確認している。 第3章は、どのような船型船舶が最も高い投資利益率を上げるかをファジー型 AHP モデルによって分析している。代替案と評価要因を明らかにした後、分析方法であるレジーム変換型 FAHP モデルによるモンテカルロシミュレーションについて詳細に説明し、その適用と結果について紹介している。本研究のコアとなる部分である。 第4章は、投資した船舶の管理方法に関する研究である。いわゆるシップマネジメントに関する問題であり、完全なアウトソースから完全な内部管理までのどのレベルで船舶管理を行うかである。本章ではさらに船員の国籍をどこにするかという問題をも取り上げている。これらの問題に前章で開発された方法論が適用されている。船舶管理と船員管理という二段階の階層構造を定義し、その適用方法およびその結果について考察を加えている。 第5章の結論においては、研究の成果、本研究が抱える問題点及び残された課題について言及している。 本研究の成果は、次の通りである。まず、伝統的な方法で行われている現実の投資活動は、長期的には利潤最大化や企業成長にロスをもたらしていることが明らかにされた。つぎに、どの船型タイプが有利かに関しては、ハンディーマックス型であり、これは海運界でも容易に受け入れられる結果であろう。シップマネジメントに関しては部分的アウトソースタイプが選択され、そのために船員管理がより重要となる。トルコの場合では、自国船員によるフル管理がベストであるという結果であった。最後に、ファジー型 AHP モデルの方法論に関していくつかの改良を提案していることである。これらの研究成果は、船舶投資という海運業にとって重要な意思決定問題に対して貴重な示唆を与えるものであり、海運研究にとってもその寄与は大きいといえよう。 このように本論文は、研究内容の新規性、独自性ならびに博士論文としての体裁等の観点から博士（海事科学）の学位を得る資格があると認める。			

氏名	Emrah Bulut
なお、本論文に関連する有審査論文は、以下の4編（3編が第1著者、すべて英文）である。 1. Bulut, E., Duru, O. and Yoshida, S. (2013). Market Entry, Asset Returns, and Irrational Exuberance: Asset Management Anomalies in Dry Cargo Shipping. <i>International Journal of Shipping and Transport Logistics</i>, (In press). 2. Bulut, E., Duru, O. and Yoshida, S. (2012). A Fuzzy Integrated Logical Forecasting (FILF) Model of Time Charter Rates in Dry Bulk Shipping: A vector Autoregressive Design of Fuzzy Time Series with Fuzzy C-means Clustering. <i>Maritime Economic and Logistics</i>, Vol. 14 (3), pp. 300-318. 3. Bulut, E., Duru, O. and Yoshida, S. (2010). Multi-attribute decision making for crew nationality pattern selection in the shipping business: An empirical study for Turkish shipping case. <i>Asian Journal of Shipping & Logistics</i>, Vol. 26 (1), pp. 139-152. 4. Duru, O., Bulut, E. and Yoshida, S. (2012). Regime switching AHP model for choice-varying priorities problem and expert consistency prioritization: A cubic fuzzy-priority matrix design. <i>Expert Systems with Applications</i>, Vol. 39 (5), pp. 4954-4964. また、口頭発表論文が以下の2編の他に13編があり、すべて国際学会での報告である。 1. Bulut, E., Duru, O. and Yoshida, S. (2012). Market Entry, Asset Returns, and Irrational Exuberance: Asset Management Anomalies in Dry Cargo Shipping. IAME-2012, September 6-8, Taipei, Taiwan. 2. Bulut, E. and Yoshida, S. (2012). Are Marine Accident really accident? Fallacy of Random Marine Accidents in Dry Cargo Fleet. WCTRs, May 21-22, Antwerpen, Belgium.	