

# Fixed Versus Floating Interest Rates in Shipping Finance: A Behavioral Finance Perspective

† Wu-Seok Kim

† *Alumnus, Graduate School of National Korea Maritime and Ocean University, Korea*

**Abstract** : This study analyzed the decision-making process in ship finance for the choice between fixed and floating interest rates using behavioral finance theories. Results confirmed that causes and background of decision-making processes could be explicitly explained by the framework of behavioral finance theories. This study also determined whether decisions were irrational. A case-study research was applied as the methodology. Decision-making data on ship finance collected through narrative and questionnaire responses were analyzed and evaluated using behavioral finance theories. Theories of behavioral finance used in the analysis and research of this study included availability heuristic, anchoring effect, and opportunity cost theory. Narrative and survey responses were clearly explained by theories of behavioral finance. It was found that a shipping company suffered additional losses owing to decisions that included behavioral finance errors. Behavioral finance theories largely influenced the decision-making process of choosing between a fixed interest rate and a floating interest rate. Shipping finance decisions related to interest rate selections could be clearly explained by behavioral finance theories. Errors related to behavioral finance could result in irrational decisions. Thus, managers who are responsible for shipping finance should remain vigilant toward any behavioral finance errors when making shipping finance decisions.

**Key words** : Behavioral finance, shipping finance, availability heuristic, anchoring effect, opportunity cost theory

## 1. Introduction

Behavioral economics and behavioral finance are study concepts that have recently drawn attention. In 2002, 2013, and 2017, behavioral economists won the Nobel Prize in Economics, and the book “Nudge” published by economist Thaler and jurist Sunstein of the University of Chicago has received international popularity. Recently, news and reports that analyze and present each country’s situation and their response to COVID-19 in terms of behavioral economics are easily accessible on the media and the Internet. As indicated by these phenomena, several experts and scholars are studying behavioral economics and behavioral finance, and people are becoming aware of these fields.

Traditional economics suggests that humans are rational beings that act for their own benefits without being swayed by emotions. Because humans are considered rational decision makers, traditional economics blames the market and the government’s functioning, or the failure of the system for various economic problems or inefficiencies. It argues that additional analysis and attention should be drawn to the functional and institutional aspects, and that it is on the market or the country to correct such problems (Baddeley, 2017; Wilkinson and Klaes, 2012; Camerer et al., 2004).

Behavioral economists, however, consistently claim that humans are not rational beings. In contrast to blaming the failure of the market or system, they contend the cause of any inefficiency of the economy within the irrationality of the economic units—the irrationality of the people (Baddeley, 2017; Chen et al., 2017; Barberis and Thaler, 2002).

The major distinction between behavioral economics and traditional economics is that it can explain the process of people’s decision-making. While traditional economics acknowledges humans as rational beings and focuses on analyzing the market or system, behavioral economics analyzes people’s decision-making in economics by applying aspects such as psychological theories. Behavioral economics and behavioral finance are suitable for explaining various decision-making situations because they are difficult to do in terms of traditional economics (Baddeley, 2017; Wilkinson and Klaes, 2012; Camerer et al., 2004).

The three-month London Interbank Offered Rate (LIBOR) data illustrated in [Figure 1] and [Table 1] indicate that it has significant volatility. In terms of shipping finance, which has a financially long-term character, it is reasonable for shipping companies to procure debt at fixed interest rates when the LIBOR is at its all-time low, as in

† Corresponding author, [wuseokkim@naver.com](mailto:wuseokkim@naver.com)

Note) This paper is a part of the author Wu-Seok Kim’s doctoral thesis, submitted at Korea Maritime and Ocean University in 2021

the ongoing circumstances. Risk implies future uncertainty about deviation from expected earnings or expected outcome. Volatility must be managed in order to reduce risk.

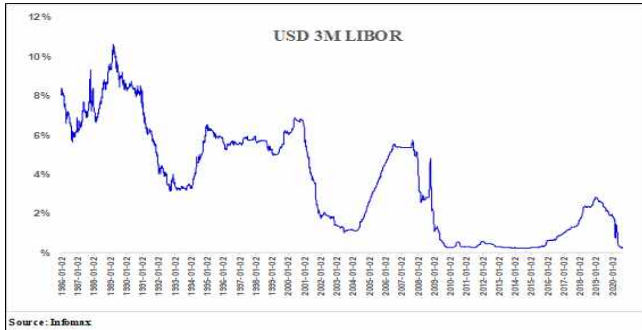


Fig. 1 USD 3M LIBOR historical chart (1986–2020)

Table 1 Volatility of historical USD 3M LIBOR

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Year High	9.31	9.63	10.6	8.75	7.69	4.44	3.50	6.50	6.50	5.69	5.94	5.81	6.22	6.87	6.37	2.05	1.39
Year Low	6.13	6.63	8.31	7.56	4.25	3.13	3.19	3.25	5.63	5.25	5.47	5.07	4.97	6.03	1.86	1.38	1.00
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Year High	2.56	4.54	5.52	5.73	4.82	1.42	0.54	0.58	0.58	0.31	0.26	0.61	1.00	1.69	2.82	2.80	1.90
Year Low	1.11	2.57	4.54	4.70	1.43	0.25	0.25	0.31	0.31	0.24	0.22	0.25	0.61	1.00	1.70	1.89	0.20

Therefore, a fixed interest rate should be selected in order to reduce interest rate volatility. Additionally, financing at a fixed interest rate can reduce agency costs (Wall and Pringle, 1989; Li and Mao, 2003), improve the company’s debt capacity (Graham and Rogers, 2002), and reduce the costs of financial distress (Smith and Stulz, 1985; Visvanathan, 1998). However, many shipping companies continue to demand a floating interest rate, even when interest rates are low. In particular, the P shipping company, which is in the process of procuring long-term financing for two new very large crude carriers (VLCC) with one of the Korean Public Ship Financiers (KPSF), opted for floating interest rates despite the KPSF strongly advocating for fixed interest rates. The decision was based on the assumption that the current low interest rate will continue over the next several years. Currently, many financial experts and media are concerned about inflation due to COVID-19 and are expecting interest rates to increase (Hosking, 2020; Davies, 2020; Mackenzie, 2020).

In the past, the US Federal Open Market Committee (FOMC) raised the federal funds rate from 9% to 20% in barely a year through strong currency control policies when the US economy suffered from inflation following the oil shock and the Vietnamese War (Cornell, 1983; Makin, 2011).

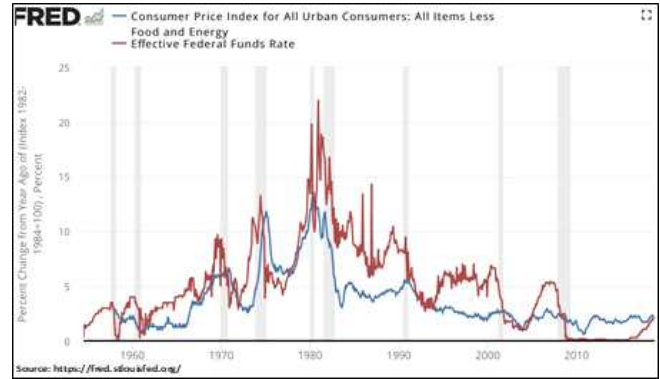


Fig. 2 Consumer price index vs. effective federal funds rate

Although the US is maintaining an extremely low interest rate due to the COVID-19 situation, it appears that the FOMC will significantly raise interest rates over a shorter period if a serious inflation problem occurs after the COVID-19 situation ends, because currency reform is challenging for USD, a key currency. If such a situation occurs, shipping companies that procured their ship financing at floating interest rates based on LIBOR are expected to suffer business management challenges due to an increase in interest costs. Hence, in such situations where the USD LIBOR is low and the risk of interest rate fluctuations exists in the financial market, such as the status quo, it is believed that domestic shipping companies will enjoy the best long-term benefits by choosing fixed interest rates.

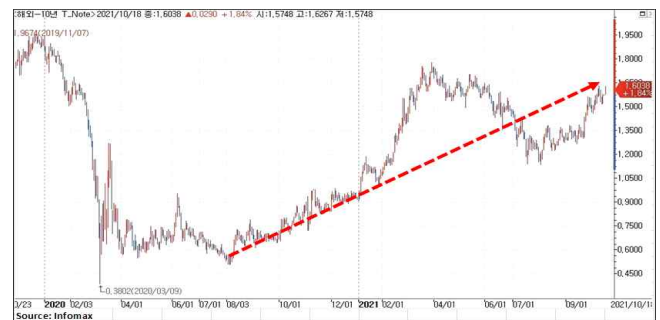


Fig. 3 10-Year US Treasury Yield

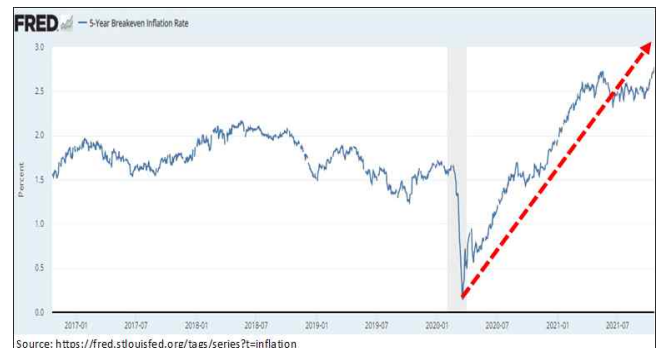


Fig. 4 US inflation rate

According to the above graphs, the yield on the 10-year U.S. Treasury has moved sharply upward and the US inflation rate is rising rapidly.

However, many shipping companies continue to prefer floating interest rates for ship financing to maximize current margins, even in the current situation with low interest rates. This phenomenon is difficult to explain with standard financial models, which assume that people always make wise decisions for more long-term benefits.

While most economists presuppose that economic problems arise not because individuals make mistakes, but because of the failure of the market and system, it is worth examining whether the problem with the above decision is in the irrationality of some shipping companies' finance managers.

Based on this pattern, this study seeks to analyze through qualitative case study methods why some shipping companies' decision makers arrived at financial decisions other than those recommended by the shipping finance institutions. Through this, an analysis of how human characteristics and psychological factors influence shipping finance decision-making from the perspective of behavioral finance is attempted. In addition, this study analyzes the results of the ship financing execution and examines whether the ship financing decisions were rational or irrational.

Using the results, this study further investigates whether shipping finance decisions can be explained by theories of behavioral finance and conclude that the ship finance decisions were ultimately irrational decisions.

This study also observes and analyzes how behavioral finance theories can influence shipping companies in terms of decision-making processes concerning shipping finance and predicting interest rates. This paper will indicate the results of decision-making and provide suggestions to Korean shipping companies to reduce their number of irrational decisions.

## 2. Literature review

Economics, like other social sciences, is a discipline that develops theories to better understand the world in which people live. Economic theories try to explain and describe economic phenomena adequately. Neoclassical economics has developed since the 19th century and is useful because it provides economists with theories that can explain economic activities based on demand and supply, the rationality of decision making, and the maximization of

utility. Neoclassical economics has made significant contributions to economic development. However, traditional economic theories do not explicitly describe or explain economic phenomena (Wilkinson and Klaes, 2012; Camerer et al., 2004).

Before 1980, economists ignored psychology and did not consider it while studying economics. Since the 1980s, behavioral economics based on psychology has been recognized in the field. Behavioral economics has clearly explained certain economic phenomena that traditional economic theories cannot (Wilkinson and Klaes, 2012; Camerer et al., 2004).

The financial market, stock market, and stock trading behavior are not easily explained by the traditional finance paradigm. A new approach has emerged to help understand the phenomena of financial markets that cannot be explained by the traditional paradigm of behavioral finance (Barberis and Thaler, 2002). Behavioral finance is a sub-discipline of behavioral economics and consists of the study of finance, with a few to how people behave in relation thereto (Forbes, 2009). Ritter(2003) asserts that behavioral finance is the study of how people think about finance and when financial markets are inefficient. In other words, behavioral finance is based on human psychology, sociology, and anthropology (Shiller, 1998).

Traditional finance has viewed human beings as rational decision makers, but behavioral finance sees people as beings who do not always make rational decisions (Chen et al., 2017).

Ship financing consists of financing activities that procure funds for newbuilding vessels or second-hand vessels. It includes bank loans, equity financing, bond issuing, and so on (Harwood, 1995). In ship financing, decisions that can be explicitly explained by behavioral finance theories are abundant. Among the behavioral finance theories, the availability heuristic, anchoring effect, and opportunity cost tend to be easily found in shipping finance.

### 2.1 Availability heuristic

In decision-making processes, people tend to make their decisions based on the examples derived from past experiences and weigh recent information in light of such related information. This phenomenon is termed as the availability heuristic. The availability heuristic has a direct influence on decision-making process (Tversky and Kahneman, 1973). Tversky and Kahneman (1974) suggest

that decision-making under uncertainty conditions is influenced by cognitive biases and the heuristics learned from past experiences.

Detmer et al. (1978) claim that the mortality rate estimates differ significantly among surgeons working in high mortality and low mortality fields because such estimates are based on their past experiences. Doctors tend to judge the seriousness of a patient's condition based on their experience of providing treatment under similar conditions. For instance, physicians may prescribe antibiotics based on their past experience of treating patients with similar health conditions; however, this might not be the appropriate in all such cases (Poses and Anthony, 1991). Further, Buckingham and Adams(2000) suggest that the availability heuristic has a strong impact on nurses' clinical decisions concerning their patients.

People tend to rely on their past experiences when predicting future conditions because of their dependence on the available information (Agans and Shaffer, 1994). Due to constraints such as limited time, information, and cognitive capacity, it is not easy to evaluate and find the optimal solution to all problems in the real world. Hence, people make decisions based on what they have learned and experienced in the past. For instance, players have to make quick decisions while playing a sport, considering the importance of speed and the availability of limited information. Thus, they must make instantaneous decisions based on their experience and judgment (Bennis and Pachur, 2006).

Sunstein(2006) finds that countries that have experienced the phenomenon of climate change are more concerned about it than those that have not experienced it. Haden et al. (2012) argue that farmers are more concerned about the critical events that they have experienced in relation to climate change, and therefore they are more likely to take precautionary measures. In this context, it is to be observed that the farmers in California are seriously concerned about water scarcity and have tried their hardest to address this issue. Mase et al. (2015) assert that the availability heuristic has a significant impact on the agricultural advisors recognizing the risks of climate change.

Chen et al. (2017) analyze that the Taiwanese stock market displays a "January effect" under the consideration of the availability heuristic. Taiwanese companies pay bonuses before the Chinese New Year with which the workers tend to buy stocks to increase their wealth. Thus, the stock market in Taiwan tends to rise in January.

It is estimated that the availability heuristic has had a significant impact on the decision-making related to shipping and ship finance. From 2004 to the first half of 2008, freight rates and the ship prices for dry bulk carriers continued to rise. As a result, domestic shipping companies predicted that high freight rates and ship prices would be maintained; therefore, many companies purchased secondhand ships at high prices and chartered many ships at high rates. It can be observed that the availability heuristic may have influenced their decision-making. This study analyzes how the availability heuristic affects decision-making in the context of ship finance.

## 2.2 Anchoring effect

The anchoring effect is the most prevalent and important phenomenon in the behavioral finance theory. It is a form of cognitive bias wherein people rely on the initial information provided during their decision-making process. Essentially, the anchoring effect refers to a psychological phenomenon wherein information and figures obtained or presented in advance are used as a basis for conscious or unconscious judgment.

Fiske and Taylor(1991) state that, when making decisions under uncertain conditions, individuals tend to find and adjust reference points and reduce ambiguities in order to make final decisions. The anchoring effect significantly impacts real life and economic activities (Northcraft and Neale, 1987; Mussweiler et al., 2000).

Tversky and Kahneman(1974) claim that individuals are more likely to make forecasts based on initial values, which directly impact their final estimation. They also assert that individuals tend to use heuristics or shortcuts to simplify their "judgmental operations" and that an initial piece of information can directly impact their subsequent decision-making. They perform an experiment on two groups of high school students. The median estimate of the descending order (2,250) is significantly different from that of the ascending order (512). In another experiment in the study, different groups are asked to estimate the proportion (expressed in percentage) of the African countries in the United Nations (UN). The groups that received a starting point of 10% and 65% estimated the answer to be 25% and 45%, respectively. The article highlights that different starting values yield different estimates. This is an example of the anchoring effect.

Northcraft and Neale(1987) analyze the anchoring effect by using the real estate price estimates. According to the

data, both amateurs and experts were influenced by the listed price anchors for the price estimates.

Anchoring effects have also been reported in the trend analyses of the Japanese and the US stock markets. Most of the US and Japanese institutional investors believe that the Japanese stock market is influenced by the changes in the US stock market. Specifically, they believe that the price changes in the US stock market play an anchoring role in the Japanese stock market (Shiller et al., 1996).

Studies have also found the anchoring effect in courtrooms. According to a study (Englich et al., 2005), prosecutors' demands directly impact the judge's decision and the defense attorney's behavior. In another article, Englich and Mussweiler(2001) claim that the prosecutor's initial demand directly impacts judges' decisions.

In a price negotiation, an initial offer price is considered crucial as it serves as the reference point throughout the negotiation. In general negotiations, the first offer plays a significant role as an anchor when the counterpart proposes its counteroffer. Essentially, the first offers directly influence the outcome of negotiations (Galinsky and Mussweiler, 2001; Galinsky et al., 2002; Galinsky et al., 2005).

In online auctions, bidders are influenced by the initial price information presented by the seller. According to the results of a survey, the lower the initial bid price, the greater is the participation of the auction participants in the bidding (Ariely and Simonson, 2003). Ku et al. (2006) also analyze the auction market and claim that anchors can increase the sunk costs and prevent people from assessing the true value.

Kahneman(2011) explains the anchoring effect in his book titled, *Thinking, Fast and Slow*. He analyzes the anchoring effect by examining the Exploratorium's fundraising efforts aimed at alleviating marine pollution caused by an oil spill. The analysis shows that when no anchor was presented, visitors donated an average of \$64 each. However, when the anchor was set at \$5, visitors donated an average of \$20 each, which reached an average of \$143 each when the anchoring amount was set at \$400.

Stock investors tend to concentrate on stock trading within a price range they set. Further, fund providers consistently buy shares at a lower than the specified price and sell them at a higher than the specified price (Verousis and Gwilym, 2014).

Concerning the initial public offering (IPO) pricing process, Chinese investors bid for the IPO offer prices

based on the underwriters' proposed prices because of the anchoring effect (Gao et al., 2018).

When pursuing an employment opportunity, prospective candidates estimate the appropriate salary for the position based on the salary level in the industry. People sell their houses either at the same price at which they purchased them or at the price at which their neighbors sold their houses. These anchors tend to be independent of the market forces of supply and demand. For example, when the economic situation worsens and house prices plummet, homeowners tend to cancel the sale of their homes because of the anchoring effect.

In summary, certain information, images, or figures are stored in the brain. Once imprinted, individuals find it difficult to make free judgments outside of it. This is referred to as the anchoring effect in behavioral finance.

This anchoring effect is frequently observed in the shipping industry's and ship finance decision-making processes. When selling a vessel, the seller and buyer tend to set the purchase and sale prices based on the purchase price of the other ships of the same type that have been recently signed. Additionally, when determining the interest rate on ship finance, shipping companies tend to refer to the interest rates on and conditions of ship finance procured by the other shipping companies. Ship finance institutions tend to consider the interest rates and conditions of internal procurement and other recently executed ship finance. This study analyzes the impact of the anchoring effect on the ship finance decision-making process.

### 2.3 Opportunity cost

In order to make a rational choice, costs must be accurately calculated. If they are underestimated, the derived benefits will be greater than the costs; however, a better alternative may not be taken into consideration due to its incorrect costing if the costs are overestimated. Therefore, it is necessary to calculate costs accurately. In this case, people study the concept of opportunity cost, which is the cost of making a choice.

Opportunity costs are a part of everyday life and an important factor in consumer behavior (Spiller, 2011). In the aspect of business, opportunity costs play an important role in the decision-making process. According to traditional economics, rational consumers precisely predict and judge the outcome of their choices and consider them in their decision-making process (Chatterjee et al., 2016).

The impact of opportunity costs on decision-making is a

major concern for behavioral economists. According to traditional economics, opportunity costs must be considered in the decision-making process to maximize future profits. However, decision-makers are more likely to ignore or underestimate opportunity costs (Hoskin, 1983). In this context, Thaler (1980) argues that opportunity costs tend to be underestimated in consumer choices.

Larrick et al. (1993) suggest that people who consider opportunity costs when making decisions are more likely to experience successful and desirable outcomes in life. They also argue that intelligent individuals use opportunity costs to increase their productivity and profitability.

By conducting an experiment on the purchase of iPods, Frederick et al. (2009) demonstrate that opportunity costs are neglected because of cost savings. Opportunity costs have a significant impact on purchase preferences. However, they tend to be perceived as additional costs because consumers are generally price sensitive. Hence, opportunity costs prevent consumers from buying an alternative with a better quality and at a higher price (Frederick et al., 2009).

Plantinga et al. (2018) claim that opportunity costs reduce consumers' willingness to purchase, regardless of their income level; therefore, they are not willing to consider opportunity costs while making a purchase decision. Further, if people with a lower income level neglect opportunity costs, their situations tend to worsen.

Opportunity costs are only considered in the decision-making processes in which consumers directly and clearly understand both their available choices (Frederick et al., 2009). Neumann and Friedman(1978) assert that under the availability of partial information, opportunity costs tend to be ignored or devalued. In the case of probability judgements, if the evaluation results are not clear or explicit, they are ignored or underestimated (Tversky and Koehler, 1994).

For instance, individuals tend to participate in an auction if the bidding price is low because the opportunity cost is perceived to be lower than the actual purchase cost (Phillips et al., 1991).

Studies in the field of economics suggest that consumers should consider opportunity costs in their decision-making processes; however, studies related to psychology show that consumers tend to ignore opportunity costs, since they are highly sensitive to the value of opportunity costs. If the value of an opportunity cost is low, consumers generally do not consider it (Spiller, 2011).

Consumers do not typically consider opportunity costs while making a decision. However, if the benefit of an opportunity cost is certain, then it is taken into account. When people analyze the opportunity costs associated with money, they tend to adopt them from the perspective of possessions and evaluate their value accordingly (Chatterjee et al., 2016).

Greenberg and Spiller(2016) argue that "the salience of opportunity costs changes the choices that people make." Read et al. (2017) also assert that people are more likely to prefer smaller and immediate rewards because they are impatient and reluctant to pursue future opportunity costs.

Opportunity costs are frequently considered in the decision-making processes related to shipping and ship finance. Although grab, crane, and shallow draft structures incur additional costs in the case of dry bulk carriers, they can generate additional profits. In this study, we analyze how opportunity costs affect decision-making with regard to ship finance.

### 3. Empirical Framework and Hypothesis

This study analyzes ship finance decision-making using behavioral finance theories. Since the decision makers of ship finance and management and the managers of shipping companies are human beings, this study should be conducted from their point of view. Therefore, the qualitative research method was suitable for the purpose of this study.

In addition, narrative inquiry or case study is an appropriate qualitative research method among others if the subject and object of the study relate to humans or human behavior (Creswell, 2013) and, if the research question is related to "how" or "why," the case study method is one of the most appropriate research methods that can be applied (Hedrick et al., 1993).

The case study is a qualitative research method that considers, analyzes, and reviews the subject of study extensively, and is a methodology suitable for describing, searching, or explaining phenomena occurring in real life. In addition, case studies are one of the most suitable research methods to improve the understanding of complex situations, behaviors, and cultural factors (Stake, 1995; Yin, 2014); and are universally used in the fields of social sciences and life sciences (Yin, 2009). In business administration, case studies are mainly used to analyze the external influences and impacts of the influences on a

company, to understand the company’s strategies, decision-making, and interests, or to ascertain and develop optimal business cases (Klonoski, 2013; Bell et al., 2019).

Therefore, this study uses a qualitative case study method and uses the narrative and questionnaire responses to analyze and explain why the person responsible for ship financing in shipping companies chose decisions divergent from the advice of managers in financial institutions and what the consequences were. In addition, this study examines whether ship finance decisions are explained by behavioral finance theories and infers whether decision-making is rational or irrational.

The narrative response and questionnaire surveys, which are important qualitative data of this study, correspond to a combination of interviews and documents among the data collection methods of qualitative research. There are three types of interviews: in-depth interviews, focused interviews, and survey interviews. The survey data collection method is mainly used for quantitative research; however, it is also used as a data collection method for qualitative case studies and is used as evidence for analysis results (Creswell, 2013; Yin, 2009).

### 3.1 Narrative response

In the case of A Shipping Company, one respondent provided a narrative response. The participant who oversaw the shipping finance negotiations with the KPSF was the director of the shipping company. The questions were as follows:

*“While the shipping finance project was ongoing with KPSF in 2016, KPSF proposed securing a senior loan with a fixed interest rate. However, A Shipping Company adopted a floating rate with LIBOR for senior loans. Please explain the background of the decision to secure a senior loan with a LIBOR base at that time.”*

### 3.2 Questionnaire surveys

Questions and multiple-choice answers related to the questionnaire were prepared based on previous studies and the literature. These questions and answers were modified from questionnaires and statements used by behavioral finance scholars to prove their theories into questionnaires and multiple-choice answers applicable to analyzing ship finance decisions, and questions and answers were also prepared based on the actual negotiations of ship finance projects executed by KPSF for shipping companies in the past.

Table 2 Availability heuristic, anchoring effect, and opportunity cost - Q1, Q2, Q3, Q4

You want to secure 10-year ship financing. The currently available interest rate is a floating interest rate of 3% and (the below conditions). In this case, please select your preferred interest rate. It is assumed that the conditions such as fees and expenses other than interest rates are the same.		
	Conditions	Answer choice
Q 1.	a fixed interest rate of 4%	- a floating interest rate - a fixed interest rate
Q 2.	a fixed interest rate of 5%	- a floating interest rate - a fixed interest rate
Q 3.	(USD 3M a fixed interest rate of 4% LIBOR has been maintained between 1% and 3% over the past 10 years)	- a floating interest rate - a fixed interest rate
Q 4.	(USD 3M a fixed interest rate of 5% LIBOR has been maintained between 1% and 3% over the past 10 years)	- a floating interest rate - a fixed interest rate

Most of the survey participants are industry practitioners and experts who have directly or indirectly experienced and performed ship finance-related work over a long period as employees in the shipping and ship finance industry.

Table 3 Participants in survey responses

	Classification	Respondents	Ratio
<b>Organizations</b>	Shipping Companies	14	25.0%
	Financial Institutions	21	37.5%
	Shipbroking Companies	6	10.7%
	Other Shipping Related Organizations	8	14.3%
	Other Organizations	7	12.5%
<b>Work Experience</b>	less than 5 years	3	5.4%
	less than 10 years	6	10.7%
	less than 15 years	21	37.5%
	less than 20 years	14	25.0%
	less than 30 years	8	14.3%
	more than 30 years	4	7.1%
<b>Age</b>	over 30s	15	26.8%
	over 40s	31	55.4%
	over 50s	6	10.7%
	over 60s	4	7.1%

## 4. Floating vs. Fixed interest rate

### 4.1 Interest Rate Selection and Results–Narrative Response Analysis

A Shipping Company purchased one capesize bulk carrier to carry steaming coals from Indonesia to South Korea. A Shipping Company made a consecutive voyage charter contract (“CVC”) for 10 years starting in 2016 with Korea South East Power Co., Ltd. (“KOSEP”). The CVC freight rates signed between A Shipping and KEPCO are structured to receive a fixed freight rate for 10 years, excluding compensation for the increase in ship fuel oil

price. Since the contract is insufficient for net margin excluding costs from freight rates, if the 3 Month LIBOR rate rises sharply and the financial cost exceeds a certain level, A Shipping will suffer a loss from the ship. Therefore, in the case of purchasing a ship to be put into the execution of the CVC contract, it is a rational decision to finance the ship at a fixed rate to reduce the risk of additional interest loss due to fluctuations in interest rates. In addition, when A Shipping proceeded with ship financing in 2016, there was no need to choose a floating interest rate because the LIBOR rate was historically low as shown in [Figure 1] and [Table 1].

Beginning in the first half of 2016, A Shipping Company conducted shipping finance negotiations with the KPSF. At the time, the USD 3M LIBOR rate was showing almost the lowest rate in its history, at around 0.6%-0.7%, and a five-year IRS rate was around 1.2-1.3% (Bloomberg, 2020). The difference between a floating interest rate and a fixed interest rate was only around 0.6-0.7%.



Fig. 5 Interest rate trend of USD 3Month LIBOR (2006-2016)

In addition, at the time of the negotiations, financial market analysts predicted that the U.S. Federal Open Market Committee (“FOMC”) would raise interest rates for the foreseeable future, and they thought that it was wise to procure financing with fixed interest rates considering the figures shown in the past (Fleming, 2016; Yellen, 2016; Leininger, 2016). Financial market reports and forecasts are not always accurate. However, they are used as references for decision makings.



Fig. 6 Bloomberg FOMC interest rate forecast - 2016

As shown in the chart above, financial market specialists forecasted that the interest rates would rise (Leininger, 2016). Thus, KPSF strongly suggested to A Shipping Company that financial procurement should involve fixed interest rates.

Table 4 Basis of Judgment - KPSF

1. The CVC freight rates are structured to receive a fixed freight rate for 10 years.
2. The USD 3M LIBOR rate was showing the lowest rate in its history.
3. Financial market specialists were forecasting that the USD interest rates would rise.

Faulkender(2005) contends that profitable companies prefer to raise funds at a fixed interest rate. Smith and Stulz(1985), Visvanathan(1998), and Wall and Pringle(1989) identify that financing at a fixed interest rate reduces the costs of financial distress and increases the value of the company. Chava and Purnanandam(2007) emphasize that firms that do not have serious financial problems in terms of management prefer a fixed interest rate for financing. Wall and Pringle(1989) and Li and Mao(2003) state that agency costs can be reduced if financing is done at a fixed interest rate. In addition, financing at a fixed rate also improves a firm’s debt capacity (Graham and Rogers, 2002).

However, A Shipping Company made the senior loan agreement with a floating basis. It signed a five-year maturity senior loan with Standard Chartered Bank at L+250bps (Marinemoney, 2020). Narrative respondent A argues in the narrative response that the low LIBOR was expected to be sustained in the future, that the IRS cost was too high, and that, even if the interest rates did increase, they would not increase by much.

As shown in [Figure 5], the USD 3M LIBOR was approximately 0.2% to 0.6% from 2009 to the second half of 2016, which was the lowest in history. Bennis and Pachur(2006) contend that people make decisions based on what they have learned and experienced. Cho et al. (2017) also argue that visual and numerical anchors directly affect decision-making processes. The director of A Shipping Company was accustomed to low LIBOR rates.

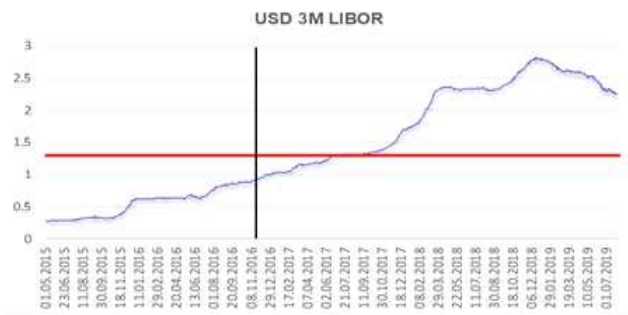
Fiske and Taylor(1991) assert that people tend to find reference points when making decisions. Hertwig et al. (2004) assert that people make decisions based on the information they have obtained from their experiences. In particular, people tend to make decisions under uncertain circumstances, based on their recent experiences. Stapel et al. (1995) also claim that people use past examples that are readily available for decision-making. A Shipping



Company’s case demonstrates the anchoring effect and availability heuristic described in the theory of behavioral finance, which led to a misleading prediction of future interest rates.

After arranging financing, KPSF continued to monitor the company. The analysis of the interest rate data shows that 3M LIBOR had risen at an enormous speed, just as KPSF predicted; starting in mid-2017, LIBOR exceeded 1.3%, which was the five-year IRS interest rate at the time of the negotiation. If A Shipping Company abided by KPSF’s suggestion to fix the interest rates of the senior loan, there would not have been any additional losses. A Shipping Company’s decision to take on a floating interest rate has clearly been proven to have been a wrong decision.

Since March 2020, LIBOR has plunged due to the COVID-19 epidemic; however, it is difficult to ascertain whether A Shipping Company’s selection of floating interest rates was rational, despite considering the fortunate collapse in interest rates caused by COVID-19, because additional losses were incurred, as presented in Table 5, due to the five-year full amortization terms.



Source: Bloomberg  
Fig. 7 USD 3M LIBOR vs. IRS rate (November 2016)

Table 5 Floating vs. fixed interest rates

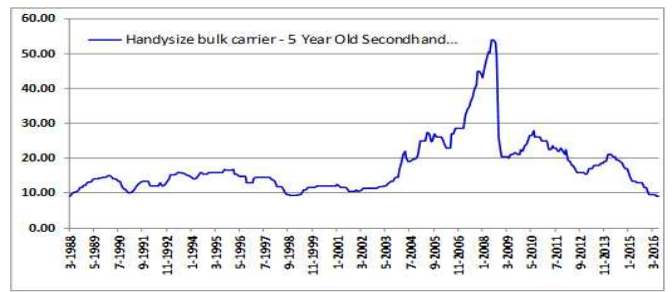
Payments	Principal	3M Libor	1.30%	Difference	Payments	Principal	3M Libor	1.30%	Difference
1st	10,000,000	0.95306%	-0.34694%	-8,674	10th	4,900,000	2.59663%	1.29663%	15,884
2nd	9,450,000	1.11956%	-0.18044%	-4,263	11th	4,300,000	2.43575%	1.13575%	12,209
3rd	8,900,000	1.22811%	-0.07189%	-1,600	12th	3,700,000	2.12725%	0.82725%	7,652
4th	8,350,000	1.31033%	0.01933%	216	13th	3,100,000	1.88725%	0.58725%	4,551
5th	7,800,000	1.54878%	0.24878%	4,851	14th	2,475,000	0.78413%	-0.51587%	-3,192
6th	7,225,000	2.07140%	0.77140%	13,933	15th	1,850,000	0.31838%	-0.98162%	-4,540
7th	6,650,000	2.32631%	1.02631%	17,062	16th	1,225,000	0.24913%	-1.05087%	-3,218
8th	6,075,000	2.33425%	1.03425%	15,708	17th	600,000	0.21950%	-1.08050%	-1,621
9th	5,500,000	2.77584%	1.47584%	20,294					
								Sum	85,254

As a result of comparing the differences between the three-month LIBOR and the IRS interest rate, as expected, A Shipping Company chose a variable interest rate and incurred additional losses. At the time of negotiations for ship finance with A Shipping Company, the IRS rate was between 1.2% and 1.3%. A Shipping Company’s loan terms contained full amortization with a maturity of 4.25 years. Interest has been paid 17 times since 2016. Of these, there

were only seven cases where the three-month LIBOR was lower than the IRS rate. Of the seven interest payments, the three-month LIBOR was lower than the IRS rate only for the initial three interest payments, and the remaining four interest payments occurred following the three months that LIBOR fell rapidly due to COVID-19. The time value of interest payments is not considered in this paper. As shown in the graphs below, it is difficult to explain the time value of ship prices or charter rates related to ship finance. Considering the time value, the recent lowest level of secondhand prices or charter hires should have been higher than the previous one as time passed, but the historical figures did not reflect the time value.



Source: Clarksons  
Fig. 8 1-Year Time Charter rate - Handysize Bulk Carrier



Source: Clarksons  
Fig. 9 Secondhand Price - 5 Year old Handysize bulk Carrier

A Shipping Company signed a CVC contract with South East Power Co., Ltd. for 10 years at a fixed rate. The rise in the interest rate indicates that the shipping company’s operating margins have decreased, and an increase in the interest rate above a certain point would eventually result in dropping below the break-even point, leading to losses in the operating profit of the vessel. Thus, the shipping company should hedge its risks by procuring fixed interest rates. However, A Shipping Company considered that swapping costs an additional cost rather than a risk-hedging cost and focuses on maximizing its temporary profits.

Frederick et al. (2009) argue that opportunity costs are neglected because of cost savings. Plantinga et al. (2018) assert that if people neglect opportunity costs, their

situation tends to worsen. Zauberma n and Urminsky (2016) contend that people are more likely to give up larger future rewards to obtain smaller immediate rewards. Read et al. (2017) also claim that people are more likely to prefer smaller and sooner rewards because they are impatient and reluctant to accept future opportunity costs. Baddeley(2017) also emphasizes that people disproportionately prefer small rewards right now over larger rewards later.

According to the narrative response, A Shipping’s ship financing decision-makers have a fixed perception on LIBOR’s constantly low interest rates. Furthermore, A Shipping did not accept the hedging cost of the interest rate volatility risk, which was the opportunity cost of 0.7% that had occurred from the difference between the floating interest rate of 0.6% and the fixed interest rate of 1.3%, at the time of the ship financing decision. These types of decision-making processes can be readily explained through behavioral finance theories, such as through the anchoring effect, the availability heuristic and the opportunity cost theory.

Table 6 Analysis of the narrative response

Data	Behavioral finance theory	Results of analysis and basis of judgment
Narrative response	anchoring effect	“The LIBOR was around 0.6%, maintaining a low interest rate trend.”
	availability heuristic	“It is expected that the low interest rate trend will continue in the future.”
	opportunity cost	“Too much IRS cost for a fixed interest rate”

Following 2009, LIBOR maintained its lowest levels in history, and during the financial negotiations in 2016, financial experts predicted an increase in interest rates in the US (Fleming 2016; Yellen 2016; Leininger 2016). A Shipping Company should have been prepared to raise interest rates by raising funds through a fixed interest rate, because low interest rates had been prolonged. However, it was observed that, despite the recommendation of choosing a fixed interest rate by the ship financing manager in KPSF, A Shipping Company had chosen a floating interest rate over a fixed interest rate due to the influence of errors outlined in behavioral finance. Therefore, it is difficult to determine if the shipping company’s decision was rational. As the ship operating in the CVC (Consecutive Voyage Charter) had fixed freight earnings, A Shipping Company had to pay additional interest expenses during the financial period because of floating rate interest costs. During the negotiations for additional shipping finance with KPSF in 2018, the director of shipping finance in A Shipping

Company regretted their decision to take on a floating interest rate in 2016.

Conventional economics models based on rational decision-making are often impractical because they assume that people can always make wise decisions that will deliver larger future rewards rather than smaller immediate rewards (Baddeley, 2017). McClure et al. (2004) argue that the choice between small gains in the short term and large gains in the distant future is a conflict between emotion and cognition. They emphasize that if emotion wins, people choose the former, and if knowledge, cognition, or calculation wins, people choose the latter. Scholars studying behavioral finance endeavor to understand why many people do not make wise decisions and strive to find solutions such that people make rational decisions to obtain greater long-term benefits rather than small short-term gains.

#### 4.2 Interest rate selection and results–Survey response analysis

One of the major challenges to understanding while conducting a ship finance business was the phenomenon in which shipping companies preferred floating interest rates rather than fixed interest rates, even when interest rates were historically low.

In 2004, the three-month LIBOR was around 1%, and shipowners ordered several new building ships and borrowed from financial institutions. Most shipping companies financed shipping loans at floating interest rates at that time; however, the three-month LIBOR, which was around 1% in 2004, rose sharply until 2007, reaching almost 6%. In ship finance, medium- to long-term USD loans are common, and the interest paid on loans is generally linked to the three-month LIBOR. Therefore, if interest rates are expected to rise, managers and directors of shipping companies should carefully consider choosing a fixed interest rate, even if the current fixed interest rate is higher than the current floating interest rate.

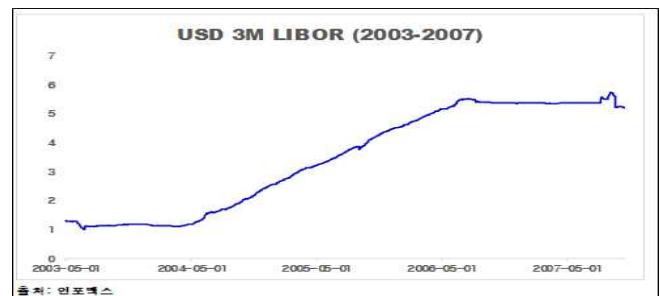


Fig. 10 Interest rate trend of USD 3M LIBOR (2003-2007)

However, shipping companies tend to choose floating interest rates to achieve immediate profit maximization. As the gap between the IRS rate and the LIBOR widens, shipping companies are more likely to avoid choosing fixed interest rates in ship financing decisions. Such a decision could have a direct negative impact on a ship's future capital expenditure. When dealing with ship financing, there are many ship-financing cases that result in huge additional interest expenditures because of floating interest rates.

Table 7 Analysis of the questionnaire responses

Data	Results of survey response analysis	Behavioral Finance Theory	The basis of judgment
Q 1	<ul style="list-style-type: none"> <li>- 69.6% of all respondents chose a <b>fixed</b> rate (39/56)</li> <li>- 90.5% of employees in financial institutions chose a <b>fixed</b> interest rate (19/21)</li> <li>- 64.3% of employees in shipping companies chose a <b>fixed</b> interest rate (9/14)</li> </ul>	opportunity cost (interest rate difference 1%)	The difference of 1% between the fixed interest rate and the floating interest rate is deemed to be an acceptable opportunity cost.
Q 2	<ul style="list-style-type: none"> <li>- 73.2% of all respondents chose a <b>floating</b> interest rate (41/56)</li> <li>- 71.4% of employees in financial institutions chose a <b>floating</b> interest rate (15/21)</li> <li>- 71.4% of employees in shipping companies chose a <b>floating</b> interest rate (10/14)</li> </ul>	opportunity cost (interest rate difference 2%)	The difference of 2% between the fixed interest rate and the floating interest rate is deemed to be an unacceptable opportunity cost.
Q 3	<ul style="list-style-type: none"> <li>- 50.0% of all respondents chose a <b>fixed</b> interest rate (28/56)</li> <li>- 57.1% of employees in financial institutions chose a <b>fixed</b> interest rate (12/21)</li> <li>- 57.1% of employees in shipping companies chose a <b>fixed</b> interest rate (8/14)</li> </ul>	opportunity cost (interest rate difference 1%) anchoring effect availability heuristic	The selection ratio of the fixed interest rate decreased because past interest rate (1-3%) information was provided
Q 4	<ul style="list-style-type: none"> <li>- 82.1% of all respondents chose a <b>floating</b> interest rate (46/56)</li> <li>- 85.7% of employees in financial institutions chose a <b>floating</b> interest rate (18/21)</li> <li>- 85.7% of employees in shipping companies chose a <b>floating</b> interest rate (12/14)</li> </ul>	opportunity cost (2%) anchoring effect availability heuristic	The absolute majority selected floating interest rates because information on past interest rates (1-3%) was provided.

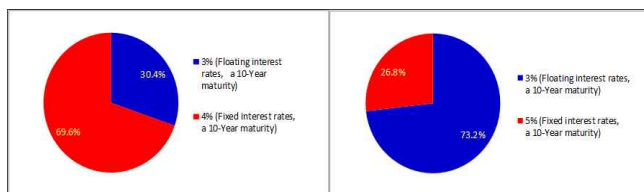


Fig. 11 Questionnaire 1 vs. Questionnaire 2

In question 1, 69.6% of the survey respondents chose a fixed interest rate for the case in which the floating interest rate was 3% and the fixed interest rate was 4% under 10-year ship financing conditions. This is presumably because the difference between the floating interest rate and fixed interest rate was negligible at 1%. The decision to choose a fixed interest rate to avoid the risk of interest rate fluctuations when securing 10-year ship financing can be considered a rational decision. According to traditional economic theories, people always consider opportunity costs

in decision-making because they make rational judgments.

Considering the survey responses of questionnaire number 2, 73.2% of survey participants chose a floating interest rate, which is significantly different from the survey responses of questionnaire number 1. In the 10-year long-term ship financing procurement, the opportunity cost of 2%, which was the difference between the floating interest rate of 3% and the fixed interest rate of 5%, was difficult to accept for the survey respondents. Mackey and Barney (2013) argue that when the opportunity cost is low, people consider it in decision making; however, when the opportunity cost is high, people do not consider it in decision making. Frederick et al. (2009) also assert that opportunity costs are neglected because of cost savings.

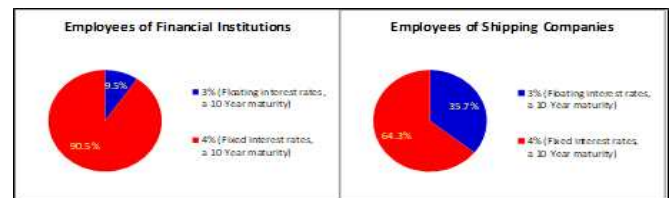


Fig. 12 Questionnaire 1 - Financial institutions vs. shipping companies

Incidentally, when comparing the results of interest rate selection between ship financial institution workers and shipping company workers among the responses to questionnaire number 1 of the survey, the proportion of those preferring fixed interest rates was higher among ship financial institution workers than among shipping company workers. Among the ship financial institution workers, 90.5% chose a fixed interest rate for the 10-year ship financing; however, only 64.3% of the respondents from the shipping company chose a fixed interest rate. It can be discerned that ship financial institution workers are more sensitive to the volatility risks of interest rates than workers from other organizations.

According to the statistical test results on the choice differences in questionnaire 1 of the survey between workers from financial institutions and shipping companies, the difference in the two proportions indicated a Z-score of 1.8976 and a p-value of 0.0294. In the case of a 5% significance level, the test results indicated a Z-score larger than  $Z_{0.05}=1.645$ , thus rejecting  $H_0$ , as well as a p-value of 0.0294 which is smaller than  $\alpha=0.05$ , thus eliminating the null hypothesis of  $H_0$ . Therefore, it can be determined that there are choice differences at a 5% significance level between the workers from the two groups based on the test results of the proportion differences concerning

questionnaire 1 in the survey.

Table 8 Statistical test of the difference between two institutions - Questionnaire 1

Q 1	A floating interest rate 3%	A fixed interest rate 4%
Financial institutions	2	19
Shipping companies	5	9
5% (Significance level)	two proportion Z-test	
Z-score	1.8976	Reject the null hypothesis(H <sub>0</sub> )
p-value	0.0294	Reject the null hypothesis(H <sub>0</sub> )
5% (Significance level)	Fisher's exact test	
p-value	0.0724	Accept the null hypothesis(H <sub>0</sub> )

However, according to Fisher's exact test, the p-value was 0.0709, which is higher than  $\alpha=0.05$ ; therefore, the null hypothesis cannot be rejected. Nevertheless, Fisher's exact test with a 10% significance level confirms that there are differences in the decision-making between the workers of the two groups.

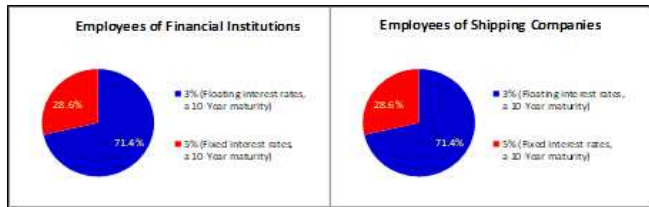


Fig. 13 Questionnaire 2 - Financial institutions vs. shipping companies

In response to Question 2, there was no difference in the ratio of choices between fixed and floating interest rates among institutional workers. In both institutions, 71.4% of the workers chose floating interest rates. The 2% difference between the floating interest rate and fixed interest rate was not easily adopted as an opportunity cost. In addition, in the interest rate difference of 2%, it could be recognized that there was no difference in the judgment of interest rate selection between employees of financial institutions and those of shipping companies.

If the manager responsible for ship finance proceeds with 10-year ship financing, the interest rate should be carefully selected. Interest rate volatility is an especially important and risky factor in shipping companies' management; therefore, it is necessary to minimize the risk of interest rate volatility by choosing a fixed interest rate when interest rates are low. However, managers responsible for ship finance tend to ignore the opportunity cost of fixed interest rates when securing ship finance.

Plantinga et al. (2018) argue that if people ignore the opportunity cost in decision making, their situation tends to

worsen. Zauberman and Urminsky (2016) claim that people tend to forgo larger future rewards to obtain smaller immediate rewards. These phenomena are inconsistent with the consideration of opportunity costs in decision-making prevalent in traditional economics.

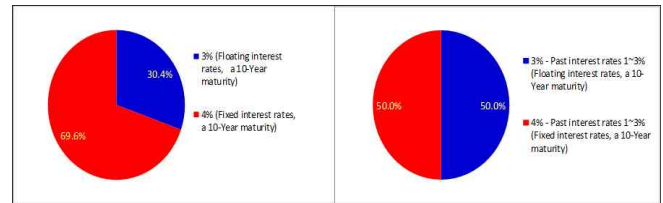


Fig. 14 Questionnaire 1 vs. Questionnaire 3(Historical data provided)

An additional finding in the questionnaire surveys regarding the choice between floating and fixed interest rates was that past experiences had a direct impact on decision making. The proportion of the survey participants who chose a fixed interest rate in questionnaire number 3 provided with historical data that the interest rates were maintained between 1% and 3%, was 50%, which was different from the 69.6% of respondents who chose the fixed interest rate in questionnaire 1.

Table 9 Statistical test of the difference between questionnaire answers 1 and 3

Q. 1 vs. Q. 3	3% (a floating interest rate)	4% (a fixed interest rate)
Q. 1	17	39
Q. 3	28	28
5% (Significance level)	Two proportion Z-test	
Z-score	2.1201	Reject the null hypothesis(H <sub>0</sub> )
p-value	0.0174	Reject the null hypothesis(H <sub>0</sub> )
5% (Significance level)	Fisher's exact test	
p-value	0.0257	Reject the null hypothesis(H <sub>0</sub> )

According to the test results on the choice differences between the test respondents of questionnaires 1 and 3 in the survey, the difference between the two proportions indicated a Z-score of 2.1201 and a p-value of 0.0174. At a 5% significance level, the test results demonstrated a Z-score larger than  $Z_{0.05}=1.645$ , rejecting  $H_0$ , as well as a p-value of 0.0174 which is smaller than  $\alpha=0.05$ , eliminating the null hypothesis of  $H_0$ . Additionally, according to Fisher's exact test, the results indicated a p-value of 0.0257 which is smaller than  $\alpha=0.05$ , thus rejecting the null hypothesis of  $H_0$ . Therefore, with the results of both the two-proportion Z-test at a 5% significance level and the Fisher's exact test, it is possible to conclude that there are choice differences among the survey respondents concerning questionnaires 1 and 3 in the survey.

As soon as information on past interest rates was provided, there was a change in the survey respondents' choices. Thus, many respondents changed their decisions from a fixed interest rate to a floating interest rate. Through the above survey responses analysis, it is evident that the availability heuristic and anchoring effect influenced the decision making of the survey respondents. The fact that low interest rates have continued in the financial market implies that there is a risk that interest rates will rise sharply in the future.

Recently, the USD three-month LIBOR, which had been maintained at a low interest rate for several years, rose sharply and remained above 2% until the outbreak of COVID-19. Analyzing the historical data in [Figure 1] and [Table 1], the case where the interest rate rises sharply after the low interest rate persists is dominant. If the USD three-month LIBOR rate is low, ship finance decision-makers should consider risk hedging against interest rate fluctuations.

However, respondents in questionnaire 3 chose a floating interest rate rather than a fixed interest rate. Respondents appear to have made a biased judgment that future interest rates will shift between 1% and 3%, similar to past interest rates. This indicates that the anchoring effect and availability heuristic specified in the behavioral finance theory influenced the decision-making of the survey respondents.

Bennis and Pachur(2006) argue that people make decisions based on what they have experienced and learned in the past. Cho et al. (2017) argue that visual and numerical reference points directly influence the decision-making process. Wright and Anderson (1989) emphasize that the anchoring effect plays a dominant role in people's decision making.

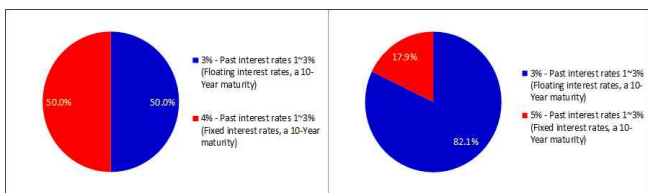


Fig. 15 Questionnaire 3 vs. Questionnaire 4 – Historical data provided

In questionnaire 4, 82.1% of those who chose a floating interest rate were different from the result of 73.2% of those who chose a floating interest rate in questionnaire 2. Past interest rates were provided as a reference point; thus, more survey respondents chose floating interest rates. In questionnaires 3 and 4, the reference point “The 3-month

LIBOR rate over the past 10 years has been continuously maintained between 1% and 3%” was provided. Because of this, respondents' decision-making has contrastingly changed from the responses to questionnaires 1 and 2.

Contrary to questionnaire 1, there was no difference in the selection ratio between the two institutions for the choice between fixed and floating interest rates in questionnaire 3.

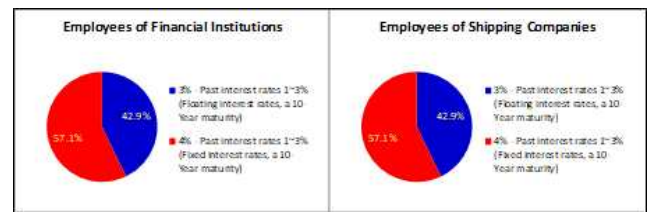


Fig. 16 Questionnaire 3 (Historical data provided)

- Financial institutions vs. shipping companies

As information on the level of interest rates over the past 10 years was provided, there was a change in the survey respondents' decision to choose between a fixed interest rate and a floating interest rate. However, in contrast to the ratio of the total respondents to the fixed interest rate selection, it was confirmed that the workers of financial institutions and shipping companies preferred a fixed interest rate.

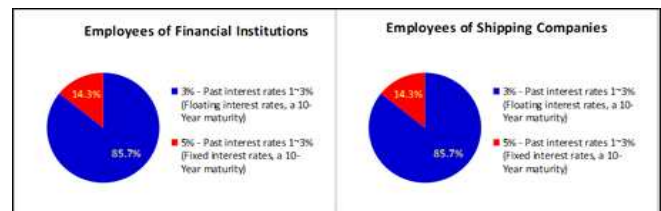


Fig. 17 Questionnaire 4 (Historical data provided)

- Financial institutions vs. shipping companies

The comparison of the ratio of interest rate selection between the two institutions in questionnaire 4, in which historical interest rates were provided, resulted in no difference, which was similar to the result of questionnaire 2, where most workers in both institutions chose floating interest rates. However, the ratio of choosing a floating interest rate increased after the historical interest rate information was provided.

Whyte and Sebenius(1997) argue that people's decision-making under uncertainty is influenced by the reference point. Hertwig et al. (2004) emphasize that people make decisions based on the information they have gained from past experiences. Through the analysis of the response results of the survey participants, it can be concluded that the anchoring effect, opportunity cost, and availability heuristic of behavioral finance theories directly

influence the decision-making related to the procurement of ship finance.

## 5. Conclusion

If a low interest rate situation persists for a prolonged period, decision makers and managers of ship finance in shipping companies tend to be anchored at a low interest rate level. Thus, there are many cases in which shipping companies adopt the floating interest rate when they procure a shipping loan, even if managers of financial institutions recommend a fixed interest rate for shipping finance. In addition, there is a tendency to be unable to accept the IRS rate, which is the hedging cost and the opportunity cost to prepare for the risk of rising interest rates. Thus, there are many cases in which additional losses are incurred owing to rising interest rates. Narrative and survey responses related to this study indicate that the anchoring effect, availability heuristic, and opportunity cost theory in behavioral finance largely influence the decision-making process of choosing between a fixed interest rate and a floating interest rate.

The USD three-month LIBOR has been maintained at the lowest rate ever in history because of the COVID-19 pandemic. Moreover, the IRS was maintained at a low rate by 2020. Therefore, if medium- and long-term ship financing is required at this point, fixed interest rates must be actively considered for shipping loans. In particular, in the case of ship financing for ships operating in a long-term contract of affreightment (COA) or Consecutive Voyage Charter (CVC), it is a rational decision to fix the interest rate to reduce the risk of operating loss.

Managers and directors responsible for shipping companies' ship finance often tend to develop plans to enter IRS contracts when they detect an atmosphere of rising interest rates after financing ships at floating interest rates. However, as shown in [Figure 1] and [Table 1], the interest rate rises sharply and the IRS rate reflects the upward prediction value when the rising trend of the interest rate is detected, increasing the opportunity cost.

Banks prefer to lend to companies at floating interest rates to avoid the risk of interest rate volatility (Chang, Rhee, and Wong 1995). However, shipping companies should actively consider financing with fixed interest rates when procuring shipping loans to reduce the interest rate volatility risk, agency costs, and costs of financial distress, and to improve debt capacity.

In conclusion, we have demonstrated a way to minimize irrational decision-making in the process of choosing between fixed and floating interest rates by thoroughly reviewing financial market reports and interest rate forecast reports, and by paying attention to various opinions from internal and external experts.

## References

- [1] Agans, R. P. and Shaffer, L. S.(1994), "The Hindsight Bias: The Role of the Availability Heuristic and Perceived Risk.", *Basic and Applied Social Psychology* 15 (4): 439-449.
- [2] Ariely, D. and Simonson, I.(2003), "Buying, Bidding, Playing, or Competing? Value Assessment and Decision Dynamics in Online Auctions.", *Journal of Consumer Psychology* 13 (1&2): 113-123.
- [3] Baddeley, M.(2017), *Behavioural Economics: A Very Short Introduction*, 1st ed. Oxford University Press.
- [4] Barberis, N. and Thaler, R.(2002), *A Survey of Behavioural Finance*, National Bureau of Economic Research.
- [5] Bell, E., Bryman, A. and Harley, B.(2019), *Business Research Methods*, 5th ed. New York: Oxford University Press.
- [6] Bennis, W. M. and Pachur, T.(2006), "Fast and Frugal Heuristics in Sports.", *Psychology of Sport and Exercise* 7: 611-629.
- [7] Bloomberg(2020), "USD 3M LIBOR.", Bloomberg Terminal.
- [8] Buckingham, C. D. and Adams, A.(2000), "Classifying Clinical Decision Making: Interpreting Nursing Intuition, Heuristics and Medical Diagnosis.", *Journal of Advanced Nursing* 32 (4): 990-998.
- [9] Camerer, C. F., Loewenstein, G. and Rabin, M.(2004), *Advances in Behavioral Economics*, New Jersey: Princeton University Press.
- [10] Chang, E. C., Rhee, M. W. and Wong, K. P.(1995), "A Note on the Spread Between the Rates of Fixed and Variable Rate Loans.", *Journal of Banking and Finance*: 1479-1487.
- [11] Chang, T. P. and Chou, R. Y.(2018), "Anchoring Effect on Macroeconomic Forecasts: A Heterogeneity Approach.", *Romanian Journal of Economic Forecasting* XXI (4).
- [12] Chatterjee, S., Rai, D. and Heath, T. B.(2016), "Tradeoff Between Time and Money: The Asymmetric

- Consideration of Opportunity Costs.”, *Journal of Business Research* 69: 2560–2566.
- [13] Chava, S. and Purnanandam, A.(2007), “Determinants of the Floating-to-Fixed Rate Debt Structure of Firms.”, *Journal of Financial Economics* 85(3): 755–786.
- [14] Chen, C. S., Cheng, J. C., Lin, F. C. and Peng, C.(2017), “The Role of House Money Effect and Availability Heuristic in Investor Behaviour.”, *Management Decision* 55 (8): 1598–1612.
- [15] Cho, I., Wesslen, R., Karduni, A., Santhanam, S., Shaikh, S. and Dou, S.(2017). “The Anchoring Effect in Decision-Making with Visual Analytics.”, In *IEEE Conference on Visual Analytics Science and Technology*: 116–126.
- [16] Cornell, B.(1983), “Money Supply Announcements and Interest Rates: Another View.”, *Journal of Business* 56 (1): 1–23. <https://doi.org/10.1086/296183>
- [17] Creswell, J. W.(2013), *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 3rd Edition. SAGE Publications Inc.
- [18] Davies, G.(2020), “As Covid Optimism Grows, Investors Seek to Hedge Against Inflation Risk”, *Financial Times*, December 14.
- [19] Detmer, D. E., Fryback, D. G. and Gassner, K.(1978), “Heuristics and Biases in Medical Decision-making.”, *Journal of Medical Education*: 53.
- [20] Dijk, M. V.(2017), “Estimating the Weight of Opportunity Costs in Housing Consumption.”, *Applied Economics* 49 (57): 5762–5770.
- [21] Englich, B. and Mussweiler, T.(2001), “Sentencing Under Uncertainty: Anchoring Effects in the Courtroom.”, *Journal of Applied Social Psychology* 31 (7): 1535–1551.
- [22] Englich, B., Mussweiler, T. and Strack, F.(2005), “The Last Word in Court – A Hidden Disadvantage for the Defense.”, *Law and Human Behavior* 29 (6): 705–722.
- [23] Faulkender, M.(2005), “Hedging or Market Timing? Selecting the Interest Rate Exposure of Corporate Debt.”, *Journal of Finance* 60 (2): 931–962.
- [24] Fiske, S. T. and Taylor, S. E.(1991), *Social Cognition*, New York: McGraw-Hill.
- [25] Fleming, S.(2016), “Federal Reserve Sets Stage for 2016 US Interest Rate Rise”, *Financial Times*, September 21. <https://www.ft.com/content/cb0f4316-8022-11e6-8e50-8ec15fb462f4>
- [26] Forbes, W.(2009), *Behavioural Finance*, West Sussex: John Wiley & Sons Ltd.
- [27] Frederick, S., Novemsky, N., Wang, J., Dhar, R. and Nowlis, S.(2009), “Opportunity Cost Neglect.”, *Journal of Consumer Research* 36 (4): 553–561.
- [28] Galinsky, A. D., Leonardelli, G. J., Okhuysen, G. A. and Mussweiler, T.(2005), “Regulatory Focus at the Bargaining Table: Promoting Distributive and Integrative Success.”, *Personality and Social Psychology Bulletin* 31 (8): 1087–1098.
- [29] Galinsky, A. D. and Mussweiler, T.(2001), “First Offers as Anchors: The Role of Perspective-Taking and Negotiator Focus.”, *Journal of Personality and Social Psychology* 81 (4): 657–669.
- [30] Galinsky, A. D., Mussweiler, T. and Medvec, V. H.(2002), “Disconnecting Outcomes and Evaluations: The Role of Negotiator Focus.”, *Journal of Personality and Social Psychology* 83 (5): 1131–1140.
- [31] Gao, S., Cao, F. and Fok, C. W.(2019), “The Anchoring Effect of Underwriter’s Proposed Price Ranges on Institutional Investors’ Bid Prices in IPO Auctions: Evidence from China.”, *International Review of Economics and Finance* 63: 111–127.
- [32] Graham, J. R. and Rogers, D. A.(2002), “Do Firms Hedge in Response to Tax Incentives?”, *The Journal of Finance* 57 (2).
- [33] Greenberg, A. E. and Spiller, S. A.(2016), “Opportunity Cost Neglect Attenuates the Effect of Choices on Preferences.”, *Psychological Science* 27 (1): 103–113.
- [34] Haden, V. R., Niles, M. T., Lubell, M., Perlman, J. and Jackson, L. E.(2012), “Global and Local Concerns: What Attitudes and Beliefs Motivate Farmers to Mitigate and Adapt to Climate Change?”, *PLoS ONE* 7 (12): e52882.
- [35] Harwood, S.(1995), *Shipping Finance*. 2nd ed. Euromoney Institutional Investor.
- [36] Hedrick, T. E., Bickman, L. and Rog, D. J.(1993), *Applied Research Design*, SAGE Publications Inc.
- [37] Hertwig, R., Barron, G., Weber, E. U. and Erev, I.(2004), “Decisions from Experience and the Effect of Rare Events in Risky Choice.”, *Psychological Science* 15 (8): 534–539.
- [38] Hoskin, R. E.(1983), “Opportunity Cost and Behavior.”, *Journal of Accounting Research*, 21(1): 78–95.
- [39] Hosking, P.(2020), “Inflation is Back on the Menu – And Not Only Because of Brexit.”, *The Times*, December 14. <https://www.thetimes.co.uk/article/inflation-is-back-on-the-menu-and-not-only-because-of-brexit-jrpkcvnsd>

- [40] Kahneman, D.(2011), *Thinking Fast and Slow*, New York: Farror, Straus and Giroux.
- [41] Kliger, D. and Kudryavtsev, A.(2010), “The Availability Heuristic and Investors’ Reaction to Company-Specific events.”, *The Journal of Behavioral Finance* 11 (1): 50-65.
- [42] Klonoski, R.(2013), “The Case for Case Studies: Deriving Theory from Evidence.”, *Journal of Business Case Studies* 9 (3): 261-266.
- [43] Ku, G., Galinsky, A. D. and Murnighan, J. K.(2006), “Starting Low But Ending High: A Reversal of the Anchoring Effect in Auctions.”, *Journal of Personality and Social Psychology* 90 (6): 975-986.
- [44] Kudryavtsev, A.(2018), “The Availability Heuristic and Reversals Following Large Stock Price Changes.”, *Journal of Behavioral Finance* 19 (2): 159-176.
- [45] Kwak, Y. S.(2016), “캠코선박, 국적선 5척 추가 매입.” *Maritime Press*, December 01. <http://www.maritimepress.co.kr/news/articleView.html?idxno=111257>
- [46] Larrick, R. P., Nisbett, R. E. and Morgan, J. N.(1993), “Who Uses the Cost-Benefit Rules of Choice? Implications for the Normative Status of Microeconomic Theory.”, *Organizational Behaviour and Human Decision Processes*, 56: 331-347.
- [47] Leininger, E.(2016), “‘Dot Plot’ shows Fed governors expect fewer rate hikes in 2016.”, *Bloomberg Professional Services*, April 4. <https://www.bloomberg.com/professional/blog/dot-plot-shows-fed-governors-expect-fewer-rate-hikes-in-2016/>
- [48] Li, H. and Mao, C. X.(2003), “Corporate Use of Interest Rate Swaps: Theory and Evidence.”, *Journal of Banking & Finance* 27 (8): 1511-1538.
- [49] Liao, L. C., Chou, R. Y. and Chiu, B.(2013), “Anchoring Effect on Foreign Institutional Investors’ Momentum Trading Behavior: Evidence from the Taiwan Stock Market.”, *North American Journal of Economics and Finance* 26: 72-91.
- [50] Mackenzie, M.(2020), “Inflation Debate Looms Large Over US Market Outlook.”, *Financial Times* December 12. <https://www.ft.com/content/ac477555-c39a-47c0-9cb2-f74da885b67f>
- [51] Mackey, T. B. and Barney, J. B.(2013), “Incorporating Opportunity Costs in Strategic Management Research: The Value of Diversification and Pay Out as Opportunities Forgone When Reinvesting in the Firm.”, *Strategic Organization* 11 (4): 347-363.
- [52] Makin, J.(2011), “American Hero.”, *International Economy* 25 (2): 24-24.
- [53] Marinemoney(2020), “Deal Database.”, Accessed September 20, 2020. <https://www.marinemoney.com/deals>
- [54] Mase, A. S., Cho, H. and Prokopy, L. S.(2015), “Enhancing the Social Amplification of Risk Framework (SARF) by Exploring Trust, the Availability Heuristic, and Agricultural Advisors’ Belief in Climate Change.”, *Journal of Environmental Psychology* 41: 166-176.
- [55] McClure, S. M., Laibson, D. I., Loewenstein, G. and Cohen, J. D.(2004), “Separate Neural Systems Value Immediate and Delayed Monetary Rewards.”, *Science* 306 (5695): 503-507.
- [56] Mussweiler, R. and Strack, F.(2000), “The Use of Category and Exemplar Knowledge in the Solution of Anchoring Tasks.”, *Journal of Personality and Social Psychology* 78 (6): 1038-1052.
- [57] Mussweiler, T., Strack, F. and Pfeiffer, T.(2000), “Overcoming the Inevitable Anchoring Effect: Considering the Opposite Compensates for Selective Accessibility.”, *Personality and Social Psychology Bulletin* 26 (9): 1142-1150.
- [58] Neumann, B. R. and Friedman, L. A.(1978), “Opportunity Costs: Further Evidence Through an Experimental Replication.”, *Journal of Accounting Research* 16 (2): 400-410.
- [59] Northcraft, G. B. and Neale, M. A.(1987), “Experts, Amateurs and Real Estate: An Anchoring-and-Adjustment Perspective on Property Pricing Decisions.”, *Organisational Behaviour and Human Decision Processes* 39: 84-97.
- [60] Phillips, O. R., Battalio, R. C. and Kogut, C. A.(1991), “Sunk and Opportunity Costs in Valuation and Bidding.”, *Southern Economic Journal* 58 (1): 112-128.
- [61] Plantinga, A., Krijnen, J. M. T., Zeelenberg, M. and Breugelmans, S. M.(2018), “Evidence for Opportunity Cost Neglect in the Poor.”, *Journal of Behavioral Decision Making* 31: 65-73.
- [62] Poses, R. M. and Anthony, M.(1991), “Availability, Wishful Thinking and Physicians’ Diagnostic Judgments for Patients with Suspected Bacteremia.”, *Medical Decision Making* 11(3): 159-168.
- [63] Read, D., Olivola, C. Y. and Hardisty, D. J.(2017), “The Value of Nothing: Asymmetric Attention to Opportunity Costs Drives Intertemporal Decision Making.”, *Management Science* 63 (12): 4277-4297.
- [64] Ritter, J. R.(2003), “Behavioral Finance.”, *Pacific-Basin Finance Journal* 11: 429-437.



- [65] Shiller, R. J.(1998), Human Behavior and the Efficiency of the Financial System, National Bureau of Economic Research.
- [66] Shiller, R. J., Konya, F. and Tsutsui, Y.(1996), "Why Did the Nikkei Crash? Expanding the Scope of Expectations Data Collection.", *The Review of Economics and Statistics* 78 (1): 156-164.
- [67] Sjoberg, L. and Engelberg, E.(2010), "Risk Perception and Movies: A Study of Availability as a Factor in Risk Perception.", *Risk Analysis* 30 (1): 95-106.
- [68] Smith, C. W. and Stulz, R.(1985), "The Determinants of Firms' Hedging Policies.", *Journal of Financial and Quantitative Analysis* 20 (4): 391-405.
- [69] Spiller, S. A.(2011), "Opportunity Cost Consideration.", *Journal of Consumer Research* 38 (4): 595-610.
- [70] Stake R.(1995), *The Art of Case Study Research*. Los Angeles, California: Sage.
- [71] Stapel, D. A., Reicher, S. D. and Spears, R.(1995), "Contextual Determinants of Strategic Choice: Some Moderators of the Availability Bias.", *European Journal of Social Psychology* 25: 141-158.
- [72] Sunstein, C. R.(2006), "The Availability Heuristic, Intuitive Cost-Benefit Analysis, and Climate Change.", *Climatic Change* 77: 195-210.
- [73] Thaler, R.(1980), "Toward a Positive Theory of Consumer Choice.", *Journal of Economic Behavior and Organization* 1: 39-60.
- [74] Tversky, A. and Kahneman, D.(1973), "Availability: A Heuristic for Judging Frequency and Probability.", *Cognitive Psychology* 5: 207-232.
- [75] Tversky, A. and Kahneman, D.(1974), "Judgement Under Uncertainty: Heuristics and Biases.", *Science* 185 (4): 1124-1131.
- [76] Tversky, A. and Koehler, D. J.(1994), "Support Theory: A Non-Extensional Representation of Subjective Probability.", *Psychological Review* 101 (4): 547-567.
- [77] Verousis, T. and Gwilym, O. A.(2014), "The Implications of a Price Anchoring Effect at the Upstairs Market of the London Stock Exchange.", *International Review of Financial Analysis* 32: 37-46. <https://doi.org/10.1016/j.irfa.2013.12.001>
- [78] Visvanathan, C.(1998), "Who Uses Interest Rate Swaps? A Cross-Sectional Analysis.", *Journal of Accounting, Auditing & Finance* 13 (3): 173-200.
- [79] Wall, L. D. and Pringle, J. J.(1989), "Alternative Explanations of Interest Rate Swaps: A Theoretical and Empirical Analysis.", *Financial Management* 18 (2): 59-73.
- [80] Whyte, G. and Sebenius, J. K.(1997), "The Effect of Multiple Anchors on Anchoring in Individual and Group Judgment.", *Organizational Behaviour and Human Decision Processes* 69 (1): 75-85.
- [81] Wilkinson, N. and Klaes, M.(2012), *An Introduction to Behavioral Economics*, London: Palgrave Macmillan.
- [82] Wright, W. F. and Anderson, U.(1989), "Effects of Situation Familiarity and Financial Incentives on Use of the Anchoring and Adjustment Heuristic for Probability Assessment.", *Organizational Behaviour and Human Decision Processes* 44: 68-82.
- [83] Yellen, J. L.(2016), Current Conditions and the Outlook for the U.S. Economy, Board of Governors of the Federal Reserve System, June 6. <https://www.federalreserve.gov/newsevents/speech/yellen20160606a.htm>
- [84] Yin, R. K.(2009), *Case Study Research: Design and Methods*, 4th ed. Thousand Oaks, CA: Sage.
- [85] Yin, R. K.(2014), *Case Study Research: Designs and Methods*, Los Angeles, California: Sage.
- [86] Zauberman, G. and Urminsky, O.(2016), "Consumer Intertemporal Preferences.", *Current Opinion in Psychology* 10: 136-141.

---

Received 24 May 2021

Revised 09 June 2021

Accepted 26 October 2021