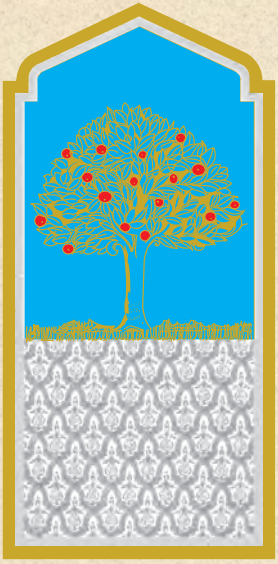

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# AN INVESTMENT APPRAISAL OF INTERNATIONAL MARITIME ASSETS FOR MALAYSIAN ISLAMIC FINANCIAL INSTITUTIONS – THE CASE FOR EQUITY FINANCE

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**Abstract**

*The purpose of this research is to investigate the overall investment performance of international maritime assets in order to facilitate Islamic equity finance and investment involving Malaysian Islamic finance institutions, retail and also institutional investors. Shipping is a strong growth industry with about 84% of global trade carried by the international shipping industry. The problem is that Malaysian Islamic financial institutions have essentially no exposure and thus understanding of international shipping. However, shipping is a highly capital intensive industry and currently 75% of ship lending has been conducted by European banks and financed on a conventional basis. This research involves an investment analysis of a full population of historical data over a period of 20 years to evaluate maritime performance by adopting IRR, net yield and standard deviation measures of risk and return. We also develop a correlation matrix for maritime assets and compare returns to other real and financial investments. Our findings reveal that whilst earnings are volatile in comparison to capital market financial products, unlevered, tax-free returns on maritime assets are very attractive. The significance is that Islamic equity finance, rather than debt at the time-value-of-money should enable the development of international shipping in Malaysia.*

**Key words:** Islamic finance, investment, international shipping

## 1.0 Introduction

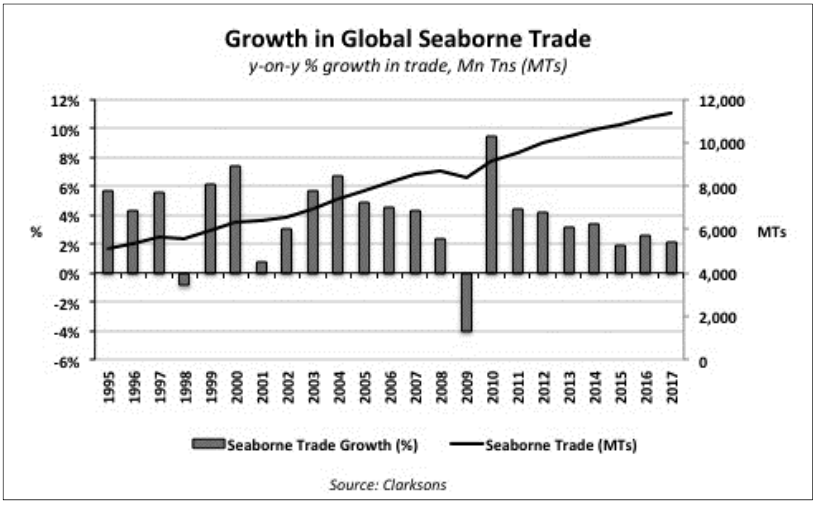
We should recall, that Islam arrived in South East Asia on the back of international shipping and Islamic finance in form of international trade and partnership financing, such that the Islamic *nusantara* (archipelago) economy flourished. However, Malaysian Islamic financial institutions (IFIs) and investors, currently, have essentially no exposure to international ship financing (Abdullah, 2016). In order to determine the willingness and ability to finance maritime assets, investors must understand the associated risks and rewards with regard to international shipping. We adopt an investment analysis of a full population of historical data over a period of 20 years to evaluate maritime performance by adopting IRR, net yield and standard deviation measures of risk and return. However, in order to facilitate an understanding of international shipping, we begin with an overview of the importance of global seaborne trade and identifying the primary shipping segments involving bulkers, tankers and containerships (section 2). In terms of the literature, we considered the underlying theories related to risk and returns for investments. We reviewed the pre-requisite of market risk for income to be considered lawful in Islam, as reflected in the Islamic normative theory of profit (section 3). We assessed inter-temporal choice for investments and the marginal efficiency of capital in evaluating returns (section 4). We then identify a suitable investment framework and methodology (section 5) for Islamic private equity investors to evaluate the investment performance of international shipping. We subsequently present our investment analysis (section 6) over 20 years in terms of unlevered IRRs and net unlevered income yields for the primary shipping segments, along with the evaluation of risks and returns including correlation matrices for selected classes of vessel. Finally, we provide some concluding remarks and recommendations (section 7).

## 2.0 Overview of Seaborne Trade

Essentially, growth fundamentals drive shipping investment returns. On average, since 2009 (post financial crisis) approximately 84.5% of global trade is carried by the international shipping industry (table 1), with 2016 maintaining a constant trend at 84%, representing

11,128 million tonnes (table 1, figure 1), although the forecast for growth in 2017 is expected to soften slightly to 2% year-on-year (figure 1)[1]. In any case, globalization could not succeed without the development of the maritime industry, transporting goods on the scale necessary for the modern world.

Figure 1: Global Seaborne Trade and Growth, 1995-2017



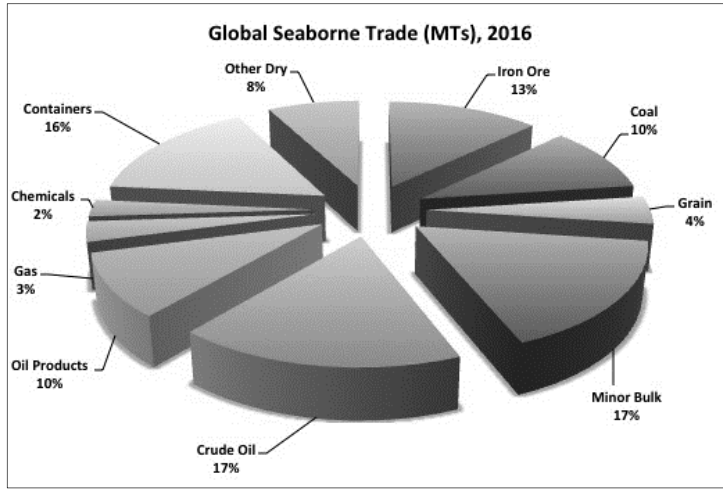

Energy, electricity and steel production underpin industrial development, hence the primary need for oil, coal and iron ore (figure 2)[2] within the composition and patterns of seaborne trade (figure 3)[3].

[1] Clarksons, *Shipping Intelligence Network* database, Clarksons Research Services, London, accessed August 21, 2016, https://sin.clarksons.net/

[2] Ibid.

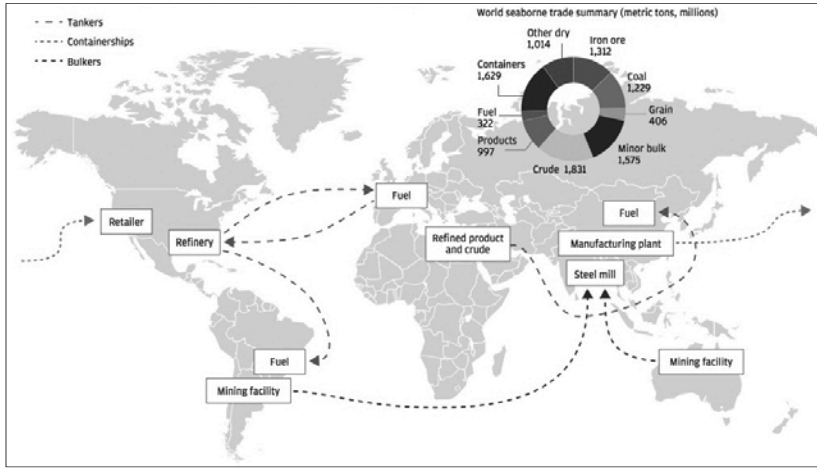
[3] J. P. Morgan Asset Management, "Maritime Investing: An Income Opportunity", *Insights and Research*, (March 6, 2015), accessed Jan. 31, 2017, https://am.jpmorgan.com/nl/institutional/library/maritime-investing

Figure 2: Composition of Global Seaborne Trade, 2016




*Source: Clarksons (2016)*

Figure 3: World Seaborne Trade




*Sources: J.P. Morgan (2015), Clarksons (2016)*

The global population already exceeded 7.0 billion in 2011 (table 1) and reached about 7.5 billion by 2016. Given that world seaborne trade grew to 11.1 Bn tones by then, international shipping is

carrying 1.5 tonnes on average for every person in the world today[4], a trend that has been steadily increasing over the years.

Table 1: Global Seaborne Trade and Analysis

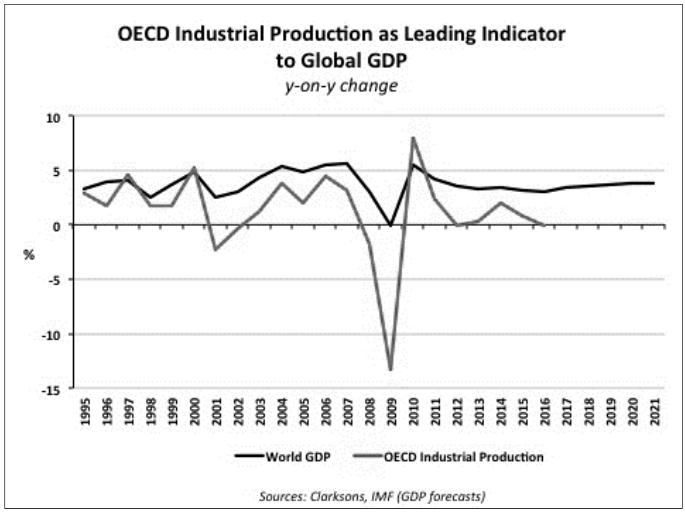
| ***Seaborne Trade per Capita*** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** |
|---|---|---|---|---|---|---|---|---|
| World Seaborne Trade (Mn Ts) | 8,355 | 9,148 | 9,554 | 9,946 | 10,286 | 10,637 | 10,841 | 11,128 |
| World Population (Mn people) | 6,846 | 6,930 | 7,013 | 7,098 | 7,182 | 7,266 | 7,349 | 7,428 |
| Trade, Tonnes per Capita | 1.22 | 1.32 | 1.36 | 1.40 | 1.43 | 1.46 | 1.48 | 1.50 |
| Bulk Trade Tonnes per Capita | 0.89 | 0.95 | 0.98 | 1.01 | 1.03 | 1.04 | 1.05 | 1.06 |
| Container Trade per Capita | 0.17 | 0.19 | 0.20 | 0.21 | 0.22 | 0.23 | 0.23 | 0.24 |
| ***Seaborne Trade Multipliers*** | | | | | | | | |
| World Seaborne Trade Growth | -4.00% | 9.48% | 4.45% | 4.09% | 3.43% | 3.39% | 1.93% | 2.65% |
| World GDP Growth | 0.00% | 5.40% | 4.20% | 3.50% | 3.30% | 3.40% | 3.10% | 3.10% |
| Seaborne Trade/ GDP Multiplier | - | 1.76 | 1.06 | 1.17 | 1.04 | 1.00 | 0.62 | 0.85 |
| Industrial Production Growth | -13.3% | 8.0% | 2.4% | -0.1% | 0.4% | 2.0% | 0.7% | 0.2% |
| Seaborne Trade/IP Multiplier | 0.30 | 1.18 | 1.85 | -40.92 | 8.57 | 1.70 | 2.75 | 13.24 |
| ***Trade (billion tonnes)*** | | | | | | | | |
| World Seaborne Trade | 8.36 | 9.15 | 9.55 | 9.95 | 10.29 | 10.64 | 10.84 | 11.13 |
| World Total Trade (all modes) | 9.56 | 10.82 | 11.54 | 11.83 | 12.19 | 12.58 | 12.88 | 13.18 |
| Seaborne Trade as % of Total | 87% | 85% | 83% | 84% | 84% | 85% | 84% | 84% |

*Source: Clarksons (2016)*

[4] Clarksons, *Shipping Intelligence Network*, (2016).

Typically OECD industrial production is a leading indicator to global GDP and the IMF forecasts a 3.4% growth for 2017 coupled with a firmer trend towards 2021 (figure 4)[5].

Figure 4: OECD Industrial Production as Leading Indicator to Global GDP

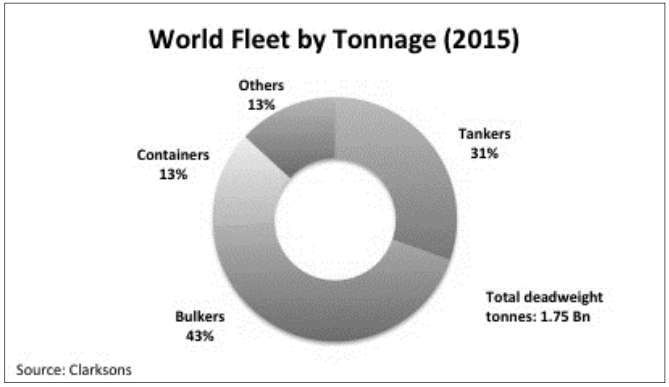



Thus international shipping carries goods for industrial production and finished products for the consumer in an increasingly urbanized world. In terms of economic outlook (market demand), shipping is a growth industry and reflected in the three primary shipping segments (market supply), as ratio of the overall size of the world fleet (1.75 Bn DWT), involving bulkers (43%), tankers (31%) and containerships (13%), totaling 87% (figure 5)[6].

[5] International Monetary Fund (IMF), *International Financial Statistics* (IFS) database, accessed on Jan. 31, 2017, http://www.imf.org/en/Data

[6] Clarksons, *Shipping Intelligence Network*, (2016).

Figure 5: World Fleet in Deadweight Tonnes (2015)




## 3.0 Islamic Normative Theory of Profit

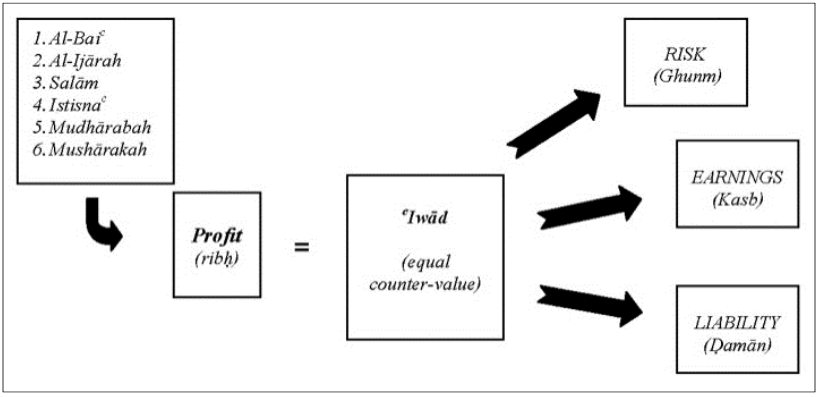
In terms of income earned from international shipping, market risk is a pre-requisite of lawful profit in Islam. In analyzing substance over form in determining a valid transaction in Islam[7], Ibn al-`Arabi (d.1148) said, "Every increase which is without an equal counter-value (*'iwad)* is *riba*", and the components of *'iwad* are; (1) risk (*ghunm*), (2) liability (*daman*), and (3) earnings (*kasb*)[8]. As reflected in figure 6, the necessary components of *'iwad* must be present for profit (*ribh*) to be lawful (*halal*), and if any of the components of *'iwad* are not present in a transaction then the income is unlawful (*haram*). In terms of risk (*ghunm*) it refers to market risk; earnings (*kasb*) implies to strive to earn or gain wealth, thus implying work and effort (*amal*); whereas, liability (*daman*) includes ownership (*milkiyyah*). The *Majallah* reaffirms this with a number of

[7] A. Abdullah, R. Hassan and S. Kassim, "Developing an Islamic Investment Framework for Maritime Assets", *The Social Sciences*, Vol.12, Iss.10, (2017).

[8] Ibn al-'Arabi, *Ahkam al-Quran*, (Cairo: `Isa al-Babi al-Halabi, 1957), Vol.1, 242; cited also by H. Ziaul, *Riba: The Moral Economy of Usury, Interest and Profit*, (Kuala Lumpur: S. Abdul Majeed & Co. for Ikraq, 1995), 10; S. A. Rosly, M. Sanusi and N. Mohd Yasin, "The Role of Khiyar Al-'Ayb in Al-Bay' Bithaman Ajil Financing", *International Journal of Islamic Financial Services*, Vol. 2, No.3, (1999), 1249; S. A. Rosly, "*Iwad* as a Requirement of Lawful Sale: A Critical Analysis", *IIUM Journal of Economics and Management*, Vol. 9, No. 2, (2001), 187-201; S. A. Rosly, *Critical Issues on Islamic Banking and Financial* Markets, (Bloomington, Indiana: Author House, 2005), 30.

important maxims: "reward begets risk" (*al-ghurm bi al-ghunm*)[9], "benefit begets liability" (*al-kharaj bi al-daman*)[10], and "burden is proportional to benefit, and benefit is proportional to burden"[11].

Figure 6: The Islamic Theory of Profit




*Source: Abdullah (2017)*

## 4.0 Inter-Temporal Choice for Investments and the Marginal Efficiency of Capital

In considering investment decisions for maritime assets, Fisher stated that, time preference (impatience) is a derivative of an individual's "marginal want for present and his marginal want for future income"[12]. An individual makes investment and savings decisions in a firm or as a consumer. With the consumer, an inter-temporal budget constraint indicates present and future income ($m_0$, $m_1$) and by making a decision on present and future consumption ($c_0$, $c_1$) also makes a present savings decision ($s_0 = m_0 - c_0$) yielding future savings $(m_o - c_0)(1+r)$, given a known market rate of interest ($r$). The

[9] *Majallah. The Mejelle: Being An English Translation of Majallah el-Ahkam-I-Adliya, And A Complete Code of Islamic Civil Law*, enacted in Imperial Turkey between 1869 and 1876, translated by C. R. Tyser, D. G. Demetriades and I. H. Effendi (1901), published (Petaling Jaya: The Other Press, 2001), no.87.
[10] Ibid., no. 85.
[11] Ibid., no. 88.
[12] I. Fisher, *The Theory of Interest*, (New York: Macmillan, 1930), 97.

absolute value of the budget constraint is $(1+r)$ corresponding to the increase in future consumption from present savings.

Preferences indicated by an inter-temporal utility function $u(c_o,c_1)$ are presented in the form of indifference curves. The absolute value of the slope of these indifference curves yields the individual's inter-temporal marginal rate of substitution (MRS), which measures the value of present consumption in terms of future consumption and reveals a decreasing marginal rate of substitution (MRS): as individuals increase present consumption, its value in terms of future consumption decreases. The MRS is the ratio of the marginal utility of present consumption to the marginal utility of future consumption and at optimal consumption (with the indifference curve tangent to the budget constraint line) the consumer's MRS equals one plus the interest rate (MRS = $1+r$). Therefore, at optimal consumption an individual values present and future consumption at its opportunity cost.

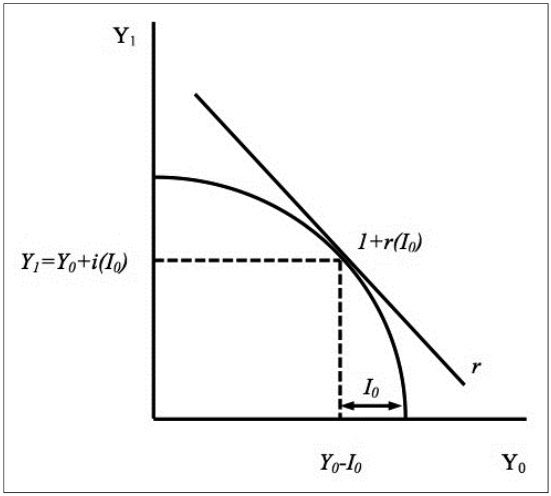
In terms of optimal savings and investment decisions, the objective for the individual is to maximize utility subject to a budget constraint. Fisher's separation between a firm and consumer reflects that all individuals, irrespective of their preference for present or future consumption, select the same investment plan, which maximizes the PV of total income and is equivalent to maximizing the NPV of the investment[13]. The Fisher model has been the foundation of corporate finance[14]: in terms of investment analysis we discount future net cash flows involving the TVM. For Fisher, the optimal decision for the firm's investment decision is where the marginal rate of return over cost equals the interest rate. We may realize that Fisher's rate of marginal return over cost is equivalent to Keynes' marginal efficiency of capital (MEC). Keynes defined the MEC, which is otherwise known as the internal rate of return (IRR), as "that rate of discount which would make the present value of the series of annuities given by the returns expected from the

[13] Ibid.; R. D. MacMinn, *The Fisher Model and Financial Markets*, (Singapore: World Scientific, 2005), 2-9.

[14] A. Abdullah, R. Hassan and S. Kassim, "Developing an Islamic Investment Framework for Maritime Assets", (2017).

capital-asset during its life just equal to its supply price"[15]. It is the rate of discount, that makes the discounted present value of an expected income stream equal to the cost of capital, such that, the MEC (IRR) makes the net present value (NPV) equal to zero. Fisher's investment frontier is concave (figure 7), which reflects the diminishing marginal returns to investment[16].

Figure 7: Fisher's Investment Frontier




*Sources: Fisher (1930), MacMinn (2005)*

The investment decision will be optimal where the investment frontier is tangent to the interest rate (capital market) line, which is given by the combination $Y_0$-$I_0$, $Y_0$+$i(I_0)$, where ***i*** is the yield on investment, ***r*** is the market interest rate, such that the condition $i(I_0) = r$ holds. An entrepreneur will continue to invest until the marginal return over cost equals the interest rate, which is the absolute value of capital market line = 1+$r$. Fisher thus laid the foundations for the Capital Asset Pricing Model (CAPM), where the value of as asset (a

[15] J. M. Keynes, *The General Theory of Employment, Interest and Money*. Originally published (1936), re-published for the Royal Economic Society, (Basingstoke: Palgrave Macmillan, 2007), 135

[16] I. Fisher, *The Theory of Interest*, (1930); R. D. MacMinn, *The Fisher Model and Financial Markets*, (2005).

vessel) is independent of its capital structure, "the market value of any firm is independent of its capital structure and…the average cost of capital, to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream of its class"[17]. Whether through the discount rate, or with the IRR, in reality the cost of capital equals the unlevered cost of equity, in the form of an annual compound rate, which can be benchmarked to other assets priced along the yield curve and hence serves as a investment framework for our analysis.

## 5.0 Methodology

The value of a vessel is determined from the vessel's ability to generate financial surpluses for capital providers and is a function of commercial and technical management. Financial surpluses include both income and capital appreciation. Accordingly, our research intends to adopt a financial analysis of a full population of historical data over a period of 20 years,

(i) to develop a discounted cash-flow (DCF) analysis involving an unlevered internal rate of return (IRR).
(ii) to financially appraise the international shipping market comprising bulkcarriers, tankers and containerships, involving a net income yield.
(iii) to evaluate risks and returns of maritime assets and compare them by shipping segment and to other real and financial assets.

Commercial management or operations are functions associated with the running of a vessel by a ship-operator and includes the commercial decisions associated with the sale and purchase and chartering of vessels, the responsibility for the employment of a vessel with cargoes (whether on the basis of time-charter or voyage charter), scheduling, stemming or the ordering of bunkers (fuel), managing arrangements for loading and discharging of vessels at ports with associated port activities and the lay-up of vessels[18].

[17] F. Modigliani and M. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", *American Economic Review*, 48, 3, (1958), 268-269.
[18] J. M. Downard, *Running Costs.* Published (1981), reprinted (Coulsdon: Fairplay,

Technical management or specifically ship-management refers to the functions not undertaken by the ship-operators and are associated with the responsibility for manning, supplying and insuring the vessel and ensuring that the vessel is available to the ship-operators for the maximum amount of time possible in terms of available trading days. The operating expenses or running costs involve the costs of managing the vessel and comprise all activities associated with ship-management[19]. It is not uncommon for the technical management to be sub-contracted to professional third-party ship-managers.

### *5.1 The determination of free cash flows*

The determination of free cash flows relates to assumptions relating to the leasing of vessels involving charter revenues, operating expenses (OPEX), the market value of the sale and purchase of new and second-hand vessels and the residual scrap value of vessels at the end of their economic life.

- **Charter revenues** involve actual time-charter rates or their voyage-charter equivalents involving spot (time-charter trips), short-period (2 to 4, or, 4 to 6 months), for long-period (1, 2, 3, 5 years duration) or contracts of affreightment (COAs), reported by shipbrokers or research companies. With access to on-line subscription databases (for example, from Clarksons Research[20]) it is possible to conduct a full population investigation of long-term historical average time-charter rates, newbuilding, second-hand and demolition price data of vessels, over a period of 20 years, in order to derive an analysis of market expectations as to the future development of income and prices. Additionally, analysis conducted regarding the current fleet in terms of volume and age profile; current and additional fleet capacity, in terms of the order book, would provide an indicator for the expected market supply of vessels. Furthermore, macro-economic and industrial data would provide analysis of the prevailing

1994), ix.
[19] Ibid., ix.
[20] Clarksons, *Shipping Intelligence Network*, (2016).

economic outlook and expected market demand, in terms of the derived demand of vessels. Ship-brokerage commissions earned on freight (1.25% up to 5%) and sale and purchase of vessels (1% to 2%) should be taken into account, although ship-management fees (3% - 5%) would typically be included in operating expenses or daily running costs (DRC). The utilization rate, involving the number of operating days a vessel is employed, must be considered with regard to normal years of ship-operation and when the vessel is dry-docked for the renewal of its classification (once every 5 years). The Hamburg Ship Evaluation Standard (HSES) recommends 358 days in normal years and 343 days in class renewal years[21], which averages 355 and is adopted in this research. With individual vessel evaluations, the utilization might be affected in the short term when taking into account the age of the vessel, classification surveys and class renewal, expected off-hire periods or lay-up if market conditions are poor.

- **Operating expenses** involve costs averaged over 365 days or daily running costs (DRC) and typically comprise crew wages and expenses, victualing, stores, spares, lubricants, maintenance, miscellaneous costs, ship-management fees, annual insurance premiums, dry-dock expenses, annual class/registration fees, and additionally, environmental costs should be taken in account. Any forecasting for capital budgeting purposes should also incorporate the effects of inflation. Operating expenses (daily running costs) are derived from published data by Moore Stephens[22].

- **Market value** reflects the market price of comparable vessels in completed arm's-length transactions between

[21] D. Mayr, "Valuing Vessels" in *HSBA (Hamburg School of Business Administration) Handbook on Ship Finance*. O. Schinas, et al (Eds), (Heidelberg: Springer, 2015), 151.

[22] Moore Stephens, vessel online operating costs database (*OpCost*), accessed on August 21, 2016, https://www.moorestephens.co.uk/ and https://www.opcostonline.com/#/

willing buyers and sellers concluded in the sale and purchase market, which would typically include brokerage commissions of 1% to 2%.

- **Residual value** or scrap value of a vessel refers to the scrap value expected at the end of the economic life of a vessel, which is typically 20-25 years[23]. The scrap value is a function of a vessel's light displacement (LDT) and the scrap price is expressed in USD per LDT. With individual transactions for demolition, brokerage commissions (of 1% to 2%) should be factored in.

### *5.2 The cost of capital*

The research intends to develop a discounted cash-flow (DCF) method of analysis involving the internal rate of return (IRR), to financially appraise the returns on the investment of a fleet of ships. Our precedent for the suitability of this approach is Sloggett (1984)[24] and also Mayr (2015)[25], except we adopt historical analysis as a guide to performance, as the DCF is indeed appropriate for maritime valuation and project financing. To value a vessel based on discounted cash flows (DCF), the expected future free cash flows must be discounted to a present value using an appropriate discount rate, which represents the required rate of return. The weighted average cost of capital (WACC) for maritime assets should represent the required rate of return on an alternative investment, which is equivalent to the investment in terms of timing, risk, currency and taxation cash-flows. Where vessels are denominated in USD, the discount rate should reflect U.S. capital market data. The valuation of maritime assets is based on free cash flows available for distribution to the capital providers, whether debt or equity. It is not necessary to take into account the benefit attributable to interest as a deductible expense for tax purposes, since the shipping industry is essentially tax-free. This is due to the fact that governments have either introduced tonnage tax regimes, as in the case of the U.K. for

[23] M. Stopford, *Maritime Economics*, 3e, (London: Routledge, 2009), 263.
[24] J. E. Slogget, *Shipping Finance*, (Coulsdon: Fairplay, 1984).
[25] D. Mayr, "Valuing Vessels", (2015).

example, or stipulate that income deemed earned from shipping companies is tax exempt, as in the case of Malaysia. A tonnage tax is not a tax, but rather a method for determining taxable income, and thus taxation is independent of earned profits: shipping companies are charged corporation tax on a fixed notional profit, calculated by reference to the net tonnage of its ships, instead of the actual profits earned from its shipping activities. The taxable income as calculated by this method is considerably lower than the actual profit. Tonnage tax regimes also allow flexibility for the operation of foreign flag vessels although this flexibility can be built into wider tax exemption on shipping income as reflected in Singapore's Approved International Shipping Incentive ("AIS"), which is a tax incentive available to resident companies which own or operate foreign flagged ships. In summary, the tax-deductible benefits associated with debt finance at interest are negated in international shipping, when income earned from shipping is tax exempt for on-shore or off-shore companies. Thus, the WACC may be expressed as follows,

$$WACC = r_e \cdot \frac{E}{V} + r_d \cdot \frac{D}{V} \qquad \text{where } V = E + D \qquad (1.0)$$

Such that, $\boldsymbol{r_e}$ = the cost of equity, $\boldsymbol{r_d}$ = the cost of debt, $\boldsymbol{E}$ = the market value of equity and $\boldsymbol{D}$ = the market value of debt. However, in a perfectly efficient market, according to the Capital Asset Pricing Model (CAPM), the value of a vessel is independent of its capital structure[26]. "The market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate $\rho_k$ appropriate to its class"[27], where $S$ denotes the market value of equity and $D$ the market value of debt, $\overline{X}$ is the expected return on the assets owned by a company and $V$ denotes the value of a firm.

[26] W. Sharpe, "Capital asset prices: a theory of market equilibrium under conditions of risk". The Journal of Finance. 19, 3, (1964), 425-442; F. Modigliani and M. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", (1958); F. Modigliani and M. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction", *American Economic Review*, 53, 3, (1963), 433-443.

[27] F. Modigliani and M. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment", (1958), 268.

$$\frac{\bar{X}}{\left(S_j + D_j\right)} \equiv \frac{\bar{X}}{V_j} = \rho_k \qquad \text{for any firm } j \text{ in class } k \qquad (2.0)$$

Or equivalently, "the average cost of capital, to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream of its class"[28].

$$\frac{\bar{X}}{\left(S_j + D_j\right)} \equiv \frac{\bar{X}}{V_j} = \rho_k \qquad \text{for any firm } j \text{ in class } k \qquad (3.0)$$

Thus, the discount rate would reflect the cost of capital and rather than a weighted average cost of capital (WACC), with the discount rate equals the unlevered cost of equity ($r_e$). By adopting an annually compounded rate, the discount factor (DF), present value factor (PVF), WACC and $r_e$ are all equivalent and can be benchmarked to other assets priced along the yield curve. The economic value added (EVA) reflects the future value of annual cash-flows (FV), then a present value (PV) or discounted cash-flow (DCF) can be derived from $PV = FV/(1+r)^t$ in order to generate a net present value (NPV). Specifically, the NPV is the PV of an investment's expected net cash-flows, less the cost of the initial investment, and the formula for the discounted sum of all cash-flows is,

$$NPV = -C_0 + \sum_{t=1}^{T} \frac{C_t}{(1+r)^{1/t}} \qquad (4.0)$$

Where $C_0$ is the present value of the initial capital invested, $C_t$ is the net cash-flow during the period ***t***, ***r*** is the discount rate and **T** is the number of time periods (years). Then the IRR is the discount rate (*r*), which causes the discounted NPV of a series of future cash flows produced from an investment to equal 0,

[28] Ibid., 268-269.

$$\sum_{t=0}^{T} \frac{C_t}{(1+r)^t} = 0 \tag{5.0}$$

Hence, the IRR and NPV can be employed in developing a framework for maritime investments, where the maritime investor can modify the DCF analysis to incorporate the actual market price of a vessel (MP) and net time-charter earnings (TCE) less operating expenses (OPEX) in the form of daily running costs (DRC) together with any residual value (RV) through a trade sale or demolition when a vessel is scrapped.

$$NPV = -MP_0 + \sum_{t=1}^{T} \frac{TCE_t - DRC_t}{(1+IRR)^{1/t}} + \frac{RV_t}{(1+IRR)^{1/t}} = 0 \tag{6.0}$$

$$\sum_{t=1}^{T} \frac{TCE_t - DRC_t}{(1+IRR)^{1/t}} + \frac{RV_t}{(1+IRR)^{1/t}} = MP_0 \tag{7.0}$$

We can then compare the risk-equivalent required rate of return of different investments through the IRR. A rolling 20-year unlevered internal rate of return ($r$) can be calculated for three shipping segments (bulkcarriers, tankers and containership) and in aggregate for 5-year old assets, where the IRR ($r$),

$$r = \left(FV/PV\right)^{(1/t)} - 1 \tag{8.0}$$

### *5.3 Income Yield*

**A**dditionally, an unlevered Net Income Yield by shipping segment, and in aggregate, over 20 years, can be calculated. The Net Income Yield (%) = Annual Income / Investment, where Annual Income = (Time-Charter Rate x 355 operating days) less Operating Expenses (Daily Running Costs x 365 days) and the investment reflects the actual market price of the vessel.

$$\text{Net Income yield (\%)} = \frac{\text{Annual Income (USD)}}{\text{Investment (USD)}} \qquad (9.0)$$

### *5.4 Risk and Returns:*

We evaluate the risks and returns of maritime investments, by adopting the Capital Asset Pricing model (CAPM), which equates volatility with risk. As a measure of volatility of shipping earnings, the population standard deviation ($\sigma$) is applied to quantify the amount of variability or dispersion around a mean (10.0) and is expressed in the same units as the original data, which in this case, is derived from a set of net time-charter rates from each type of vessel selected from each primary shipping segment, over the period of analysis. The larger the variability or dispersion is, the higher the standard deviation and *vice versa*.

$$\sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{n}} \qquad (10.0)$$

Rates of return are measured by the net income yield (9.0) by market segment and in aggregate are then compared to other real and financial assets. We can also compare various types of vessel through a correlation of net time-charter earnings in order to evaluate various investment strategies by analyzing their relationships, as some relationships are expected to be positive, whilst others negative. Ship-owners are able to reduce the volatility of earnings by incorporating vessels with low or negative correlations in their fleet. On the other hand, investors may be unwilling to reduce volatility risk as this will merely result in lower returns on their maritime assets. The Pearson product-moment correlation coefficient ($\rho$) for a population is adopted to measure the strength of the linear dependence (correlation) between two variables, reflected in two sets of net time-charter earnings over the period of analysis. The population correlation coefficient is defined in (11.0), where $\sigma_x$ and $\sigma_y$ are the population standard deviations, and $\sigma_{xy}$ is the population covariance.

$$\rho_{xy} = \frac{\sigma_{xy}}{\sigma_x \sigma_y} \tag{11.0}$$

In the methodology, we have clarified the nature of ship-operations and ship-management and clarified the nature of a stream of income and expenses associated with shipping companies. Investment analysis is undertaken using a full population of maritime price and earnings data over a period of 20 years from 1995-2015. Furthermore, the IRR and risk-reward analysis facilitates the development of a business strategy for maritime investment and demonstrates that if we define risk as the possibility of losing an investment, then in terms of the CAPM, despite the risk associated with volatile earnings, the returns over the long term reveal that international shipping is not nearly as risky as the volatility suggests. Such an analysis would form part of any due diligence conducted by the asset manager, or *mudarib* as a general partner, but also by retail, high net worth or institutional investors in the role of a limited partner as capital provider (*rabb al-mal*) within an Islamic private-equity shipping fund.

## 6.0 Overall Investment Performance

In this section, we assess long-term historical data involving freight indices, time-charter rates and modern second-hand ship prices. Then we analyze a 20 year rolling 5-year unlevered IRR for each shipping segment and the cash-on-cash unlevered net income yield over a similar period, before comparing various shipping market segments through a correlation matrix of net time-charter earnings in order to evaluate various investment strategies given the fluctuations and volatility in revenue. We also analyze risk and return for maritime assets and compare yields on maritime assets to other real and financial assets.

In terms of ship-valuation, typically various stakeholders (banks, brokers and owners) historically adopted a market approach involving a “comparative valuation” or “last done”, where a vessel’s value reflected the market price of comparable vessels in recently

completed arm's-length transactions between willing buyers and sellers. Mark-to-market valuations of this type are predicated on the type of vessel, size, age and condition, whilst also recognizing that the need to sell quickly in the form of a "fire sale" would result in a much lower price. Our methodology has adopted an income approach, where the value of the vessel is based upon the PV of all future cash flows during the period that the vessel was owned, including its residual sale value. A mark-to-model valuation critically relies on relevant input factors associated with the market value cost of investment, time-charter rate and operating expense data. We have adopted this technique, since as a result of the global financial and economic crisis, the number of completed vessel transactions, characterized by forced sales conducted by ship-owners with liquidity problems, has resulted in a significant decline in ship prices, as well as time-charter rates and earnings, as reflected in related freight indices (figures 8, 9, 10).

Figure 8: Baltic Dry and Tanker Indices (1995-2016)

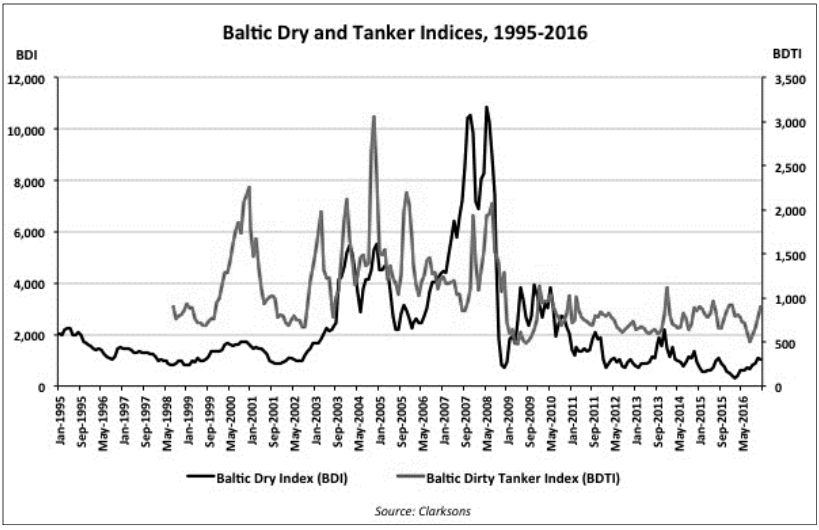


Figure 9: VLCC, Capesize and Containership Historical Earnings (1996-2015)

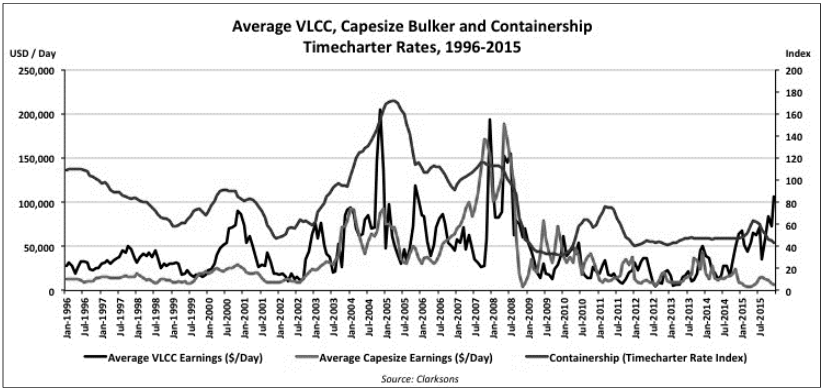
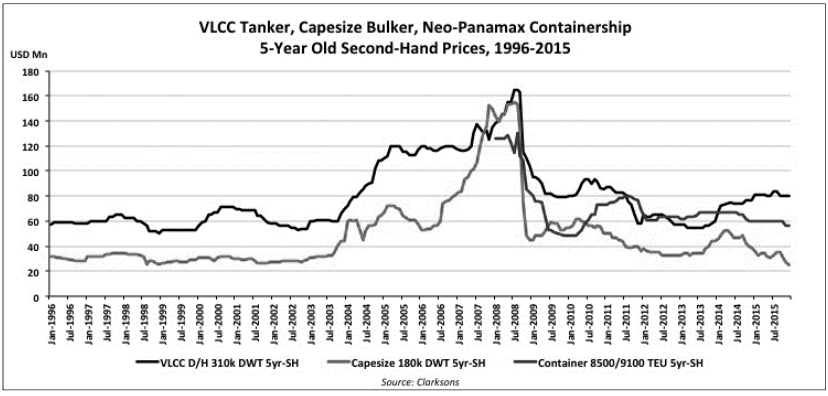



Figure 10: VLCC, Capesize and Containership Historical Secondhand Prices (1996-2015)

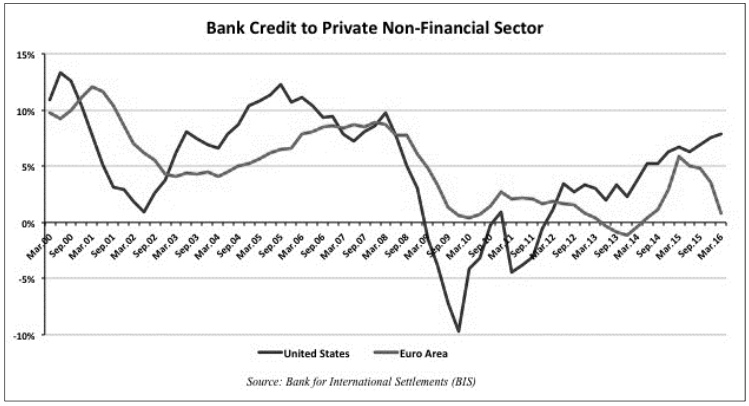



Furthermore, shipping loans granted by commercial banks decreased substantially as a direct result of the global financial crisis (figure 11) and associated bank capital adequacy, liquidity and risk management problems[29]. As a result, additional collateral may be requested from a bank apart from the underlying vessel, so that the shipping industry

[29] Bank for International Settlements (BIS), *BIS Statistics*, accessed on Jan. 31, 2017, https://www.bis.org/

has suffered from the limited availability of shipping loans from banks.

Figure 11: Bank Credit to Private Non-Financial Sector (2000-2016)

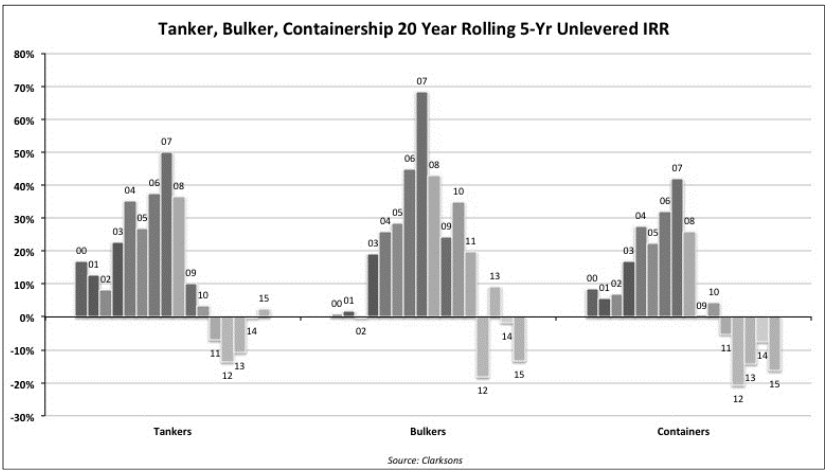



Moreover, the shipping market can be driven by excessive optimism and pessimism by market participants (builders, owners and charterers). A primary reason for the high volatility in prices and earnings is due to the delayed adjustment of the market supply and demand, which intensifies price and charter rate fluctuations. Additionally, tax advantages, easy credit and high profits in the second-hand sale and purchase market drives excessive optimism in newbuilding orders in relation to demand. In the current shipping cycle, which is the worse market since the mid-1980s, market participants are excessively pessimistic due to fewer loans and investments, notwithstanding the expected strong future growth in shipping. The strong upswing prior 2007-2008 and the subsequent market collapse, does not reflect the realistic long-term market perspective. In fact, an historical analysis over the shipping market over the preceding 20 years can give a reasonable guide to the associated risks and returns associated with investing in maritime assets, especially since the market is showing since of improving and has experienced an absolute low as reflected in the current data. Accordingly, this provides for an excellent market entry investment opportunity in the three primary shipping segments involving tankers, bulk-carriers and containerships.

Unlevered IRRs for the three primary shipping segments are presented in figure 12 in order to show the overall performance on investment in maritime assets. The IRRs exclude any fees or expenses associated with a private equity shipping fund, but are nonetheless, based on historical data and illustrate a 20-year (1996-2015) rolling 5-year unlevered IRR for tankers, bulkers and containerships as an asset class. The unlevered IRRs are weighted by the average historical market share of each standard ship size within each asset class based on a standard carrying capacity, which is measured in deadweight (DWT) tonnes. Each year marked in each bar represents the unlevered IRR for a 5-year hold period. For example, "00" in the tanker asset class represents a tanker that was bought in 1995, held for 5 years and sold in 2000. Similarly, "07" in the bulker asset class represents a bulker that was bought in 2002, held for five years and sold in 2007. Also, "15" in the container asset class represents a containership bought in 2010, held for five years and sold in 2015. For each asset class, the purchase price is a 5-year old second-hand vessel and the sale price is a 10-year old second-hand vessel. The sale and purchase prices, as well as, the net time-charter earnings for each vessel type are annual aggregates of monthly averages of a full population of reported transactions and fixtures compiled by Clarksons[30]. Operating costs (daily running costs) are derived from published data by Moore Stephens[31]. Annual time-charter earnings were calculated over 355 days and daily running costs (DRC) over a calendar year of 365 days.

[30] Clarksons, *Shipping Intelligence Network*, (2016).
[31] Moore Stephens, *OpCost*, (2016).

Figure 12: Tanker, Bulker, Containership 20 Year Rolling 5-Yr Unlevered IRR

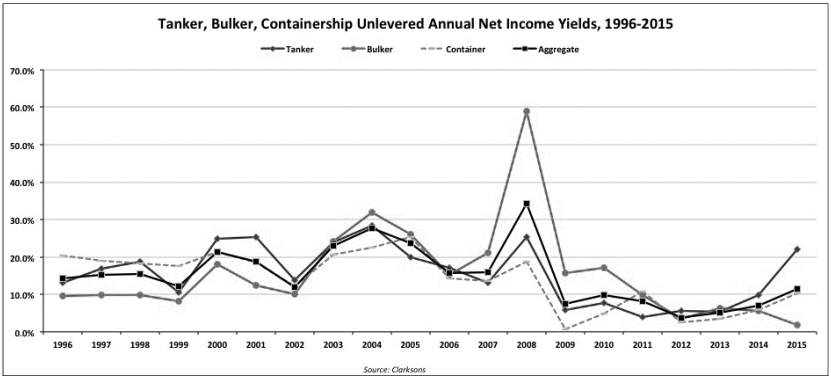



The aggregate IRR for a 5-year hold period for tankers over a 20-year period (1996-2015) was 14%, and for bulkers it was 18% notwithstanding the depressed nature of the dry cargo in recent years. For containerships it was 8% and this reflects the weak earnings for the container trade and given the over-leveraged assets, significant consolidation of ownership and continued insolvencies are expected in the short term (Hanjin, one of world's largest containership operators, filed for bankruptcy in 2016). Over a period of 20 years (1996-2015), for an equal portfolio of the three asset classes, the aggregate unlevered IRR was 13%, although our analysis reveals that between 1996-2009 the aggregate IRR for a 5-year hold period was 23%. Given the depressed nature of current assets prices and growth expectations going forward, a target unlevered IRR of 18% for an international shipping fund would not be unreasonable.

The historical unlevered annual net income yields (figure 13) also excludes any fund fees or expenses, since our objective is to analyze the underlying performance of the three primary international shipping asset classes. Each line represents the unlevered annual net income yield for each asset class over a 20-year period (1996-2015). The unlevered annual net income yield is defined as the cash-on-cash return of the net annual income generated on the market value of a

5-year old vessel type within each asset class. The unlevered annual net income yields are weighted by the average historical market share of each standard ship size within each asset class based on a standard carrying capacity, which is measured in deadweight (DWT) tonnes. The aggregate yield line represents an equally weighted portfolio of tanker, bulker and containership assets over a 20-year period. The 5-year second-hand market prices, as well as, the net time-charter earnings for each vessel type are annual aggregates of monthly averages of a full population of reported transactions and fixtures compiled by Clarksons[32]. Operating costs (daily running costs) are derived from published data by Moore Stephens [33]. Annual time-charter earnings were calculated over 355 days and daily running costs (DRC) over a calendar year of 365 days.

Figure 13: Tanker, Bulker, Containership Unlevered Net Income Yields (1996-2015)




The aggregate yield from 1996-2009 was 18%, but this has softened to 15% from 1996-2015, given the de-leveraging and decline in asset prices and earnings post-financial crisis. When we consider that ship-owners are also confronted with reduced lending by conventional European maritime lenders, we note that there is an important opportunity for profit-and-loss sharing equity investors, especially for maritime assets acquired through an Islamic private-equity shipping fund. This would also provide an attractive

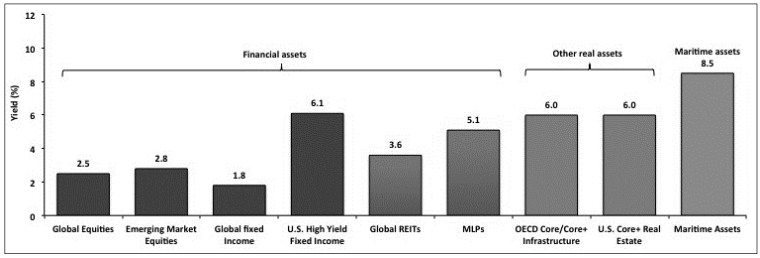
[32] Clarksons, *Shipping Intelligence Network*, (2016).
[33] Moore Stephens, *OpCost*, (2016).

*Shari'ah* compliant product for potential Muslim investors, who currently have USD 9.5 trillion in assets that are intermediated by conventional institutions, attributable to a lack of suitable Islamic investment instruments and services on offer by Islamic Financial Institutions (IFIs). Equally, for IFIs these investors represent an opportunity to develop investment rather than credit-based intermediation, with estimated potential annual revenue of USD 180 billion in fund management fees alone[34].

Determining cash-on-cash unlevered net income yield facilitates the evaluation of potential investments that are immediately accretive to overall company earnings on one hand, but the opportunity cost of capital invested in maritime assets can be compared to other real and financial assets. In fact, J. P. Morgan Asset Management published metrics comparing financial and real assets[35], which involve a dividend yield for equities, REITs and listed infrastructure and a yield-to-worst for fixed income (reflecting the lowest potential yield on bonds). The OECD core/core+ infrastructure yield is derived from the J.P. Morgan Global Real Assets OECD Infrastructure strategy trailing 12-month cash yield. The U.S. core+ real estate yield is derived from the J.P. Morgan Global Real Assets U.S. Core-plus Real Estate strategy trailing 12-month income return. The maritime assets yield is derived from the J. P. Morgan Global Real Assets target yield for income-oriented maritime assets, which was 8.5% as at Sept. 2014 (figure 14). This can be contrasted with our actual yield on maritime assets of 7.1% for 2014, rising to 11.4% in 2015. Notwithstanding the decline in time-charter earnings since the high of 2007, maritime assets have outperformed other real and financial assets, representing an income opportunity as well as the potential for capital appreciation. The comparison is even more valid in terms of maritime returns *versus* those obtainable in the capital markets, where global fixed income is nominally just above zero, but in real terms are negative in major markets, such as in the U.S., Japan and in the E.U.

[34] Securities Commission Malaysia (SCM), *Islamic Fund and Wealth Management Blueprint,* (Kuala Lumpur: Securities Commission, January 2017), 19.
[35] J. P. Morgan, "Maritime Investing: An Income Opportunity", *Insights and Research*, (March 6, 2015).

Figure 14: Yields on Real and Financial Assets




*Source: J. P. Morgan (2015)*

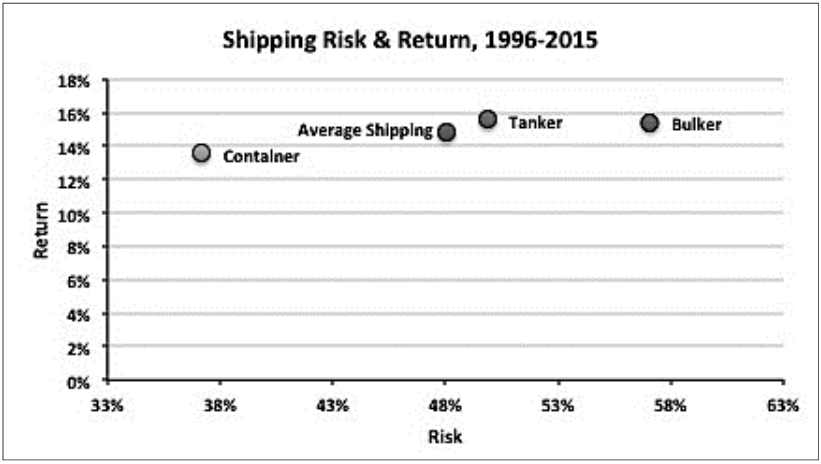
In terms of providing clarity to potential investors as to the attractiveness of investing in maritime assets within international shipping, our analysis must effectively communicate both risk and reward. We can apply the unlevered net income yield for either the three primary shipping segments and for individual classes of vessel as a measure of return. Typically, within the framework of the capital asset pricing (CAP) model, investment analysis equates volatility with risk. By comparing the average net time-charter earnings of different classes of vessel using the standard deviation as a percentage of mean earnings we can measure risk. In terms of constructing a shipping efficient frontier for tankers, bulkers and containerships (table 2, figure 15), our analysis reveals that the yields are strong, averaging 15%. If the average earnings are the revenue stream needed to operate a shipping business to generate a 'normal profit' and we define a 'normal profit' as whatever the participants in the market settle for[36], then between 1996-2015, shipping companies would earn 48% more or less than is required, reflecting associated risk. For a typical public listed firm and in terms of the capital market, such volatility would be considered high risk. However, our 20-year IRR and net income yield data reveals that shipping returns are very healthy over the long term. So if we define risk as the risk of losing an investor's investment capital, then the answer must be that shipping is low risk only if equity capital is adopted since debt financing is likely to threaten mispriced maritime investments in the presence of volatile earnings.

[36] M. Stopford, *Maritime Economics*, (2009), 324.

Table 2: Shipping Efficient Frontier (1996-2015)

| Vessel Segment | Risk | Return |
|---|---|---|
| **Tanker** | 50% | 16% |
| **Bulker** | 57% | 15% |
| **Container** | 37% | 14% |
| **Average Shipping** | 48% | 15% |

Figure 15: Shipping Risk and Return (1996-2015)




The volatility of earnings is reflected in all classes of vessel within the three main shipping segments. Hence, there are differing correlations between the movements in earnings between different types of vessel and depending on prevailing market conditions during different periods of analysis. Between 1995-2001 (table 3), there was negative correlation between a VLCC tanker and a handymax bulker (-0.16) and a feeder containership of 1000 TEU (-0.20) and indeed one might expect that the revenue stream of large tankers would move in an opposite direction to a small bulker or containership.

Table 3: Correlation Matrix for Selected Vessel Classes (1995-2001)

| | VLCC Tanker | Handymax Tanker | Capesize Bulker | Handymax Bulker | Feeder Container (1,000 TEU) |
|---|---|---|---|---|---|
| **VLCC Tanker** | 1.00 | | | | |
| **Handymax Tanker** | 0.64 | 1.00 | | | |
| **Capesize Bulker** | 0.57 | 0.38 | 1.00 | | |
| **Handymax Bulker** | -0.16 | -0.08 | 0.60 | 1.00 | |
| **Feeder Container (1,000 TEU)** | -0.20 | -0.08 | 0.25 | 0.84 | 1.00 |

However, between the years 1995-2015 (table 4), these correlations were dramatically reversed and overall were often strongly positively related. This unusual pattern is reflected across all vessel types in the correlation matrix, implying underlying market forces were compressing earnings upwards towards 2007 and similarly downwards post 2007.

Table 4: Correlation Matrix for Selected Vessel Classes (1995-2015)

| | VLCC Tanker | Handymax Tanker | Capesize Bulker | Handymax Bulker | Feeder Container (1,000 TEU) |
|---|---|---|---|---|---|
| **VLCC Tanker** | 1.00 | | | | |
| **Handymax Tanker** | 0.84 | 1.00 | | | |
| **Capesize Bulker** | 0.71 | 0.61 | 1.00 | | |
| **Handymax Bulker** | 0.68 | 0.60 | 0.98 | 1.00 | |
| **Feeder Container (1,000 TEU)** | 0.60 | 0.79 | 0.53 | 0.55 | 1.00 |

In terms of causality, this could have been due to the commodity boom and eventual bust experienced in Asian industrial revolutions as reflected, for example, in terms of raw material (coal, iron ore and oil) imported into, and finished products (carried in containers) exported out of China, during this period. However, further research is required to determine the impact of U.S. easy monetary policy has on financing international trade and shipping pre-financial crisis and equally also the de-leveraging effect in the aftermath of the financial crisis that began in 2007/2008.

## 7.0 Conclusion

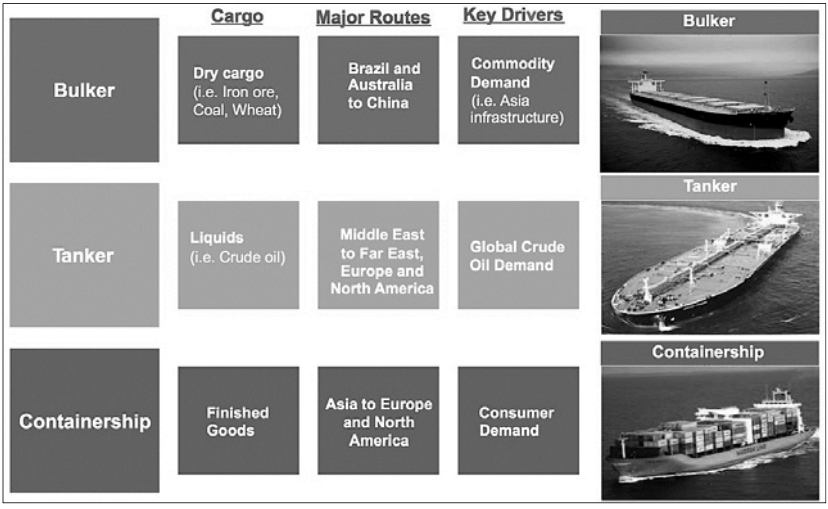
In this research, we have analyzed the importance of seaborne trade in the context of globalization. We have established that 84% of global trade, representing 11,128 million tonnes, is carried by international shipping totaling 1.75 Bn DWT, 87% of which, is carried by the primary shipping segments involving are bulkers (43%), tankers (31%) and containerships (13%). However 75% of ship-finance is financed on a conventional basis. We identified an investment framework for Islamic private equity institutional and retail investors to participate in international shipping. In terms of communicating risk and reward, we then presented our investment analysis over 20 years in terms of net unlevered IRRs and net unlevered income yields for the primary shipping segments, and we also evaluated risks and returns and correlation matrices for selected classes of vessel within the primary shipping segments (figure 16), such as capesize bulkers, VLCC tankers and panamax containerships, given their role in seaborne trade[37].

In terms of investment performance, over a period of 20 years (1996-2015), for an equal portfolio of the three asset classes, the aggregate unlevered IRR was 13%, although our analysis reveals that between 1996-2009 the aggregate IRR for a 5-year hold period was 23%. We also established that the aggregate net income yield for the three primary shipping segments was 18% from 1996-2009, but this

[37] J. P. Morgan Asset Management, *Global Maritime Investment Fund* (GMIF), presentation to San Diego County Employees Retirement Association (SDCERA), (May 20, 2010).

has softened to 15% from 1996-2015, given the de-leveraging and decline in asset prices and earnings post-financial crisis. Nonetheless, the average yield on maritime assets has improved from 7.1% in 2014 to 11.4% in 2015 as the industry worked its way through the excess supply of tonnage in relation to market demand. Although the standard deviation of TCE earnings for the three primary shipping segments was 48% from 1996-2015, suggesting a risky investment from the perspective of capital market financial assets, the financial performance of specific asset classes was not as risky as their individual volatility in earnings suggests, as reflected in our analysis of maritime investment involving risk, yield and IRR for modern 5-year old tonnage.

Figure 16: The Primary Vessel Segments in Seaborne Trade

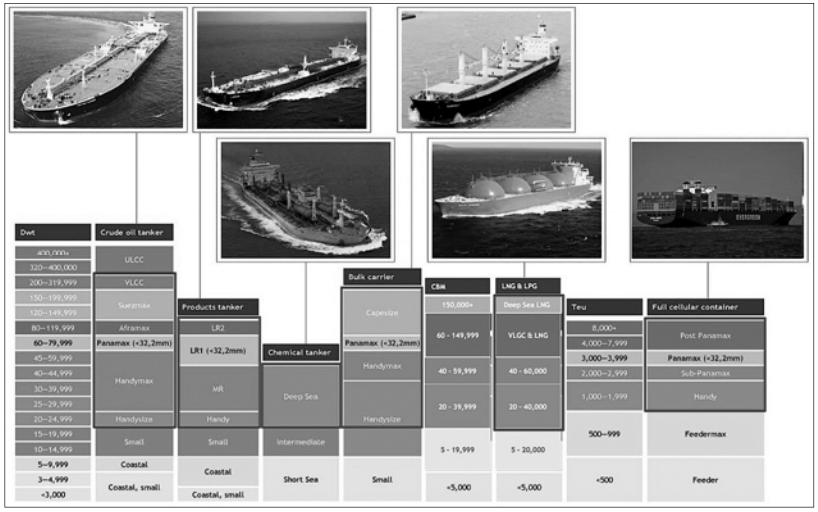



*Source: Adapted from J. P. Morgan (2010)*

These returns are tax-free and debt-free investments. In fact, there is an array of potential target investments (figure 17) including crude oil tankers, products tankers, chemical tankers, bulk-carriers, liquefied natural gas (LNG) carriers, liquefied petroleum gas (LPG) carriers and containerships with their respective homogeneous vessel types within each segment[38].

[38] J. P. Morgan Asset Management, *Global Maritime Investment Fund (GMIF) and*

Figure 17: Target Investments in International Shipping




*Source: J. P. Morgan (2014)*

Indeed, these types of international maritime assets were exactly targeted by J. P. Morgan Asset Management's private equity Global Maritime Investment Fund (GIMF), which raised USD 780 Bn in commitments from institutional investors between 2010 and 2014, including even a USD 25 Mn from the Omaha Schools Employee's Retirement System (OSERS), Douglas County[39] (J. P. Morgan, 2014). Omaha, Nebraska is in the middle of the United States without any maritime heritage. Presumably for OSERS it was a suitable tax-efficient long-term investment that formed part of their asset allocation mix in terms of private equity, even though GIMF was a start-up. Given exceptionally low asset prices, there is currently an enormous investment opportunity available to retail and institutional investors, with the participation of IFIs as well as pension and investment institutions, to participate in the development of international shipping from Malaysia, to grow GDP and employment, and re-discover Malaysian heritage in the *nusantara* (archipelago)

*Market Update*, presentation to Omaha School Employees Retirement System of Douglas Country School District 0001, (May, 2014).

[39] J. P. Morgan Asset Management, *Global Maritime Investment Fund and Market Update*, (May, 2014).

maritime economy within ASEAN and globally in the international shipping industry.

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