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The rise of new yield-oriented investment vehicles has been a notable characteristic of the post-global financial crisis landscape. However, in the sea of alternative investing, the island left largely unexplored remains the maritime industry. Investing in maritime assets is an area where we anticipate increased popularity, based on the premise that such investments offer a new avenue for obtaining scarce higher-yield-oriented returns.

Ships—like buildings, pipelines and toll roads—can provide a visible, reliable and consistent stream of income. We believe, when risk can be effectively managed, a maritime strategy is capable of generating an attractive relative return vs. other financial and real assets.

A yield-oriented maritime strategy, employing diversified and long-term charters to creditworthy counterparties, can provide income in excess of other yield-oriented alternative strategies, such as infrastructure and real estate (Exhibit 1, next page). This premium extends to more mainstream financial assets, such as equities, fixed income, REITs and master limited partnerships (MLPs). It is worth noting that maritime investments have the added benefit of being nearly all U.S. dollar denominated, decreasing foreign exchange risk.

**IN BRIEF**

We believe a maritime investment strategy, rigorously planned and efficiently executed, could anchor today’s income-oriented portfolios. Global shipping is showing signs of recovery. Current long-term charter rates today allow for profitable employment of shipping assets with strong counterparties. In our view, yield-oriented maritime asset investments offer a unique combination of benefits: attractive total return potential, the inflation protection of real assets, low correlation to financial and other real assets, and a premium yield in an otherwise income-starved environment.

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The maritime industry is the workhorse of the global economy. Seaborne trade amounted to approximately 50 trillion ton-miles in 2013 and has averaged over 6.5% growth per annum since 2001, exceeding average global GDP growth of 4.0% over the same period. Roughly $1.8 trillion has been invested in new vessels over the past 20 years, a figure Clarksons, one of the world's leading ship brokers, anticipates will double within the next decade due to replacement of current vessels as well as expansion of the global fleet.

In addition, we believe the maritime sector offers distinct advantages over the fixed income market, especially in a rising rate environment. Unlike bonds, which typically underperform in rising interest rate and inflationary environments, the maritime sector is positively correlated to inflation. In fact, given shipping's vital role in the global economy, we would expect underlying vessel asset values to improve in an economic-growth-driven rising interest rate environment.

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Rising tides? Interest rates and inflation

While we are not predicting future interest rates or fixed income performance, we do believe that the relatively high duration of fixed income investments, as evidenced by the Barclays Global Aggregate Index, accompanied by ongoing low yields, may eventually become a tough challenge for fixed income investors. There is very little yield cushion in bond prices if interest rates eventually rise from historical lows (Exhibit 2). As investors look for a long-term yield and/or fixed income substitute, it is worth noting that maritime assets do not have the same directional interest rate sensitivity as bonds. In fact, even in moderately inflationary environments, long-term maritime returns have outperformed other investment alternatives.

The gap between yield and duration is the widest it has been in over two decades, leaving little yield cushion when rates rise. The gap between yield and duration is the widest it has been in over two decades, leaving little yield cushion when rates rise. The gap between yield and duration is the widest it has been in over two decades, leaving little yield cushion when rates rise.

EXHIBIT 1: CURRENT ASSET CLASS YIELDS


Metrics used: dividend yield for equities, REITs and listed infrastructure; yield-to-worst for fixed income. 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; and the maritime assets yield is derived from the J.P. Morgan Global Real Assets target yield for income-oriented maritime assets.

EXHIBIT 2: BARCLAYS GLOBAL AGGREGATE INDEX

Source: J.P. Morgan Asset Management, Barclays; data as of September 30, 2014.
Shipping, while not as visible as real estate, arguably plays a greater role in modern life. The global maritime industry moves 90% of world trade. For example: sneakers from factories in Vietnam to joggers in the U.S.; cell phones from assembly plants in China to consumers in Europe; soybeans and wheat from the U.S. to noodle makers in China. Even these basic examples fail to reflect the full depth and complexity of maritime networks. A commuter’s everyday automobile, for instance, is typically an import from many different geographies—steel smelted in Japan with coking coal mined in Canada and iron ore sourced in Australia or Brazil. So even a new “domestic” car may have traveled tens of thousands of miles before it leaves the showroom.

The map in Exhibit 3 illustrates some of the world’s myriad shipping lanes, giving a sense of some of the variety of trade routes that exist across the three main shipping sectors: bulkers, tankers and containerships. In addition, the exhibit provides a breakdown of some of the main cargoes moved by these ships.

Like real estate and infrastructure, maritime assets—most often ships—are typically long-lived, with an average useful life of 25 to 30 years. They are employed in numerous global industries by a wide variety of end users of diverse credit quality. There are also multiple employment opportunities and structures that offer a variety of options regarding duration of employment and consistency of revenue (see “A primer on ships for hire,” page 6). Vessels also come in a wide range of sizes and ages, and there can be differences in construction quality based on a vessel’s yard of build as well as ongoing maintenance.

Just as no real estate investor would assume that all buildings are created equal, different vessels combine divergent qualitative and quantitative variables, which can impact risk and return profiles. Nevertheless, while ships vary by sector, carrying capacity, demand fundamentals, yard of build and maintenance record, they do enjoy a degree of homogeneity among specific vessel sizes, allowing for price transparency within size categories. Exhibit 4 (next page) breaks down the global fleet by tonnage.

**The maritime network: The web that ties the world together**

**EXHIBIT 3: GLOBAL TRADE ROUTES FOR THREE MAIN SHIPPING SECTORS**

- Tankers
- Containerships
- Bulkers

*Source: J.P. Morgan Asset Management, Clarksons; data as of September 30, 2014. For illustrative purposes only.*

**Principal cargoes by shipping sector**

<table>
<thead>
<tr>
<th>Dry bulk</th>
<th>Dry cargo (e.g., iron ore, coal, grain)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanker</td>
<td>Liquids (e.g., crude oil, refined petroleum)</td>
</tr>
<tr>
<td>Container ship</td>
<td>Finished goods</td>
</tr>
</tbody>
</table>

*Source: J.P. Morgan Asset Management, Clarksons; data as of September 30, 2014. For illustrative purposes only.*
A closer look at the recent maritime cycle: Choppy waters

We see an attractive entry point today for maritime investments. Few major global industries experience the same peak-to-trough variation as the maritime industry. Later in this paper we will talk about how to hedge the extremes with time chartering and counterparty selection, but it is maritime’s volatility that often creates opportunity for investors. Exhibit 5 charts the past 10 years of performance of the Baltic Exchange Dry Index (the benchmark for dry bulk shipping rates); average earnings for five-year-old VLCCs (VLCCs, or very large crude carriers, are the largest crude oil tankers); and the Clarksons average containership earnings index. These data series all tell very similar stories, with peak-to-trough movement of greater than 94%, 99%, and 85%, respectively. Rates soared in 2007-08 and sank in the aftermath of the global financial crisis, underscoring the cyclical nature of the industry. Rate recovery has been inconsistent, with only modest gains, on average, though real fundamental improvement appears to be taking hold in some sectors.

Exhibit 6 (next page) tells a parallel story for asset values across the maritime sector for this 10-year period. The prices of five-year-old Capesize dry bulk vessels1 (the largest dry bulk ships), five-year-old VLCCs and five-year-old post-Panamax containerships2 fell 79%, 67%, and 63%, respectively peak to trough. The subsequent rebound in dry bulk and tanker values has been encouraging, but prices still lag their 10-year averages by 25% and 22%. Containership values have not rebounded to that extent and remain generally depressed.

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1 Ships that have to travel between Europe and Asia around Africa’s Cape of Good Hope because they are too large to traverse the Suez Canal.
2 The largest vessels that can pass through the Panama Canal.
Navigating vessel employment options

Like a real estate owner, a ship owner has to toggle the length of a “lease”—which in shipping corresponds to a charter—and counterparty credit quality to generate desired risk-adjusted returns. Charters vary in length from short-term spot market employment, measured in weeks or months, to longer-term period charters, typically measured in years. Spot market charters can drive maximum profits in a strong market but leave a vessel exposed to market volatility, given their short duration. Period charters (such as time charters and bareboat charters) bring a measure of stability to the table. Large end users, such as oil conglomerates, major mining companies and global commodity traders, that have visibility into their future transportation needs can insulate themselves from the gyrations of the market through longer-term contracts.

Ship owners, for their part, ensure a vessel’s employment, lock in a predictable cash flow and earn steady income, assuming they purchased the vessel at a price that allows for sustained profitability (that is, the operating expenses of the vessel, plus financing costs, do not exceed the charter hire) and have chartered the ship to a creditworthy counterparty. Because charter contracts can transfer with ownership, they support asset values in a down market (or limit the upside on asset values in a rising market).

As with real estate leases, period charters can extend to five years or 10 years and in some cases can cover the 25- to 30-year economic life of a ship. Credit quality grows in importance as the length of the charter increases. It can also have an impact on rates, depending on market conditions. Investment grade counterparties can often garner more favorable terms—especially in a tepid market. In many cases, the yield that period charters achieve can far exceed that realized for fixed income securities issued by the very same counterparty. While there are arguably more risks assumed in the operation of a vessel than in buying a bond or making a loan to a corporate entity, experienced vessel operators and careful counterparty selection can help mitigate these risks.

3 In a worst-case scenario, an investor can always rely on the versatility of the vessel’s employment alternatives. If a charter does not perform, the ship owner may re-charter the vessel at the prevailing rate, which may, of course, differ, either positively or negatively, from the charter rate at inception.
A PRIMER ON SHIPS FOR HIRE

Voyage Charter (Spot Market): Contract typically for single voyage. Owner is paid based on tons of cargo carried from loading to discharge port and is responsible for voyage expenses (fuel costs and port fees) and vessel operating expenses (such as crewing, repairs and maintenance, insurance, stores and provisions, etc.). Charterer typically is responsible for any port delays (“demurrage”) but not for off-hire days. Spot market charters move fluidly with market demand and can vary widely by route, vessel type and age. Greatest degree of volatility.

Time Charter: Contract for a pre-defined period of time, typically one year or longer. Owner is paid an agreed-upon dollars-per-day rate for length of contract. Owner is responsible for vessel operating expenses, while charterer is responsible for voyage expenses. Charterer determines vessel’s commercial management (where it operates). Rates for short-to medium-term time charters vary with the spot market, but are somewhat insulated from short-term factors. Longer time charters typically do not carry the same degree of spot market fluctuation risk as voyage charters, but do carry greater counterparty risk.

Bareboat Charter: Similar to a time charter, but charterer pays all vessel operating expenses in addition to voyage expenses. Structure is similar to a triple net lease in real estate, thus eliminating the lessor’s operating risk. Bareboat charters are typically quoted in dollars per day and equate to time charter rates, less operating expenses. This employment type reduces the owner’s involvement to a more passive role and is often viewed as a financing vehicle. Generally, these are long-term arrangements, often spanning the useful life of the vessel.

SUMMARY OF PRINCIPAL CHARTER STRUCTURES

<table>
<thead>
<tr>
<th></th>
<th>Voyage charter (spot)</th>
<th>Time charter</th>
<th>Bareboat charter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical contract length</td>
<td>Single voyage</td>
<td>One year or more</td>
<td>One year or more</td>
</tr>
<tr>
<td>Hire rate basis</td>
<td>Varies</td>
<td>Daily</td>
<td>Daily</td>
</tr>
<tr>
<td>Voyage expenses</td>
<td>Ship owner pays</td>
<td>Charterer pays</td>
<td>Charterer pays</td>
</tr>
<tr>
<td>Vessel operating expenses</td>
<td>Ship owner pays</td>
<td>Ship owner pays</td>
<td>Charterer pays</td>
</tr>
<tr>
<td>Off-hire</td>
<td>Charterer does not pay</td>
<td>Ship owner pays</td>
<td>Charterer pays</td>
</tr>
</tbody>
</table>

a “Hire rate” refers to the basic payment from the customer for the use of the vessel.
b Voyage expenses are all expenses unique to a voyage, including fuel costs, port fees, cargo loading and unloading expenses, etc.
c Vessel operating expenses include crewing, repairs and maintenance, insurance, stores, lube oils, communication expenses, etc.
d “Off-hire” refers to the time a vessel is not available for service.

Charting today’s course: The upside of a down market

Unlike a normal yield curve in the fixed income market, where longer-maturity bonds have a higher yield than shorter-maturity bonds, in the strong pre-crisis shipping market prices for longer-term charters fell below the spot market rates, resulting in a downward-sloping curve. Further out in time, ship owners were willing to accept reduced rates to lock in revenues. In this scenario, a five-year charter generated lower average revenues than a three-year charter, which in turn generated a lower rate than a one-year charter (Exhibit 7). This discount was driven in part by the notion that, over time, rates eventually experience mean reversion as supply and demand comes into balance.

In contrast to fixed income yields, pre-crisis shipping rates typically fell as duration increases

EXHIBIT 7: ILLUSTRATIVE FIXED INCOME AND PRE-CRISIS SHIPPING RATE CURVES

Bloomberg Treasury yields shown at each respective duration.
Conversely, in a depressed market like that of the past several years, the curve can be inverted and slope upward. If rates are expected to rise, shippers are willing to pay a premium in order to lock in low shipping rates, and ship owners will require higher compensation to forgo revenue opportunities in a recovering environment. With spot rates across market sectors generally below 10-year averages today, we are seeing a curve inversion in charter rates (Exhibit 8).

Exhibit 9 illustrates this point by tracking the average Capesize rate curve in the strong pre-crisis dry bulk market vs. the average post-crisis rate curve. The pre-crisis curve exhibited what we would expect from a capacity-constrained shipping market. Charter rates dropped during the 2004–07 period as charter lengths extended. In contrast, in the current market rates are moving upward along the curve from spot rates to five-year time charters.

The wind in our sails: Income and appreciation potential

The current environment presents a twofold opportunity. Low historical asset values, together with firming charter rates, create the potential for yields above those in other asset classes. At the same time, a recovering market opens the possibility of enhanced residual value. We believe an income-driven approach can work well in the present phase of the maritime cycle. While asset values have yet to return to their historical mean, they have moved off the bottom (see Exhibit 6). Meanwhile, rates in the spot market have fluctuated between profitable and unprofitable levels across sectors (depending on underlying basis and financial leverage). However, longer-term period charters have remained at much more robust levels of profitability (albeit with varying degrees of availability in the market) and have helped support asset values. As a result, we believe that by employing
an asset on a long-term charter today we can achieve rates that, on average, discount a higher degree of industry recovery than spot rates. Such a strategy can participate in the improvements achieved in asset values, while simultaneously generating the sustainable yields seen in Exhibit 1.

We are often asked why customers would look to do these types of long-term employment agreements. The answer is relatively simple. For large end users such as oil conglomerates, global commodity traders and major mining companies, these vessels are the essential link between a company’s product and market. These companies have visibility into their future transportation needs, and as a result, they seek to fill a portion of those needs in advance and to appropriately size their market exposure. Like a ship owner, they, too, seek to insulate themselves from the gyrations of the market. In addition, for most of these companies, shipping is not a core competency. Therefore, their human and financial capital is better spent elsewhere.

Cross currents: Maritime exhibits low correlations vs. other assets

One of the advantages of a maritime investment is its relatively low correlation to financial and other real assets. This quality can be further refined, for those seeking consistent yield, through the revenue stability offered by an income-oriented shipping strategy that employs long-term charters. Exhibit 10 (next page) shows a correlation matrix comparing global maritime asset returns with equity, fixed income and real-asset index returns over the past 15 years (1999–2013). The first column lists correlations with maritime returns for a spot-oriented strategy. The correlations are generally low vs. other income-oriented and real assets, and the historical return during this period is second only to that of MLPs, which outperformed maritime by merely 30 basis points. The second column’s long-term global maritime strategy, which employs assets on three-year fixed charter rates, forces correlations even lower. Despite offering less total return over the same 15-year period, the stable charter revenue stream drives more favorable correlations and adds portfolio diversification.

CALCULATING THE LONG-TERM STRATEGY MARITIME RETURN SERIES

The annual maritime assets total return series is derived from the Clarksons Research historical data for the bulker, tanker and containership maritime sub-sectors. The sub-sector allocations used to calculate the maritime asset returns are as follows: 33% tankers, 35% bulkers and 32% containerships, in order to approximate the exposures of a world fleet investment strategy. For the purposes of developing a proxy for an income-oriented maritime strategy, each annual return figure assumes a five-year investment hold period and uses beginning-of-period (January) three-year base ship time charter rates over the investment period.

For example, the 1994 total return assumes December 1989 month-end five-year-old base ship second-hand sales price as the purchase price and the December 1994 month-end 10-year-old base ship secondhand sales price as the exit price. Each month over this investment period, the Ebitda is calculated based on revenue from the three-year time charter rate determined at the beginning of the investment period (January 1990 in this example), 2.5%–5% charter commission expenses and market-reported monthly operating expenses. This Ebitda provides for the monthly cash flows over the assumed life of the investment. The total return is calculated using the respective purchase prices, exit values and monthly cash flows for bulkers, tankers and containerships separately.
A maritime charter strategy has delivered exceptional diversification benefits

EXHIBIT 10: SPOT-ORIENTED STRATEGY AND 15-YEAR CORRELATION MATRICES USING ANNUAL DATA IN USD

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<tbody>
<tr>
<td>Maritime world fleet</td>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td>Global equities</td>
<td>0.4</td>
<td>-0.1</td>
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<tr>
<td>Emerging market equities</td>
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<td>0.2</td>
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<tr>
<td>Global bonds</td>
<td>0.3</td>
<td>0.2</td>
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<tr>
<td>U.S. high yield bonds</td>
<td>0.1</td>
<td>0.2</td>
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<tr>
<td>U.S. REITs</td>
<td>0.5</td>
<td>-0.1</td>
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<tr>
<td>MLPs</td>
<td>0.3</td>
<td>-0.1</td>
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<tr>
<td>U.S. Core-plus real estate</td>
<td>0.5</td>
<td>0.1</td>
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<tr>
<td>OECD infrastructure</td>
<td>0.4</td>
<td>-0.2</td>
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<td></td>
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<tr>
<td>Historical return (CAGR)</td>
<td>17.0%</td>
<td>10.1%</td>
<td>4.8%</td>
<td>11.2%</td>
<td>4.8%</td>
<td>7.5%</td>
<td>10.4%</td>
<td>17.3%</td>
<td>10.4%</td>
<td>8.1%</td>
<td></td>
</tr>
</tbody>
</table>

All data is annual and denominated in USD.

Shipshape: Taking it apart to put it together

In Exhibit 11 we disaggregate the total return components for a five-year-hold maritime strategy. Here we have broken out 20-plus years of yield and asset price movements into their distinct components, which together make up total return. The long-term average yield comes in at 10.5%, bolstering our argument for an income-oriented maritime investment. With asset values currently low and on an upward-sloping rate curve, we believe an attractive entry point exists for this type of strategy. Looking back at the return components over the past two decades, we can see this strategy has generated solid and relatively stable income. Additionally, the average impact of depreciation on total return throughout the period below is relatively neutral.

Despite its volatility, maritime’s total returns have been positive 14 of the last 15 years, thanks to strong and steady yields

EXHIBIT 11: WORLD FLEET FIVE-YEAR-HOLD YIELD ANALYSIS

Source: J.P. Morgan Asset Management, Clarksons; data as of November 30, 2014.
Ending our voyage

Despite being a very old industry, maritime is a new and exciting asset class for institutional investors. With a search for income in a low interest rate environment as our starting point, we have examined how long-term maritime charters are capable of generating better yields than other real and financial assets. They offer inflation protection not available in conventional fixed income investments, and low correlations insulate maritime when contrasted with other income-generating strategies. Finally, low historical asset values afford the prospect of relative asset value appreciation in a future recovery. We believe maritime ticks the boxes investors are looking for and can provide the income they need (Exhibit 13).

Checking all the boxes: Maritime assets can be, and should be, part of a diversified portfolio, given the attractive investment character of the asset class

EXHIBIT 13: MARITIME BENEFITS

<table>
<thead>
<tr>
<th>Essential nature</th>
<th>High return potential</th>
<th>Attractive historical returns</th>
<th>High income potential</th>
<th>Long-term cash flow visibility</th>
<th>Financial assets</th>
<th>Other real assets</th>
<th>Inflation sensitivity</th>
<th>Complementary strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maritime assets</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Source: J.P. Morgan Asset Management.
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PORTFOLIO DISCUSSION: Maritime investing: An income opportunity

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