Using technology to tame freight rate volatility and reduce capacity risks

White paper | September 2019

Co-researched between Drewry and Cyberlogitec

Drewry
Supply Chain Advisors

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1 Executive Summary

In this white paper, Drewry assesses the ability of technology platforms to reduce the fundamental mismatch between supply and demand in global liner shipping spot markets. This mismatch is caused by the volatile nature of demand and the fixed nature of supply and is exacerbated by the limited time during which supply and demand interact. It results in oscillating vessel load factors, which cause freight rates to be highly volatile. That, in turn, results in severe inefficiencies for all market participants.

Drewry believes that online technology platforms where shipping lines and their customers can negotiate forward contracts could help improve vessel utilisation levels and reduce freight rate volatility. As the market increasingly adopted such platforms, the outcome would be a liner shipping market where shipping lines are proportionally better able to manage their revenues, and their customers enjoy more reliable service and pricing levels.

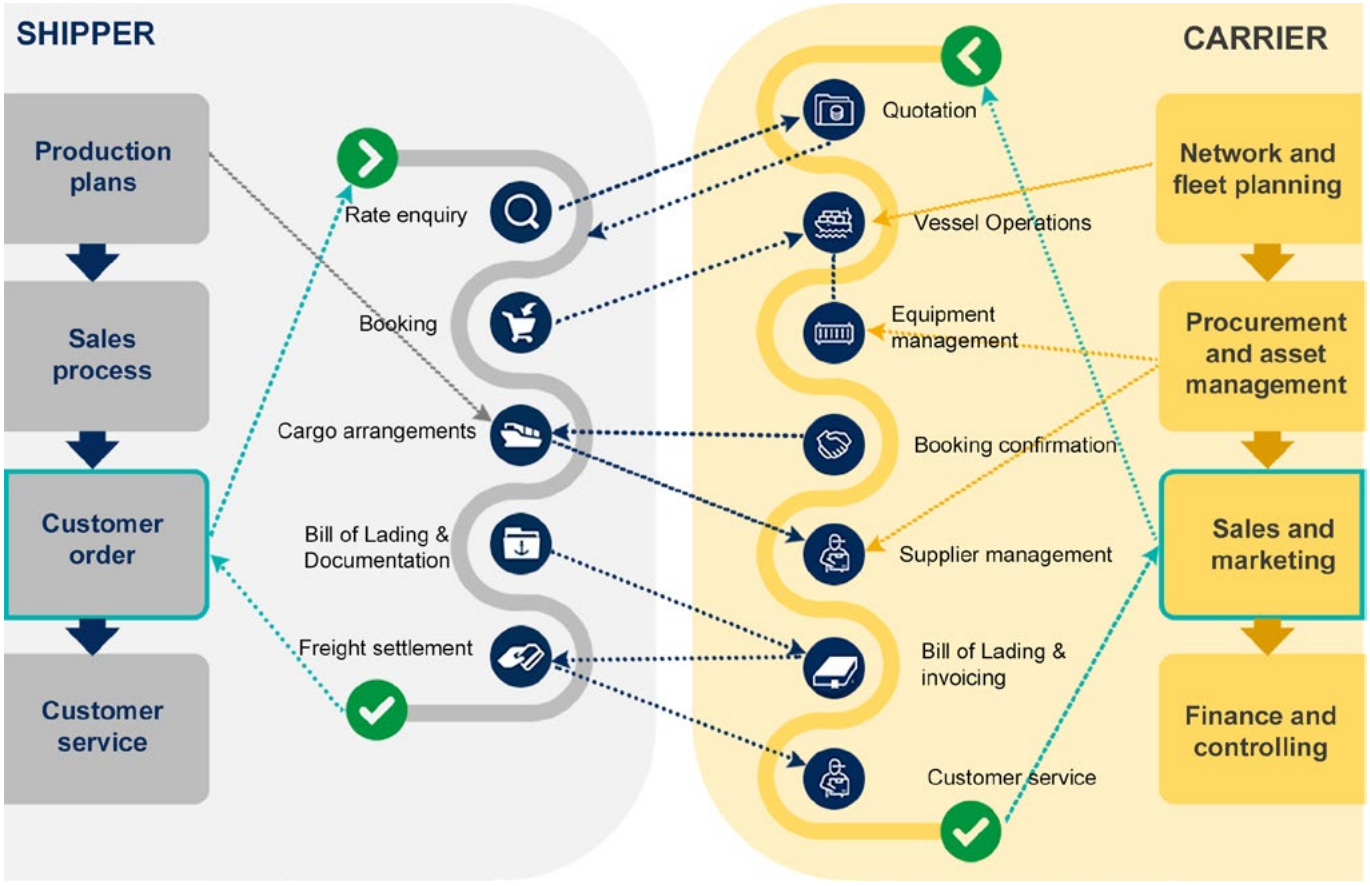
For IT providers, a platform which provides these forward negotiation capabilities would be the ideal starting point to also provide the ensuing requirements involving electronic booking, documentation, freight settlement and cargo visibility, thereby unlocking unparalleled scope and exciting opportunities to optimise their customer's ocean freight experiences.

2 Problem statement

The liner shipping industry has changed radically in the last few years. Key topics that are widely discussed are carrier concentration and vessel upscaling. At the same time, numerous digital start-ups have surfaced offering unprecedented price discovery capabilities, process efficiencies and cargo visibility. But none of these have dealt with the fundamental handicap of the liner shipping industry which deprives shipping lines of sustainable profits and leaves their customers wanting for reliable pricing and service levels. That handicap is the **structural mismatch of supply and demand**, which operate in fundamentally different time zones with only very limited overlap.

This mismatch between supply and demand is unpacked in sections 3.1 through 3.3 and illustrated in Exhibit 1 which represents the main interactions that take place in container spot markets and where they are situated in the organisations of shippers and carriers respectively.

Exhibit 1 **Main interactions that take place in container spot markets and where they are situated in the organisations of shippers and carriers respectively**



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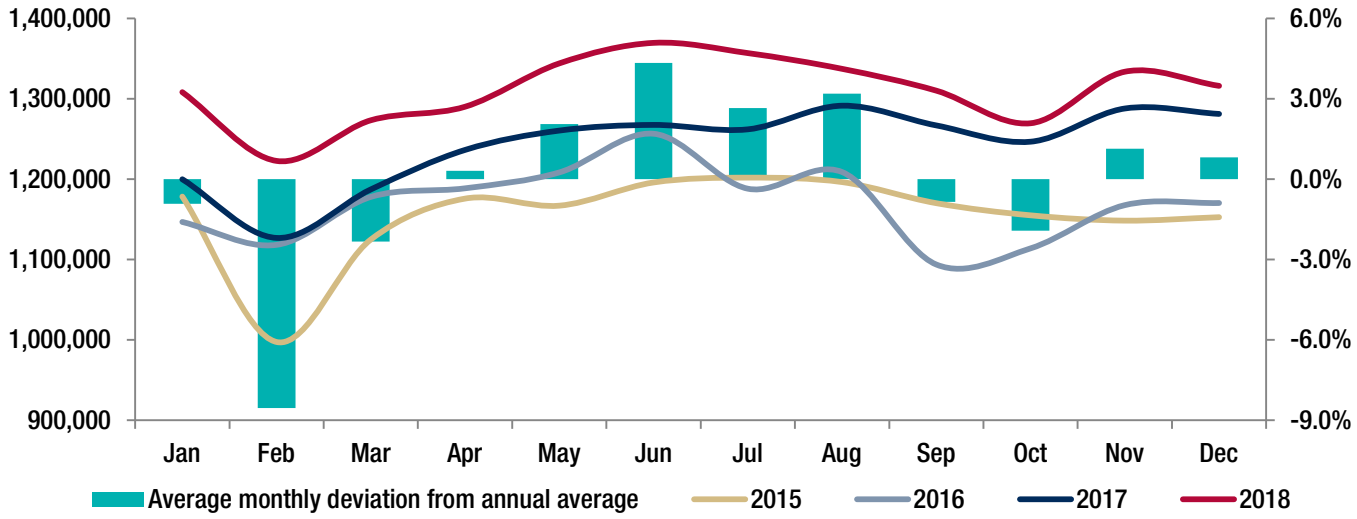
2.1. Vessel deployment schedules are too static

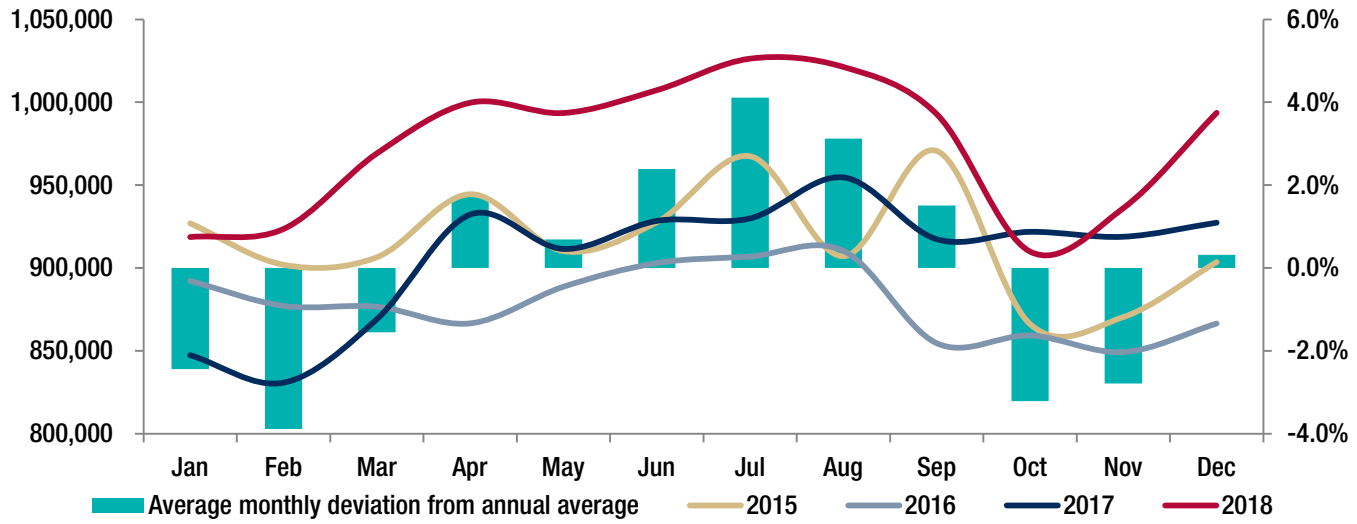
Ocean carriers' vessel procurement and network planning activities aim to bring **long-term stability** to the trade's service patterns, based on which efficient supply chains can be planned. Decisions that shipping lines make in this regard entail strategic repercussions on cost and service levels. Once the necessary trade-offs are reconciled and a plan is deployed, ocean carriers' only option to adjust supply to changes in demand is to fiddle with their vessel operations: adjusting a vessel's port time or port rotation, blanking a sailing or, in the extreme event, laying up ships to take out a complete string. These schedule amendments add to the 'normal' service disruptions due to weather, port conditions etc. and deteriorate the ocean carrier's service level, thereby undermining its competitive differentiation and ability to charge premium freight rates. Unsurprisingly then, shipping lines prefer to keep their vessels 'on schedule'. This is illustrated in Exhibits 2 and 3 which show that monthly supply on the Asia-West Coast North America and Asia-North Europe trades fluctuated with, on average, a standard deviation of 3.9% and 3.6% respectively over the past four years.

Exhibit 2 Monthly supply on the Asia-West Coast North America trade fluctuated with, on average, a standard deviation of 3.9% over the past four years



Source: Co-researched between Drewry and Cyberlogitec

Exhibit 3 Monthly supply on the Asia-North Europe trade fluctuated with, on average, a standard deviation of 3.6% over the past four years



Source: Co-researched between Drewry and Cyberlogitec

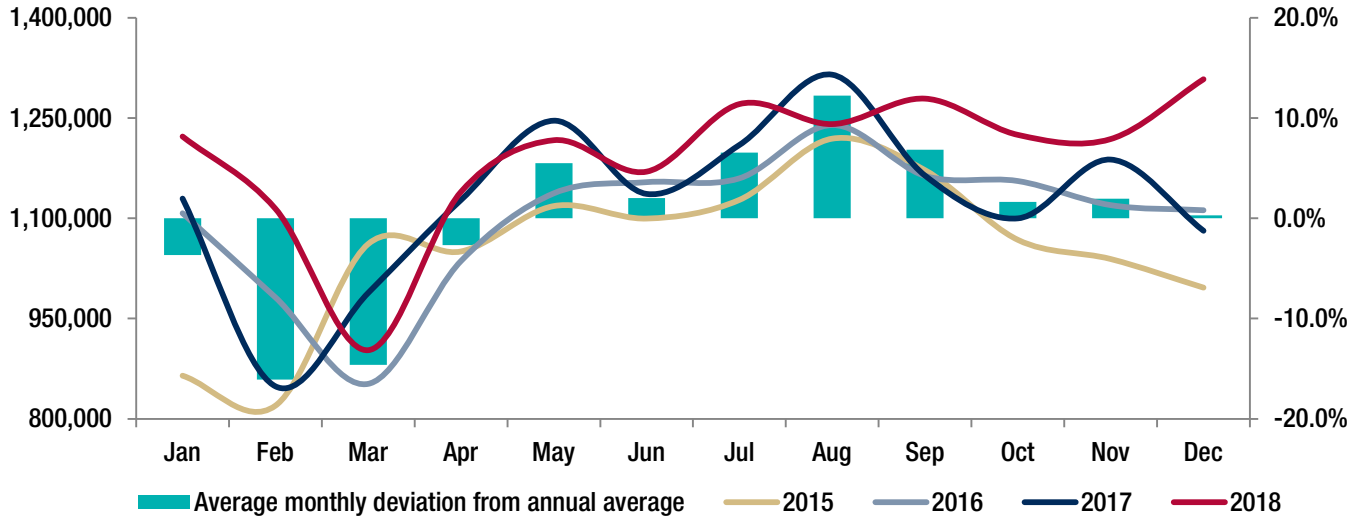
2.2. Shipping volumes are highly volatile and unpredictable

Demand patterns for consumer goods and semi-finished products display huge, **short-term variations** throughout any given year and 'regular seasonality' plays an ever-smaller role in the overall variability. Instead, political instability, exchange rate fluctuations, changing trade policies and weather patterns have taken centre stage over the last few years. That results in highly volatile and unpredictable demand numbers that are notoriously difficult to forecast.

Shippers and intermediaries like forwarders and NVOCCs that are large enough will try to ring-fence those volumes they can forecast with reasonable certainty and secure long-term service contracts for those volumes. This way, the 'contract market' provides some stability and predictability to the current markets. Still Drewry estimates that the 'spot markets', where cargo is booked on the short term and with very little visibility or predictability, account for about 45% of the volumes on the Asia-West Coast North America trade and even 70% on the Asia-North Europe trade.

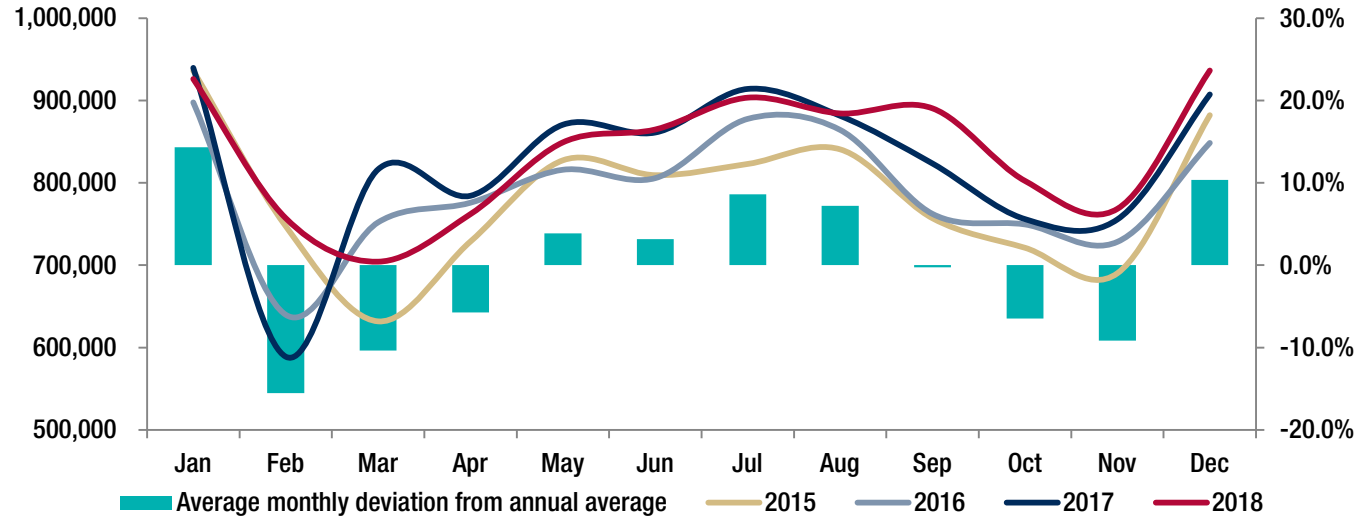
Exhibits 4 and 5 demonstrate that the variability in demand is almost three times larger than that of supply when measured on a monthly basis.

Exhibit 4 Monthly demand on the Asia-West Coast North America trade fluctuated with, on average, a standard deviation of resp. 10.0% over the past four years



Source: Co-researched between Drewry and Cyberlogitec

Exhibit 5 Monthly demand on the Asia-North Europe trade fluctuated with, on average, a standard deviation of 10.2% over the past four years

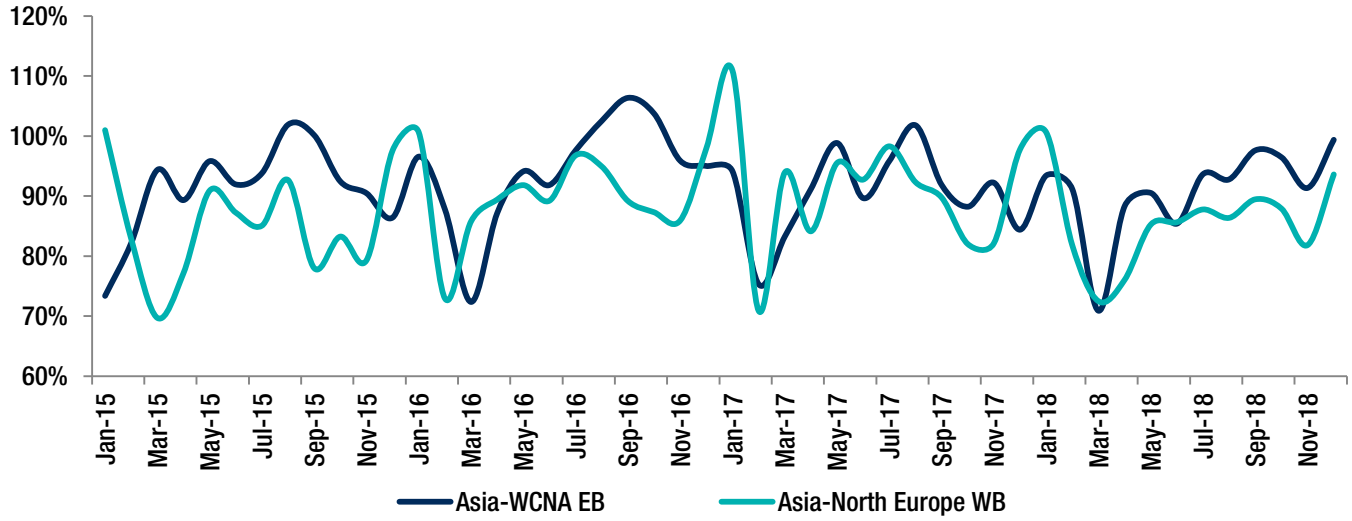


Source: Co-researched between Drewry and Cyberlogitec

2.3. Oscillating load factors cause freight rate volatility

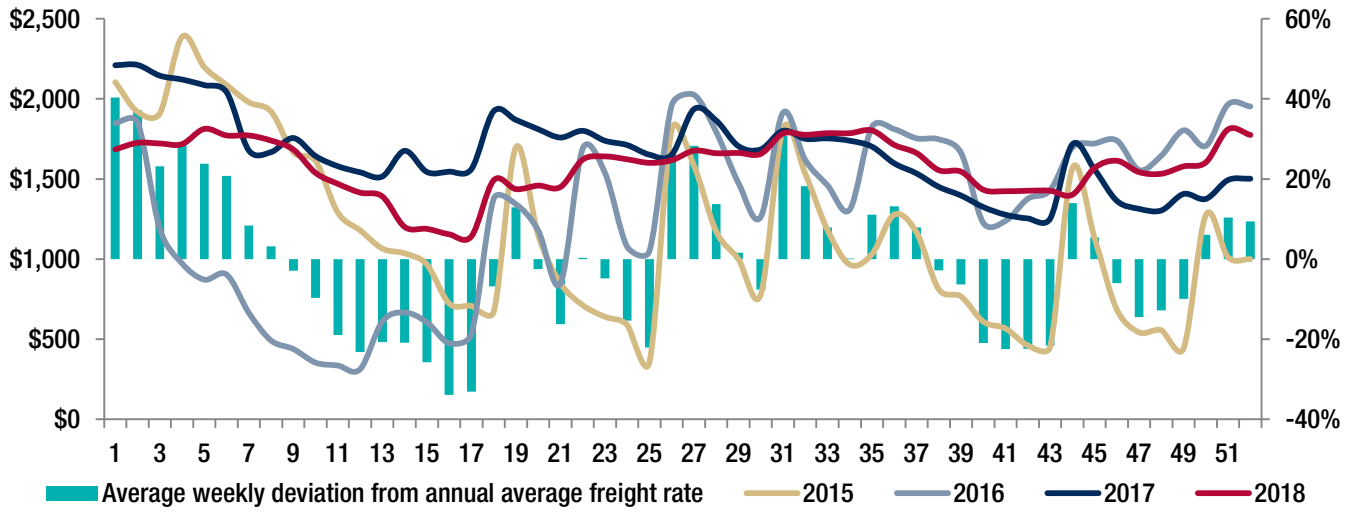
When volatile demand meets static liner services, vessel load factors oscillate. During periods of high vessel utilisation, shipping lines try to increase freight rates knowing that will not negatively impact the overall demand because the latter is largely price inelastic. But as soon as the demand curve dips, vessel utilisation levels fall. With vessel deployment, hence fixed costs, unable to flex with demand, ocean carriers are left chasing the same cargo and willing to drop freight rates towards the marginal cost of the extra containers . Both load factors and price volatility are displayed in Exhibits 6, 7 and 8.

Exhibit 6 Monthly load factors on the Asia-West Coast North America and Asia-North Europe trades fluctuated with, on average, a standard deviation of resp. 8.6 and 9.6% over the past four years



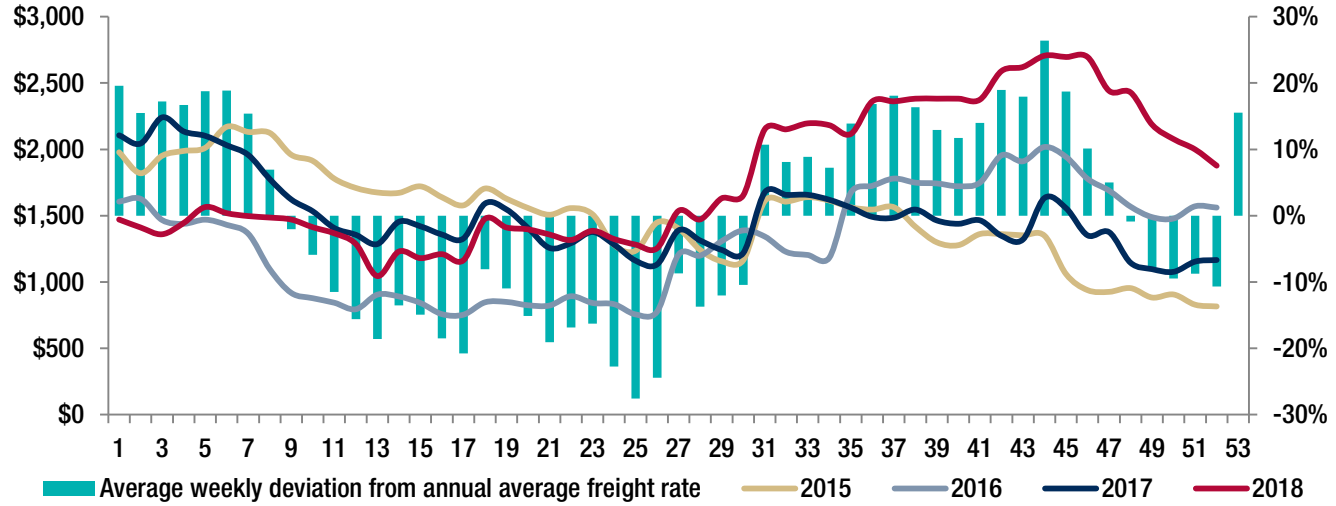
Source: Co-researched between Drewry and Cyberlogitec

Exhibit 7 Weekly spot rates on the Asia-West Coast North America trade fluctuated with, on average, a standard deviation of 25.5% over the past four years



Source: Co-researched between Drewry and Cyberlogitec

Exhibit 8 **Weekly spot rates on the Asia-North Europe trade fluctuated with, on average, a standard deviation of 27.9% over the past four years**



Source: Co-researched between Drewry and Cyberlogitec

Oscillating vessel load factors have led to industry practices that are aimed at short-term gains, but de facto worsen price volatility:

- **Over-bookings and double-bookings** are prevalent in the container shipping industry because charging 'dead freight' has never been industry practice and hence there is no penalty for last-minute booking cancellations. Particularly in certain industry verticals (for example waste and recyclable materials on backhaul trades) and seasons (for example: during peak season on headhaul trades), customers of liner companies may overbook if the actual shipment volume is uncertain but they want to make sure they reserve sufficient capacity for their customers; they may double-book to protect against the liner company's inability to deliver the required space or equipment, or to leverage their position to renegotiate freight rates at the last minute. Whatever the case, the amount of such phantom bookings often amounts to 20-25% of a vessel's total loadings.
- **Rollovers** occur when cargo was booked for a certain vessel, accepted by the shipping line, delivered to the deepsea terminal before the closing date and with all documentary requirements fulfilled, but still ends up not being loaded on the intended vessel and has to be rolled over to the next departure. This usually happens when the shipping line has over-booked a particular vessel or decides to stop the vessel's load and discharge operations before completion to reach the next port of call 'on time' and avoid costly and escalating delays. Drewry estimates that 3-4% of total worldwide shipments are rolled over.

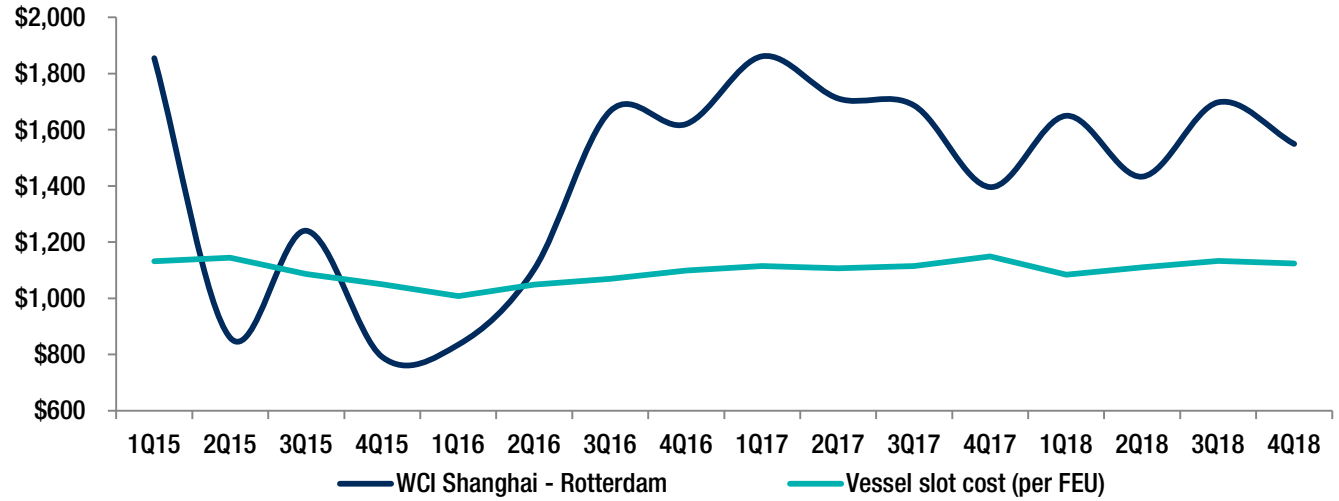
3 Why is freight rate volatility a problem?

Freight rate volatility is a major concern for all industry stakeholders.

For shipping lines, freight rate volatility has a negative impact at all levels of management. At the strategic level, the near impossibility to forecast and secure future revenues affects their cost of capital. On a more tactical level, shipping lines struggle to properly integrate cost fluctuations like bunker fuel or terminal handling costs into their prices. This causes erratic vessel P&L's driven by events that are largely outside of the lines' control. Even at the operational level, freight rate volatility poses challenges to shipping lines: the multiplication of quotes also multiplies the number of manual errors, and Drewry's 2018 Shippers Survey found that 66% of shippers are not satisfied with their shipping line's billing accuracy.

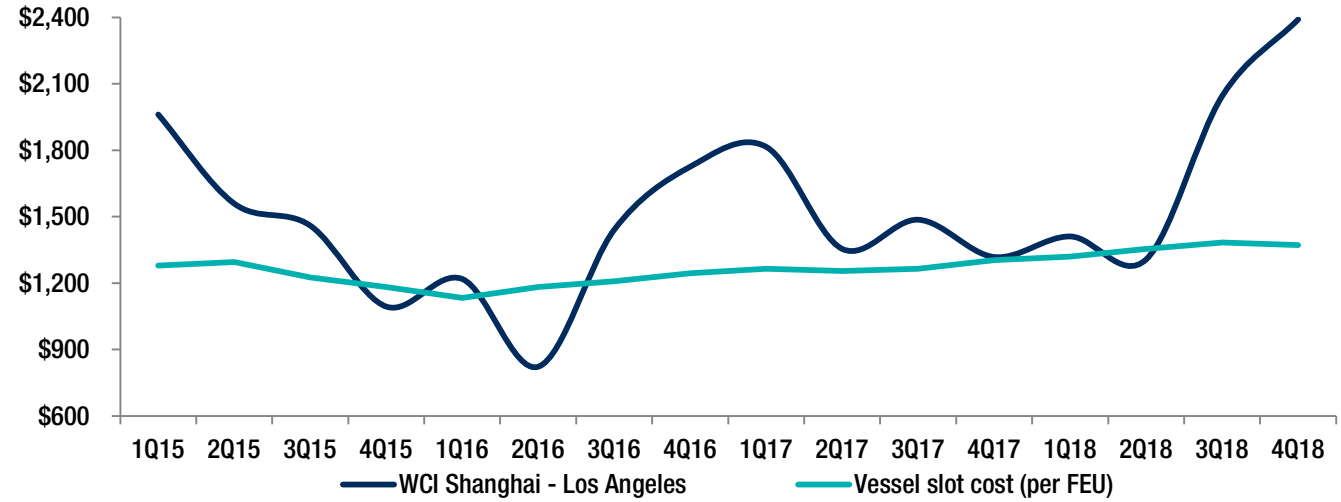
Exhibits 9 and 10 illustrate some of this by bringing together quarterly averaged spot rates and averaged vessel slot costs, calculated for the average vessel size deployed on that trade and global average bunker prices, for the Asia-North Europe and the Asia–West Coast North America trades.

Exhibit 9 Quarterly averaged World Container Index spot rates and slot cost for the Asia-West Coast North America trade



Source: Co-researched between Drewry and Cyberlogitec

Exhibit 10 Quarterly averaged World Container Index spot rates and slot cost for the Asia-West Coast North America and Asia-North Europe trades



Source: Co-researched between Drewry and Cyberlogitec

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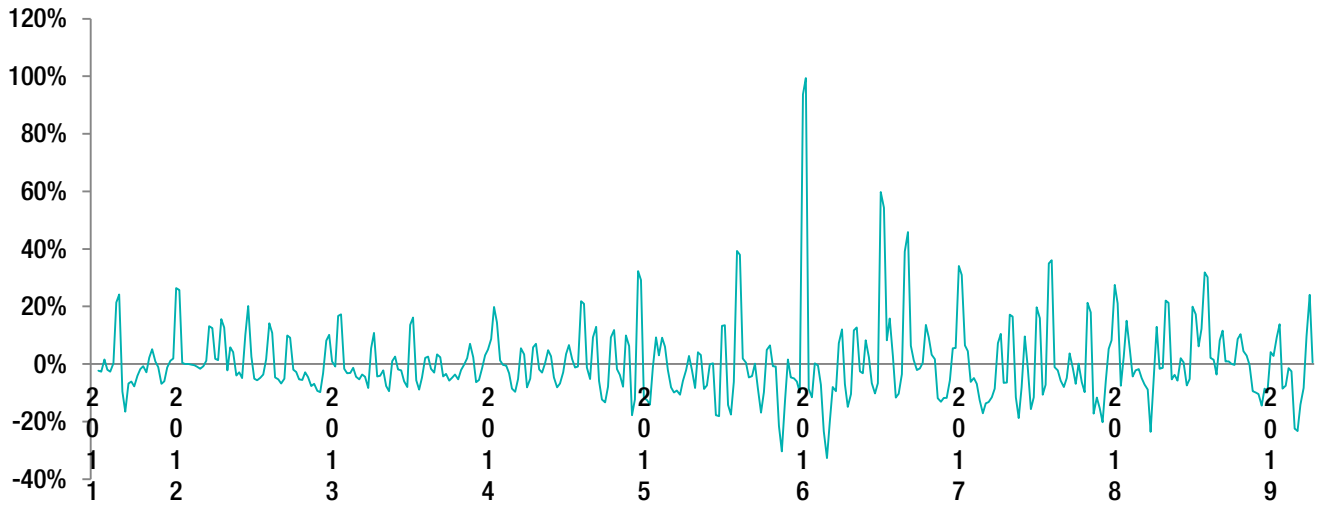
For shippers, the impact of freight rate volatility on their business is not as pervasive as it is for shipping lines. There is an inverse effect: where shipping lines have relatively fixed costs and freight rate volatility affects, arguably, 100% of their revenue streams, shippers have relatively stable revenue streams but see volatility in their costs. Typically, ocean transport cost makes up about 3 to 5% of the landed cost of a consumer product. So a shipper's exposure to the effects of freight rate volatility is smaller than for a shipping line but because most shippers fix their sales prices 6 to 12 months ahead, their product margins can be compromised by sudden ocean cost fluctuations. Only larger shippers can negotiate annual contracts with the shipping lines, and most of them will still have quarterly BAF clauses.

For forwarders, freight rates that change every week, at times even more than once, make selling ocean services with any sort of stable price tag impossible and cause huge amounts of administration to make sure their buying cost data is kept up to date and selling margins intact.

Analysis of historical spot market rates in Exhibits 7 and 8 quantifies the exposure market participants have when contracting freight rates, by displaying the changes in freight rate between the date of contracting (quotation) and the date when the cargo is loaded on board, which triggers the final price to be invoiced. Graph A shows the change in freight rate for a two-week time lag, which could be considered 'typical' for spot markets. Graph B shows the calculation for all possible time lags ranging between 1 and 52 weeks.

Unsurprisingly, the price variations tend to increase as the time lag becomes greater. But even in a two-week time frame, prices on the Transpacific trade may change by as much as 94% and on the Asia-North Europe trade even by 324%. On average, the two-week freight rate variations are 9.0% on the Transpacific Eastbound trade and 24.6% on the Asia-North Europe.

Exhibit 11 The change in freight rate between the time of contracting and the time of loading the cargo on board, for the Asia-West Coast North America trade, displayed in for a time lag of two weeks



Source: Co-researched between Drewry and Cyberlogitec

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Exhibit 12 The change in freight rate between the time of contracting and the time of loading the cargo on board, for the Asia-West Coast North America trade, displayed in for time lags ranging from 1 to 52 weeks

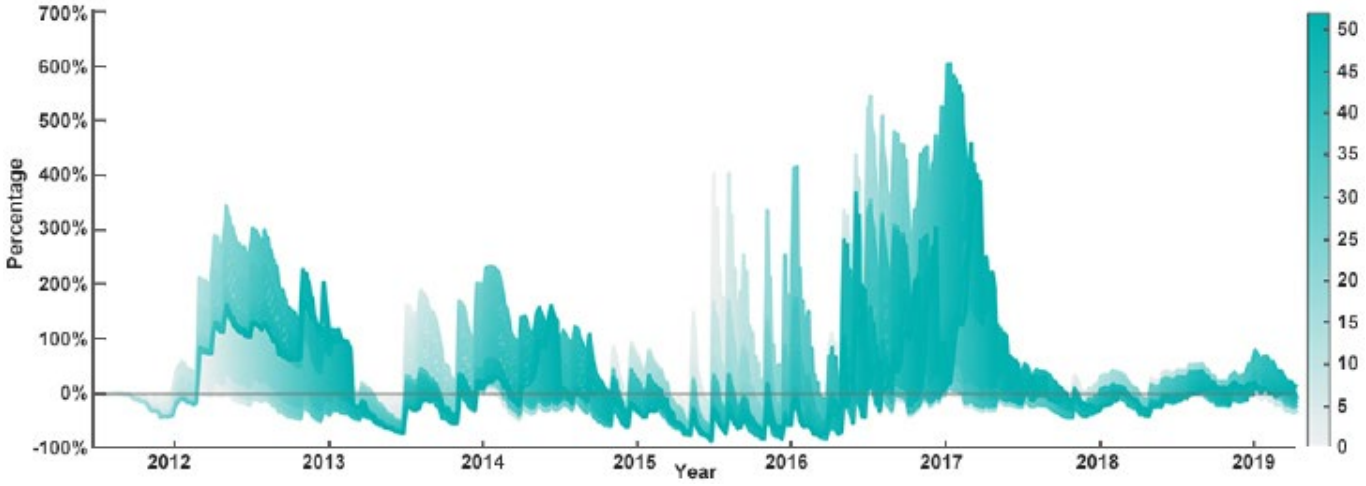


Exhibit 13 The change in freight rate between the time of contracting and the time of loading the cargo on board, for the Asia-North Europe trade, displayed for a time lag of two weeks

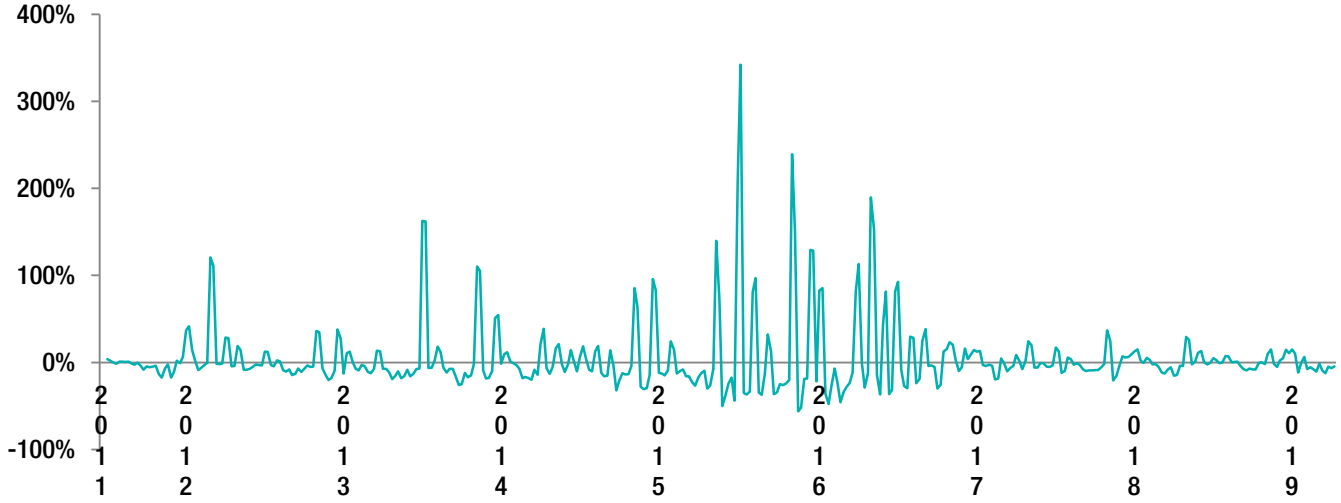
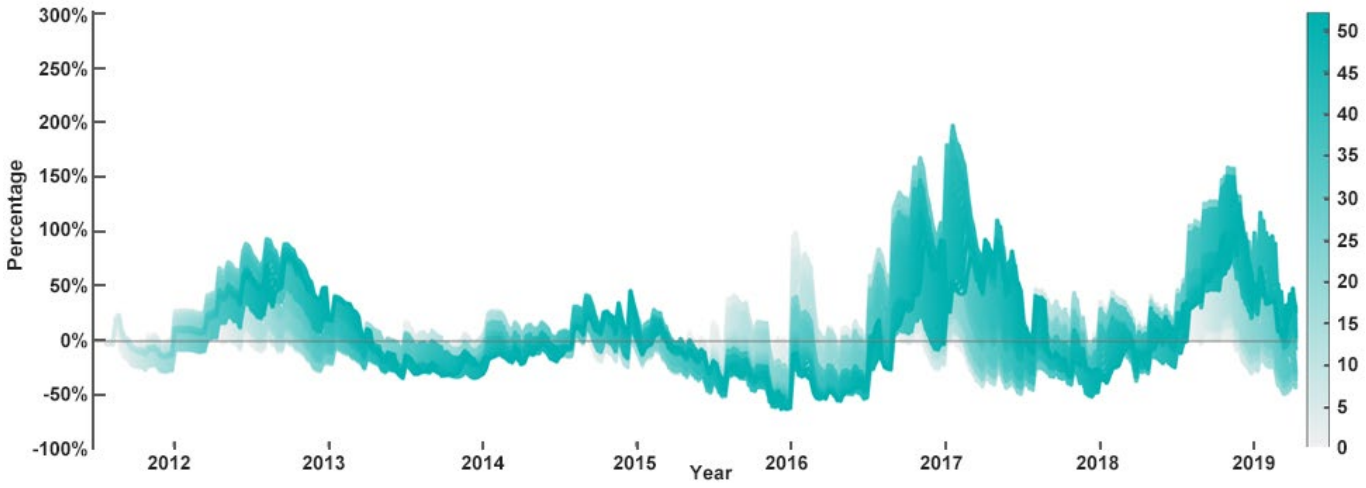


Exhibit 14 The change in freight rate between the time of contracting and the time of loading the cargo on board, for the Asia-North Europe trade, displayed for all lags ranging from 1 to 52 weeks



Source: Co-researched between Drewry and Cyberlogitec

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4 Can supply and demand be aligned through technology?

Any technology platform aiming to improve the alignment between supply and demand should be able to capture and visualise future demand earlier than is the case in the current spot markets. This could be achieved through online technology platforms where shipping lines and their customers meet to negotiate shipping contracts. Ideally, either party could post initial offers, the characteristics of which could be negotiated flexibly and dynamically; however, any final contract should contain a space guarantee and a volume commitment. These could be enforced via a deposit scheme. Any non-conformance should feed into a reliability scoring mechanism which identifies high and low performers in their future agreements.

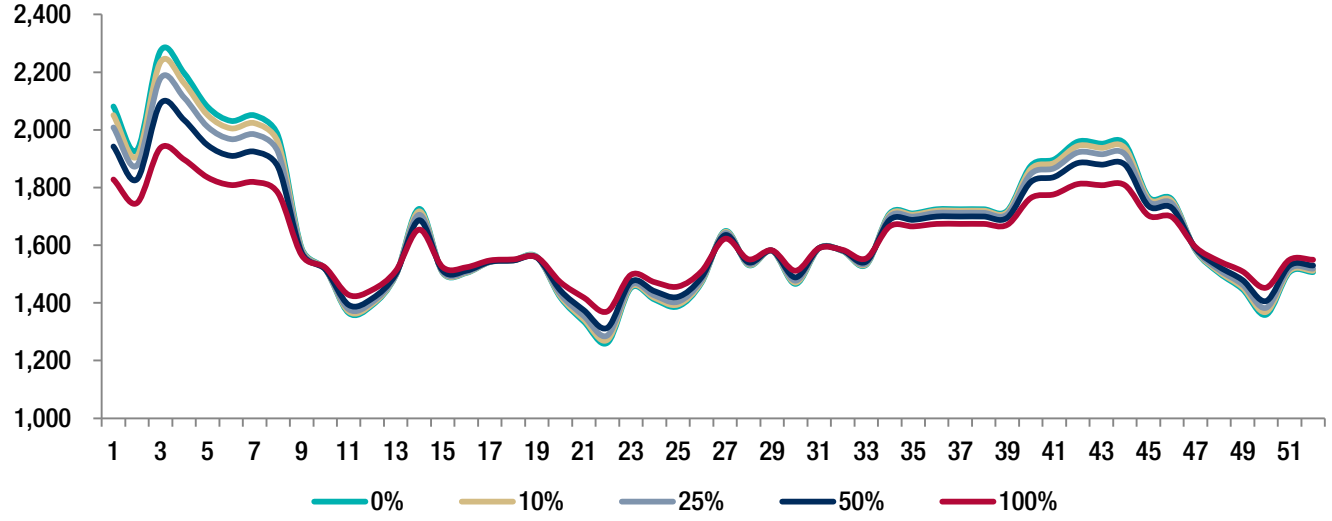
A flexible technology platform that connects shipping lines and their customers online to negotiate forward contracts, which offer a space guarantee and a volume commitment, both of which are enforced via a deposit scheme.

Such a platform would address the fundamental weakness of the current industry configuration: both shipping lines and their customers can agree contracts months in advance hence the common time frame within which supply and demand can collaborate is expanded compared to the current spot market. The early visualisation of demand and freight rates, underpinned by volume commitments, would help shipping lines in their revenue forecasting, capacity management and billing, while their customers would benefit from more reliable shipping services and reduced freight rate volatility.

Drewry has simulated the impact that the introduction of such a technology platform could have on current spot freight rates. First, we disaggregated the historically observed volatility into its two constituent parts: trend and seasonality. We then simulated spot freight rates for various degrees of adoption of a forward buying and selling capability in the spot market, assuming that at 100% adoption the seasonality would disappear from the freight rate and what remains is the trend.

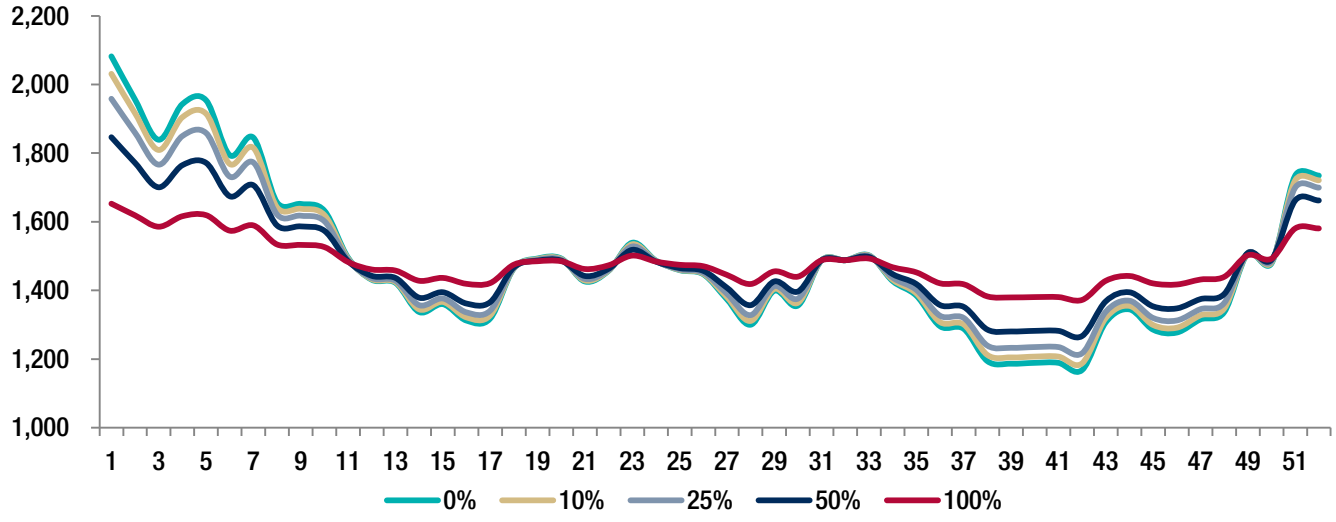
The results, as shown in Exhibits 15 and 16, show that as the adoption of the platform increases, overall freight rate volatility decreases. For example, in a rising freight market, which we simulate in Exhibit 15 for the route Shanghai – Los Angeles between weeks 31 and 44, the upward trend prevails regardless of the adoption rate, but the actual increase in freight rates is less as the adoption increases. At week 44, the rate increase from week 31 is $362 per 40ft without the platform. This increase shrinks to $218 (-40%) at 100% adoption. The effect in a bearish market is simulated in Exhibit 16 between weeks 31 and 42. At week 44, the fall in freight rates from week 31 is $143 per 40ft without the platform. This decrease eases to $46 (-68%) at 100% adoption.

Exhibit 15 Simulated freight rates on the Asia-West Coast North America trade with different rates of adoption of forward buying / selling technology reveal reducing freight rate volatility while maintaining the upward freight trend



Source: Co-researched between Drewry and Cyberlogitec

Exhibit 16 Simulated freight rates on the Asia-North Europe trade with different rates of adoption of forward buying / selling technology reveal reducing freight rate volatility while maintaining the downward freight trend



Source: Co-researched between Drewry and Cyberlogitec

A platform which provides these forward negotiation capabilities would be ideally placed to also provide the ensuing requirements involving electronic booking, documentation, freight settlement and cargo visibility.

5 Conclusions

In today's liner shipping market, many pain points could be addressed through a capability to flexibly buy or sell ocean freight services in advance, using a neutral, global platform. Volume commitments and capacity guarantees would provide an early visualisation of demand to the market, thereby **reducing the supply-demand mismatch and rate volatility,** to the benefit of all market participants:

- For shipping lines, forward selling of vessel slots, underpinned by volume commitments, would put them in a stronger position to forecast their revenues and reduce their cost of capital. The early visualisation of demand could also be linked to collaborative, dynamic capacity management and increase vessel load factors. The reduced freight rate volatility would assist in stabilising vessel P&L's and improve invoice accuracy. The ability to 'sell forward' will provide **an effective hedge against freight rate decreases.**
- For shippers and forwarders, the reduction in freight rate volatility and the ability to 'buy forward' would protect their product margins and provide an **effective hedge against freight rate increases**. Together with space guarantees, enforced through a deposit scheme and vendor reliability scores, this would result in more stable and elevated service levels of their ocean providers that enable reduction of safety stock levels. Forward buying ocean freight provides procurement teams with an additional ocean freight procurement tool with flexible timings, thereby improving the agility of their logistics management teams.
- For IT providers, a platform which provides these forward negotiation capabilities would be the ideal starting point to also provide the ensuing requirements involving electronic booking, documentation, freight settlement and cargo visibility. These items combined would provide a unique position in today's market place offering unparalleled scope and exciting opportunities to optimise their customer's ocean freight experiences by eliminating other pain points like:
  - Ambiguous freight agreements and extensive contract management efforts
  - Uncertain booking and cargo statuses
  - Unreliable contracts
  - Low documentation and invoice quality

6 List of Tables and Figures

Drewry

About Drewry Research

Drewry Maritime Research is the research arm of global shipping consultancy Drewry. The company has over 40 years' experience in the maritime sector and employs more than 90 specialists across its offices in London, Delhi, Singapore and Shanghai.

Our market research is renowned for its quality and is trusted by industry leaders around the world to deliver impartial, robust analysis and balanced opinion. This independence, alongside our sector knowledge and expertise, sets our research apart and gives clients the rich market insight they need to make informed business decisions.

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