XENETA

Xeneta — Estimating Rates for Ocean Freight

Providing rate coverage for the vastness of the global shipping network is a monumental task and, even with Xeneta's over 160 million freight rate data points to work with, delivering meaningful data for every port-to-port combination in the world is a challenge.

By applying data science methodology, Xeneta is able to take existing rate data, break it down into segments, and re-combine it to create estimated rates — a computed approximation of what a real price on a trade lane might look like.

Estimated rates aim to provide users with a basic level of understanding about trade lanes where contracted rate coverage is low.

Estimated rates allow the possibility for insight in cases that would lack clear answers without considerably more data, such as:

- **Assessing prices on a low-volume trade lane.** If Xeneta lacks contracted rates for a trade lane, estimated rates can be used as a starting point for understanding prices.

- **Exploring new opportunities on smaller lanes.** Estimated rates can serve as a baseline in negotiations for prices on smaller trade lanes.

1 Introduction

Calculating estimated rates is possible because the data associated with the ocean freight market suggests more about the market than can be seen at first glance. An example of this can be found by examining the Anqing, China (CNAQG) to Århus,

Denmark (DKAAR) trade lane, where Xeneta has enough freight pricing data to give our users an accurate price for shipping a container. Less than 100 km away from Århus lies the city of Federicia (DKFRC), and, unlike Århus, Xeneta processes almost no freight rate data for shipping done to and from Federicia.

By Xeneta's standard data methodology, it would be unlikely that we could provide our users with a rate for the Anqing–Fredericia trade lane, even if we have excellent coverage for a port just 100 km away. Yet from the sheer proximity of Federicia and Århus, one would expect that the price of shipping goods from either location to Anqing could not possibly be very different.

This idea that two nearby ports — and their associated shipping rates — are not altogether different from one another forms the basis for Xeneta's rate estimation approach.

2 The Shipping Process

Across the globe, container shipping is done in two ways:

- Main lane shipping (also known as deep sea shipping) — where containers are moved between regions through main ports on very large container ships; and

- Sub-port shipping (also known as feeder port shipping or short-sea shipping) — where containers are moved within regions through sub-ports on smaller ships

Main lane shipping is highly competitive: many carriers offer their services and prices change often as these shipping companies compete for customers. As a result of this competition, Xeneta processes significant amounts of main lane rates and can provide accurate and valid information to our customers as a result.

Conversely, shipping to and from sub-ports, due to its regional nature, sees fewer competitors and more stability in prices for shipping containers. However, less competition results in fewer available rates for Xeneta — often leading to less coverage for certain sub-port shipping lanes.

To add to the confusion, freight rates do not always contain comprehensive port-to-port pricing information.

Returning to our earlier example, the total price to ship from Anqing, China to Århus, Denmark can be broken down into the following segments:

• Anqing (CNAQG) → Shanghai (CNSGH) (sub-port to main port)

• Shanghai (CNSGH) → Hamburg (DEHAM) (main port to main port)

• Hamburg (DEHAM) → Århus (DKAAR) (main port to sub-port)

The total shipping price of a container will therefore contain the price of transport from main port to main port and two additional prices to move containers to and from sub-ports. The price of shipping a 40-foot container between the ports based on data gathered on August 12, 2019, can be seen below:

• Anqing → Shanghai → Hamburg → Århus
($225) ($924) ($643)
Total = $1792

Yet, in most cases, the freight rate for the Anqing–Århus trade lane will be treated as a single number. Each port along the way from origin to destination will be factored into the whole price of shipping a container instead of being listed separately.

• Anqing → Århus
($1792)

3 Estimating Rates Part I: Sub-Port Prices

Nonetheless, even if a freight rate is not broken down to its segments, it can still be used to extract valuable pricing information related to the shipping of a container.

To illustrate Xeneta's methods for calculating prices of moving containers through sub-ports, we'll examine two scenarios where we want to estimate the price of shipping a container to Oslo (NOOSL) from Hamburg (DEHAM) without knowing the direct shipping price on the Hamburg–Oslo shipping lane.

We can visualize the shipping route from Shanghai, China to Oslo, Norway in terms of distance:

S →→→→→→→→→→→→ H →→→ O

The length of the arrow is representative of the combined value of price and distance associated with shipping a container. Let S represent Shanghai, H represent Hamburg, and O represent Oslo.

Scenario 1

The simplest rate estimation approach is based on having two rates, where one rate

can be said to contain the other. For example, the following two rates represent shipping from Shanghai to Hamburg and Oslo.

Rate 1: Shanghai → Hamburg ($1623)

S →→→→→→→→→ H

Rate 2: Shanghai → Oslo ($2271)

S →→→→→→→→→→→→→ O

At first glance, the two rates seem incomparable — goods are shipped from Shanghai to two different European ports. However, Hamburg is a main port, and Oslo is a sub-port, meaning that containers coming into Oslo will likely pass through Hamburg on their way there.

Therefore, the full freight rate for the Shanghai–Oslo lane can be viewed as containing a sub-port price along with a main lane price within a single freight rate. We can thus approximate the price of shipping a container from Hamburg to Oslo with the following equation:

Estimated Sub-Port Rate (Hamburg to Oslo) = Rate 2 - Rate 1

S →→→→→→→→→→ O (Rate 2) ($2271)

−

S →→→→→→ H (Rate 1) ($1623)

=

→→→ O (Estimated Rate) ($648)

By subtracting the price of the shorter ocean voyage (Shanghai to Hamburg) from the price of the longer one (Shanghai to Oslo), we are left with an estimate of what it might cost to ship a container from Hamburg to Oslo.

This is possible because we know that there is no direct route between Shanghai and Oslo. This means that the freight rate between Shanghai and Oslo likely contains a sub-port rate at some point in its journey. By removing the main lane rate, we can say that the remaining price is a good analogue for the sub-port shipping rate between Hamburg and Oslo.

Scenario 2

A more complex variant involves the calculation of sub-port prices from several similar rates on the same lane. For example, let's say we have two different rates between Shanghai and Hamburg, and one rate between Shanghai and Oslo.

Rate 1: Shanghai → Hamburg

S →→→→→→→→→→ H

Rate 2: Shanghai → Hamburg

S →→→→→→→→→→→→ H

Rate 3: Shanghai → Oslo

S →→→→→→→→→→→→→→→ O

Simply subtracting Rate 2 or Rate 1 from

Rate 3 will give us two possible prices for the shipping of a container from Hamburg to Oslo. However, a more conclusive single price can be generated by first averaging the similar rates and then subtracting them from the remaining rate.

Averaged Rate = (Rate 1 + Rate 2)/2

S →→→→→→→→→ H (Rate 1) ($1536)

S →→→→→→→→→→→ H (Rate 2) ($1656)

=

S →→→→→→→→→→ H (Averaged Rate) ($1596)

Estimated Rate = Rate 3 − Averaged Rate

S →→→→→→→→→→→→→ O (Rate 3) ($1940)

−

S →→→→→→→→→→ H (Averaged Rate) ($1596)

=

→→ O (Sub-port Rate) ($344)

The example above must be understood as illustrative.

At Xeneta's scale, sub-port rates are not generated from simple averages as such.

A realistic sub-port rate calculation involves an analysis of numerous rates, which are further limited by specific criteria — described in Section 4 — to ensure that rates are possible to compare.

The resulting datasets often result in an over-determined system, and its solution, reached using the Least Squares Method, serves as the approximated price for the shipping done through the sub-port.

4 Estimating Rates Part II: Comparison Criteria

To create accurate estimated rates, it is important to consider the conditions that inform freight shipping prices. As freight moves between ports, no two prices for shipping will be the same and any number of conditions can change prices in a short time-frame. When calculating sub-port prices, and later, when constructing whole estimated rates, Xeneta uses a set of criteria to ensure that every segment of an estimated rate is comparable to another.

The criteria for selecting appropriate candidates for constructing estimated rates are as follows:

1. The rates share the same supplier — different suppliers use different pricing schemes, and cannot be mixed together to provide an estimated rate.

2. The rates share the same shipper — every shipper has different requirements

for their freight. Some shippers may prefer a lower price and a longer delivery time, while others may pay more to have priority shipping. To keep rates comparable, the same shipper will be used throughout rate estimation.

3. The rates use the same equipment type — prices for shipping 40' containers differ from 20' reefer containers, so rates across different equipment types will never be used.

4. The start of the contract period for all rates must be sufficiently close — for rates to be comparable, they must occur within a reasonable window of one another. Mixing today's rates with rates from a year ago will not produce an accurate rate estimate.

If enough rates remain in the pool of candidates after the above criteria have been applied, then they can be used to build an estimate. If the criteria result in too few available rates for the creation of an estimate, Xeneta will not offer any estimated rates to the user.

5 Estimating Rates Part III: Combining Segments

Now that we understand the methodology for choosing appropriate candidate rates and deriving sub-port prices, we can examine how these calculations can be combined with known contracted rates to create complete freight rate estimates for trade lanes lacking direct coverage.

In this approach, we'll examine a scenario where a few actual contracted rates are used to create useful estimates. In this scenario, Xeneta has several rates available for two trade lanes:

1. Anqing, China (CNAQG) to Hamburg, Germany (DEHAM)

2. Shanghai, China (CNSGH) to Gothenburg, Sweden (SEGOT)

In both cases, Xeneta can provide accurate freight rate data to its customers. However, Xeneta has no pricing data available between Anqing and Gothenburg — any customer wanting to know the cost of shipping on this uncommon trade lane would be left without an answer.

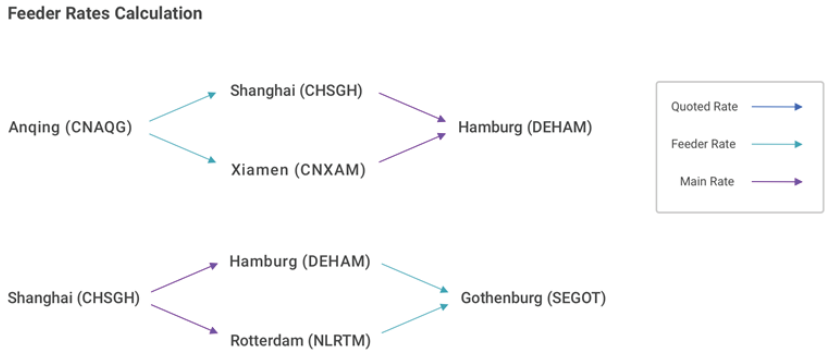
Nonetheless, by leveraging estimated rates, Xeneta can construct a rate for the

Anqing–Gothenburg trade lane that is representative of the real-world market.

We can illustrate the above-mentioned rates with a diagram:

The quoted rates above are not reflective of the fact that the actual shipping routes would include movement from sub-ports to main ports, such that a container being shipped from Anqing would pass through either Shanghai or Xiamen (CNXAM) on its way to Hamburg.

Similarly, a container shipped out of Shanghai would travel through Hamburg or Rotterdam (NLRTM) on its way to Gothenburg. As such, the above routes can be represented by their sub-port and main port shipping segments as follows:



As discussed in Section 4, each port-to-port combination represented here shares the same supplier, carrier, equipment type, and contract validity window. If this were not the case, it would not be possible to proceed with the creation of estimated rates.

With this information prepared, we can use the method described in Section 3 to subtract known main lane prices from the Anqing–Hamburg and Shanghai–Gothenburg trade lanes to determine approximate prices for:

- Anqing to Shanghai
- Anqing to Xiamen
- Hamburg to Gothenburg
- Rotterdam to Gothenburg

Next, we can examine Xeneta's rate database to find contracted rates for popular

trade lanes, which include:

- Shanghai to Hamburg
- Xiamen to Hamburg
- Shanghai to Hamburg
- Shanghai to Rotterdam

Then by combining all the available routes above, which include approximated sub-port prices as well as known main lane prices, we can generate the following estimated rates:

With this, Xeneta can offer up to 12 different estimated trade lane rates based on the actual information of only two lanes. From these 12, there are 4 estimated rates from Anqing to Gothenburg by way of Xiamen, Shanghai, Hamburg, and Rotterdam.

This very same approach can be repeated with different parameters — for instance, a different supplier or shipper — to generate even more estimates, including additional ones for the Anqing to Gothenburg trade lane.

In this way, estimated rates offer a way forward on trade lanes that would have previously been completely without freight rate data.

Viewing Estimated Rates

In the Xeneta app, estimated rates appear automatically when the appropriate conditions are met. Estimated rates can be viewed as a search result from the location search on the dashboard, or directly on the Benchmarks and Trends graphs, when

when available. In many cases, estimated rates appear as a companion to regional rate prices when Xeneta does not have enough valid data to show port-to-port contracted rates.

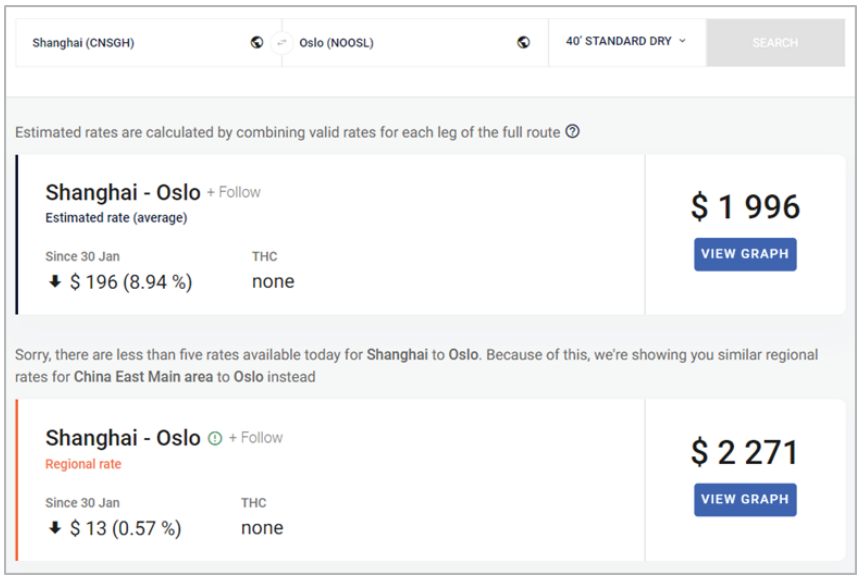


Figure 1: An estimated rate for the Shanghai to Oslo trade lane and a comparable regional rate for the China East Main to Oslo trade lane.

When viewed on the Trends graph, estimated rates can be toggled to appear alongside the other market positions, like the market average, made available by Xeneta.

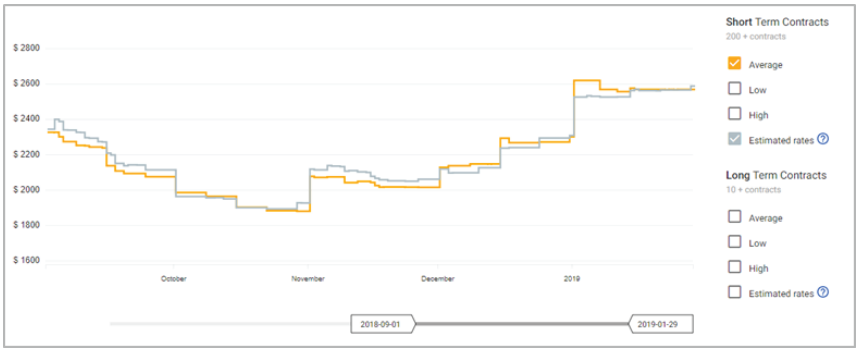


Figure 2: An estimated rate (gray) compared against a regional contracted rate (yellow) for the Anqing, China to Oslo, Norway trade lane.

Conclusion

By approaching ocean freight data in a new way, Xeneta is able to create rate estimates for many trade lanes across the world — especially trade lanes that see very little shipping volume.

Estimated rates are backed by Xeneta's data science and produce prices that closely correlate to actual trade lane prices. They are calculated by taking comparable trade lane rates, breaking them into rate segments, and connecting the segments to form whole routes that express a new total rate.

Estimated rates serve as a good first step for exploring freight prices in low-volume trade lanes. In cases where Xeneta can only provide regional coverage instead of port-to-port coverage, estimated rates offer additional insight into the state of the freight market. Ultimately, estimated rates are a novel application of Xeneta's data meant to help users better understand the freight market and stay informed in low-data situations.

GET IN TOUCH TO LEARN MORE
info@xeneta.com
xeneta.com