Impact of slow steaming for bulk carriers

Assessment of the impacts on transport costs for different ship sizes

Jakob Graichen
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London, 7 May 2019
Background

- Initial IMO GHG strategy:
  - 50% reduction compared to 2008 by 2050
  - Peaking as soon as possible
  - “use of speed optimization and speed reduction as a measure”
- Relationship between slower speeds and fuel consumption follows a cubic function:

<table>
<thead>
<tr>
<th>Speed reduction</th>
<th>5%</th>
<th>10%</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel savings</td>
<td>14%</td>
<td>27%</td>
<td>39%</td>
<td>49%</td>
<td>58%</td>
<td>66%</td>
</tr>
</tbody>
</table>

- Slow steaming most promising high-impact short-term measure to reduce GHG emissions from shipping
Impact of slow steaming on GHG emissions (dry bulk, oil tanker and container fleet)

Slow steaming and transport costs

- Crucial questions for
  - Exporting countries/industries: how will slow steaming impact their market position?
  - Importing countries (and especially SIDS): how will slow steaming impact consumer prices?
- Most studies assess the impact of CO$_2$ prices on the sector and nations (e.g. World Bank 2019, Vivid Economics 2010)
- Case studies have assessed the impact of slow steaming on exporting nations (e.g. CE Delft 2017)
- This study assess the impact of slow steaming on transport costs which affect both exporter’s market position as well as consumer prices
Slow steaming and transport costs

• Main contributors to transport costs:
  • Capital costs (purchasing or leasing of vessel)
  • Operational costs (crew, insurance, repairs, …)
  • Voyage costs (fuel, port charges, …)
  • Earnings of ship owner

• Longer transport times will lead to higher costs/trip for:
  • Capital costs, operational costs, earnings (proportional increase with time at sea)
  • Fuel costs for auxiliary engines (proportional increase with time at sea)

• Fuel costs savings (main engines) depend on the speed reduction (cubic relationship)
Methodology to model impact of slow steaming on transport costs

- Model calculates relative change of transport costs per trip
- All parameters are calculated as daily rates
- Distance does not affect relative results; absolute costs strongly depend on distance.
- Modelling for three different ship types and ranges for some parameters:

<table>
<thead>
<tr>
<th>Ship type</th>
<th>Fuel consumption</th>
<th>Auxiliary fuel consumption</th>
<th>Speed</th>
<th>Operation costs</th>
<th>Capital costs</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Panamax</td>
<td>37.7</td>
<td>10 (5 – 15)</td>
<td>13.8</td>
<td>5 700</td>
<td>2 700</td>
<td>10 000 (5 000 – 15 000)</td>
</tr>
<tr>
<td>Handysize</td>
<td>22.2</td>
<td>10 (5 – 15)</td>
<td>12.7</td>
<td>5 000</td>
<td>2 200</td>
<td>7 500 (4 000 – 12 000)</td>
</tr>
<tr>
<td>Capesize</td>
<td>55.5</td>
<td>10 (5 – 15)</td>
<td>13.6</td>
<td>6 700</td>
<td>5 500</td>
<td>12 500 (5 000 – 20 000)</td>
</tr>
</tbody>
</table>

Source: IMO (2014); Greiner (2017); Kemene (2018); UNCTAD (2018)

- Fuel price assumption: 500 (250-750) USD/ton
Impact of slow steaming on transport costs in the reference case

![Graph showing the relative change of total trip costs for different ship sizes (Handysize, Panamax, Capesize) with varying speed reduction.](Image)

- The graph illustrates the relative change of total trip costs (%) against speed reduction (%) for Handysize, Panamax, and Capesize ships.
- The x-axis represents the speed reduction percentage, ranging from 0% to 50%.
- The y-axis represents the relative change of total trip costs, ranging from -10% to 40%.
- The graph shows that as the speed reduction increases, the relative change of total trip costs increases for all ship sizes, with Capesize ships experiencing the most significant increase and Handysize ships experiencing the least.

Source: www.oeko.de
Impact of slow steaming on handysize bulk carriers

![Graphs showing the impact of speed reduction on trip costs for different scenarios: Baseline, High fuel costs, Low fuel costs.](image)

![Graphs showing the impact of speed reduction on trip costs for different scenarios: Baseline, High earnings, Low earnings.](image)

![Graphs showing the impact of speed reduction on trip costs for different scenarios: Baseline, High auxiliary, Low auxiliary.](image)
Impact of slow steaming on Panamax bulk carriers

Slow Steaming & transport costs | Jakob Graichen | London | 7 May 2019
Impact of slow steaming on Capesize bulk carriers

![Graphs showing the impact of slow steaming on total trip cost, with different scenarios: baseline, high fuel costs, low fuel costs, high earnings, low earnings, high auxiliary, low auxiliary.](Image)
Key messages

- For most scenarios slower steaming will bring down transport costs;
- Fuel price has highest impact on economic viability of slow steaming;
- Depending on the ship type there is a) an economically optimal speed (minimum) and b) a maximum speed reduction which would maintain transport cost (break even point);
- Impact on freight rates depends on the cost-pass through and might be smaller than the actual change of transport costs;
- Maritime transport costs contribute with less than 5% to consumer prices in most cases; small changes in either direction will not have a significant impact.
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Senior Researcher

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10179 Berlin
## Estimation of bulk freight costs for a selection of illustrative routes and different assumptions

<table>
<thead>
<tr>
<th>Round trip</th>
<th>Speed reduction</th>
<th>Typical speed</th>
<th>Days at sea</th>
<th>Reduced fuel consumption</th>
<th>Main engine</th>
<th>Auxiliary engine</th>
<th>Fuel consumption costs</th>
<th>Operation costs (other than fuel consumption)</th>
<th>Capital cost</th>
<th>Earnings</th>
<th>Total cost</th>
</tr>
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<td>0</td>
<td>60.5</td>
<td>-</td>
<td>37.7</td>
<td>33.8</td>
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<td>1,140,765</td>
<td>344,955</td>
<td>163,399</td>
<td>605,180</td>
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<td>181,554</td>
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<td>11.0</td>
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