INTERNATIONAL EMISSION REGULATION IN SEA TRANSPORT: ECONOMIC FEASIBILITY AND IMPACTS

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Research
Rationale/Aim

IMO/EU

- Developing an extensive legislative playing field
- Focusing stepwise reduction worldwide on Sulphur and NOx

Objective of legislation

- To provide an environmental benefit and health gains by reducing the hazardous emissions that international shipping produces.
Rationale/Aim

Actual and potential ECA zones

Source: Wärtsilä
Rationale/Aim

Potential negative effects for the maritime economy?

Two broad mechanisms for reducing emissions

- Alternative fuel
- Vessel retrofitting (retrofit-project.eu) or cleaner new vessels
  - Also slow steaming (reduces capacity)

Extra cost

- Ship owners must determine which method is the most cost efficient. (Miola et al., 2010)
- ECA zones have a cost effect
  (Johansson et al., 2013; Odgaard et al., 2013; Entec Consulting Ltd., 2010)
- Ship routes or landing ports may be affected by ECA zones
- Possibility of reverse modal shift?
Rationale/Aim

- To examine the potential effects upon the competition between European ports of the approaching international maritime emission regulations
- To analyse the potential underlying motivations fostering the discussion
A transversal study

- Economic
- Political
- Legislative
Research Questions

**Political playing field of the regulation**

- RQ1: Why are some European seas ECA-zones and others not (e.g. the Mediterranean)?
- RQ2: Why is the SECA emission cap fixed at the very strict 0,1%?

**Economic viewpoint**

- RQ3: Will the main container carriers re-route their vessels and adapt their strategies with respect to Northern-European port calls in favour of Mediterranean Ports?

**Legal viewpoint**

- RQ4: Which important legal issues have influence on the answer to RQ3.
Scope

Deepsea shipping

Big 5 container shipping operators

Europe

Westbound Asia Europe flow

sECA vs non-sECA
Methodology

- Qualitative research
  - Face to Face interviews
  - Public choice theory of Buchanan and Tullock
  - Olson's Logic of Collective Action

- Qualitative research
  - Face to face interviews
  - Shift Port Assessment Method

- Qualitative research
  - Becker's theoretical framework
Main results
Policy Discussions

RQ1: Why isn’t the Mediterranean Sea a sECA?

- Member states should have the will and conviction to persevere and enforce the sECA (Mortensen, 2010)
- Political instability and unresolved treaties in the Mediterranean.
- Maritime environmental discussions are unpopular in the region
Policy Discussions

RQ2: Why 0.1% standard for sECA’s?

- Geopolitical: become less dependent on oil
- Political: greening of public policies and public opinion throughout the Western world.

- Method: Public Choice theory – ‘rent seeking’
  - What? an economic and game-theoretic approach to decision-making
  - The winners are environmentalists and alternative fuel/technology manufacturers
  - Clean shipping Coalition obtained observer status at IMO, same level as EU
  - Do environmentalist always benefit?
    - Potential modal backshift may not be beneficial
Policy Discussions

RQ2: Why 0.1% standard for sECA’s? (2)

- **METHOD: Olson’s logic of collective action**
  - What? To explain the impact of interest groups / to look at member interests

- The members of Clean Ocean Shipping have a rather diverse profile (from fishery to emissions technology) making successful cooperation rather unrealistic.

- Petrochemical lobbies are very united and backed by vast resources of their members.
  - They can thus emerge as winners in such a strict legislation
  - May shift shore based sulphur-free production/supply to maritime
Economic Analysis: Ports and Port Competition

TEU/year for selected ports

Data source: Ports website
# Economic Analysis: Ports and Port Competition

Throughput /crane for selected ports

<table>
<thead>
<tr>
<th>Port</th>
<th>2008 Throughput</th>
<th>Cranes</th>
<th>2012 Throughput</th>
<th>Cranes</th>
<th>Throughput/crane</th>
<th>% Throughput/crane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mersin</td>
<td>854,500</td>
<td>19</td>
<td>1,260,000</td>
<td>12</td>
<td>44,974</td>
<td>105,000</td>
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<tr>
<td>Piraeus</td>
<td>431,056</td>
<td>16</td>
<td>625,914</td>
<td>12</td>
<td>26,941</td>
<td>52,160</td>
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<tr>
<td>Marseille</td>
<td>850,000</td>
<td>26</td>
<td>1,070,000</td>
<td>26</td>
<td>32,692</td>
<td>41,154</td>
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<tr>
<td>Barcelona</td>
<td>2,570,000</td>
<td>43</td>
<td>1,756,429</td>
<td>25</td>
<td>59,767</td>
<td>70,257</td>
</tr>
<tr>
<td>Port Said</td>
<td>3,202,000</td>
<td>31</td>
<td>3,631,000</td>
<td>31</td>
<td>103,290</td>
<td>117,129</td>
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<tr>
<td>Genoa</td>
<td>1,766,605</td>
<td>30</td>
<td>2,000,000</td>
<td>31</td>
<td>58,887</td>
<td>64,516</td>
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<tr>
<td>Antwerpen</td>
<td>8,633,736</td>
<td>77</td>
<td>8,629,992</td>
<td>84</td>
<td>112,126</td>
<td>102,738</td>
</tr>
<tr>
<td>Valencia</td>
<td>3,597,215</td>
<td>26</td>
<td>4,470,000</td>
<td>36</td>
<td>138,354</td>
<td>124,167</td>
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<tr>
<td>Tanger</td>
<td>920,708</td>
<td>12</td>
<td>1,900,000</td>
<td>28</td>
<td>76,726</td>
<td>67,857</td>
</tr>
<tr>
<td>Hamburg</td>
<td>9,737,000</td>
<td>81</td>
<td>8,880,000</td>
<td>91</td>
<td>120,210</td>
<td>97,582</td>
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<tr>
<td>Rotterdam</td>
<td>10,784,000</td>
<td>90</td>
<td>11,800,000</td>
<td>128</td>
<td>119,822</td>
<td>92,188</td>
</tr>
<tr>
<td>Le Havre</td>
<td>2,488,654</td>
<td>30</td>
<td>2,310,000</td>
<td>40</td>
<td>82,955</td>
<td>57,750</td>
</tr>
</tbody>
</table>

Data source: Ports website
Economic Analysis: Ports and Port Competition

RQ3: Will ports shift and/or reverse modal shift occur?

**METHOD: Port Shift Assessment Method**

**What?** to calculate the cost increase associated with sailing through a sECA

**Cost?** The total logistics cost in port selection decisions

- on the Shanghai-Antwerp trajectory, the cost increase is within a range of 2.15% and 2.66% depending on the sailing speed and fuel price scenario.
- the sailing speed has a higher impact than the fuel price.
- the percentage of the cost increase is lower than in most studies
  - most studies focused on shortsea shipping, where commercial speed is very important and a far greater percentage of the sailing distance needs to be covered with low sulphur fuel
- the higher maritime trajectory cost is compensated for by the lower road transport cost
Economic Analysis: Ports and Port Competition

RQ3: Will ports shift and/or reverse modal shift occur?

Criteria
- Transportation costs
- Transit times
- Quality
- Frequency
Economic Analysis: Ports and Port Competition

RQ3: Will ports shift and/or reverse modal shift occur?

METHOD: interviews

<table>
<thead>
<tr>
<th>Opportunities and Chances</th>
<th>Weaknesses and Pitfalls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closer to Asia</td>
<td>Geography (mountains, locations...)</td>
</tr>
<tr>
<td>Liberalisation creates dynamism</td>
<td>Social tensions and strong unions</td>
</tr>
<tr>
<td>Not as congested as the North</td>
<td>Few barge connections</td>
</tr>
<tr>
<td>North-African hinterland and market</td>
<td>North-African competition</td>
</tr>
<tr>
<td>Rising capacity</td>
<td>Old infrastructure and less capacity</td>
</tr>
<tr>
<td>New initiatives</td>
<td>Lack of cooperation and perseverance</td>
</tr>
<tr>
<td>Wants to develop logistical chains</td>
<td>Few green strategies</td>
</tr>
<tr>
<td>Potential grower</td>
<td>Stays number two in Europe</td>
</tr>
<tr>
<td>Does not border a sECA-zone</td>
<td></td>
</tr>
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</table>
Legal viewpoint
RQ4: Is the current enforcement regime is efficient or not?

METHOD: Becker’s theoretical framework

What? to explain why people decide to violate or not to violate a certain regulation

A shipping company will violate the regulations when the associated benefits exceed the costs and when utility is maximized.

No guidelines for implementation → a number of different enforcement regimes
Ship operators with a great amount of uncertainty.
Ships inspections are limited to a verification of the documents
- bunker delivery notes
- analysis of fuel samples
Concluding remarks

Transversal study

- The petrochemical lobby much more than the green lobby is the driver behind emission caps at sea.
- The shift from Southern-European to Northern-European ports as a consequence of emission zones at sea will be rather limited.
- The main liner companies seem well prepared to deal with the upcoming emission zones in their current strategies.
- MARPOL enforcement is to be improved.
Thank you for your attention

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