The expected impacts of a maritime MBM[1] on global food prices and outline of proposed options to mitigate these impacts on the most vulnerable

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Dr Andre Stochniol[2]

Executive Summary

The expected maximum cost impact on food prices from a global market-based measure (MBM) for greenhouse gas emissions (GHG) from international maritime transport (maritime MBM) is estimated at circa 0.3%. This is equivalent to less than $3 for every $1,000 value of imported food, a relatively low cost impact. The cost impact may be lower as any benefits and transport cost reductions arising from the MBM are not included in the estimates, and also because a high cost scenario is used to derive the maximum impact, in which MBM costs are assumed to be equivalent to 10% of bunker fuel price.

The only option being formally considered in the multilateral process to directly mitigate the expected cost impact of an MBM on the most vulnerable is to at least compensate the net costs (net incidence) unconditionally through the Rebate Mechanism. Excluding certain product categories and/or destinations, although potentially feasible, may not necessarily mitigate the cost impacts given that higher freight rates elsewhere in the world would likely filter through to the excluded areas, given that ships can be deployed anywhere, and taking into account transhipments. Instead such exclusions may even increase rather than decrease the cost impact, given that some of the rebate (compensation) may not be warranted while the vulnerable countries may still be impacted by some unscrupulous companies, which would be profiting from the exclusions designed originally to protect the most vulnerable.

1 Impact on global food prices

A maritime MBM may increase the cost of shipping food by sea. As noted in the report of the Expert Group on the MBM, established by the International Maritime Organization (IMO; see document MEPC61/INF.2), increased transportation costs have two direct effects on countries: increases in the price of imports and decreases in the competitiveness of their exports.

Increases in the price of imports will be particularly important for countries that import a significant proportion of their food supply and where expenditures on food are a large part of

[1] A maritme MBM means a global Market-Based Mechanism or Measure for greenhouse gas (GHG) emissions from international maritime transport, such as a levy on shipping fuel or an Emission Trading System (ETS).

[2] The contents of this briefing note are the author's sole responsibility, E-mail: andre@imers.org.

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household budgets.[3] The decreased competitiveness of exports is of particular concern to export focused countries, but is not analyzed in this paper. [4]

Improvements in fuel efficiency of ships resulting from application of the MBM and the revenue raised could lower transportation costs over time. If trade routes serving a given destination are particularly long, this improved fuel efficiency would further contribute to lower the overall costs associated with sea-borne trade serving distant markets. However, as these improvements are difficult to quantify, they are ignored in this note. Thus only the the first order impacts are considered and the results below proxy the maximum potential impact of the maritime MBM.

1.1 Analysis

Food in seaborne trade is transported on three main ship types: bulk (clean bulk), container, and tanker.

The ad valorem transport costs (i.e. transport costs divided by the total import value, in short AV) and unit transport costs vary per commodity, and depend on the main type of ship used to carry the commodity as illustrated in Table 1.[5] These costs are derived from the Maritime Transport Costs (MTC) database, created by the Organization of Economic Co-operation and Development (OECD)[6], for all food-related top-level categories (chapters) in the Harmonized System code (HS 2, chapters 1-24).

Typically, the lower value goods, such as cereals (HS 10), have larger AV than high value goods. It is noted, that some of the product categories, such as live animals (HS 1), may be carried over long distances predominantly by air, while others practically exclusively by ships, such as cereals (HS 10), fruits and nuts (HS 8), and so on.

[3] Jane Korinek and Patricia Sourdin (2009), "Clarifying Trade Costs: Maritime Transport and its Effect on Agricultural Trade", OECD Trade Policy Working Papers, no. 92, OECD Publishing.

[4] It is noted though that when a carbon pricing or regulations is implemented at the destination markets for fuel and/or domestic transport, they would increase the cost of domestic products. Thus the implementationm of a maritime MBM may not decrease the competitiveness of seaborne exports and the relevant concerns may not apply, given that shipping is the most energy efficient mode of transport. Futhermore, the anticipated transport cost increases from a maritime MBM are likely to be much smaller than the increases due to rising fuel prices.

[5] It can also vary by source and destination of transport. The values used are averages from all data in the MTC database for 2007, covering circa a quarter of seaborne trade worldwide.

[6] The OECD MTC database is currently the most comprehensive databases of maritime transport costs. For details and certain caveats about the data see OECD 2010.

Table 1 *Maritime transport costs by product category and ship segment (source OECD MTC)*

HS Chapter	Description	Ad valorem AV, %	Unit Cost US$/Tonne	Ship Segment
1	Live animals	19%	821	Container
2	Meat	5%	168	Container
3	Fish	4%	172	Container
4	Dairy products, birds eggs, honey	3%	110	Container
5	Products of animal origin	6%	173	Container
6	Live trees, plants, bulbs, cut flowers	8%	250	Container
7	Vegetables	22%	154	Container
8	Fruit & nuts	13%	123	Container
9	Coffee, tea, mate & spices	4%	103	Container
10	Cereals	21%	58	Clean Bulk
11	Milling products, malt, starch	11%	70	Container
12	Oil seeds and oleaginous fruits	16%	68	Clean Bulk
13	Lac, gums, resins	4%	135	Container
14	Vegetable plaiting materials	10%	65	Container
15	Animal or vegetable fats, oils	5%	62	Tanker
16	Preparations of meat, fish	4%	166	Container
17	Sugars and sugar confectionary	9%	52	Container
18	Cocoa and cocoa preparations	5%	149	Container
19	Preparations of cereals, starch, etc.	7%	174	Container
20	Preparations of vegetables, fruit, nuts	9%	108	Container
21	Miscellaneous edible preparations	4%	135	Container
22	Beverages, spirits and vinegar	5%	95	Container
23	Food industry residues & waste	25%	124	Container
24	Tobacco	3%	193	Container

For international transport, under global rules, MBM costs will generally be passed on to the end consumers through higher prices for delivered imports (and potentially lower returns to some exports delivered to countries with high domestic competition for such exports). Putting a carbon cost on shipping, through a levy on fuel or emissions trading, can be analyzed by considering the impact of raising fuel costs on freight rate, and subsequently passed on to the end consumers in proportion to the ad valorem transport costs.

Based on several econometric studies, the elasticity of freight rate to oil prices (as a proxy of bunker fuel costs) is used as shown in Table 2.

Table 2 *Elasticity of freight rate to oil prices (E)*

Clean Bulk	Tanker	Container
0.25	0.28	0.29

Data sources: Clean bulk – Vivid Economics 2010;
Tanker and Container – UNCTAD 2010.

According to the various scenarios for carbon and bunker prices investigated in the MBM-EG report (MEPC 61/INF.2), the MBM costs as a percentage of fuel cost (P) may range from 3% to 10%. Thus to estimate the maximum potential cost impact of an MBM, P=10% is used. As an example, for the average fuel price in 2007 of $431 per tonne of heavy fuel oil (HFO), a fuel levy of 43$/tonne of HFO would be equivalent to P=10%.[7]

To calculate the potential impact on commodity prices in chapters HS 1-24 it is assumed that 100% of freight cost is passed on to end consumers (importers).

The maximum potential price increase in each food category (C) is estimated by multiplying: the relative cost of MBM, expressed as an equivalent increase in fuel price (P), elasticity of freight rate to bunker prices (E) for a relevant shipping segment, and the ad valorem cost of transport (AV) per each category (HS 1-24). The formula is: C = P x E x AV.

Thus the maximum potential price increase of food-related products (categories HS 1-24), obtained using the formula for C and the relevant values in Tables 1 and 2, is shown in Table 3. The price increase of live animals is not calculated given that for most remote destinations live animals, if and when transported, are likely carried by air rather than by sea.

Table 3 *Maximum potential price increase of products carried by sea (author's calculations)*

HS Chapter	Description	Price increase C %
1	Live animals	-
2	Meat	0.2
3	Fish	0.1
4	Dairy products, birds eggs, honey	0.1
5	Products of animal origin	0.2
6	Live trees, plants, bulbs, cut flowers	0.2
7	Vegetables	0.6
8	Fruit & nuts	0.4
9	Coffee, tea, mate & spices	0.1
10	Cereals	0.5
11	Milling products, malt, starch	0.3
12	Oil seeds and oleaginous fruits	0.4
13	Lac, gums, resins	0.1
14	Vegetable plaiting materials	0.3
15	Animal or vegetable fats, oils	0.1
16	Preparations of meat, fish	0.1
17	Sugars and sugar confectionary	0.3
18	Cocoa and cocoa preparations	0.1
19	Preparations of cereals, starch, etc.	0.2
20	Preparations of vegetables, fruit, nuts	0.3
21	Miscellaneous edible preparations	0.1
22	Beverages, spirits and vinegar	0.1
23	Food industry residues & waste	0.7
24	Tobacco	0.1

[7] Equivalent to carbon price of circa $14/t CO2, as the emission factor for maritime HFO is just over 3.

The estimated maximum price increases vary per product category, being lowest for higher value products such as beverages and spirit at 0.1%, and circa 0.5-0.6% for cereals and vegetables.

The above results are in line with estimates for specific markets by Vivid Economics (2010). [8] For example, wheat import into South Africa represents 50% of South Africa's total consumption. In this case, wheat prices were estimated by Vivid Economics to increase by approximately 0.2% for the 2.5% increase in freight costs estimated to result from a 10% increase in the price of bunker fuel. For a different market in Kenya, Vivid Economics has calculated that a 10% increase in freight costs would raise bulk wheat prices in Kenya by around 0.4%.

An estimated maximum cost impact on a country from the increased prices for food products imported by sea depends on the value of imports in different HS 1-24 chapters. Based on calculations for Bangladesh and South Africa, this impact is anticipated to be circa 0.3% for most developing countries.[9]

An OECD study[10] found that it is more expensive to ship grains to smaller markets in developing countries than to larger markets. There are a number of reasons given: less competition on the shipping route; port infrastructure (more time spent unloading the cargo); imbalances in trade on some routes; and distance. The study suggests that distance from major grain exporters is a key determinant of shipping costs, but that other factors are important as well. Thus, even though that many small vulnerable developing countries have much smaller trade-weighted distances than South Africa and Bangladesh, their impacts on imports of food are likely to be comparable (these issues are also discussed in document GHG-WG 3/3/11).

As stated in the MBM-EG report (MEC 61/INFF.2), the potential impacts of the implementation of an MBM upon end consumers depend on the ability of the importers to pass on the increased costs. This, in turn, is partially affected by the existence of domestic production of that product. For countries with little domestic production, an increase in the price of imported goods will be more likely to be passed on to consumers than in the case of a country with a larger portion of the market supplied by domestic production. In this analysis, a maximum 100% cost pass-on rate was used to calculate maximum impact, irrespective of the domestic competition

Thus, in conclusion, the expected maximum cost impact on food prices from a global maritime MBM is estimated at circa 0.3% (average across all products in HS 1-24). This is equivalent to less than $3 for every $1,000 value of imported food products.

[8] In the study, Vivid Economics used a variable cost pass-on rate depending on the domestic competition for the imported product.

[9] For both Bangladesh and South Africa the impact on food prices imported by sea, overall across the HS 1-24 chapters, is estimated as 0.30%. Both of these countries are at the top 3 countries ranked by their trade-weighted distances (see GHG-WG 3/3/11), and thus selected for the detailed calculations. Furthermore, Bangladesh is a Least Developing Country importing a significant amount of food. For furher details see the additional paper “Bottom-up analysis of projected impacts on imports arising from a maritime MBM for Bangladesh and South Africa”.

[10] Jane Korinek and Patricia Sourdin (2009), "Clarifying Trade Costs: Maritime Transport and its Effect on Agricultural Trade", OECD Trade Policy Working Papers, no. 92, OECD Publishing.

2. Outline of proposed options to mitigate MBM cost impacts on the most vulnerable

Changes in freight rates due to the dynamics of the global food market appear likely to dwarf any increases due to a maritime MBM for GHG emissions. It could be argued that at this level, the potential cost impact of the MBM on seaborne trade is marginal. For an MBM applicable to a fraction of total emissions or at a fraction of the prevailing carbon price, the potential impact would be even lower.

However, as the import of food is essential for many of the most vulnerable countries, including most of the net food-importing developing countries[11] some sort of mitigation of MBM cost impacts on the most vulnerable is warranted.

The only officially proposed option being considered at the International Maritime Organization is to at least compensate the expected economic costs (or net incidence from the MBM) to the most vulnerable, unconditionally through the Rebate Mechanism (RM). The RM proposal, aims to ensure no net incidence on developing countries, and also provide additional financing for climate change action from developed countries. It has recently generated a significant interest at the IMO from a number of developed and developing countries.[12]

One reason for the lack of other proposals is the complexity and inherent global character of international shipping. Excluding certain product categories and/or destinations from the MBM, although potentially feasible, may not necessarily mitigate the cost impacts on the most vulnerable. The reason is that higher freight rates elsewhere in the world (for essentially the same ships, cargo) would likely filter through to the excluded areas, given the commercial nature of global shipping, in which ships can be deployed anywhere.

In fact, due to the global character of the shipping industry, exclusions of destinations (say for instance some Small Island Developing States) or some food cargo (say cereals) may even increase rather than decrease the cost impact on these areas. In such a situation some of the rebate (compensation) may not be warranted given the exclusion, while the excluded countries or areas would likely still be impacted by the profit seeking companies. Some unscrupulous companies may be profiting from the cost savings, charging the higher rates by assuming the costs of the MBM even for the excluded areas, thus defeating the exclusions designed originally to protect the most vulnerable. Furthermore, cargo especially in containers is often transhipped, and thus on some legs of the voyage to the exempted destinations it would be subject to MBM costs, and only the last voyage leg could be formally exempted. A system that could exempt cargo, including the transhipments would be administratively very complex, and has never been officially tabled, confirming technical issues with such approach.

[11] The net food-importing developing countries comprises the Least Developed Countries (LDCs), as recognized by the Economic and Social Council of the United Nations plus the following countries: Barbados, Botswana, Côte d'Ivoire, Cuba, Dominica, Dominican Republic, Egypt, Gabon, Honduras, Jamaica, Jordan, Kenya, Mauritius, Mongolia, Morocco, Namibia, Pakistan, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Senegal, Sri Lanka, Trinidad and Tobago, Tunisia and Venezuela.

[12] As reported in document MEPC 60/2/5. For instance, “A number of delegations expressed interest in the RM proposal and supported its further development and consideration either as an integral or add-on element to a future MBM for international shipping under IMO.” (paragraph 3.77)

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