THE POLITICAL ECONOMY OF SHIPPING US FOOD AID UNDER THE CARGO PREFERENCE REGIME*

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ABSTRACT

We are concerned with the way in which US agricultural cargo preference that regulates the international transportation of US Government generated goods may affect food aid provision. It considers specifically the efficiency of the current arrangements whereby 50 percent of food aid has to be moved by US registered ships, and the potential implications of changing this. It does this within a much broader critique of the ways in which such policies tend to be evaluated. The findings are that, when its opportunity costs are netted out, there are likely to be fewer quantifiable benefits to the US economy of the cargo preference structure than are often posited. In particular, many of the estimates of the economic gains to the US found in prior studies often involve those of vested interests and are frequently gross calculations based on not only a weak underlying methodology, but also a distorted use of that methodology.

Key Words: cargo preference; food aid; ship registration,

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> We hear it all the time: "For every Boeing job, 2.8 more are created around Washington State." "Seattle will lose 1,800 jobs if the Mariners leave town." "Cultural/arts organizations create more than 8,800 jobs in the county each year." Such numbers, called "multipliers," typically are cited with precision and certainty, as if they're sure-fire ways to measure economic impact. In fact, they are inexact and controversial.
>
> Michele Matassa Flores, "Analysts argue whether Boeing cuts will cost area large loss of other jobs", *Seattle Times*, December 4, 1998.

Introduction

While open market forces dominate most non-military international maritime activities, there are some elements that are regulated by governments. These are often designed to favor the use of a particular nation's merchant fleet, and in many cases can play a quasi-military role. Here we focus on the use of cargo preference by the US to reserve a small part of its commercial maritime activities for its flag carriers. The paper looks, in particular, at the economic costs to the US of this action, and at some of the arguments that have been advanced for it continuation. In doing so, we focus on a common problem that often extends beyond the public protecting of shipping interests, namely the inflation in estimates of the economic benefits of such actions.[1]

Background

US cargo preference dates back to the Cargo Preference Act of 1954, an amendment of the Merchant Marine Act of 1936 and requires at least 50% of the gross tonnage of cargoes procured, furnished, or financed by the US Government to be transported on privately owned, US-flag commercial vessels to the extent such vessels are available at fair and reasonable rates. [2], International food assistance provided by US Agency for International Development (USAID) and the US Department of Agriculture (USDA) is included in the definition of "Government generated cargo."

Between 1954 and 1985, 50% of US food aid had to be shipped using US flag vessels. This rose to 75% between 1985 and 2012, before reverting back to 50%. US registered ships do not have to be US built but the officers and pilot must be US citizens or

[1] This inflation has largely been explored with regard to other modes of transportation with considerable evidence, in particular, emerging of inflated estimates of the market for public transportation accompanied deflating of cost estimates. While technical issues are not absent from these trends, it is also seen that "political" pressures to produce supporting results for an *ex ante* favored policy are often more important; see Flyvbjerg (2007).

[2] There is the older Military Cargo Preference Act of 1904 that focuses on movement of cargo bought for the Army, Navy, Air Force, or Marine Corps. We do not consider that here.

residents, as must 75% of the rest of the crew. Given the high pay scale of US maritime workers, this policy has led to a significant decline in the US flagged fleet. According to the US Maritime Administration, in 1955 there were 1,072 vessels sailing internationally under the US flag, but this has declined to about 110 vessels. Put another way, in 1955, the US flag fleet represented almost 25% of the world's tonnage while today its share is 2%. This contrasts with the 794 US owned vessels registered, often under a flag of convenience, in other countries in 2010.[3] The US flag fleet is heavily dependent on cargo preference traffic; e.g. in 2008 preference cargoes accounted for 49.6% of that carried (Subcommittee On Coast Guard and Maritime Transportation, US House of Representatives, 2010).

In terms of security needs, the Maritime Security Program provides annual funding of $186 millions to support a fleet of 60 commercial vessels that can be made available to the US government in times of war or national emergency, with the 1920 Jones Act giving US flag ships that are US owned and built, a monopoly of domestic shipping trade. US registered ships carry 100% of military cargo, in addition to that moved as part of food aid programs.

Because of the high costs of US flag vessels, the Food Security Act of 1985 requirement the US Maritime Administration (MARAD) to reimburse the shipper agencies, USAID and USDA, for any extra expense in using them, and for any amount by which the cost of ocean transportation exceeded 20% of the cost of food purchases and ocean transportation costs. The Bipartisan Budget Act of 2013 eliminated the requirement that MARAD reimburse USAID and USDA for the "excess freight" costs.

We are concerned with the effect this direction of food aid to the US flag fleet may have on US aid policy, focusing on the economic implications, broadly defined, of moving back to a 75% minimum use of this fleet for carriage of USAID and USDA food aid.[4] The US House of Representatives passed the Coast Guard and Maritime Transportation Act of 2014 that included a provision to increase cargo preference for food aid programs to 75%, although this was subsequently removed from the final Act.[5]

The Nature of the "Market" for Food Aid Shipping

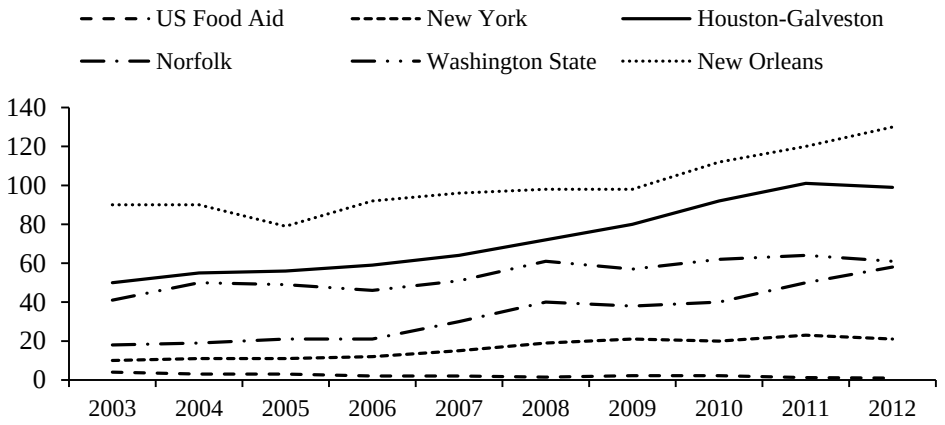
Food aid is a very small part of the maritime trade of the US, and hardly registered when compared to the throughput of the country's major ports (Figure 1). In 2013 it amounted to 510 shipments totaling 1.3 million tonnes, at an ocean carriage cost of $212.2 million, and involved 41 ships. Nine ships handled 81% of the aid moved with six of the dry bulk

[3] https://www.cia.gov/library/publications/the-world-factbook/

[4] We do not consider the option that food aid may be provided directly using cash transfers or vouchers allowing local purchases.

[5] More general official studies of US cargo preference are found in; US General Accounting Office (1980, 1990, 1994a,b) and US Government Accountability Office (2004, 2009).

carriers accounting for 52%.[6] Liberty Maritime Corporation (49%), Sealift of Delaware (20%) and Maersk Inc. (18%) dominated the tonnage moved, with Liberty and Sealift each using four ships while Maersk employed 14, with four of these accounting for more than 90% of the food aid it carried. Overall, despite the limits drawn up by the legislated minimum of 50% carriage by US registered vessels, the US flagged fleet carries more than this lower limit (Table 1).



Source: http://www.usaid.gov/foodaidreform/impact-on-ports

Figure 1
Million tonnes exported through major US ports compared to the trend in US food-aid

Table 1
Cargo preference carriage (October 1, 2013 to September 30, 2014 in current $)

	US Flag	Foreign Flag	Total	Percentage US
Bulker	260,810	144,110	404,920	64.4%
Liner	164,468	121,549	286,017	57.5%
Tanker	0	0	0	0
Total	*425,278*	*265,659*	*690,937*	61.6% (weighted average)

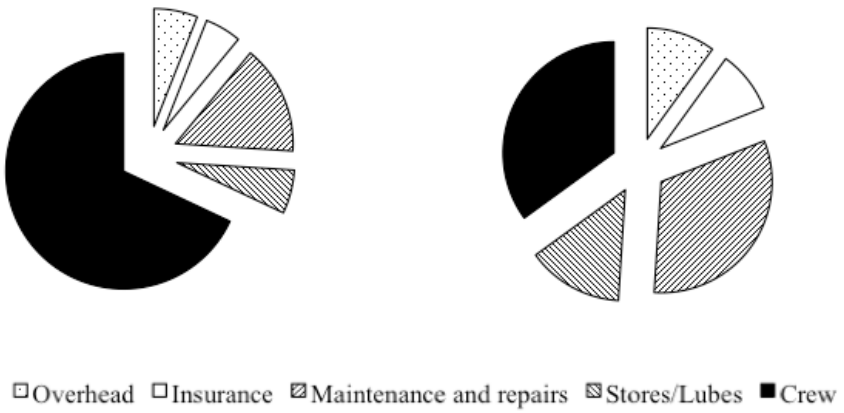
Source: https://forums.info.usaid.gov/index.php?q=topic/cargo-preference-statistics-dated-june-09-2014

Shipments, by international standards, were on average not large; e.g. those weighing between 10 and 560 tonnes accounted for 755 shipments, two-thirds of the total but only represented 10% of the tonnage of food aid shipped. The next 10% by weight of shipments, ranged between 560 to 1,110 tonnes and accounted for 174 shipments. This can be contrasted to the eleven of 51 US flagged ships used to carry food aid, all of which

[6] Sixteen of the ships were built in South Korea; six in the US; five in Japan; three each in Germany, Portugal and Taiwan; and one each in China, Denmark, France, and Norway. The US-built ships carried less than 6% of the food moved by the US flags, half were between eight and 16 years old, and the others between 23 and 48 years.

exceeded 60,000 dead-weight tonnes. Overall, individual shipments were small relative to the deadweight tonnage capacity of most ships that are generally used in the ocean transporting food. This may in part, however, be offset when there are multiple consignments on a ship.

The conditions for US registry push up the costs of such vessels. A US Maritime Administration (2011) study finds that the average cost of operating a US registered ship is 2.7 times that of a foreign flag equivalent vessel; a difference largely accounted for by the much higher proportion of labor costs associated with US registry (Figure 2) and the union based wage rates paid to US mariners.



Source: US Maritime Administration (2011)

Figure 2
Breakdown of US (left) and foreign-flagged (right) shipping costs

The Broad Economic Policy Challenge

The debate about cargo preference largely revolves around the differing needs of retaining maritime capacity for times of emergency and to support the country's foreign aid program. Rather than have separate funding mechanisms for these distinct goals, measures have become entangled, with political lobbying favoring greater emphasis on one or the other.

Considering diagrammatically a few stylized facts highlights the trade-off issues. In Figure 2 there are two outcomes of expenditure – explicitly defense and aid – and a fixed public budget. There are externalities involved in the sense that providing shipping explicitly for defense will also make some amount of capacity available for aid transportation and *visa versa*. Assuming there are no scale effects, and the positive externalities between the two policies are constant ratios, then if all the public funds go to maintaining a military reserve fleet, given its costs, this will lead to point **D** being realized on the highest obtainable preference curve D_m, with D defense and A aid being provided. If all is spent on food aid, then the outcome will be at point **A**, proving A* of aid and D* of defense. The problem starts when there are two groups in society, one

having a strong preference for defense (as represented by the D_c indifference mapping) and the other with a strong food aid preference (A_c mapping). Since both **D** and **A** are unobtainable concurrently, a judgment must be made either favoring those with a strong defense bias or those with a strong food aid bias.

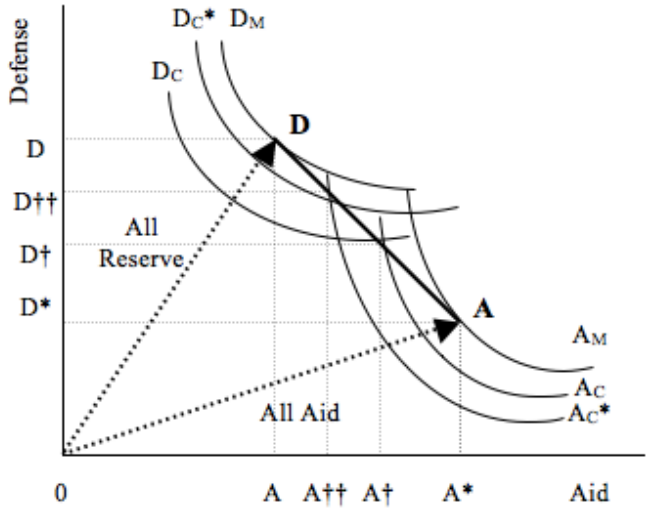


Figure 2. The aid/defense trade-off

There are of course intermediate possibilities, as under the existing situation in the US, at points on the line between **D** and **A** with public expenditure shared between explicit defense and food aid programs. This does not, however, resolve the problem. Moving to a position whereby the public expenditure provides $D^{\dagger}$ of defense and $A^{\dagger}$ of aid may make the pro-food aid lobbyist more satisfied than at **D**, but only at the expense of the priorities of the strong-defense group. Conversely, with the attainable position of $D^{\dagger\dagger}$ and $A^{\dagger\dagger}$, the pro-defense group is more satisfied than at **A** but the pro-food aid group is less satisfied. Just as there is not objective way of comparing points **D** and **A** on the possibility curve, there is no way of comparing intermediate combinations; it is a matter of judgment that, in practice, involves a set of secondary criterion.

Put another way, the current tangle of policies debates surrounding cargo preference and food aid stems from a fundamental flaw in the way the policy is thought about. Looking at Figure 1 from a different perspective, Tinbergen (1956) classified some economic quantities as targets and others as instruments. Targets are those variables that policy makers wish to influence, whereas instruments are variables that policy makers can control directly. He emphasized that achieving the desired values of a certain number of targets requires the policy maker to control at least an equal number of instruments. The problem regarding food aid is that essentially one instrument, namely cargo preference is being used in trying to achieve at least two explicit targets (to provide food to populations in need and to maintain a mercantile marine for use at times of national emergency) and one less explicit target (that the maritime sector is protection from international

competition in the carriage trade). This is a point also made clear by Bageant *et al* (2010) viz; "The most salient problem with the current formulation of the agricultural cargo preference program is the difficulty inherent to pursuing multiple policy objectives through a single policy instrument."

The problems that can arise, and that Tinbergen was fully cognizant of, is that the use of limited instruments relative to targets generally leads to conflicts, and with this ultimately serious inefficiencies in trying to meet the targets. In Figure 1, in terms of cargo preference, it is not just a matter of neither being at **A** or **B**, but not even being on the production possibility line between them. Using aid and reserve military capacity as an example, as active military involvement in Iraq and Afghanistan declined so did the commercial maritime logistics capacity. This led to pressure for more use of US registered ships to carry food aid, although these were more costly than capacity on the open market thus reducing funds available for food acquisition.

Additionally, the defense and aid policies actually run counter to each other. It has been recognized since the days of the Marshall Plan that it is important for long-term political stability to give economic and humanitarian aid to those in need after a conflict – the title "Food for Peace Program" has meaning! This, however, is at the very time when the pressures are to divert resources from aid to support a reserve fleet. This is not to say at all that a reserve fleet is not needed, but using cargo preference to support it leads to a reduction in the effectiveness of policies aimed at limiting conflicts.

There is also the question of how targets are prioritized when insufficient instruments are not in play, and in particular, Stigler (1971) points to a tendency for capture of policy by those supplying goods and services, and Maskin and Tirole (1990) sets this within the principal-agent problem involving the ability of the principal (in this case the government) to monitor and control its agents. In the context of shipping food aid, US maritime interests, in their widest sense, have a vested interest in taking as much aid as possible in US registered ships and can muster both lobbying power due to the concentration in the sector and information to support their position. They capture the argument and the principal is seldom well equipped to assess this. The consultancy reports commissioned by MARAD, the American Maritime Congress, and USA Maritime discussed later largely following this pattern, or to be fair, it is often as much the way such reports have been used as their intrinsic analysis that is the problem.

Measuring the Economic Implications of Cargo Preference

We turn to consider why some reports have led to seriously misleading results regarding policy like cargo preference; essentially we are dealing with "multiplier inflation". Not all have been particularly relevant to on-going discussion of changing the degree of cargo preference, because this is largely a zero sum game transferring parts of the food aid budgets between groups, but they have colored it. In terms of physics, "any action leads to an equal and opposite reaction". The problems in much of the applied work used for preference debate lie largely in ignoring this.

A simple guide to fiscal multipliers

Fiscal multipliers can be traced back to the work of Richard Kahn in the early 1930s, and their adoption to John Maynard Keynes in the later 1930s. Multipliers are macroeconomic concepts designed to assess the consequences major changes in fiscal policies of a nation. There use at more micro levels is inevitably problematic given their nature; they rely heavily of aggregate averages of consumption patterns, taxation, and international trade. Micro studies, even at the level of large regions or relating to major industries rely almost exclusively on macro parameters with inevitable issues of aggregation bias, and the assumption that local circumstances exactly mirror the national.

The underlying idea of the multiplier is that if there are underused resources in an economy, the government can step-in and, by running a fiscal deficit, employ these resources.[7] In turn the expenditure of this income by the newly employed will circulate, creating more jobs and output, with the additional income being spent leading to a furthers spirals in employment and income. The fact that not all income will be spent in each round, some will be kept back as savings, some will go to buy imports, and some will be taken in taxes, increasingly mutes the impact of the injection over the cycles. The outcome is a constrained overall increase in jobs and income in excess of the initial multiplicand. A reduction in government expenditure will have the reverse effect; effectively a reverse multiplier.

The concept, as developed by Keynes, was not seen as exact devise with a specific amount of fiscal stimulus being calculated to generate a given level of national income and employment; indeed, he publicly stated that he did not believe exact quantification of multipliers is possible. Rather it was perceived as a general policy approach that provided a rationale for broad government intervention at times of economic recession. The subsequent development of national income accounting and mathematical modeling, together with a growth in computer power led in the 1960s to the misguided idea that government could "fine tune" an economy by manipulating public expenditures.

The macro concept, let alone those applied to industries, has come under a variety of criticisms. In particular, government fiscal injections have to be financed in some way other than through raising general taxes that would simply off-set the multiplicand. Equally, borrowing on financial markets faces the problem that it can "crowd-out" private investment and, as with taxation, set in motion a reverse multiplier.

There are also issues about whether the magnitude of the "leakages" from the multiplier is so large that it effectively reduces the magnitude of the income spiral to near zero. The size of the aggregate fiscal multiplier, which is also often used in industrial studies, has been the subject of considerable academic work that suggests it falls well below the estimates often mooted by politicians and lobbyists. A recent overview in the journal of the American Economics Association, provides a good summary, quoting from the

[7] The fiscal multiplier is $\Delta y = \Delta G\ (1/\{[1-b_C][1-b_T]+b_M]\})$ where: y is income, G is government expenditure, b_C is the marginal propensity to consume, b_T is the original income tax rate and b_M is the marginal propensity to import.

Conclusions; "At this point it seems that the bulk of estimates imply that the aggregate multiplier for a temporary rise in government purchases not accompanied by an increase in current distortionary taxes is probably between 0.8 and 1.5." (Ramey, 2011) This is supported by a number of more recent studies; for example Owyang *et al* (2013) regarding the US national multiplier at various stage in the trade cycle, concludes it is "between 0.7 and 0.9" with it being higher during slack periods; the Canadian multiplier is found to be 0.5. At a more local, state level looking at fiscal injections from pension changes, Shoag (2013) finds that a $1 increase in spending leads to a $1.43 increase in state income; a multiplier of 1.43.

Input-output analysis

At a more meso level when policy involves fiscal injections in particular industries rather than broadly across the general economy, the multiplier has often been disaggregated following the advent of input-output analysis in the 1950s. There has, however, been considerable misuse of the approach.

Input-output analysis, was designed by Leontief to provide guidance on overall inputs required to produce a given output, including secondary inputs needed to provide the primary inputs. It shows, "…what level of output should each of the n industries in an economy produce, in order that it will just be sufficient to satisfy the total demand for that product?" (Leontief, 1941) Thus the input-output model makes it possible, under an extreme set of assumptions, to determine the output of each industries that must be produced to obtain a given amount for final demand. It makes it possible to find production levels that will meet the demands of all sectors inside and outside of that economy. The usefulness was seen in highlighting bottlenecks in supply that might arise, and that would stymie the ability to produce the target level of output. If there are inadequate inputs then outputs elsewhere in the system need to be taken from other types of production, with their own complex interactions throughout the economy, or the output target for the sector of interest must be revised down.

The misuse, or to be more generous, the "alternative use", has come in reversing the logic of what input-output analysis was designed to do, and instead it is used to trace out across sectors the implications of fiscal injections into the system on levels of output. The original use relied upon numerous restrictive assumptions, not least of which is that there are no scale-economies in production and the there is a fixed production technology (a "Leontief Production Function") implying that doubling output requires a doubling of all inputs. It is also assumed that there is a perfectly elastic supply of factors of production.

Despite this misunderstanding, the use of both multipliers and input-output at the meso-level has become widespread, and with this has been a tendency to have parameter inflation. Just as the aggregate national multiplier is often exaggerated in policy debates, the same frequently occurs when assessing meso-level projects; indeed the tendency may be greater. A major problem in many policy comparisons is that the dispersion of overall gains from an action is estimated but the dispersion of costs across sectors is ignored. The point is made clear regarding maritime studies by Haralambides (1996);

> "[E]stimates of the economic impacts of an industry are, with rare exceptions, measures of *gross*, not *net* impacts [*Italics in original*]. A net impact would need to reflect all opportunities available elsewhere in the economy for the resources used directly by the industry and indirectly by all other industries. For example, if the demand for shipping were to decline and the services provided by the shipping industry were to decline, seafarers might remain employed in other maritime occupations or other industries. In this case, the provision of service by the merchant marine would not have resulted in a gain in national employment. Moreover, if the decline in service provided by the merchant marine did not affect the provision of port services and the production of other domestic goods and services because foreign-flag operators taking the place of national shipping operators would have used these goods and services, then the jobs associated with the provision of merchant marine service would not have been lost with the decline in service provided by the merchant marine. Hence, shipping would not have indirectly generated employment gains in other domestic industries
>
> In most cases, estimated impacts are gross impacts of economic activity and as such they fail to identify alternative employment opportunities for the human, material and financial resources used by the industry under examination and all other industries linked to it…To use the "creation of employment" argument again, "employment" per se, despite its positive impacts, is an economic cost rather than an economic benefit (otherwise societies would be willing to pay people for digging and filling ditches); it is only the goods and services that this employment produces (and society is willing to pay for) plus the value that society attributes to the preservation of a certain know-how that can be considered as an economic benefit."

There are also longer-term, often dynamic effects ignored in multiplier style work. For the coefficients of any input-output analysis to hold, there must be slack, unemployed resources to use. And this must hold for each round of the multiplier spiral. Often an industrial policy designed to stimulate income or jobs in a particular sector because slack is thought to exist there, ignores the fact that these unemployed factors will need combine with factors taken from elsewhere where there is full employment (Coughlin and Mandelbaum, 2011). This sets in motion negative multipliers in industries where these factors are drawn from. The same is true in the opposite direction when public support for any industry is reduced. While there will be job losses in that industry, with associated multiplier implications, there will be off-sets as new businesses take up at least some of the resources that are released setting in train positive multipliers in those. This excludes any positive multiplier effects that come from the reduction in taxes or borrowing associated with the reduced public expenditure.

Perhaps the greatest potential for overestimating multiplier effects, both at the macro- and input-output levels, stems from their underlying assumption of a fixed technology (Button, 2012). In practice there are market reactions and technical changes to consider if markets are manipulated. Any increase in the demands for the outputs of a sector will, unless all the resources were previously unused, lead to the price of inputs rising and efforts to reduce their use in production, either by substituting cheaper inputs from other sectors or by improving the technical efficiency of their use. The former will involve reduced outputs and higher prices for consumers in the sectors that lose their productive capacity, thus setting in train reverse multipliers.

The overriding problem with using any multiplier approach is well summed up in several Australia reports, *viz*: "Multipliers are used to suggest that an industry is more valuable to Western Australia than its current size would suggest. ...However, multipliers do not provide a measure of net economic benefit of expanding activity in a particular area...It is in assessing claims for government assistance that the potential misuse of multipliers is greatest." (Western Australia Department of Finance and Treasury , 2002) And, "….multipliers are a poor predictive device in many applications. In the context of assessing assistance to industry, how changes translate into changes in demand ... is not clear. Also, they often overstate effects on account of the omission of important adjustment mechanisms and constraints." (Industry Assistance Commission , 1989).

Assessment of Studies of Agricultural Cargo Preference

As we have highlighted, the inherent danger of using multiplier and input-out measures in assessing the impact of any government expenditure is that it almost inevitably leads to gross over estimations because on the double counting involved and/or the lack of netting out of costs. We briefly comment on the problems that are inherent in some of the work that has been conducted regarding the maritime sector.

The Nathan Report
Two decade ago, Nathan Associates (1995) produced a report for the American Maritime Congress providing a general assessment of the economic outcomes of US federal aid to the US merchant fleet. It concluded that overall, the impact was, at the time, about 107,000 jobs and $4.5 billion in direct, indirect and induced effects. As with all other studies discussed there are no indications of the statistical significance of the results, they are just presented with a reassuring degree of confidence.

The dated and general nature of the work excuses detailed comment, but most of the underling, potential traps laid out above are present. To turn over commentary to a disinterested third party, in assessing this much-cited study of the importance of the US Maritime sector to the economy, together with that of the Dutch maritime sector to the Netherland's economy (Peters et al, 1994), Haralambides (1996) comments:

> " Even more importantly however, the method's usefulness is to be found in its ability to rank order the impacts of sectoral economic activity, such as shipping, *vis-a-vis* the corresponding impacts of other industrial sectors …In this context, unfortunately, neither of the two studies referred to above addressed the issue of whether the benefits of government support to shipping are greater than the benefits that could be attained by other government support programmes (current or contemplated) for other sectors of the economy."

The Promar Report
Impacts on the US Economy of Shipping International Food Aid (Promar International, 2010) further typifies this gross assessment input-output analysis approach. The study arrives at the extraordinary employment multiplier of 8.56 for the US maritime

contribution to the movement of food aid.[8] This is in a sector where a 49% foreign ownership of ships is allowed, with the remainder often being owned by a foreign subsidiary, meaning that any multiplicand is immediately reduced as parts of the profits are not retained in the US, and where up to 25% of the crew may be non-nationals or residents thus leaking income overseas, where also most of the ships used (if not all) are built, and where many inputs to the sector (elements of fuel, repair, victuals, etc.) may be foreign sourced.[9]

Another way of looking at this over estimation issue is consider the demand side, and to distinguish between final and intermediate goods. While the Promar study argues that water transportation creates over eight times the number of jobs for one in water transportation, this can simply be stood on its head. Water transportation is an intermediate good; it is an input into the production process. It is the production of the final good that is driving the demand for water transportation. Thus in strict input-output terms it is the supply of wheat that is driving the demand for water transportation – or more bluntly, the provision of more water transportation will not lead to a greater demand for wheat, or other food products unless it reduces the costs of production that, with the assumed Leontief technology involving fixed costs, is not possible.

Added to this, we reiterating that any change in preference represents a transfer of government expenditures and not a change in there aggregate; in technical terms there is 100% crowding out. The implications for the US economy will be minimal at best. The implication for recipients of aid, which may be very significant, is not considered.

The Cornell Study

This academic study by Bageant *et al* (2010) focuses explicitly on the costs of the jobs created as a result of the Agricultural cargo preference policy-making use of an extensive database for 2006. Its wide ranging conclusions are that and meeting cargo preference requirements cost taxpayers roughly $140 million representing a premium of 46 percent over tapping the competitive freight market and that counter to cargo preference requirements, 70 percent of US flag-vessels eligible to carry food aid failed to qualify as militarily useful under MARAD criteria. Further, 40 percent of the food aid tonnage was carried on vessels which companies are ultimately owned by foreign corporations. The cost of maintaining a pool of roughly 1,400 mariners on cargo preference vessels amounted to about $99,300 per mariner. There are, however, no real indicators of the statistical significance of these results; we have no idea of confidence intervals or of such

[8] To glean some idea of what a multiplier of 8.6 for shipping means, given the assumptions that underlay the notion of input-output analysis, let us assume entire the US stimulus packages of about $831 billion to combat the Great Recession all went to shipping. Applying a fiscal multiplier of 8.6 to this means that if it were all spent on the US maritime sector, this would result in a $7,146.6 trillion increase in National Income. The US National Income is about $17,528 trillion! Quite clearly by reason of *reductio ad absurdum*, the 8.6 multiplier is untenable. One can also compare it to other sectorial multipliers that are based not just on the RIMS II approach as used by Promar, but also IMPLAN, REMI, REMI2, IMPANA, and REMI2A. For example, Rickman and Schwer (1995) find employment and output multipliers of about 1.5 with a maximum of 3.61, annn extreme outlier, when applied to industry in Nevada.

[9] The b_M term in Footnote 6 is large

things as the degree of kutosis, although estimating such things many be challenging given the uncertainties involved.

The exactitude of the calculations and their relevance to 2015 may be questioned, but the methodology adopted has merit to it in its simplicity and the openness of the discussion. An attempt to explicitly criticize, as opposed to evaluating, the paper by USA Maritime (2010) focuses on some of the data issues and some factual issues, not always germane to the quantitative points make but Barrett *et al*, but also comments on methodology. There is for example, commentary on neglected cost savings to the US Transportation Command of the readiness initiatives (some $10 billion in capital costs and $1 billion in annual costs) although this seems to relate to the entirety of the initiatives and not specifically to cargo preference. How numbers are arrived at is also not clear. It also claims, using essentially gross multipliers, that cargo preference contributes $1.9 billion to the US economy and 33,000 jobs. Even if these very large figures were correct, and because of our doubts about multiplier type analysis expressed above, this seems unlikely, it ignores the opportunity costs involved. Much of the rest of the USA Maritime paper contains more rhetoric than substance.

Recalculating the Economics of Returning to a 75 Percent Cargo Preference

Just to play the numbers game, we provide some calculations regarding a return to a 75 percent cargo preference that correspond to a more complete estimation of the full economic implications Given this context, we are not concerned with any addition of funding to the food aid program, but rather with the restrictions placed upon the ways existing monies may be spent. Many of the arguments for moving back to a 75 percent US flag carriage are based upon overestimates of the contribution to the US shipbuilding and shipping industry to the national economy, with no consideration of the loss of income and jobs in the production of food, the making of agricultural equipment, the use of US domestic transportation, and the throughput of US ports that any reduced volume of physical aid creates. We provide some simple estimates of some of these without any claims of scientific exactitude.

Our analysis makes use of publicly available data to assess the implications on three sectors most likely to be impacted by a change in cargo preference; shipping, ports and US agriculture.

The additional costs of using US flag vessels rather than seeking capacity in the international market, are based on the tonnage of products moved and the shipping rates involved. Taking US Department of Agriculture quarterly bill of lading data for fiscal years 2004 to 2010 for the food aid program, one finds the ocean freight differential, the subsidy paid for using US flag vessels, ranges between $12.89 and $53.4 per tonne, with an average of $31.50.[10] Using a conservative $30 per tonne as the subsidy, and given agricultural aid in kind amounts of about 1,800,000 tonnes per annum, this produces an overall subsidy of about $13.5 million for 25% percent of this; i.e. a move from a cargo

[10] OFD_table_USDA_2nd_FOIA-data_Dec2_WF.xlsx.

preference of 50 to 75 percent.[11] Added to this must be the commercial rate charged by the flag carriers. US Department of Agriculture data suggests that flag subsidies are about 20 percent of the overall rate obtained by flag carriers, implying overall revenue to the shipping companies of $67.5 million again assuming a $30 per tonne subsidy.

To gain a handle on the job effects of changing cargo preference, it is necessary to separate capital from operating costs. These vary according to the types of vessels involved, and the costs of financing investment in them. The capital/operating cost ratio allows a general estimation on the sorts of figure involved. Sopford (2009) provides some broad figures on the ratio of capital to operating costs for liner services of 1.62 for a 1,20 TEU vessels, 2.24 for 2,600 TEU, 2.14 for 4,000 TEU, and 2.79 for 6,500 TEU. We take an extremely conservative position and assume a capital/operating cost ratio of unity. Use of, say, the 2.14 ration for a 4,000 TEU vessels would significantly reduce the number of mariners involved in any increase in the agricultural cargo preference.

Because about two-thirds of US shipping operating costs are labor related (see again Figure 2), after allowing for capital costs, the amount of extra money going to sailors will be about $22.3 million annually. To convert this into jobs one can use US Bureau of Labor Statistics wage data. This finds that a sailor in the US earns $39,000, with ship's engineers and captains earning $81,000 per year.[12] Assuming a crew/officer ratio of 2:1 or so this gives an annual average pay for someone working on a ship of $53,000.[13] Because officers' pay considerations involves a wide range of rank and remuneration - basically not all are captains - we deflate this and use $50,000. Added to this, there are non-pay overhead costs of employment, including, medical coverage, feeding, pensions, cabin provision, and heating/cooling. These we assume, admittedly rather arbitrarily but in line with many other industries, these represent 30 percent of the direct labor costs.[14] This yields a cost per maritime worker of $75,000, which is probably a very conservative figure given our assumptions. In terms of jobs this implies some addition 298 mariners if the cargo preference rises to 75 percent. The political-economy question is whether 298 or so additional US maritime jobs justifies $13.5 million per annum in reduced *de facto* aid, including Food for Peace funding, and the associated US job losses in other sectors this also entails. While this may not seem large, about $50,000 per mariner, it needs remembering that this, unlike the US stimulus package of 2009, is not a lump sum effect. Hence a job that is maintained for say five years costs around $250,000 in subsidy.

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[11] USAID estimate that returning to a 75% US registered shipping component would add about $75 million in the cost of shipping food aid (http://www.usaid.gov/foodaidreform/cargo-preference). No specific rationale for this number is provided but it seems high.

[12] This maybe a conservative figure, the 2012 *Maritime Salary Review* shows a master marine's pay of $110,981, a chief engineer of $98,963, a chief officer of $82,737 and a second engineer of $75,019 (http://www.slideshare.net/faststream_singapore/2012-maritime-salary-review).

[13] In 2011, a typical deep-sea merchant ship had a captain, three mates, a chief engineer and three assistant engineers, plus six or more unlicensed seamen. We basically assume the captain, mates, and chief engineers approach the officer pay level, and assistant engineers, seamen, electricians, oilers, etc. the crew level.

[14] http://www.bls.gov/news.release/pdf/ecec.pdf

But this can also be looked at in terms of the foregone revenues elsewhere in the economy due to the smaller amount of food shipped as a result of using high cost US flag vessels.

First, less agricultural aid will mean a lower demand for port services. The evidence in Figure 1, that relates to 2002 to 2012, a period over which food aid fell from five million tonnes to 1.4 million, makes it clear that this is moving against the secular trend in the overall shipping market. Moving to a 75 percent cargo preference would, although not in a substantial way, make the drag of falling aid traffic even larger. Continuing to assume this decline will be 450,000 tonnes and, with no other insight, that this is all wheat, an indication of the reduced number of port workers required can be gleaned from speed of loading which in the US is 3,200 to 3,400 tonnes per hour. Making the conservative assumption of 3,000 tonnes per hour indicates an aggregate loading time of 150 hours is lost; pro-rata adjustments can be made for faster loads. Assuming that loading entails a crew of five, this yields 750 labor hours. Assuming a 40-hour week this is less than 19 man-weeks of labor. At the other extreme, if the movement were by containers, this would imply a much lower tonnage of higher valued food. Estimating job loss is difficult, but modern loading methods mean that cranes can load 30 containers an hour, implying that it takes on average between 10 and 20 hours to load 1,000 TEUs using three to four cranes. The size of ship has only a marginal impact on this rate.

Thus, without knowledge of exactly what the physical mix of the food aid is in terms of whether it is bulk or containers, it is difficult to estimate what the impact on port labor of increasing the use of US flag carriers would be.

There will also be some impact on shipbuilding, although not large. Because US registered ships do not have to be US built it is difficult to put even an estimate on this figure. If we arbitrarily assume that half the extra capacity needed to handle the food is US built then this means an extra $11.25 million is spent domestically. Making the rather extreme assumption that this is all paid out to ship builders we can make use of a US Maritime Administration (2013) study of shipbuilding. This shows that private shipbuilding and repair in the US provided 107,240 jobs in 2011 at a direct labor income of $7.9 billion, or $73,666 per job. Assuming the "direct labor income" includes all costs of labor, this would imply that that the capital needed for the increase to a 75 percent preference level would involve 153 jobs.

The main effects on the non-marine labor force of reintroducing 75 percent cargo preference will be felt in sectors where there is a reduction in the amount spent on US produced food aid. If we assume that all the physical loss is felt in the US agricultural sector, then this means, assuming that we ignore any automatic farm support subsidies that may come into play, that output will suffer a reduction of $13.5 million a year in sales. We estimate the implications for labor from this by dividing the value US agricultural production in 2011, some $374,174 billion according to the US Census of Agriculture, by the 757,900 workers in the sector in 2010.[15] This implies that each

[15] This assumes that none of the 1,202,500 farm-owners and managers will be put out of work. If these are included the figures rises to

worker produces about $493,000 in output. Thus a loss of $13.5 million in sales would result in the loss of 27 jobs. These figures can also be set in the context of US Department of Agriculture, Economic Research Service (2011), that found a $1 billion of agricultural exports supported 6,800 American jobs in 2011, including positions on farms, in the food processing industry, in the trade and transportation sector, and in other supporting industries. These data mean a $13.5 million drop in food exports would reduce US employment by 74.

These, of course are very tentative, partial calculations based on strong assumptions and should be taken as no more than this. There may be many other ripple effects, but these are unlikely to be large, could even be negative, and different for the various industries affected. Additionally, not all of the extra maritime workers will have been unemployed, and even if unemployed may be receiving a variety of state supports; e.g. from employment insurance In these cases, their employment in food aid shipping will have "crowding out" effects elsewhere in the US economy setting off-reverse income multipliers. This is true irrespective of whether they were previously active in the maritime sector or any other industry. Added to this, some of the income of the crew is likely to be "spent" outside of the US when "at sea" and in particular permanent residents may send funds to their country of nationality. In all cases this will involve leakages that extend beyond those normally associated with import purchases. In a nutshell, the calculations of the impact of reforming cargo preference are complex and open to all sorts of assumptions. What we do know, however, is that if home sourcing of food aid is used, there are significant opportunity costs involved that have largely been ignored in cargo preference studies to date.

Conclusions

Changes in cargo preference for the transportation of food aid involve higher transportation costs and thus, given a fixed budget, less actual food being available. The argument that this somehow benefits the US macro economy is seriously flawed, even if one accepts Keynesian economics, because the action of increasing the cargo preference to commit 75% of aid to go by US registered ships is simply a transfer of a fixed public expenditure; it does not represent a net injection of public expenditure. In the parlance of economics it involves 100% crowding out.

The only way it could very marginally affect the US economy, and given the scale of monies involved any effect of this kind would be lost in rounding errors at many places of decimal when estimating National Income, is if the effective multiplicand is increased by this action. Any subsequent multiplier effects will be identical irrespective of whether the money goes to the agriculture sector or the US shipping sector – an extra dollar spent by an agricu1tural worker as a result of food aid money going to that sector on a new shirt will have exactly the some effect as an extra dollar spent by a mariner spent on a new shirt. Given the likely levels of leakages in the multiplicands, the fact that part of the incomes going to shipping will be to essentially foreign owners and to foreign crew, whereas food is US produced, suggests that the impact of a shift to a 75 from a 50% cargo preference on the US economy will be trivial.

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