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Food Aid Cargo Preference: Impacts on the Efficiency and Effectiveness of Emergency Food Aid Programs

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Abstract

This paper examines the impact of cargo preference requirements, which create market power for US flagged ships, on the effectiveness of USAID's Food for Peace emergency food aid program. We find that cargo preference requirements increase real ocean transportation costs per metric ton by 68 percent for packaged goods shipments and 101 percent for bulk goods shipments. These differences in cost impacts appear to be associated with differences in the impacts of the mandate on market concentration in the packaged and bulk shipment markets. These higher costs reduce USAID's capacity to serve millions of families in dire need each year.

Keywords: Agriculture Policy, Organizational Behavior, Shipping, In Kind Aid

JEL: Q18, D23, L92, F35

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1 Introduction

In 1954, Congress passed the Agricultural Trade Development and Assistance Act (1954) (P.L. 480), which committed the United States to making regular appropriations for humanitarian food aid.[1] These funds serve the dual mandate of providing desperately needed assistance to the world's most vulnerable populations and projecting US soft power by bolstering the country's image in developing countries. Two months later, Congress mandated that at least 50 percent of all US food aid shipments be carried on US vessels and that all, or almost all, food aid provided under US programs be sourced in the United States. Here we examine the impacts of the cargo preference mandate on transportation costs given the requirement that almost all food aid be sourced from the United States.

Proponents of the cargo preference requirement and US sourcing for international emergency food aid include the US maritime industry and the agency that oversees the implementation of this requirement the US Maritime Administration (MARAD).[2] Those proponents argue that the industry makes a significant contribution to the nation's defense by ensuring that the private US mercantile marine service will have an ample supply of vessels and sailors to ship goods and personnel across the oceans in time of war.[3] There is little or no empirical evidence to support this assertion (Ferris and Thomas, 2015; Mercier and Smith, 2015).

However, in recent years, the costs of the cargo preference mandate have been substantial, limiting the ability of the US agencies that manage food aid programs, the US Agency for International Development (USAID) and the US Department of Agriculture (USDA), to provide aid to millions

[1] Prior to 1954, international food aid was authorized on an ad hoc basis and, starting in 1904, Congress had only explicitly applied cargo preference requirements to military cargoes (Riley, 2017; Mercier and Smith, 2015; Mercier, 2019).

[2] MARAD is viewed as one of the federal agencies most influenced by, and serving the interests of, the private sector companies for which it has regulatory responsibilities, not least because its stated mission is to support the domestic shipping industry (Government Accountability Office, 2015*a*; Ferris and Thomas, 2015; Barrett and Maxwell, 2005; Hoxie and Smith, 2019; Mercier, 2019; Maritime Administration, 2020*a*).

[3] For a more in depth discussion of the arguments used by maritime interest groups see Mercier (2019). Additionally, comments in the federal register for the National Maritime Symposium hosted by MARAD in 2014 offer an example of interest group arguments for cargo preference laws (Maritime Administration, 2013).

of families in dire circumstances every year (Barrett and Maxwell, 2005; Bageant, Barrett and Lentz, 2010; Government Accountability Office, 2015*a*; Mercier and Smith, 2015, 2019). This study uses new information from a comprehensive dataset encompassing 4,814 individual shipments of international emergency food aid under the Title II "Food for Peace" program over six fiscal years (FY), from October 1, 2012 to September 30, 2018, to reexamine the costs of the cargo preference mandate and its impact on the ability of those agencies to address humanitarian needs created by natural and man-made disasters. These costs are found to be substantial, accounting for about 36 percent ($47.5 million) of the total costs incurred in shipping emergency food aid from the United States to targeted populations in developing countries in need of the aid. Further, the results are surprisingly robust with respect to alternative empirical model specifications.

This study provides new and more robust estimates of the impact of the cargo preference mandate on international food aid shipping costs that are stable across a range of alternative model specifications compared to earlier estimates reported by Mercier and Smith (2019), Bageant, Barrett and Lentz (2010) and the Government Accountability Office (2015*a*). The new estimates are obtained using a substantially larger data set from USDA and USAID that includes all individual emergency food aid shipments over six fiscal years from 2013 to 2018.[4] This data set is also sufficiently large to permit the estimation of separate econometric models for packaged good and bulk shipments of emergency food aid, enabling an examination the potential role of market power in determining mark ups over globally competitive freight rates on freight rates charged for cargo preference emergency food aid shipments. Herfindahl-Hirschman Indexes (HHI), computed for bulk and packaged shipments (Figure 1), indicate that the degree of market concentration for cargo preference US carrier shipments of bulk commodities is substantially higher than for packaged goods.[5] Correspondingly, the results reported here indicate

[4]For example, the estimates reported by Mercier and Smith (2019) are based on a total of 2,321 observations on bulk and packaged emergency food aid shipments for the period October 2012 to May 2015.

[5]The HHIs reported in Figure 1 are constructed on a per-metric ton basis by carrier using the formula described in US Department of Justice (2018).

that, in both absolute and proportional terms, cargo preference mark-ups charged by US carriers are much larger for bulk commodity shipments than for packaged goods shipments. However, for both packaged and bulk shipments, cargo preference allows US flagged carriers to benefit from reduced levels of competition associated with higher levels of market concentration.

The study also examines the extent to which the cargo preference mandates benefit foreign companies that own US subsidiaries operating US flagged vessels eligible to bid on cargo preference shipments as well as foreign-flagged vessels that compete with other foreign-flagged vessels for food aid shipments not restricted to bids from US carriers. Through its US subsidiary, the Danish shipping conglomerate Maersk handled over half of all emergency food aid shipments carried under the Title II program. Maersk's US subsidiary company obtained substantially higher freight rates on shipments carried on US flagged vessels under cargo preference than for other shipments carried on Maersk's own foreign-flagged vessels. The Maersk mark-up for cargo preference shipments over non-cargo preference shipments was substantial, amounting to an average of 47 percent or $65 per ton of freight. These results support the argument that many of the rents associated with the cargo preference mandate accrue to foreign entities rather than US carriers.

A further contribution of this study has been to establish a new data set on the age and other characteristics of vessels eligible for cargo preference, including the countries in which they were built. The purpose is to provide insights about whether the emergency food aid cargo preference mandate has any substantial role in sustaining the capacity of the US shipbuilding industry and to examine the quality of vessels the program supports for national defense purposes. The findings indicate that, of the total of 273 vessels eligible for cargo preference shipments between fiscal years 2013 and 2019, only 4 vessels were built in the United States, one less than the number of such vessels built in China, suggesting that this national defense argument for continuing cargo preference has little empirical support. In addition, the results indicate that older and slower vessels are used for cargo preference emergency food aid

shipments, suggesting that, as Bageant, Barrett and Lentz (2010) and others argue, the mandate is one cause of significant delays in the delivery of US emergency food aid to populations who urgently need it.

2 A Brief History of Emergency Food Aid Program Legislation

Congress first passed legislation requiring that government purchases of cargo designated for foreign destinations should be carried on US flagged vessels in 1904. Initially, under the Military Transportation Act (1904) (P.L. 58-198), cargo preference applied only to military cargo and all such cargoes had to be transported on US flagged ships (a 100 percent cargo preference mandate). However, the mandate did not indicate whether the vessels were to be owned by the military or private US companies (Frittelli, 2015). The question remained unresolved until 1951 when a Memorandum of Understanding between the Departments of Commerce and Defense stated that, as a first priority, military goods should be transported on civilian ships.

The Cargo Preference Act (1954) (P.L. 83-664), enacted two months after P.L.480 became law, expanded cargo preference rules to include food aid shipments and other goods shipped or "impelled" by government agencies not located within the Department of Defense, and explicitly required that eligible vessels be owned by private US companies. Under the 1954 legislation, on a fiscal year basis at least 50 percent of all US food aid must be shipped on vessels registered under the US flag and operated by US crews.[6] Currently, in response to the settlement of a law suit filed against USDA by US mercantile interests, for reasons discussed in more detail below, USAID defines the geographic areas to which the mandate applied for bulk commodities to be each recipient country. For packaged products,

[6]Cargo preference eligible vessels must be US registered for three years, use a crew that is made up of at least 75 percent US citizens, and be owned by a company with a US address, even though the company may be a subsidiary of a foreign firm. Substantial costs are also associated with registering any vessel under the US flag. For a more complete discussion of these costs see Maritime Administration (2011), Government Accountability Office (2015*a*), Michel (2016), and Leptos-Bourgi, van den Bree and Boonacker (2015).

the mandate applies to all shipments, regardless of the country of destination.

In 1985, through a provision of a new farm bill, the Food Security Act (1985) (P.L. 99-198), Congress mandated that the percentage of US food aid to be shipped on US flagged vessels gradually be increased from 50 percent in 1985 to 75 percent in 1988 (Glaser, 1986). The legislation also required that MARAD, the agency with oversight responsibilities for enforcing cargo preference rules, provide the agencies operating US international food aid programs with payments to compensate them for the additional costs of complying with the expanded cargo preference mandate.

The reason for the change was as follows. In February of 1985, the federal District Court in Washington DC ruled that cargo preference rules should apply to US commercial agricultural export shipments to developing countries supported by favorable credit terms offered by the US Department of Agriculture under two agricultural export loan programs called GSM-5 and GSM-102 (Office of Technology Assessment, 1985).[7] Within a week of the decision, USDA suspended the GSM programs because the extension of cargo preference jurisdiction to GSM sales increased shipping costs sufficiently to make the GSM programs unattractive to potential borrowers. The plaintiffs in the case, trade associations representing the US maritime industry, then agreed not to seek enforcement of the court's decision on the GSM programs in exchange for a higher cargo preference mandate for US food aid programs (Gitomer and Runge, 1990). Subsequently, in 1990 through a provision in the Food, Agriculture, Conservation, and Trade Act, Congress formally exempted export credit guarantee programs from any cargo preference requirements (Ackerman, Smith and Suarez, 1995).

In 2012, unexpectedly, as part of negotiations over reforms to the federal budget, Congress lowered the cargo preference mandate for food aid to its pre-1985 level of 50 percent.[8] At the same time, however, for budget offset purposes, Congress also terminated the requirement that MARAD annually

[7] See United States District Court, District of Columbia (1985).
[8] See the Moving Ahead for Progress in the 21st Century Act (2012).

reimburse USDA and USAID for up to $130 million of the additional freight costs incurred because of cargo preference, reducing the funds available for food aid programs.[9] Subsequently, in 2013, Congress repealed a second provision that required MARAD to reimburse USDA and USAID for other cargo preference related freight costs averaging about $65 million a year. Since 2012, on several occasions the US maritime industry has unsuccessfully sought to persuade Congress to restore the 75 percent cargo preference requirement for food aid shipments and, since early 2017, to increase the cargo preference mandate to 100 percent of all emergency food aid (Maritime Administration, 2013; Wroughton and Zengerle, 2017).

3 The Emergency Food Aid Contract Bidding System

The costs of cargo preference and mandatory sourcing of food aid from the United States derive from the bidding process under which the procurement and shipment of emergency food aid is implemented. That process, managed by the Commodity Operations division of the USDA Agricultural Marketing Service, involves two separate requests for bids.[10] One request is a solicitation for bids to supply the food required for a shipment. The other request, initiated at the same time, solicits bids for shipping the freight, but is managed as a separate contract (Office of Food for Peace, 2019).

Prior to the announcement of a request for bids on each shipment, the agency under whose programs the shipments (USAID or USDA) are to be made determines whether the aid should be shipped under the cargo preference mandate or open to bids from any carrier. The private voluntary organization (PVO) selected by the government agencies to manage the food aid shipment then initiates the procurement processes for the food itself and its transportation. Such organizations include the United

[9] Schnepf (2014) notes that the termination of the excess freight adjustment program was simply a five-year $540 million budget offset exercise to provide congressional committees with room to support other programs. Stakeholder groups with interests in cargo preference and food aid programs were not consulted prior to the bill's passage.

[10] In September 2017, the Commodity Operations (CO) function of the Farm Service Agency (FSA), which among other responsibilities has procured commodities for U.S. food aid programs for several decades, was shifted to the USDA Agricultural Marketing Service (AMS) and renamed the Commodity Procurement Program (Agricultural Marketing Service, 2017).

Nations World Food Program (WFP) and approved PVO's such as CARE and Catholic Relief Services. The organization then initiates the procurement request or "call forward" for the commodities to be to be shipped by soliciting bids from eligible vendors through the aegis of the International Procurement staff of the USDA Agricultural Marketing Service (Agricultural Marketing Service, 2017). In addition to defining the quantity and amount of the product, the commodity procurement solicitation also identifies the preferred US port of origin, the destination port, and the intended delivery date for the shipment. The PVO also puts out a separate request bids from mercantile freight carriers to transport the food aid to the intended destination.[11] However, the process for obtaining bids from carriers is managed by the organization responsible for distributing the aid in the recipient country, or by a freight forwarding company chosen by the organization to manage the shipment on its behalf, not by USAID.

The one exception to this approach involves bids to preposition food aid in warehouse locations close to areas of expected need to shorten the period required to procure, transport, and deliver US food aid commodities.[12] USAID directly handles all aspects of these bids. Currently, such commodities are prepositioned in three international locations (Las Palamas, Canary Islands, Durban, South Africa, and Tanjung Pelepas, Malaysia).

4 The Cargo Preference Mandate Bidding Process

Regardless of whether bids are managed by PVO's (including the World Food Program) or USAID, the objective of the bid solicitation process for commodities appear to be to minimize the total cost of

[11]The food procurement and transportation requests for bids are both initiated through the same USDA website, the Web-Based Supply Chain Management System.

[12]USAID was authorized to use Title II resources to set up a single overseas warehouse in a provision of the trade title in the 2002 farm bill. That authority was expanded in the 2008 farm bill to permit USAID to establish warehouses in multiple overseas locations partly in response to the results of a 2007 GAO study (Government Accountability Office, 2007). The study reported that food aid deliveries took four to six months from the time USAID initially solicited food aid proposals and that prepositioned food could reduce the response time by one to two months, especially in countries located close to USAID warehouses. Recently USAID has reduced the number of preposition locations because of competition for warehouse space with other organizations and related logistical issues. Prepositioned goods are typically bagged commodities (for example, rice, corn meal, peas and lentils) and processed products (for example, vegetable oil and corn-soy blends) which are often used for rations to address emergency needs.

procuring and shipping emergency food aid in the most timely manner while complying with cargo preference and other congressional mandates. Contracts for procuring food aid commodities are usually awarded to the lowest cost bidder that complies with all contract specifications in a solicitation.[13] In contrast, the freight bidding process is complicated by the requirement that USAID and USDA comply with the cargo preference mandate that 50 percent of all cargo (by volume) be shipped on a US flagged vessel.

In addressing cargo preference requirements on an annual basis, USDA and USAID established a priority rating for every bid based on whether or not the agency has determined that a food aid shipment has to be carried on US flagged ships. A bid is designated as P1 (priority 1) if the shipment is to be carried on a US flagged vessel on every leg of the voyage to the recipient country's port. It is designated as P2 (priority 2) if the shipment is to be shipped on US flagged vessels for the majority of the voyage, and as P3 (priority 3) if the shipment is to be carried on foreign-flagged vessels. However, P2 contracts are very rarely used.[14]

The agencies track the extent to which their programs comply with cargo preference on a weekly basis throughout the fiscal year. The mandate requires that cargo preference be applied to well-defined geographic areas but the 1985 legislation did not explicitly identify those areas. Thirteen years later, however, in response to a 1998 lawsuit filed by the US maritime industry, USDA agreed to meet the 50 percent cargo preference requirement on a country-by-country basis for the international food aid programs it operates, initially the Food for Progress program and subsequently, the McGovern-Dole Food for Education program which was authorized as part of the 2002 Farm Bill (Farm Security and Rural Investment Act, 2002).[15]

[13] USDA also has to meet set-aside requirements if firms submitting bids are classified as small businesses.

[14] Typically, P2 bids are for shipments delivered to ports not capable of handling ocean going vessels and therefore have to be offloaded to smaller boats near the destination port. Between October, 2012 and September, 2018, only 11 of 4,814 packaged food aid and bulk goods shipments were shipped under P2 contracts.

[15] See United States District Court, District of Columbia (1998).

However, because USAID, was not a party to the 1998 lawsuit, that agency has more flexibility in defining the geographic areas relevant for Title II emergency food aid shipments. In volume terms, about two-thirds of all Title II shipments consist of bulk grains, which in recent years have mostly been shipped to a handful of countries in East Africa. Thus, perhaps to minimize the risk of further litigation, subsequently for bulk shipments USAID has applied the cargo preference mandate on a country-by-country basis. However, for packaged shipments, which are often relatively small and go to dozens of different countries, USAID applies the cargo preference mandate to all such shipments, regardless of destination.

USAID appears to have adopted the following approach to ensure compliance with cargo preference for all Title II emergency food aid shipments. Throughout the year, the agency closely tracks the volume of aid shipped under cargo preference. If, at any time during the year when new bids are solicited, the cargo preference mandate is not being met, then USAID may be more likely to determine that a P1 request for bids for transportation on US flagged vessels be issued for future shipments of aid.[16]

5 Data

Data were obtained on all 520 shipments of bulk commodities and all 4,294 shipments of packaged goods carried out under the Title II emergency food aid program over the six-year period between October 1, 2012 and September 30, 2018 (fiscal years 2013-2018) from two USAID and USDA sources on

[16]For solicitations for P1 cargo preference bids, even if only one shipping company makes a P1 bid for a cargo preference shipment, that bid will be accepted as long as the freight rate is deemed to be "fair and reasonable" under the rules established by MARAD. MARAD itself reported that daily operating costs for US flagged ships were 170 percent higher than for foreign flagged ships, thus justifying higher freight rates for US flagged ships (Maritime Administration, 2011). Further, the Government Accountability Office Government Accountability Office (2015*a*) reported that MARAD allows US flagged ship owners to include a surcharge of 19 percent over estimated costs in such fair and reasonable freight rates. USAID manages all aspects of procurements involving prepositioned food aid, as discussed above. In recent years, the agency has endeavored to use US flagged ships that have regular routes to Djibouti and South Africa to move these commodities to maximize their flexibility in meeting the remainder of the cargo preference requirement for shipments to other destinations.

international food aid shipment contracts Agricultural Marketing Service (2020).[17] For each observation, the information from the two sources was linked using the purchase order identification numbers for each shipment. The variables for each observation include the total cost of the shipment, freight bid category (P1, P2, or P3), shipment start date, ports of origin and destination, size (metric tons), carrier, shipment vessel (liner or bulk carrier) and private voluntary organization managing the shipment. As discussed above, food aid carried under P1 or P2 bids are cargo preference shipments carried on US flagged vessels; cargoes carried under P3 bids by foreign-flagged vessels are non-cargo preference or other shipments. Thus, the indicator variable US flag equals one for cargo preference shipments and zero otherwise.[18]

Two measures of the costs of shipping goods between ports of origin and destination are utilized in the empirical models for which parameter estimates are reported.[19] The first is the real cost per metric ton of goods shipped (total ocean transportation cost of the shipment divided by size of the shipment in metric tons and deflated by the Bureau of Labor Statistics (2020) producer price index for deep-sea transportation). The second is the inflation adjusted (real) total ocean transportation cost of each shipment, in which total nominal costs are converted to 2012 dollars using the Bureau of Labor Statistics (2020) producer price index for deep-sea transportation.

Other variables used in the empirical analyses include the size of the shipment (measured in metric tons), distance between ports of origin and destination for each shipment (Sea-Distanes.Org), ton-miles (shipment distance multiplied by shipment size), the type of vessel used for the shipment (a liner (container) vessel or bulk carrier), and four sets of indicator variables.[20]

[17] One atypically expensive shipment to Niger during the 2014 Ebola crisis is omitted from the empirical analysis. Shipping costs for the 270 metric tons of bulger totaled $370,000, at a freight rate of $1,333 per ton, over 880 percent higher than the average nominal freight rate of $151 for all packaged shipments. Omitting this observation had no meaningful impact on the parameter estimates obtained from any of the econometric models for which results are reported here.

[18] Two observations were missing bid information and are coded as P3 shipments here.

[19] 16 observations had to be excluded due to missing price data.

[20] For a small number of shipments in the data set, ports of origin were not reported. However, in each case, ports of origins for other shipments to the same destination were reported. Thus, distance travelled for shipments where the port of origin was not identified were estimated by computing the average distance of all food aid shipments to that destination for which

The first set consists of indicator variables for the carriers that frequently carried either packaged goods or bulk cargo preference shipments (APL, CMA CGM, Liberty, Maersk, and Sealift) over the six-year estimation period. Liberty Maritime only operates bulk carriers, while Sealift operates bulk and liner vessels.[21] The other three companies only carried packaged goods over the fiscal year period 2013 to 2018. Thus, four company indicator variables are included in empirical models of packaged good shipment costs and two company indicator variables in models of bulk commodity shipping costs. The omitted categories include a group of 15 carriers of packaged goods and 17 carrier of bulk commodities with smaller shares of food aid cargoes.

The second set includes indicator variables for shipments organized by the World Food Program (WFP) and the following PVOs: ACDI/VOCA, Catholic Relief Services (CRS), and all other (Small) PVOs, where any shipments of food aid managed by USAID are treated as the omitted category.[22] The third and fourth sets of indicators are for shipment routes and year of shipment. Packaged goods were shipped on 179 routes and bulk commodities on 49 routes over the six year estimation period.

One company, Maersk, accounts for 55 percent of all packaged good shipments of emergency food aid on both US flagged (cargo preference) and foreign-flagged vessels.[23] Thus, in some models, an additional indicator variable is included to identify shipments carried by Maersk vessels under cargo preference (Maersk-US flag) to examine the extent to which Maersk is able to charge different prices for cargo preference shipments and all other shipments of emergency food aid. As discussed below, separate econometric models utilizing observations only on Maersk shipments of food aid packaged

ports of origin were identified. For example, suppose that ports of origin (Galveston, TX and Norfolk, VA) were available for two shipments to Dar Es Salam, Tanzania but not for a third shipment. The average distance for the first two shipments would then be used as the estimate of the actual distance of the third shipment. Additionally, 5 packaged shipments were missing vessel types and assumed to be carried on liners.

[21] One observation was missing carrier information, but shared the same origin port and destination port, as other packaged shipments carried by Sealift on the same day. Thus, this shipment from Jacinto, TX to Mombasa, Kenya in 2013 is assigned to the carrier Sealift.

[22] The WFP handles more Title II shipments than any other organization and CRS is the next most frequent carrier of such aid. Following Mercier and Smith (2015) and Mercier and Smith (2019) we also include a category for ACDI/VOCA. Other carriers are relatively small and are therefore aggregated into one category.

[23] Maersk vessels did not carry bulk shipments of emergency food aid over the period for which data are available.

goods are also estimated to test the hypothesis that Maersk is able to systematically charge different freight rates for cargo preference and non-cargo preference shipments of Title II emergency food aid.

Definitions and descriptive statistics for the variables are presented in Tables 1 and 2, respectively. The empirical analysis examines packaged and bulk Title II shipments separately. Thus, in Table 2, descriptive statistics are presented separately for shipments of packaged goods (Panel A) and bulk commodities (Panel B).[24]

There are two reasons for examining bulk and packaged good shipments separately. First, as discussed above, there are substantial differences in how USAID manages bulk and packaged good shipments to meet the cargo preference mandate (on a country-by-country basis for bulk shipments and a global basis for packaged shipments). Second, there appear to be potentially important differences in the competitive structures of the supply side of the markets for cargo preference shipments of bulk and packaged goods. Between FY 2013 and FY 2018, under cargo preference, ten US registered carriers handled packaged goods shipments serving dozens of countries. However, only six companies handled a much smaller number of bulk shipments, mainly to countries located in sub-Saharan Africa.

Volume (metric ton) based Herfindahl-Hirschman index (HHI) measures of market concentration are shown in Figure 1 for fiscal year shipments of bulk and packaged goods.[25] For both bulk and packaged goods, HHI measures are estimated for cargo preference (P1 and P2) and competitive (P3) shipments. Fiscal year HHI values for shipments open to competitive (P3) bids from all carriers are very similar, ranging from 1,923 (FY 2013) to 3,111 (FY2018) for packaged goods and 1,627 (FY2015) to 3,244 (FY2018) for bulk commodities. HHI values for cargo preference shipments are much higher for both bulk and packaged good than for shipments open to foreign competition. Moreover, in every year

[24]Additionally, select summary statistics are reported for US flagged and foreign flagged shipments of packaged goods and bulk commodities in Table A.1.

[25]For non-hazardous cargoes, carriers generally quote freight rates from a given origin to a given destination on the basis of weight (metric tons), contingent on whether the cargo is a bulk commodity or consists of packaged goods. Insurance costs are based on the value of the cargo, but usually accrue to an insurance company, not the carriers, and represent a relatively small fraction of total shipping costs. Thus, here volume based HHI measures of concentration are reported.

the cargo preference HHI index for bulk commodities, averaging 6,476 over the entire six-year period, is higher and on average substantially higher than for packaged goods, which averaged 4,960 over the same period.

On an HHI scale of zero to ten thousand, in an antitrust context, the US Department of Justice (DOJ) defines a “moderately concentrated" industry as having an HHI between 1,500 and 2,500, illustrated by the shaded region in Figure 1, and considers markets in which the HHI is in excess of 2,500 points to be highly concentrated (US Department of Justice, 2018). Thus, cargo preference shipments fall into the DOJ’s “highly concentrated" category while open bid (P3) shipments are “moderately" concentrated.[26] Further, the cargo preference market for bulk commodities appears to be substantially more concentrated and potentially less competitive than for packaged goods, with potential implications for the impacts of the cargo preference mandate on transportation costs in the two markets.

6 Econometric models

Emergency food aid shipping costs for both bulk and packaged commodities are likely to be affected by several factors, including whether or not USAID solicits P1 and P2 bids only from cargo preference eligible US flagged vessels or under P3 bids open to foreign-flagged vessels. The impacts of cargo preference as measured by the US flagged variable are the main focus of this paper. However, other variables may also affect shipping costs. Shipment size (measured in metric tons) may affect such costs because of potential efficiencies in cargo handling. (Mercier and Smith, 2019).[27]

The experience of the organization that manages the bidding process also potentially affects shipping costs. Mercier and Smith (2019), for example, argue that organizations such as the World

[26] In addition, an increase an HHI of 200 is viewed as a substantial increase in concentration by DOJ agencies (US Department of Justice, 2018).

[27] Mercier and Smith (2019) found no evidence that commercial freight rates had any impact on cargo preference shipments, but that freight rates for food aid shipments carried on foreign flagged vessels were positively correlated with commercial freight rates on almost a dollar for dollar basis. In this paper, we deflate the cost per ton variable by the Bureau of Labor Statistics (2020) producer price index for deep sea transportation instead of including it as an independent variable.

Food Program that handle relatively large numbers of shipments may be more efficient in managing shipments than smaller PVO's, and reported that on a cost per ton basis shipments managed by smaller PVOs were more expensive. In addition, different carriers may be more or less experienced and efficient in handling emergency food aid and, therefore, transportation costs may vary according to the company that carries out a shipment.[28]

For packaged goods, whether the shipment is carried on a liner (container vessel) or as "deck cargo" on a bulk carrier could also influence shipping costs. Similarly, occasionally bulk shipments may be carried on container ships. Thus, the indicator variable Liner is included in the models of packaged and bulk shipment costs to account for these potential effects.

Two other sets of variables are also included in the empirical models. Budgets for emergency food aid are authorized by Congress and managed by USAID on a fiscal year basis. Thus, a set of indicator variables is included in some empirical models to account for potential year fixed effects. In addition, the route on which a shipment is carried is likely to affect shipping costs, both because of differences in distance traveled and differences in costs associated with serving different ports.[29]

The first set of estimation models utilize the real cost per metric ton, measured in 2012 dollars, as the dependent variable.[30] This variable is effectively a measure of the freight rates charged for shipments of emergency food aid, which are widely quoted on a per metric ton basis, for both cargo preference shipments on US flagged vessels and all other shipments carried on foreign flagged vessels under the assumption that freight rates for foreign flagged shipments are exogenously determined.[31]

[28] Mercier and Smith (2019) also found evidence that shipping costs varied systematically among carriers.

[29] Routes may affect shipping costs through fuel, labor and other costs directly affected by distance travelled, but could also have impacts on a cost per ton basis (Mercier and Smith, 2019).

[30] Mercier and Smith (2019) and Government Accountability Office (2015*a*) also used cost per metric ton as the dependent variable in their analyses of the determinants of emergency food aid shipping costs. In our analysis which uses the real cost per metric ton, for each observation, the Bureau of Labor Statistics (2020) producer price index for deep-water freight rates is the value of the index for the month in which the cargo was scheduled to be shipped from its port of origin to its destination.

[31] In the absence of cargo preference requirements, it is likely that USAID would source all food aid through the competitive bidding process. It is unlikely that this increase in volume would change freight rates because Title II emergency food aid is consistently less than 1 percent of US agricultural exports for both packaged goods and bulk commodities. These tonnages are presented for fiscal years 2013 to 2018 in Table A.2.

The most general specification for this set of models is:

$$\begin{aligned} RealCostPerTon_{itr} = \alpha + \beta(USFlag)_{itr} + \delta \times ln(Tons)_{itr} + \theta(Liner)_{itr} \\ + Carrier\vec{D}ummies_{itr} \times \kappa + \phi(MaerskDummy \times USFlag)_{itr} \\ + PVOD\vec{u}mmies_{itr} \times \pi + \tau_t + \rho_r + \varepsilon_{itr} \end{aligned} \tag{1}$$

where i indexes individual shipments, t indexes fiscal years, and r indexes routes (destination and origin port pairs). Our main variable, $USFlag_{itr}$, is an indicator variable that takes a value of 1 when a shipment is a cargo preference shipment (P1 or P2). The coefficient for this variable identifies the impact of the cargo preference mandate on freight rates for such shipments. $Tons_{itr}$ is the shipment weight in metric tons. $Liner_{itr}$ is an indicator that takes a value of 1 when a shipment is carried on a containership. $Carrier\vec{D}ummies_{itr}$ and $PVOD\vec{u}mmies_{itr}$ are vectors of indicator variables to account for select carriers (APL, CMA CGM, Sealift, Maersk, and Liberty) and PVOs (ACDI/VOCA, CRS, WFP, and Small PVOs). $(MaerskDummy * USFlag)_{itr}$ is the carrier dummy for Maersk interacted with the dummy variable $USFlag_{itr}$, which we use to identify cargo preference shipments carried by Maersk. τ_t and ρ_r are year and route fixed effects, and ε_{itr} is an error term.[32] Parameter estimates are obtained using OLS procedures with robust standard errors clustered by route, and can therefore be interpreted as the marginal impacts of changes in each explanatory variable on nominal freight costs.[33]

The second set of models utilize the log of the total cost of each shipment as the dependent variable, where total costs are measured in constant 2012 dollars.[34] On the right hand side, we use the

[32] Mercier and Smith (2019) identify four US regions of origin and 10 destination regions to identify shipping routes. Here, because the data set includes over 4500 observation rather than about 2300 observations routes are defined in terms of actual ports of origin and destination.

[33] Emergency food aid cargos were shipped from a total of 23 US ports of origin between FY 2013 and FY 2018. Packaged goods were shipped from a total of 17 ports of origin and bulk commidities were shipped from a total of 8 ports of origin. Maersk only carried packaged good shipments between FY 2013 and FY2018. Thus, Maersk indicator variables are not included in the models of bulk shipment costs.

[34] As reported in Table 2, total shipping costs for packaged goods range from $576 to about $2.1 million; similarly total

same $USFlag_{itr}$ and $Liner_{itr}$ dummies as in Equation 1. Instead of the log of metric tons, we include the log of metric ton-miles, which is an interaction of the $Tons_{itr}$ variable and the route distance in nautical miles. We also replace the select set of carrier and PVO dummies with a set of carrier fixed effects in addition to the fiscal year and route fixed effects. These models serve two purposes. First, they provide robustness checks in assessing the consistency of the estimates of the costs of cargo preference obtained from the first set of models. These models are also used to estimate the total costs of the cargo preference mandate.[35]

7 Results

In Table 3 results are reported for models in which the dependent variable is the real cost per ton of each shipment. Parameter estimates for models of packaged goods are presented in Columns 1 and 2 and estimates for bulk commodities are presented in Columns 3 and 4. For both commodity categories the estimation models for which results are reported consist of a parsimonious specification that only includes the US flag variable and fiscal year and route fixed effects and a more complete specification that includes all of the variables identified in Equation 1. For both packaged goods and bulk commodities, in terms of explanatory power, the preferred empirical models are the specifications that include carrier, PVO, year and route fixed effects for which parameter estimates are reported in Columns 2 and 4 of Table 3.[36] In the preferred model for packaged goods, the parameter estimate for US flag is \$94.88 and statistically significant at the 1 percent level. Given that, among all observations, for packaged goods average shipping costs are \$140 per ton, these results indicate that under cargo preference packaged good freight rates are more than 68 percent higher than the comparable freight rates charged on foreign-

shipping costs for bulk commodities range from about \$2,000 to \$6.7 million. Hence, because of the extreme range in values, dependent variable observations are converted to logs.

[35]The second set of models are used to project total program costs because they model actual costs with less error than the specification in Equation 1 and account for a higher percentage of the variance in the dependent variable.

[36]For the four models presented in Table 3, F-tests show that both the route and fiscal year fixed effects are jointly significant at the 1 percent level.

flagged shipments for which bids are subject to much more competition.

As discussed above, the Danish multinational conglomerate Maersk carried 55 percent of all packaged good shipments, including 37 percent of all such shipments on foreign flagged vessels, and through its US subsidiary, 71 percent of all such shipments on US flagged vessels under cargo preference. Thus the variable Maersk-US flag was included to assess the extent to which Maersk was able to charge higher prices for cargo preference shipments than foreign-flagged shipments also carried by Maersk after accounting for the effects of other variables such as routes and time periods. The parameter estimate for this variable, Maersk-US flag in Column 2 of Table 3, is -$32.31 and statistically significant at the 1 percent level. Thus, the net impact of carrying cargo preference shipments on a Maersk US flaged vessel as compared to carying shipments on a Maersk foreign flagged vessel is the sum of the coeffecients of the US flag variable ($94.88) and the Maersk-US flag variable, which yields an estimate of $62.57 per metric ton.[37]

Given Maersk's extensive role as a carrier of US emergency food aid, a third set of models were estimated using only data on the company's shipments in which the dependent variable is the nominal per ton freight rate. Results are reported in Table 4.[38] The impacts of cargo preference for this set of models are remarkably similar to those obtained using the full packaged goods sample reported in Table 3. In the most fully specified model (see column 4 in Table 4), in which the p-value for the US flag variable is essentially zero, the results indicate that cargo preference shipments carried on vessels owned by Maersk's US subsidiary were $65.46 more expensive than non-cargo preference shipments carried on vessels owned by Maersk. Thus, the evidence indicates that, as Bageant, Barrett and Lentz (2010) argued, foreign corporations are able to benefit from the market power created by the US cargo

[37]It is important to note that cargo preference shipments carried on Maersk vessels were observed to be less per metric ton than cargo preference shipments carried by other carriers. It is also the case that freight rates for competitive non-cargo preference shipments carried by Maersk were lower than other non-cargo preference shipments carried by other carriers (the coefficient on the Maersk variable in Column 2 of Table 3 is -$11.55).

[38]F-tests show that all sets of fixed effects presented in the models in Table 4 are jointly significant at the 1 percent level.

preference mandate.[39]

In addition to Maersk, some companies appear to charge less than others. On a per ton basis, freight rates charged by APL for packaged goods appear to be consistently lower than those charged by other carriers (coefficients for the variables APL are negative and statistically significant at a 1 percent level in Table 3) but are higher for similar cargoes carried by CMA CGM.

In absolute terms, the parameter estimates for the impact of cargo preference on freight rates for bulk shipments reported in Columns 3 and 4 of Table 3 are very similar to the estimates reported for packaged goods. In the most completely specified model (Table 3, Column 4), freight rates per metric ton for bulk commodities are $89.77 per ton higher for all emergency food aid shipments between fiscal years 2013 and 2018 after controls and fixed effects are included. However, the proportional impacts of the cargo preference mandate on bulk shipments appear to be larger than for packaged goods, about doubling freight costs. Given that far fewer US carriers compete for bulk shipments than for packaged goods shipments, this result is consistent with the hypothesis that US companies such as Liberty and Sealift which own US flagged bulk carrier vessels obtain exceptionally high economic rents from the cargo preference mandate. Liberty freight rates for bulk shipments do appear to be lower than those charged by other US flagged carriers as the coefficient on the variable Liberty is statistically significant at the 1 percent level, negative, and about -$31.38 a ton in Column 4 of Table 3. However, this still implies that the company charges over $58 a ton more for cargo preference shipments than other carriers charge for shipments of bulk commodities carried on foreign-flagged vessels.

Another question is whether the organization that manages an emergency food aid shipment affects the costs of transporting the food to where it is needed. Mercier and Smith (2019) reported that freight rates were substantially higher for PVOs that handled relatively few emergency food aid

[39]Maersk is able to obtain higher rates for cargo preference shipments compared to its own foreign flagged shipments as shown in Table 4. However, it is important to note that Maersk incurs higher costs on those shipments, in part because it is required to use US crews for those shipments.

shipments. The results presented in Table 3 for packaged goods provide some evidence that this is also the case for the much larger sample used in this study. The coefficients for the variable ADCI/VOCA and Small PVOs are positive and statistically significant at the 5 percent level in Column 2. For bulk shipments, the results in Column 4 of Table 3 suggest that PVOs may have relatively modest impacts on freight rates.

Finally, the size of the shipment appears to have no impact on the per metric ton costs of emergency food aid, regardless of whether the shipment consists of packaged goods or bulk commodities. None of the estimated coefficients for the variable tons are statistically significant in any of the models for which results are reported in Table 3.

As discussed above, as a further robustness check, an alternative set of models of the determinants of shipping costs were estimated in which the dependent variable is log of the real total cost of each shipment (measured in constant 2012 dollars). Results are reported in Table A.3 for both packaged goods (Panel A) and bulk commodities (Panel B). In the packaged goods model which is used to estimate the aggregate impact of the cargo preference mandate on total shipping costs (Table A.3, Panel A, Column 4), the coefficient for the US flag variable implies that ocean freight costs are 62 percent higher for cargo preference shipments than other shipments.[40] In the bulk commodities model used to estimate the aggregate impact of the cargo preference mandate on total shipping costs (Table A.3, Panel B, Column 4) the coefficient for the US flag variable implies that the total cost of bulk commodity shipments carried under cargo preference are 114 percent higher than other shipments. For both packaged goods and bulk commodities these results are similar to those obtained for the models in which the dependent variable is the real cost per metric ton in Table 3, demonstrating that the impact of cargo preference requirements on transportation costs for food aid are robust to alternative model specifications.

[40] When the dependent variable is measured in logs and the explanatory variable is either 0 or 1, the formula for estimating the proportional impact on the dependent variable of a change in the value of the explanatory variable from 0 to 1 is e^{β} - 1, where β is the parameter estimate for the explanatory variable.

A central question in the debate over US emergency food aid policy is the extent to which the cargo preference mandate increases transportation costs at the expense of the delivery of more aid to developing country populations. The regression models for which results are reported for packaged goods and bulk commodities in Column 4 of Table A.3 are used to obtain estimates of the costs that would have been incurred in those years in the absence of the mandate. The projections are based on the assumption that destinations, routes and the requirement that emergency food aid cargoes be sourced in the United States remain unchanged.[41]

To estimate the shipping costs incurred in the absence of cargo preference, for each shipment of bulk and packaged goods, the variable US flag is set equal to zero and all other explanatory variables are set to their observed values for that shipment. These values are then converted to nominal current year dollars using the Bureau of Labor Statistics (2020) price index for deep sea transportation services, and then summed for all shipments in each fiscal year to obtain projected estimates of total annual shipping costs in the absence of cargo preference. The estimated costs of the cargo preference mandate in each fiscal year are then computed as the difference between the actual annual expenditures incurred and the estimates of the costs for the same shipments in the absence of the cargo preference mandate. The resulting cost reduction estimates are reported in Table 5.

The estimated total annual cost savings obtained by eliminating cargo preference for all Title II emergency food aid shipments range from 34 percent of ocean transportation costs ($32.37 million) in FY 2013 to 38 percent of ocean transportation costs ($54.82 million) in FY 2017, and averaged 36 percent of ocean transportation costs ($47.5 million) from the entire six-year period (FY 2013 to FY 2018). They imply that ending the cargo preference mandate would have reduced annual total

[41] Column 4 of Table A.3 is used to obtain estimates of what total transportation costs would be without cargo preference because, unlike Column 5, it does not include carrier fixed effects. The estimates are obtained under the assumption shipment destinations and other characteristics would not change in the absence of cargo preference, because of the emergency nature of most shipments. Thus, for forecasting purposes, Column 5, which includes carrier fixed effects, may be over-specified because in the absence of cargo preference, the carrier for each shipment is likely to change substantially but in ways that cannot be predicted.

shipping costs by between 34 percent and 38 percent over the six-year period. The reductions in annual shipping costs for packaged goods range from 27 percent ($12.90 million) in FY 2015 to 34 percent ($15.93 million) in FY 2014, reducing annual shipping costs by 30 percent on average over the six year period. Reductions in annual shipping costs for bulk commodities are larger, ranging from 35 percent ($20.44 million) in FY 2014 to 41 percent ($35.66 million) in 2017, reducing annual shipping costs by 40 percent on average over the six year period. These annual cost estimates are comparable to those reported by Mercier and Smith (2019) for the period January 2012 to May 2015.

Estimated cost reductions associated with terminating the cargo preference mandate vary from one year to the next in part because both the prices of agricultural commodities and freight rates vary. This affects the amount of aid that can be provided from agency budgets, which themselves vary somewhat from one year to the next. Cost savings are higher for bulk commodities than packaged goods in part because the volume of annual bulk shipments is larger. In addition, as discussed above, because of differences in the degrees of market power that US bulk and packaged good carriers enjoy under cargo preference, on a per metric ton basis as well as proportionally, the difference between freight rates charged for cargo preference shipments and foreign-flagged shipments is larger for bulk commodities.

The scope of the humanitarian impact of the cargo preference mandate is substantial. USAID estimates that providing emergency food aid to families in need under current program restrictions costs about $37 per person (US Agency for International Development, 2014). However, Elliott and McKitterick (2013) argue that if cargo preference rules were to be relaxed, that figure would fall to about $25 per person. Given that the cargo preference mandate increases shipping costs by an annual average of $47.5 million, by itself, the mandate means that annually nearly two million desperately poor children and adults do not receive emergency food aid. Thus, over 11 million people did not receive help between FY2013 and FY 2018, with dire implications for mortality, morbidity and malnutrition rates among those populations. If the mandate to source almost all food aid within the United States

were also terminated, transportation cost saving would be much larger, with commensurately larger impacts on the effective use of the US emergency food aid budgets.

A second concern about cargo preference mandate impacts is that, combined with the requirement that all or almost all food aid be sourced in the United States, the mandate has contributed to significant delays of up to four months in the delivery of urgently needed food aid (Government Accountability Office, 2007, 2015*a*; Bageant, Barrett and Lentz, 2010; Barrett and Maxwell, 2005). Table 6 provides information on the characteristics of the 214 foreign-flagged vessels and 59 US flagged vessels that carried aid shipments between FY2013 and FY 2018.[42] Crucially, cargo preference vessels, which delivered an average of 52 cargoes per vessel over that period, were on average 6 years older than foreign-flagged vessels which delivered an average of 11 cargoes per vessel. The concomitant implication is that cargo preference vessels owned by US companies were older, slower, more technologically outdated, more likely to experience breakdowns and use more fuel, as argued by Ferris and Thomas (2015), the Government Accountability Office (2015*a*,*b*) and Bageant, Barrett and Lentz (2010).[43]

Beyond pure rent seeking activities by the private US mercantile industry, proponents of cargo preference and other shipping mandates have also claimed that they are sustaining the US shipbuilding industry and the pool of mariners and vessels available for sealift (Center for Strategic and Budgetary Assessments, 2019). The evidence presented in Table 6 suggests that the impacts of food aid cargo preference on US ship building have been very modest. Only four (7 percent) of the 59 ships that carried cargo preference food aid shipments between FY 2013 and FY 2018 were built in the United States. Thirty vessels (51 percent) were built in South Korea and six in Japan (10 percent). Rather

[42]Data on vessels that carried Title II shipments between 2012 and 2018 were accessed from BalticShipping.com (2019). These records were linked to Title II shipments using vessel ID numbers from USDA and MARAD, port call records, and finally IMO numbers (Maritime Administration, 2020*b*; Navigation Data Center, 2019). We were unable to match three small vessels (one tug and two barges) that carried cargo preference (US flagged) food aid shipments to Haiti and Guatemala.

[43]These findings are also consistent with the results of other studies that have examined the impact of programs that protect a selected group of companies from competition by other companies, enabling them to exercise market power that generates economic rents and at the same time reduces incentives for both technological innovation and cost minimization. See, for example, the extensive literature on rate of return regulation in the electric power industry and natural monopoly sectors (Averech and Johnson, 1962; Joskow and Rose, 1989; Coggins and Smith, 1993).

surprisingly, even China's shipbuilding yards constructed more vessels (five) than United States yards (four vessels) to transport emergency food aid cargo preference shipments over the period covered by this study.

Cargo preference laws also appear to have little impact on maritime employment. Ferris and Thomas (2015), for example, estimate that at most the food aid cargo preference mandate sustains about 495 maritime jobs. If that is the sole justification for the mandate, the estimates of the annual costs of cargo preference indicate that the jobs are being sustained at a federal government cost of approximately $100,000 per mariner.[44]

The requirement that almost all food aid be sourced in the United States also imposes additional costs on the program. If both the cargo preference and sourcing mandate were terminated, additional transportation cost savings would be achieved as well as improvements in delivery speed because food aid could then be sourced from the most efficient providers, often much closer to the populations in need (Lentz, Passarelli and Barrett, 2013). USAID would likely continue sourcing food for the Americas and Caribbean in the United States. These destinations accounted for about 3 percent of all packaged and less than 1 percent of all bulk shipments by tonnage between FY 2013 and 2018. It is also possible that some of the prepositioned shipments to USAID's global warehouses could also most efficiently be sourced from the United States. However, if USAID were to continue to source food from the US at the three closest prepositioning locations (Las Palamas, Canary Islands, Durban, South Africa, and Tanjung Pelepas, Malaysia) the total percentage of food aid shipments sourced in the US would only account for about 8 percent of all packaged good shipments and less than 4 percent of all bulk shipments.[45] It is difficult to estimate the total cost savings from removing both the cargo preference and US sourcing

[44]The estimate of $100,000 per job is obtained by dividing the estimated average fiscal year cost of cargo preference programs reported in Table 5, $47.5 million, by the total number of mariner jobs supported by the program as estimated by Ferris and Thomas (2015), 495.

[45]If all Americas, Caribbean, and Prepositioned shipments were sourced from the US, they would still only constitute 24 percent of all packaged shipments and 9 percent of all bulk shipments.

mandates because of lack of information about where the aid would then be sourced. However, the additional cost savings are likely to be substantial.

8 Conclusion

In the United States, cargo preference mandates and other protective policies have been used as mechanisms to protect domestic carriers from foreign competition since 1789 and have explicitly been applied to shipments of international emergency food aid since 1954 (Hoxie and Smith, 2019; Mercier, 2019). Consistently since its inception, the emergency food aid cargo preference mandate has been justified as a means of supporting the US military's sea lift capacity by sustaining domestic shipping and shipbuilding companies and assuring the availability of US mercantile marine sailors to crew sealift vessels. It is unlikely that sealift capacity has been enhanced by this mandate in any substantive way (Thomas and Ferris, 2015; Ferris and Thomas, 2015; Government Accountability Office, 2015*a*; Mercier and Smith, 2015) and, as indicated by the data on the origin of cargo preference vessels presented in this study, the impact on the demand for US shipping and ship building services seems minimal. However, the adverse impacts of the cargo preference mandate on the budgets available to USAID are significant. The mandate, which added an annual $47.5 million (36 percent of spending on ocean transportation) to shipping costs between 2013 and 2018, substantially reduces the ability of the USAID Tittle II program to meet the most basic nutritional needs of populations facing the dire consequences of poverty because of natural and man-made disasters by at nearly two million people every year.

The humanitarian implications of those impacts are real; because of the cargo preference mandate, every year hundreds of thousands of children and adults suffer unnecessarily from severe malnutrition and starvation, with both short-term and long-term impacts on their morbidity and mortality rates. There are also adverse impacts for the United States with respect to foreign relations and national

defense because emergency food aid is an important manifestation of US “soft power"; winning hearts and minds are still important in the context of international relations and risks of international conflicts.

This study has also provided new evidence about the role of market power in determining the size of the costs that derive from cargo preference mandates. Between FY2013 and FY 2018, only six companies handled cargo preference shipments of bulk commodities, while ten companies successfully competed for cargo preference shipments of packaged goods. In both absolute and proportional terms, the consequence has been that freight rate markups for cargo preference shipments over the internationally competitive rates at which foreign-flagged vessels carried food aid on average have been much higher for bulk commodities (101 percent) than for packaged goods (68 percent). Thus, US companies with bulk carrier vessels such as Sealift and Liberty have exceptionally large stakes in lobbying for the continuation and expansion of the international food aid cargo preference requirement (Maritime Administration, 2013; Mercier, 2019). This is because of both higher markups and the fact that, on a metric ton basis, on average bulk commodity shipments are ten times larger than packaged goods shipments.[46]

These results suggest that the impact of regulations that grant a limited number of companies with access to a market are closely linked to the resulting extent of market concentration. In this context, barriers to entry from potential competitors associated with qualifying vessels for cargo preference shipments are important. They include registering a vessel under the US flag, which requires increased staffing and higher tax obligations, and a three year waiting period before the vessel becomes eligible for cargo preference shipments (Maritime Administration, 2011; Government Accountability Office, 2015*a*; Leptos-Bourgi, van den Bree and Boonacker, 2015; Michel, 2016). These barriers appear to be more substantial for bulk carriers than for container vessels that carry packaged goods.

[46]Over the six year period, as shown in Table 2, the average size of a packaged good shipment was 516 tons and the average size of a bulk commodities shipment was 9,221 tons.

In summary, it is difficult to avoid the conclusion that food aid cargo preference provides little in the way of spillover benefits to the United States for sealift capacity, domestic shipbuilding, and, therefore, national defense. However, it does reduce the ability of US aid agencies to meet the global humanitarian aid needs with which they are confronted while generating substantial economic rents for some private carriers, including substantial benefits that flow to foreign conglomerates such as Maersk.

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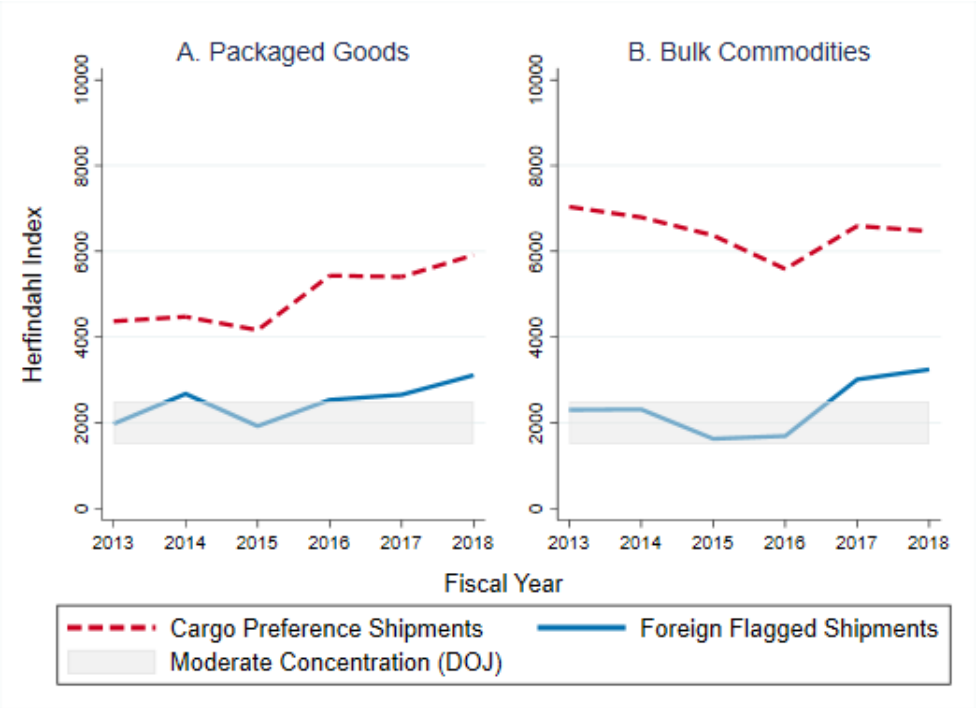
Figure 1: Herfindahl-Hirschman Indexes for Title II Food Aid Shipments (FY 2013 to FY 2018)



Note: This figure constructs Herfindahl-Hirschman Indexes for shipment volumes by carrier for packaged and bulk shipments of cargo preference and competitive shipments separately (Agricultural Marketing Service, 2020). We use the formula described in US Department of Justice (2018) to construct index values that can range from 0 to 10,000. The shaded box denotes the range of the index defined to represent “moderate" concentration by the US Department of Justice (2018). A values closer to 0 represent more market competition and values closer to 10,000 (the maximum value possible) represent more market concentration.

Tables

Table 1: Variable Descriptions

Variable name	Description
Total shipment cost	Total ocean shipment cost (from port of origin to port of destination).
Cost per ton	Total ocean cost per metric ton of goods shipped.
Real cost per ton	Total ocean cost per metric ton of goods shipped deflated by the Bureau of Labor Statistics (2020) producer price index for deep sea shipments to be in 2012 US dollars.
Real total cost	Total shipment cost adjusted by the Bureau of Labor Statistics (2020) producer price index for deep sea shipments to 2012. constant dollars.
US flag	Indicator variable set equal to one for shipments on US flagged vessels under P1 and P2 bids and set equal to 0 for shipments from competitive (P3) bids.
Company dummies	A set of six indicator variables set equal to 1 if a shipment is carried by either APL, CMA CGM, Sealift, Liberty or Maersk and equal to 0 for all other carriers.
Maersk-US flag	An indicator variable set equal to 1 if a shipment is carried by Maersk on a cargo preference vessel and equal to 0 for all other shipments.
PVO dummies	A set of indicator variables equal to 1 if a shipment is organized by the following PVOs: ACDI/VOCA, Catholic Relief Services (CRS), the World Food Program (WFP), and other (Small) PVOs. Shipments managed by USAID form the omitted group and take a value of 0.
Tons	Size of shipment measured in metric tons.
Ton-miles	Distance of shipment in nautical miles multiplied by size of shipment in metric tons.
Liner	An indicator variable equal to 1 if a shipment is carried on a line service vessel and a value of 0 if carried on other vessel types.

Table 2: Summary Statistics

Panel A: Packaged goods	Mean	St.Dev.	Min	Max
Total shipment cost	78,020	122,566	575.5	2,133,000
Cost per ton	151.0	56.27	41	570.6
Real cost per ton	139.7	52.14	38.51	497.7
Real total cost	720.5	1,128	5.503	19,339
Distance	7,930	1,945	650	11,783
Tons	516.3	693.8	10	8,450
Ton-miles	4,114,000	5,553,000	10,450	66,130,000
Index (2012 = 100)	108.3	6.830	98.57	127.5
Liner	0.951	0.215	0	1
US flag	0.531	0.499	0	1
Carriers:				
APL	0.0692	0.254	0	1
CMA CGM	0.0701	0.255	0	1
Sealift	0.0505	0.219	0	1
Maersk	0.551	0.497	0	1
Maersk-US flag	0.378	0.485	0	1
PVOs:				
ACDI/VOCA	0.0189	0.136	0	1
CRS	0.150	0.357	0	1
WFP	0.475	0.499	0	1
Small	0.148	0.355	0	1
Panel B: Bulk commodities	**Mean**	**St.Dev.**	**Min**	**Max**
Total Shipment Cost	891,957	964,313	2,039	6,738,000
Cost per Ton	95.90	40.01	22.51	215
Real cost per ton	88.60	37.23	22.45	206.2
Real total cost	8,222	8,728	18.67	53,633
Distance	8,456	1,027	960	11,008
Tons	9,221	8,217	40	47,500
Ton-miles	78,680,000	72,990,000	321,640	443,500,000
Index (2012 = 100)	108.3	7.003	98.57	127.5
Liner	0.0654	0.247	0	1
US flag	0.525	0.500	0	1
Carriers:				
Liberty	0.390	0.488	0	1
Sealift	0.0692	0.254	0	1
PVOs:				
ACDI/VOCA	0.00385	0.0620	0	1
CRS	0.360	0.480	0	1
WFP	0.394	0.489	0	1
Small	0.140	0.348	0	1

Source: This table shows means, standard deviations, minima, and maxima using data from USAID, Agricultural Marketing Service (2020), Bureau of Labor Statistics (2020), and Sea-Distanes.Org. There are 4,294 packaged observations and 520 bulk observations.

Table 3: Impacts of Cargo Preference on Real Shipping Costs per Metric Ton for Packaged Goods and Bulk Commodities (FY 2013 – FY 2018)

	Dependent variable: Real cost per metric ton			
	Packaged goods		Bulk commodities	
	(1)	(2)	(3)	(4)
US flag	66.43***	94.88***	61.84***	89.77***
	(5.866)	(11.21)	(2.078)	(4.106)
Ln tons		-0.821		0.193
		(0.565)		(0.584)
Liner		17.02**		10.00
		(8.278)		(8.414)
APL		-25.98***		
		(7.474)		
CMA CGM		17.35***		
		(5.931)		
Maersk		-11.55***		
		(3.714)		
Maersk-US flag		-32.31***		
		(11.81)		
Sealift		-9.520		-36.60***
		(8.689)		(6.722)
Liberty				-31.38***
				(4.798)
ACDI/VOCA		26.26***		-1.790
		(4.231)		(8.383)
CRS		-0.665		-3.038
		(5.822)		(4.448)
WFP		-4.965		-5.538
		(4.975)		(3.876)
Small		9.928**		-4.056
		(4.374)		(6.047)
Year FEs	Y	Y	Y	Y
Route FEs	Y	Y	Y	Y
Constant	137.1***	134.1***	49.25***	56.70***
	(4.162)	(11.78)	(3.162)	(8.658)
Observations	4,294	4,294	520	520
R^2	0.590	0.641	0.784	0.826

Note: This table reports estimates of Equation 1 using data from USAID, Agricultural Marketing Service (2020), and Bureau of Labor Statistics (2020). Standard errors are clustered by route and presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Impacts of Cargo Preference on Real Transportation Costs per Metric Ton for Packaged Goods Shipments Carried by Maersk (FY 2013-FY 2018)

	Dependent variable: Real cost per metric ton		
	(1)	(2)	(3)
US flag	49.71***	60.44***	65.14***
	(3.836)	(5.787)	(9.424)
Ln tons			-0.399
			(0.804)
ACDI/VOCA			16.31***
			(5.721)
CRS			-7.483
			(4.830)
WFP			-16.15***
			(4.293)
Small			4.781
			(6.870))
Fiscal Year FEs		Y	Y
Route FEs		Y	Y
Constant	105.0***	113.8***	105.3***
	(3.118)	(13.87)	(5.916)
Observations	2,364	2,364	2,364
R^2	0.248	0.509	0.530

Note: This table reports estimates of a modified version of Equation 1 for shipments handled by Maersk using data from USAID, Agricultural Marketing Service (2020), and Bureau of Labor Statistics (2020). The average real cost per metric ton for the 2,364 shipments handled by Maersk is $139. Standard errors are clustered by route and presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Actual and Estimated Total Shipping Costs for Packaged and Bulk Title II Emergency Food Aid Shipments in the Absence of a Cargo preference Mandate: FY2013 to FY2018

	Nominal total cost ($ Millions)					
Panel A: Packaged goods	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Actual costs	$61.76	$47.38	$48.21	$60.94	$58.21	$58.53
Projected costs without CP	$44.12	$31.45	$35.30	$44.22	$39.05	$40.57
Estimated total costs of the CP mandate	$17.64	$15.93	$12.90	$16.72	$19.16	$17.96
Percent reduction in costs without CP	29%	34%	27%	27%	33%	31%
Panel B: Bulk commodities						
Actual costs	$70.76	$57.78	$47.51	$101.42	$85.94	$100.33
Projected costs without CP	$42.80	$37.35	$28.04	$60.17	$50.28	$60.24
Estimated total costs of the CP mandate	$27.96	$20.44	$19.47	$41.25	$35.66	$40.09
Percent reduction in costs without CP	40%	35%	41%	41%	41%	40%
Panel C: Total						
Actual costs	$132.52	$105.16	$95.72	$162.35	$144.15	$158.86
Projected costs without CP	$86.92	$68.80	$63.35	$104.39	$89.33	$100.81
Estimated total costs of the CP mandate	$45.60	$36.37	$32.37	$57.97	$54.82	$58.05
Percent reduction in costs without CP	34%	35%	34%	36%	38%	37%

Note: This table reports projections of total shipping costs for emergency food aid by USAID under the Title II program using estimates from a modification of Equation 1 which use the real total cost of ocean transportation as the dependent variable, as described in the text. Parameter estimates for the model used in these projects are reported in Table A.3 Column 4. These estimates use data from USAID, Agricultural Marketing Service (2020), Bureau of Labor Statistics (2020), and Sea-Distanes.Org.

Table 6: Comparison of Vessel Characteristics Among Ships Carrying Cargo Preference and Foreign Flagged Ships (FY 2013-FY2018)

	Foreign Flagged Mean	Cargo Preference Mean
	(1)	(2)
Dead weight tons	53,885	49,047
Year built	2003	1997***
Number of Title II shipments	11	52***
Built in the US	0%	7%***
Built in China	23%	8%**
Built in Korea	38%	51%*
Built in Japan	25%	10%**
Ever non-US flagged	100%	49%***
Maersk	7%	37%***
N	214	59

Note: This table presents averages for vessels that carried any cargo preference shipment to vessels that carried food aid shipments that were not cargo preference. Vessel data were retrieved from BalticShipping.com. *** p<0.01, ** p<0.05, * p<0.1

Appendix

Table A.1: Mean Values for Foreign Flagged and Cargo Preference Shipments of Emergency Food Aid (FY 2013-FY2018)

	Packaged goods		Bulk commodities	
	Foreign flagged	US flagged	Foreign flagged	US flagged
	(1)	(2)	(3)	(4)
Cost per metric ton	$119	$179	$62	$127
Real cost per metric ton	$111	$165	$57	$118
Real total cost	$506	$909	$4,556	$11,539
Tons	482	546	8,497	9,877
Distance	7,831	8,017	8,583	8,341
N	2,012	2,282	247	273

Note: This table presents average values for foreign flagged (competitive) and cargo preference shipments separately for both packaged goods and bulk commodities using data from USAID, Agricultural Marketing Service (2020), Bureau of Labor Statistics (2020), and Sea-Distanes.Org. Real total costs are in constant 2012 USD. Distances are in nautical miles.

Table A.2: Title II Emergency Food Aid as a Share of US Agricultural Exports (FY 2013-FY 2018)

	Packaged goods			Bulk commodities		
	USAID	Exports	Percent	USAID	Exports	Percent
Fiscal year	(1)	(2)	(3)	(4)	(5)	(6)
2013	462,490	62,279,060	0.74%	707,550	95,532,695	0.74%
2014	293,440	71,705,623	0.41%	587,420	136,871,906	0.43%
2015	318,400	65,503,861	0.49%	587,560	136,829,089	0.43%
2016	404,220	64,832,080	0.62%	1,180,710	144,301,866	0.82%
2017	384,910	66,121,068	0.58%	830,810	159,308,725	0.52%
2018	353,492	68,407,013	0.52%	901,060	155,515,800	0.58%

Note: This table presents total tonnages (in metric tons) of packaged goods and bulk commodities shipped as part of USAID's Title II emergency food aid program and for all US agricultural exports. Data for food aid tonnages are from USAID and Agricultural Marketing Service (2020). US export data accessed from Foreign Agriculture Service (2021). Packaged US exports include intermediate and consumer oriented agricultural goods only. Agricultural related products (forest products, seafood products, and biodiesel) are excluded from both bulk and packaged export totals.

Table A.3: Impacts of Cargo Preference on Real Total Transportation Costs (FY 2013-FY 2018)

	Dependent variable: Ln real total cost				
Panel A: Packaged goods	(1)	(2)	(3)	(4)	(5)
US flag	0.614***	0.675***	0.505***	0.485***	0.468***
	(0.097)	(0.112)	(0.030)	(0.030)	(0.027)
Ln ton-miles			0.964***	0.965***	0.960***
			(0.010)	(0.010)	(0.010)
Liner				0.133	0.584**
				(0.092)	(0.249)
Year FEs		Y	Y	Y	Y
Route FEs		Y	Y	Y	Y
Carrier FEs					Y
Constant	5.556***	7.112***	-7.762***	-7.896***	-8.897***
	(0.058)	(0.073)	(0.148)	(0.159)	(0.539)
Observations	4,294	4,294	4,294	4,294	4,294
R^2	0.063	0.169	0.927	0.927	0.933
	Dependent variable: Ln real total cost				
Panel B: Bulk commodities	(1)	(2)	(3)	(4)	(5)
US flag	0.878***	0.934***	0.764***	0.763***	1.046***
	(0.071)	(0.108)	(0.025)	(0.025)	(0.061)
Ln ton-miles			0.994***	0.994***	0.994***
			(0.007)	(0.007)	(0.006)
Liner				0.023	-0.176
				(0.054)	(0.111)
Year FEs		Y	Y	Y	Y
Route FEs		Y	Y	Y	Y
Carrier FEs					Y
Constant	8.033***	7.504***	-9.548***	-9.550***	-9.506***
	(0.113)	(0.137)	(0.127)	(0.126)	(0.123)
Observations	520	520	520	520	520
R^2	0.142	0.289	0.971	0.971	0.979

Note: This table reports estimates of a modified version of Equation 1, as described in the text, using data from USAID, Agricultural Marketing Service (2020), Bureau of Labor Statistics (2020), and Sea-Distanes.Org. Real total costs are in constant 2012 USD. F-tests show that each set of fixed effects included in Columns 2 through 5 is jointly significant at the 1 percent level. standard errors are clustered by route and reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1