FOOD AID DISTRIBUTIONAL PATTERNS

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Abstract

Food aid is often viewed as a donation of food to starving people gathered in refugee camps during a famine, but it also includes international food sales on concessional terms. In this respect, it resembles international trade. It has also been argued that food aid can be used as a tool to strengthen bilateral trade relationships. Accordingly, the specification and estimation of food aid models could borrow from recent advances in trade flow modeling. This paper uses different model specifications to evaluate separate impacts of political donor interests, economic donor interests, recipient needs and good governance. In doing so, it disaggregate the data according to delivery modes. The results show that a mix of altruistic motives, economic and political interests, under different specifications, is responsible for the allocation of international food aid.

Work in progress.

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1- Introduction

In his 1976 paper "*Scarce Goods as Political Weapons: the Case of Food*", Peter Wallenstein describes how food can become a political weapon for the largest producing countries. Due to factors like scarcity, supply concentration, demand dispersion and the sellers' liberty of action, food may be used to serve political interests. In the case of food aid, it can be argued that donor countries may use international aid to strengthen their own economic interests (i.e., aid for trade). The rapid intervention by American troops to handle aid flights to Haiti after a 7.0 earthquake in January 2010, an intervention that raised a few eyebrows in France, tends to support Wallenstein's thesis.[1] This should not however obscure the fact that, especially in situation of emergencies, food aid is also allocated on the basis of needs.

According to the *Food and Agriculture Organization*, the average price of staple food commodities increased by 48 percent, in real terms, from 2006 to 2008 (FAO, 2009). Given that staples contribute between 40-80% of energy intake in poor countries, even small price increases can have significant effects on the well-being of large populations. With the current global food crisis, it has become increasingly important to gain a better understanding of the factors conditioning world food security. Food shortages and the resulting soaring prices are often slow to correct and, in consequence, they magnify the dreadful consequences of hunger and famine in many countries. International food aid programs can mitigate such situations as long as the donor's own interests are aligned with the interests of the targeted countries. However, several factors unveiled in extent research suggest that this is not always the case. In this paper, we join a chorus of researchers who have attempted to answer the following question: *What are the factors conditioning the decision to allocate and decide on the volume of food aid to send to potential recipient countries?*

Since the innovative work of McKinlay and Little (1977), in which they define the modern typology of determinants of aid programs, donor interests and recipient needs, many authors have contributed to this large body of research. However, several of these studies concentrate uniquely on American aid programs. Even if the United States is the main supplier, several other countries are involved in the allocation of food aid. Clay (1985) goes as far as affirming that comparatively small programs can have a considerable impact on the international food aid regime. To pursue this line of inquiry, we adapt the oft-used bilateral trade flow gravity equations (e.g., McCallum, 1995; Anderson and van Wincoop, 2003; Helpman, Melitz and Rubinstein, 2008) to explain food aid allocation decisions. Our analysis includes every donor who participated in at least 1% of the food aid flows in any given year for the period 1988-2002. We start our inquiry with the basic claims of gravity equations in assuming that food aid from

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[1] The French Foreign Ministry quickly denied any official protest against the US handling of aid flights into Haiti, but leaked information attested to the French government dissatisfaction over the issue (France 24: January 17, 2010).

donor countries to recipient countries is positively related to their respective size and negatively related to the distance between them.[2]

The development of empirical models explaining development aid in general and food aid in particular, has generated a large debate in the scientific literature. Part of the debate rests on econometric issues: the high presence of zeros for the dependent variable and the possibility of heteroskedasticity. Inspired by findings of Silva Santos and Tenreyro (2006), we address these methodological difficulties by relying on a Random Effects Negative Binomial Regression to correct for the deficiencies of traditional ordinary-least-squares (OLS) or probit analyses.

We rely on the typology of McKinlay and Little (1977) to classify the determinants of food aid allocation into four categories: political donor interests, economic donor interests, recipient needs and good governance. With the exception of Zahariadis et al (2000), previous studies evaluated the impact of these categories of determinants in isolation. Our contentions are that determinants from all four categories may matter in explaining food aid flows and that the omission of variables from one category could result in a biased estimation. We hope that one of the key contributions of this study to the literature on food aid will be our inclusion of all categories of determinants in our model specifications. Our statistical results indicate that the impact of each determinant is also dependent on the mode of distribution for food aid. By disaggregating the data, we can a better understanding of the motives behind international food aid programs.

The outline of the remainder of this paper is as follows. Section 2 contains a short review of the literature to which our paper pertains. Section 3 presents our research design and the theoretical determinants of food aid allocation. Section 4 presents our estimation of the model, along with extensions to different types of delivery modes. Section 5 concludes.

2- Food Aid

Even though food aid no longer represents a high proportion of international aid (2%), the aid literature has usually distinguishes it from all other types of development aid for many reasons. It is typically studied separately because of its special bond with international agricultural trade and the basic need for food security (Barrett and Maxwell, 2005). However, the concept of food aid itself is often misunderstood. Food aid is frequently viewed as a donation of food to starving people gathered in refugee camps during a famine, but this accounts for only a small part of it. Food aid also includes international food sales on concessional terms. Barrett and Maxwell (2005: 5) discern some «core characteristics that distinguish food aid from other forms of assistance: the international sourcing of concessional resources in the form of or for the provision of food». According to them, all food aid share three basic characteristics 1) it comes from an international source, 2) it is in form of food or money for provision of it, 3) and it is given or sold under favorable conditions for the benefit of the recipient country.

In this paper, we argue that by breaking down food aid into its different delivery modes we gain a better understanding of diverse food aid donors' practices and we avoid misinterpretation associated with extent studies.

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[2] We will nuance these claims in the following sections.

Indeed, our findings show that when we consider food aid *in toto,* we may misinterpret the influence of some food aid allocation determinants. Therefore, this study accounts for different food aid delivery modes.

There are three different ways for donors to deliver food aid commodities to recipient countries: direct transfer, triangular purchase and local purchase. Each delivery mode has inherent advantages and disadvantages for donors and recipients. Donors must account for those tradeoffs in their decision to allocate food aid. We infer that different delivery modes induce different allocation patterns.

Direct transfers of food assistance correspond to aid sent directly from the donor to the recipient. The proportion of food aid allocated with this delivery mode has progressively decreased from 90% in 1988 to 81% in 2002. Furthermore, some food aid laws or regulations (as in Canada and the United States) stipulate that a high percentage of food aid must come from its domestic production. Even when aid exporters are not legally bound to buy a percentage of food aid from their national producers, administrative decisions generally give a huge advantage to national supplier (Clay, 2006). Thus, direct transfers of food assistance are often viewed as tied aid because it comes from donors' national production to the benefits of national stakeholders (Clay, 2006).

Triangular purchases stand for a «transaction by which a donor provides commodities purchased in a third country as food aid to a final recipient country» (WFP, 2009). This type of food aid aims to increase food trade between developing countries (Cathie, 1997).

Local purchases are « transactions by which food aid is purchased and distributed in the recipient country» (WFP, 2009). Obviously, using local markets for food aid requires a certain level of food availability and development in the recipient countries. Local or regional food availability has an impact on food aid allocation patterns. Food aid sent by triangular transactions and local purchases increased from 7% to 10% and 1% to 6% respectively from 1988 to 2002.

As indicated above, previous studies did not account for how delivery modes condition the volume of food aid sent to potential recipient countries. By discriminating by delivery modes we propose that each mode implies different allocation patterns. Now that we have defined food aid, and its delivery modes, we will explain our theoretical choices regarding food aid allocation patterns.

3- Research Design

Due to data availability, the period of analysis for this study is goes from 1988 to 2002. We include in our dataset all donors that have given at least one percent of all food aid flows during any given year. While they fulfill the previous conditions, we exclude Russia and the Republic of Korea, because the only recipients of their aid contributions were, respectively, the Ukraine and the Democratic People's Republic of Korea. We consider therefore that they don't have an official food aid program; giving only a large amount of aid sporadically under specific circumstances to a specific country. As a result, only the following donors meet our "one-percent" criterion:

Australia, Canada, China, Denmark, the European Community[3], France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, the United Kingdom and the United States. The possible recipients are all countries that received food aid during the period covered by our sample, all countries that are included in the Food Aid Convention as possible recipients and countries that are defined as developing countries by the *International Monetary Fund*. Due to a lack of information, French Guiana, Hong Kong and the American Samoa are excluded from our sample. In all, this study considers 155 potential recipients of food aid.

Our dependent variable is the amount of food aid sent by a donor country i and received by the recipient country j calculated in thousand-ton grain equivalents. The collected data on this variable come from the FAIS program of the *World Food Programme*, which have been used in previous studies (Ball and Johnson, 1996; Neumayer, 2005; Young and Abbott, 2008).

One of the major challenges for researchers working on food aid is to control for all motives underlying allocation patterns. Indeed, Nunnenkamp and Thiele (2006) state that the current literature does not reflect aid realities because it does not take into account all aid distribution determinants. A strong consensus on food aid is emerging on the notion that humanitarian needs and donor interests matter in the elaboration of food aid distributional patterns (e.g., Ball and Johnson, 1996; Neumayer, 2005; Shapouri and Missiaen, 1990; Zariadis et al, 2000; Fariss 2007). To make matters worse, omitting some determinants of aid could lead to biased econometric estimates. To remedy the situation, this study jointly tests eight hypotheses. The first two hypotheses are derived from the gravity model. The next six hypotheses refer to the aforementioned McKinlay and Little's (1977) four categories of determinants: donor political interests, donor economic interests, recipient governance and recipient needs.

Modeling food aid is a difficult task. From an econometric perspective, the main problems are the high number of zeros in food aid flows and heteroskedasticity due to the panel nature of the data. There is much debate regarding which method should be used to deal with these econometric issues. Early food aid studies used Ordinary Least Squares (OLS) regressions (Ball and Johnson, 1996) even though the basic assumptions behind OLS are not likely to hold when modeling food aid (Wooldridge, 2006; Neumayer, 2003). For example, the high frequency of zeros causes a problem because OLS predictions are not censored at zero thus allowing for nonsensical negative aid offerings. Excluding all zero observations is not a solution because this would cause a sample selection bias. A better way to manage the high frequency of zeros is the use of a Tobit estimator as in Eggleston (1987). While this estimator is usually better than OLS in dealing with zeros, its performance can be affected by heteroskedasticity (Cameron and Trivedi, 2009).

Similar econometric issues, that is, high presence of zeros and heteroskedasticity, are also encountered in the literature on gravity models. Relying on Monte Carlo simulations, Santos Silva and Tenreyro (2006) recommend the use of a Poisson Pseudo-Maximum-Likelihood (PPML) estimator in gravity equations to solve these issues.

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[3] We consider the separate impact of EC programs and those of their member countries.

Gourieroux et al., (1984) show that a Poisson regression is efficient even when the data does not follow a Poisson distribution. The PPML multiplicative form deals in a "natural way" with the presence of zeros (Santos Silva and Tenreyro, 2006: 641) and it produces coefficient estimates that are consistent in the presence of heteroskedasticity and efficient, especially in large samples (King, 1988; Santos Silva and Tenreyro, 2006; Burger et al., 2009). However, prior testing showed that the high presence of zeros induces over dispersion and violates the equidispersion property of the Poisson regression. Consequently, we will instead rely on a random-effects negative binomial (RENB) regression, as suggested by Cameron and Trivedi (2009), which is a reliable method to adjust for the above-mentioned statistical pitfalls.

a) Gravity Effects

As indicated above, this research uses a gravity model to explain food aid allocation patterns. Since the innovative work of Tinbergen in 1962, the gravity model has been used extensively to explain international trade flows. Gravity equations were long regarded as ad hoc or without solid theoretical foundations (Deardorff, 1984: 503), but they are now supported by mainstream economists who use them to unveil international trade flows (McCallum, 1995; Feenstra, Markusen and Rose, 2001; Anderson and van Wincoop, 2003; Helpman, Melitz and Rubinstein, 2008). It is now widely accepted that «the gravitational force between two objects is directly proportional to the product of the masses of the objects and inversely proportional to the geographical distance between them» (Burger et al, 2009, p. 169).

In this paper, we adapt traditional gravity equations to explain international food aid flows. A few reasons justify why gravity equations are suitable to assess food aid distribution patterns. First, we assume that in many situations food aid is considered as a commercial commodity. We propose the argument that some concessional sales of food are tantamount to any other traded commodities. If this is the case, the proportion of food aid sold by donors may be motivated by the same incentives as those that sustain traded commodities. In such situations, food aid can be considered as commercial good. Second, certain authors argue that the major beneficiaries of food aid delivered by direct transfers, which account for approximately 85% of all food aid delivery during our period of study, are industries residing in the country of origins (Barrett and Maxwell, 2005; Cardwell, Fridfinnson and Rude, 2007). Since this form of aid comes from domestic food supplies and food aid is still largely linked to agricultural surpluses, agribusiness gains a lot from food aid; it raises prices of agricultural goods and it allows them to increase their yields. In addition, transport and logistic businesses benefit greatly from the delivery and logistic contracts related to food aid. Third and finally, the United States, Germany and France recently made admissions that they use food aid to promote their respective agricultural exports (Cathie, 1997). All this lead us to believe that food aid is a commercial product in some situations and that the same determinants of trade flows may also determine the allocation of food aid.

The gravity model predicts that a large distance between donor-recipient pairs may affect negatively the volume of food aid. Huang (2007) argues that distance creates unfamiliarity effects that may have a profound impact on the exports of uncertainty-averse countries to distant destinations. Countries sharing a common border or that are close to one another are more likely to have similar institutions and values. As such, individuals and firms from

these countries are more likely to network and develop strong ties. Neumayer (2005) makes a similar argument by theorizing that donors want to have a regional influence. Hence, in the event of a food supply crisis in a given country, donors that are nearby are possibly more sensitive to such crisis than far away countries. In the absence of religious, racial or cultural ties, a nearby donor may still be more generous simply to avoid the migration of a hungry foreign population. Furthermore, distance is correlated with transport costs and transaction costs increase with distance (Obstfeld and Rogoff, 2000). This should not hold for food aid delivered by local transactions. Indeed, there are no international transportation costs for local transactions.[4] As distance increases, we should expect triangular transactions to increase in order to offset transportation costs.

H1: Donor countries provide more direct transfers (and less triangular transactions) of food aid to countries that are geographically closer to them.

To test this hypothesis, we rely on the log of the harmonic distance between the donor and the recipient for each dyad[5] (Head and Mayer, 2002). For the European Community, we use Belgium as representing the sender country.

Also on the basis of gravity models, we hypothesize that the mass of the recipient country is positively correlated with the volume of food aid it receives, as well as with its needs (See also Diven, 2001; Neumayer, 2005; Fariss, 2007). Furthermore, allocation of food aid to large recipient countries may be more visible to policy makers – and their citizens- in donor countries (Fariss, 2007). Thus, it may be more worthy, politically speaking, for governments to allocate aid to larger countries.

H2: Donor countries provide more food aid to more populous countries.[6]

To test this hypothesis we use the log of the population of each recipient country in our statistical analysis.

Should this study also include the population of the donor countries, in the gravity equation? There are good reasons to exclude this variable from our equations. There are no reasons to believe that a country with a larger population should have a larger food aid program. On the contrary, larger countries may need more of their agricultural production to feed their population, and population is not directly related to the level of wealth in a country. The case of China supports our argument. It has by far the largest population of all donors included in this study, but we can easily predict that China does not have the leeway to sustain a large food aid programs, since for some years; it is a recipient of food aid. This is why we exclude the population of a donor country from our analysis.

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[4] It is not clear how other transaction costs are associated with distance. Are more remote countries less likely to share a common language or transactional law, or use a common currency with donor countries? Maybe. Yet, we could easily argue that this isn't so different than Huang's "familiarity" hypothesis,

[5] Harmonic distance accounts for the geographic distribution of population within each country. For more details see Head and Mayer (2002).

[6] Unless indicated otherwise, we expect our coefficients to post a positive sign.

We do however account for the available supply of food aid, by including a donor's production of agricultural goods.[7]

b) Needs of the Recipient Countries

The literature on food aid and official development assistance largely recognizes that recipients' needs influence at least in part the elaboration of the donor's distributional patterns (Ball and Johnson, 1996; Eggleston, 1987; Zahariadis et al, 2000)[8]. Theoretically, many reasons may explain seemingly altruistic motives for aid allocation. First, the world is increasingly interdependent and it is therefore in the countries' best interest to cooperate, because it will lead to greater international prosperity (Keohane and Nye, 1977). Also, states actions are conditioned by the beliefs and desires of different groups within their society. As a result «government policy is constrained by the underlying identities, interests, and power of individuals and groups who constantly pressure the central decision makers to pursue policies consistent with their preferences» (Moravcsik, 1997: 518). Visibly, to the extent that noble sentiments can move public opinion, such sentiments may ultimately drive government decisions.

H3: Donor countries provide more food aid to countries with larger needs.

To verify this hypothesis we include in our empirical analysis the log of the total amount of food available for human consumption expressed in Kcal/per capita/per day in recipient countries. Other food aid studies use this indicator (Hermann et al, 1992; Young and Abbott, 2008; Neumayer, 2005; Eggleston, 1987) because it represents quite accurately food aid needs at a macro level. We also account for the level of economic development of each recipient of by including the log of its gross domestic product (GDP) per capita in our investigation (Ball and Johnson, 1996; Shapouri and Missiaen, 1990; Hermann et al, 1992; Neumayer, 2005). We expect these two indicators to carry a negative sign.

c) Economic Interests of Donor Countries

Prior to the end of the Cold War, the impact of economic interests on food aid distributional patterns has been tested several times, but with mixed results. Zahariadis et al (2000) established that under certain conditions the recipient's importations from the donor influenced the pattern of food aid. Eggleston (1987) studied agricultural trade and argued that agricultural imports and food aid were substitute goods. It also appears from past studies that economic interests are less important than political and military interests in explaining the pattern of food aid (Zahariadis et al, 2000; Eggleston,1987; Ball and Johnson, 1996). Even though some scholars had predicted that the end of the Cold War would boost the importance of economic interests to the detriment of political interests, there is a lack of empirical evidence supporting the validity of this prediction (Barrett and Maxwell, 2005). In a study

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[7] We return to this independent variable below.

[8] This paper does not attempt to determine if donors are efficient in responding to recipients' needs. For studies on this topic, see Young and Abbott, 2008; Barrett, 2001; and Barrett and Heisey 2002. In particular, Young and Abbott (2008) find that donors were more efficient in the second half of the 1990s in response to recipient needs.

published in 2005, Neumayer rejects the claim that economic interests stimulate a donor country's desire to allocate international food aid. Using a different econometric specification, we revisit Neumayer's conclusions.

As stated previously, interdependence encourages cooperation. However, Keohane and Nye (1977) explain that the level of interdependence varies in time and in space. The fluctuations in the number of transactions with different countries produce different levels of interdependence between donor-recipients dyads. By the same token, a donor country should be more prone to give to a recipient with which it has a higher level of trade interdependence. Since interdependence can be economically defined by the monetary value of transactions, we hypothesize that donors are more prone to allocate aid to their largest economic partners in the developing world.

H4: Donor countries provide higher volume of food aid to developing countries with which they have larger volumes of trade.

We use the volume of trade between the dyad to test this hypothesis, more particularly the log of the sum of exports and imports of the donor country to and from the recipient country.

American food aid law PL- 480 mentions that aid programs could serve to develop new markets. Germany and France also admit to using food aid to promote trade (Cathie, 1997). Many donors are net exporters of agricultural goods (United States, Canada, France, Germany and Australia). Agricultural lobbies might have enough clout to influence their country's foreign policy and food aid programs (e.g., Barrett, 1998; Diven, 2001; Diven 2006; Fariss, 2007). Indeed, for many donor countries, it has been convincingly argued that agricultural surpluses determine the absolute volume of food aid (Eggleston, 1987; Ball and Johnson, 1996; Shapouri and Missiaen, 1990; Cathie, 1982; Webb, 2000; Barrett 1998). As such, food aid can also serve the "needs" of the sending country. Agricultural overproduction abounds in the Western world and food aid is often used a tool to export foodstuff overflows. To account for the economic interests or, more specifically, economic needs of sender countries, we control for the size of their economies and their annual grain production. For obvious reasons, these factors should play a role for only one type of food delivery, that is, direct transfers.

H5: For direct transfers only, the volume food aid is associated with agricultural surpluses in donor countries.

To verify this hypothesis we rely on two indicators: a) the log of the annual per capita GDP of a donor country and b) the log of the annual per capita grain production of a donor country.

Besides arguably supporting the development of a recipient country's economy – or more cynically as stated above, the development of a sender country–, food aid programs may develop future export markets for a donor country's agricultural producers (Ball and Johnson, 1996; Barrett 2001; Barrett and Heisey, 2002; Diven, 2001; Diven, 2006). Others argue that habit formation in food consumption, associated with food aid, could lead to the eventual sale of the same food products (Barrett and Maxwell, 2005). Watkins (2004) outlines a specific situation in the 1990s where food aid may have served to develop new markets: «In the early 1990s, the Philippines was [sic] unable to sustain imports of high protein soya meal because of foreign exchange difficulties. PL- 480 was used to

help finance the purchase of U.S. exports. Ten years later, the Philippines was [sic] the largest market for U.S. high-protein soybean meal, with American exporters accounting for 90 percent of total imports» (USDA/FAS 2001b : 7, as quoted in Watkins, 2004). Assuming that donor countries wish to develop markets through food aid contributions, then the recipient countries' economic openness should have a significant influence on food aid patterns (Meernik, Krueger and Poe, 1998). It may seem counterintuitive to target countries with little trade openness for food aid, but if we consider seriously the proposition that aid can be used to open markets, it is exactly such countries that should attract donors' attention. If a country is already "open for business", foreign aid is unlikely to foster increased trade. Even when it does, the marginal returns are ostensibly low. However, when trade openness is at a low level, aid can be used as a foreign policy tool to "crack the door ajar" for future trade. If this is correct, we should find an increased flow of direct transfers and, to a lesser extent, triangular purchases[9] of food aid to countries with less liberalized economies. We should also expect that local purchase of food aid is easier in more liberalized recipient countries. Another explanation could be that countries with restrictive market access policies are more likely to face food supply shortages and hence have more urgent and larger needs for food aid. If this alternative hypothesis is right, we should find that food aid is just as likely to come through as either direct transfers or triangular purchase. However, if a recipient country faces a food shortage, the opportunity for a donor country to send aid through direct purchase is clearly diminished.

H6: Donor countries provide higher volume of food aid to countries with less liberalized economies.

To disclose the link between food aid allocation by donor countries and economic openness of the recipient countries, we compute the latter's log of the sum of exports and imports divided by its GDP. We expect a negative sign for this variable when sender countries resort to direct transfers and (possibly) triangular purchase, and a positive sign when they rely on local purchase.

d) Political Interests of Donor Countries

Many studies consider diverse donor's political interests to explain the patterns of food aid. Studies focusing on the Pre- and Cold War era tested mainly hypotheses regarding the military ties between the donors and the recipients (Eggleston, 1987; Ball and Johnson, 1996; Zahariadis et al, 2000). Post-Cold War investigations turned to political affinities and cultural similarities between a donor and a recipient (Neumayer, 2005). In line with the latter studies, we investigate the claim that political affinities within a donor-recipient dyad fuel larger flows of food aid.[10]

H8: Donor countries provide more food aid to countries with which they maintain close political ties.

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[9] We write "to a lesser extent" because food stuff sent through triangular purchase is unlikely to carry the sender country's logo. In this case, it is much less apparent to civilians (and maybe government officials) that such aid is coming from the sending country.

[10] Because we believe that there exists a high level of correlation between political affinities and cultural similarities, we excluded cultural similarities from our empirical analysis.

We use the Index of United Nations Voting Similarity developed by Erik Gartzke (2006) to test this hypothesis. This variable, measures the similarity of voting records of the donor and the recipient in the United Nations General Assembly and represents, in our view, a good indicator of political convergence (Neumayer, 2005).

e) Governance in Recipient Countries

Studies on the impact of democratic commitment in recipient countries on the allocation patterns of food aid have produced mixed results (Zahariadis et al, 2000 and Fariss 2007). Many scholars argued that the end of the Cold War allowed donors to pay less attention to national security matters and more to the promotion of ideological values (Meernick et al, 1998; Allison and Beschel, 1992; Clad and Stone, 1993; Deibel, 1992; Diamond, 1992; Gaddis, 1992; Jervis, 1991; Kegley, 1993). Meernick et al (1998) add that world safety is directly related to the level of democracy worldwide. On the contrary, Fariss (2007) develops a theoretical framework explaining why US policymakers may give more food aid to countries with less respect for human rights, because they are legally bound and cannot give other forms of aid to their needy populations. This debate is not unlike a broader debate about aid in general.[11] Several variables assess the impact of good governance food aid distributional patterns. Unfortunately, using different variables, representing every aspect of good governance in the same regression is likely to lead to a serious problem with multicollinearity. Therefore, as a proxy for good governance, we pay special attention to civil liberties and political rights.[12]

H7: Donor countries provide higher volumes of food aid to recipient countries with better respect for civil liberties and political right.

To verify this hypothesis we rely on a *Freedom House* combined score of civil liberties and political rights. We constructed this indicator in a way that we expect it to unveil a negative sign.

4- Results

We can predict intuitively that different delivery modes induce different aid patterns for many reasons. Mainly, different delivery modes imply different benefits for donors and recipients. As we noted above, food aid sent by direct transfers is often associated with tied aid. It is also the donor countries' favored delivery mode (OCDE, 2006). On the contrary, triangular and locally purchased food aid implies a money contribution for food aid. For triangular transactions, donors use money to buy food in a third country, which is then sent to the recipient. It is similar for local transactions; donors buy and deliver food within the recipient countries. Thus, it is reasonable to predict that donors may be more sensitive to some criteria than others when buying food abroad, rather than subsidizing their own industries through food aid exports. Commercial incentives should not apply equally for direct transfers of food versus aid attributed through local purchases or triangular transactions. The latter two types of food

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[11] We will address this debate in a subsequent paper. For the first spark that ignited the debate, see Burnside and Dollar (2000).

[12] The concept of "good governance" is multifaceted and a complex phenomenon. We explore the impact of a recipient country's good governance on food aid allocation in another paper. In that paper, we pay greater attention, not only to the different forms that good governance may take, but we also to the type of food aid (emergency, program and project). We reach the conclusion that good governance is only significant when recipient needs are exogenous to its level of corruption (i.e, program and project aid, but not emergency aid).

delivery are unlikely to lead to some "addictions" in the recipient country to food produce in the sender country. Any attempts by sender countries to increase future market shares of food sales in recipient countries must occur through direct transfers. In short, we argue that different delivery modes induce different food allocation patterns and our results tend to shore up our claims.

The first column of Table 1 points to our results on total food aid allocation pattern. Columns 2-4 of Table 1 break down our data according to delivery modes. Our overall results suggest that breaking down the data according to delivery modes allows us to have a better appreciation of the motives behind food aid distribution patterns.

All variables in our regression for total aid allocation have significant coefficients and most of them portray their expected sign (Column 1). A few of our variables drop from significance once we break down the data by delivery modes (Columns 2-4). Wald Chi2 results at the bottom of Table 1 attests to the good fit of our equations. We discuss each factor (gravity, needs, economic and political interests and governance) separately before turning to an overall assessment of the impact of each delivery mode on aid allotment.

[Table 1 about here]

a) Gravity Effects

Our results confirm that total aid flows, regardless of delivery modes, are larger when donors and recipients are geographically closer, as illustrated by the significance of the coefficient and its negative sign (Column 1). Had we not broken down the data by delivery modes, we might have reached a skewed conclusion, in the best case scenario, or a wrong conclusion, in the worst case scenario. Our results (Column 2) give support to the assumption that associates transportation costs with food aid volumes. Indeed, these results indicate that direct transfer transactions are greater between geographically proximate countries, which may represent a good indication that transportation costs matter for food aid distribution. This finding doesn't automatically dismiss alternative explanations. Unfamiliarity associated with distance, as theorized by Huang (2007), and the possibility to gain regional influence for donors (Neumayer, 2005) may also have a significant impact on the direct transfer of food aid. We propose however that unfamiliarity associated with distance and the thrust to gain regional influence are less likely than transportation costs to correlate with any particular type of food aid delivery. That is not to say that they are not associated with delivery modes. In other words, it seems clear that transportation costs should matter to a great extent for direct transfers and triangular purchases, and not at all for local purchase. It is not as obvious to associate Huang (2007) and Neumayer (2005) hypotheses with delivery modes. Let's take a closer look.

Results from the triangular transaction equation (Column 3) tend to confirm that transportation costs have a salient impact on the decision to allocate food aid. The coefficient is significant and, in opposition to the direct transfer equation, its sign is positive. This would indicate that donors rely more on direct transfer to countries geographically close to them and turn increasingly to triangular transactions as distance increases. Economic rationality supports this behavior. The familiarity hypothesis appears agnostic in regards to these results. Assuming

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that unfamiliarity is positively associated with distance, why would a donor country rely increasingly on triangular purchases as distance increases? One could put forward the argument that a donor country is more likely to look for a familiar third party in a remote area of the planet as a transit for its aid allocation. This line of argument seems far-fetch to us. What about the regional influence proposition? It could be that triangular purchases in far reach of the globe make sense because it may serve to involve more countries, if not exert more diffuse influence, in the region. If so, why wouldn't the same argument work for a donor country's immediate neighborhood? In fact, following Neumayer's (2005) argument, we should expect, on the contrary, more, not less triangular purchases in the immediate region of the donor country.

Let us now consider local purchase food aid (Column 4). We first notice that the coefficient is significant and with a negative sign, which suggests that as distance increases, the amount of food aid diminishes. Thinking of transportation costs, we did not foresee such result. We projected that distance should have no effect on local purchase. In fact, if we think of food aid delivery modes as substitutes for one another, we'd anticipate aid by direct transfer to diminish, and triangular and local purchases to increase, as distance increases.[13] The substitution theory is borne out by the results for the first two forms of delivery, but it is surprisingly invalidated by the outcome for local purchase. It does however lend greater support for Huang's (2007) unfamiliarity argument, such that lack of knowledge of local purveyors (or even maybe a lack of trust in local purveyors) is heightened as distance increases. As we indicated for triangular purchase, our results for local purchase contradict Neumayer's (2005) "regional influence" hypothesis.

Overall, our results lend a lot of credibility to the argument that transport costs affect food aid allocation via direct transfers and triangular purchase, but it comes short of providing a good explanation for local purchase. For local purchase, it seems that an account based on familiarity with local purveyors of food rests on more solid ground.

Gravity models, as used here, rely not only on distance, but also on the population size of recipient countries. We find that, surprisingly, total aid (Column 1), direct transfers (Column 2) and triangular purchase (Column 3) are more likely to flow to less populous recipient countries. For local purchase (Column 4) the results are as anticipated. These results are an indication that we were probably wrong to assume that aid would flow to more heavily populated countries, in order for government officials to attract more domestic attention to their "good deeds". The alternative, and most likely accurate explanation, is that local suppliers of food products are easier to locate in more populous countries. Where local production is lacking, it makes more sense to turn to direct transfers and triangular purchases. These results might be an indication that, in most situations, needs are localized or that they affect only some segments of the overall population of a recipient country. Populous countries (or countries with large territories) have therefore more resources to cater to their own emergency needs. Before asking for international assistance, countries often try to solve their predicaments on their own, which is easier to do for

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[13] Unlike Fariss (2010), we did not base our analysis on a strategic substitution model. The main objective of this paper is to demonstrate that we must account for delivery modes in order to get a more accurate depiction of the motives that underlie food aid allocation patterns. For instance, unlike a strategic substitution model, we don't base our analysis on the assumption that more aid allotted through direct transfers automatically reduces the amount of aid available through triangular and local purchase. We don't doubt that it might be the case, but this isn't what we are trying to understand in this paper.

countries with abundant resources. For instance, China is much less likely to require international assistance than Haiti when natural disasters strike. In corollary, more local resources are available in China than Haiti to provide emergency food aid. This is consistent with our results.

b) Needs of the Recipient Countries

We find strong support for the hypothesis that contributors pay great attention to the needs of beneficiaries when allocating food aid, regardless of delivery modes used. All coefficients for caloric intake and per capita GDP supports the anticipated sign and they are all highly significant. This adds support to numerous studies that demonstrated that total food aid supply decisions are at least partially sensitive to the needs of recipient countries.

c) Economic Interests of Donor Countries

In opposition to a previous study covering the same period (Neumayer, 2005), we find that one of the variables capturing the donor's economic interest, trade interdependence, influences significantly food aid allocation patterns. This result holds for total aid and aid disaggregated by delivery means. This result is also congruent with Huang's (2007) hypothesis that familiarity, as portrayed in this specific case as trade transactions, breeds international aid.

We also contend that food aid can often be a tool to redistribute agricultural surpluses. More precisely, we predict that countries with large per capita GDP and per capita grain production are more likely than others to rely on direct transfers to allocate food aid. We find strong support our hypotheses (Column 2). This is only what seems to drive our positive result for total aid (Column 1). These results are reinforced by the realization that triangular and local purchases of food (Columns 3 and 4) are inversely correlated with the per capita grain production in donor countries. We find it however more puzzling that important per capita GDP has a similar positive impact on triangular and local purchases of food products as a form of food aid. This could simply symbolize that wealthy countries have better financial means to buy foodstuffs from other countries.

The statistical results support our claim that food aid can be a foreign policy tool to help open future trade avenues with countries with relatively low levels of trade openness. We hypothesized that this could be the case for two reasons: 1) donor countries are more likely to use aid for trade with countries that are less economically integrated with international markets. For obvious reasons, this logic does not apply to aid through local purchase. When open links for trade are already in place, local purchase of food for aid is unproblematic. 2) Countries that rely to a certain extent on a self-reliant economic policy are more likely to face food shortages. Consequently, they should have more important needs for international food aid. This should hold for direct transfers and triangular purchases, but food shortages should, on the contrary, lead to less local purchase. We find stronger support for the first hypothesis. Indeed, according to our statistical analysis, total aid (Column 1), direct transfers (Column 2) and triangular purchases[14] (Column 3) are inversely correlated with a recipient country's level of trade openness. We also

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[14] It should be noted however that this variable is not significant. This lends credence to our "no logo" assumption regarding triangular purchases.

find, as expected, that local purchase is positively correlated with trade openness. The second explanation for the relationship between trade openness and food aid achieve little empirical support from our statistical analysis.[15]

d) Political Interests of Donor Countries

One of the objectives of this paper is to revisit Neumayer's (2005) contention that political affinities between donor and recipient countries are a strong indicator of food aid distribution. As in Neumayer's analysis, we use UN vote similarities as an indicator of political affinities. We find, in opposition to Neumayer's results, greater flows of that total food between countries with dissimilar voting records at the UN General Assembly. We can't propose a strong theoretical explanation for this phenomenon, but it seems that the results are driven by the large proportion of direct transfers. Indeed, our statistical analysis unveils similar results for this form of aid distribution. A partial, but unsatisfying, explanation of this behavior is that direct transfers are, more often than not, tied aid. They usually take the form of grain exports. Under those circumstances, it may not be important to strengthen political ties with aid recipients. What really matters is to unload grain surpluses, no matter which political affinities the sender have with the recipient of aid. If this was truly the case, we'd expect this variable to be insignificant. It does not explain why more direct transfers of aid target "unfriendly countries." There is however an important trade precedent for this type of behavior. In 1972, in an episode that was dubbed the "Great Grain Robbery", the Soviet Union managed to offset a severe domestic drought by buying large American grain surpluses at very low prices (Luttrell, 1973). This unusual trade relationship received an official stamp when the two Cold War opponents signed a 3-year agreement in July of 1972 under which the Soviets agreed to purchase large amounts of grain from the United States.[16] This could be only anecdotal evidence that direct transfers of aid can, under some circumstances, flow more freely to political opponents.[17] It should be noted that this logic works only for direct transfers. It cannot work for triangular and local purchases because these forms of aid don't involve dispatching domestic surpluses. For triangular and local purchases, it makes more sense to use aid to stimulate the economy of friendly countries. This is what our statistical results indicate. Positive coefficients for the variable "UN Vote Similarity" in columns 3 and 4 of Table 1 show that untied aid can be used to support the local economies of friendly countries through triangular and local purchase.[18]

e) Governance in Recipient Countries

Most of our results regarding civil liberties and political rights are congruent with those of Fariss (2010)

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[15] For total aid and direct transfers, the second explanation is supported by our results.

[16] Considering that the Soviets used a $750 million line of credit supplied by the United States to finance the purchase of US grains, it is not too preposterous to consider this episode as a form of international aid.

[17] On one hand, if we consider the situation in terms of absolute gains, the sender country should be indifferent between recipients of international aid, as long as it serves domestic economic interests by unloading grain surpluses on international markets. On the other hand, if we consider the situation in terms of relative gains, the sender might make the calculation that it has more to gain by subsidizing its domestic economy through aid subsidization than the gains its opponent might accrue to importation of needed foodstuffs. This could explain why direct transfers of aid are more likely to target "unfriendly countries."

[18] We note however that the coefficient is not significant for local purchases.

regarding American aid policies. Fariss show strong support for the assertion that donors give more food aid to recipients with a bad record of democratic values, since they may be forbidden to send other forms of aid. Our results however present a more balanced view of aid. For total aid, direct transfers and triangular purchase, our statistical analysis backs up Fariss' contention. Interestingly though, when it comes to local purchase recipients' respect for civil liberties and political rights matters. Aid trough local purchase is more likely to target countries with good governance records. These results are probably our best contribution to an age old debate regarding the relationship between good governance and aid effectiveness. They seem to indicate that government officials make a strategic and responsible calculation when allocating food aid. On one hand, they use international aid through direct transfers and triangular purchase to help citizens in recipient countries where other forms of support are impeded by a lack of respect for civil liberties and political rights. On the other hand, they choose wisely when they open their purse to support the same citizens through local purchase. They make sure that their aid allocation will not serve to perpetuate corrupted political and civil systems in recipient countries. In that sense, good governance matters.

Our results regarding the link between good governance and food aid may also be an indication that countries with poor human rights records are susceptible to having problems with their food supply chain. Consequently, they may have higher needs for food aid. If there is a direct relationship between good governance and well-oiled supply, donor countries should be able to local suppliers of food products in countries where governments respect political and civil rights. In addition, some authors contend that democracy is good prevention against famine (D'Souza, 1994; Sen, 1994 and 1999). According to Sen, « gross disadvantage such as widespread death from lack of food would not be allowed by a democratic government in which the press can and probably would make an issue of immense public concern» (D'Souza, 1994, p. 369). Our results undoubtedly provide some support for Sen's contention.

Overall, our results show how important to account for delivery modes in when assessing the motives that underlies food aid allocation patterns. They indicate especially that the same logic doesn't apply for food aid allocated through direct transfers and triangular purchase as it is for local purchase. We believe that we have contributed to a better understanding of food aid practices. For instance, it may seem counterintuitive to believe that a donor country would allocate more aid to countries with which it shares little political affinity. Once we break down the data according to distinct delivery modes, we gain a better appreciation of why it might be the case. Even if our results might contradict some of Neumayer's (2005) findings, we also believe that he (2005) made a major contribution to our understanding of how "food aid works." Yet, by breaking down the date according to delivery modes, we nuance several of his results. Our results are also largely congruent with Fariss (2010) findings regarding American food aid allocation. His results gain greater external validity with our findings. Yet again, we show that his assertion may not hold for local purchases of food aid. This is an important result, considering that research community is strikingly divided on the relationship between good governance and aid efficiency. We hope that we have added a needed dimension to the debate.

5- Conclusion

International assistance is an important aspect of North-South relations. Within the context of primary food price increases, it becomes increasingly important to gain a better understanding of the concept of food security in general, and the relationship it holds with international food aid, in particular. Several aspects of international assistance have been investigated, but we believe that our analysis fills a void in the food aid literature. We did not try to understand what motivates the absolute level of food aid or the strategic decision to use a delivery mode rather than another, but we turned our attention to the motives sustaining food aid allocation patterns. We find that food aid distribution is a complex phenomenon that is dependent on geographic and demographic imperatives, donors' political and economic motives, and recipients' needs and respects for political and civil rights. We also innovated by breaking down food aid data according to their delivery modes. By doing so, we believe that we provided a more accurate and nuanced view of "how food aid works." Finally, we take solace in the realization that classical explanations of total food aid largely hold, despite our use of a more sophisticated econometric analysis that accounts for the high occurrence of zeros and adjusts for heteroskedasticity in the data.

Obviously, this is not the last word on international food assistance. Future studies must pay greater attention to domestic factors influencing aid allocation. Furthermore, we assume that different motivations underlie Non-Governmental Organizations (NGOs) and private donors' decision to provide international aid. Some of our findings are probably invalid in regards to these non-state actors. Also, the relationship between good governance and aid distribution deserves further scrutiny. Finally, we believe that food aid data should also be broken down according to program types. The motives sustaining the allocation of food aid are probably different for program, project or emergency aid.

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Table 1: Total Aid, Direct Transfers, Triangular Purchase and Local Purchase, 1988-2002

VARIABLES[19]	TOTAL AID (COLUMN 1)	DIRECT TRANSFERS (COLUMN 2)	TRIAN. PURCHASE (COLUMN 3)	LOCAL PURCHASE (COLUMN 4)
GRAVITY EFFECTS				
DISTANCE	-.1008323***	-.1326959***	.0979339*	-.2781227***
	(.0288051)	(.0337052)	(.0529062)	(.0661557)
POPULATION (RECIPIENT)	-.0997888***	-.1847256***	-.1136271***	.1879101***
	(.0119348)	(.0143666)	(.0206069)	(.0255937)
RECIPIENT NEEDS				
CALORIES	-1.228997***	-.8515891***	-2.128266***	-1.824615***
	(.1158791)	(.1365039)	(.2007115)	(.236354)
GDP PER CAPITA	-.5916511***	-.4733738***	-.6417372***	-.7222754***
	(.0222713)	(.0263222)	(.0382617)	(.0456084)
DONOR ECON. INTERESTS				
TRADE (X+M DYADS)	.1350628***	.1601429***	.2087168***	.1018676***
	(.0073426)	(.0087635)	(.0130582)	(.0147196)
GDP PER CAPITA (DONOR)	.7464955***	.3865318***	1.506075***	.9361001***
	(.0427668)	(.0466876)	(.1284337)	(.0996787)
GRAIN PRODUCT. PER CAPITA (DON.)	.058475***	.3982479***	-.374278***	-.1009172***
	(.0144894)	(.0194785)	(.023535)	(.0996787)
TR. OPEN. (REC) (X+M/GDP)	-.1000981***	-.2415442***	-.0107589	.2271301***
	(.0253579)	(.0313696)	(.0420779)	(.0526671)
DONOR POL. INTEREST				
UN VOTE SIMILARIY	-.894325***	-1.086962***	1.077597***	.179047
	(.080365)	(.0836546)	(.2082101)	(.2327684)
GOVERNANCE				
CIVIL LIB. + POL. RIGHTS	.1414132***	.269246***	.5503859***	-.3690544***
	(.0353624)	(.041618)	(.0670686)	(.0729488)
NUMBER OF OBS	26037	26037	26037	26037
NUMBER OF GROUPS	1877	1877	1877	1877
WALD CHI2	2517.29	1880.04	1366.19	891.27

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[19] We use the natural log for each of our independent variables. Random-effect negative binomial regression. P>|z .05*, .01**, .001***