

# To give or not to give? How do donors react to European food aid allocation?

NATHALIE FERRIÈRE \*

September 2016

*Using a change in the rules of EU food aid policy in 1996, I investigate how donor countries react to EU's food aid allocation. Taking advantage of the phase-in period of the reform I find that donors have two different reactions depending on the size of the recipients. On average if the EU stops allocating food aid to a small country, this reduces by 1.4 the average number of other donors. On the contrary, if the EU stops allocating to a large country, this increases by 0.3 the average number of other donors. I also observe differences between EU members and other countries. Next, I develop a simple theoretical framework in which donors react to EU's action either indirectly because it changes the recipient's needs or directly because they are motivated by comparing with their allocation with the EU. I derive a donor typology from the theoretical framework. Donors are motivated by direct comparison with the EU allocation in the case of small countries and by recipient's characteristics for large countries.*

*JEL: C26, F35, F42, H84*

*Keywords: Food Aid, European Union, Allocation, Donor Interaction*

\* Paris School of Economics – EHESS (ferriere.nathalie@gmail.com). I am grateful to Andreas Fuchs, Erasmus Kersting, Karen Macours, Marc Raffinot and Akiko Suwa-Eisenmann for their advice and careful reading of the paper and their numerous suggestions. This paper benefits from discussions with Pamina Koenig, Gani Aldashev and Toman Barsbai. For their helpful comments I also thank participants to the Doctorissimes 2015, to the Journées de Microéconomie Appliquées 2015, to Political Economy of International Organization 2016, to the AFSE Congress 2016 and to seminars at PSE. I thank the World Food Programme for the data and their help on the data. The research leading to these results has received funding from the European Union's Seventh Framework Programme FP7/2007-2011 under Grant Agreement n290693 FOODSECURE. The author only is responsible for any omissions or deficiencies. Neither the FOODSECURE project and any of its partner organizations, nor any organization of the European Union or European Commission are accountable for the content of papers.

## I. Introduction

Since the Paris Declaration (2005) and the Accra Agenda for Action (2006) the lack of coordination among donors has been pointed as one reason of development aid inefficiency. Coordination should reduce transaction costs and projects duplication [Brown et al., 2000, Acharya et al., 2006]. Reducing fragmentation should also decrease corruption induced by aid in the recipient government according to Djankov et al. [2009]. Kimura et al. [2012] finds that aid fragmentation, which they assume implicitly as a sign of lack of coordination, lowers aid efficiency. Coordination is also seen as a way to solve the problem of orphan and darling countries, where darling countries, who are favored by most donors, receive relatively too much aid, while orphan countries, who are neglected, do not receive enough [Utz, 2011].<sup>1</sup> However some authors [Easterly, 2002, Torsvik, 2005] consider that coordination is not the perfect solution, because it will reduce competition among donors and lead to a “cartel of good intentions” that favor supply-driven aid programs - supposedly less efficient than demand-driven aid programs. In addition coordination could be difficult to implement [Bourguignon and Platteau, 2015].

Whatever the exact impact of coordination on aid efficiency, the idea stands out that bilateral interactions between donors also matter on top of bilateral relations with a recipient country. Ignoring such potential interaction is assuming that an increase of aid allocated from one donor just produces a 1-for-1 increase in total aid to a recipient. However donor interactions could motivate giving to a particular country and result in a leverage effect.

For food aid, the issue of coordination has emerged long before the Paris Declaration of 2005. The Food Aid Convention (1967) provided “a framework for cooperation, coordination and information-sharing among members to achieve greater efficiency”. In parallel food aid is seen by donors as a diplomatic weapon.<sup>2</sup> Food aid can be used to put pressure on recipients but it could also be a way to compete with other donors. For instance Kim [2011] investigate how China and the US allocate food aid to North Korea and show that they strategically react to each other because they compete for leadership in this geographical area. Hence given the historical background and the specificity of food aid relative to other types of aid, it seems more likely to observe strategic interactions between food aid donors than in other types of aid. In addition, food aid has become an

1. For instance, in December 2014, the World Food Programme (WFP) partially suspended food aid to countries hosting Syrian refugees due to a funding crisis, while in March 2010, the Haiti’s president asked the United States to “stop sending food aid”.

2. “Food is a weapon much more than other type of aid because you can starve people” (Butz, 1967).

increasingly scarce resource. From 1988 to 2011, the total amount of food aid allocated over the world has been divided by 3.6. Hence, an allocation of food aid which would be driven by donor's interests related to other donors rather than by recipient's needs could be detrimental in terms of food security.

The question of donor interactions has been often neglected in the literature on aid allocation. While a large set of studies examine aid and food aid allocation in general, few papers focus specifically on interactions between donors.<sup>3</sup> Kuhlitz et al. [2010], which is, to my knowledge, the only paper looking specifically at interactions between food aid donors, estimate simultaneously food aid allocation for different donors and allows for correlation among donors with respect to a given recipient country in a specific year. They do not distinguish between simple interaction and coordination and interpret the significance and value of correlation terms directly as indicators of whether donors coordinate and the way they do. They find positive correlation and interpret it as a sign of joint action.

The literature on donor interactions in the case of development aid (ODA) in general is larger even if it remains small. Frot and Santiso [2011], using methods from finance, show small but significant and positive interactions – that they call “herding behavior” : if a donor increases its aid, this results in a more than 1-for-1 increase for the recipient, as other donors step in. Fuchs et al. [2015] look at overlapping aid allocation that they interpret as a lack of coordination, given the risk of duplication.<sup>4</sup> They find that export competition between donors is a major impediment to aid coordination.

Using panel data from 1988 to 2007 and tackling endogeneity of other donors' aid with a spatial econometric approach, Davies and Klasen [2015] find a small but significant positive effect of other donors' aid on the amount of aid provided by a particular donor to a recipient. They carefully do not interpret their results as coordination but only as interactions among donors. They also provide some rationale on what could generate positive or negative dependencies in donor allocations. However there are concerns on the exclusion restriction and the use of spatial econometrics (see Gibbons and Overman [2012] for instance). Davies and Klasen [2015] assume, for instance, that the fact that a recipient country  $r$  shares the same language with a donor  $d_1$  (for instance Ivory Coast and France)

3. On aid allocation, papers look at whether allocation is driven by donor interests but also on differences between donors [Berthélemy, 2006, Nunnenkamp and Ohler, 2011, Fuchs and Vadlamannati, 2013], on the evolution of aid drivers [Clist, 2011]. On food aid, papers look at whether allocation is driven by needs [Zahariadis et al., 2000, Barrett and Heisey, 2002, Neumayer, 2005, Young and Abbott, 2008].

4. They define it as the number of countries receiving aid from both donor  $d_1$  and  $d_2$  over the number of countries receiving from at least one of the two donors.

does not directly affect the probability of receiving aid from another donor  $d_2$  (for instance the USA). It is unlikely to be the case because the fact that the USA and Ivory Coast do not share the same language may increase administrative costs between them, such as translation costs. Finally Knack et al. [2014] relies on an exogenously determined eligibility threshold based on the level of income for concessionary International Development Association (IDA) loans. They find that bilateral aid is significantly reduced when a country crosses the IDA income cutoff. They also find large heterogeneity across donors, especially between EU member countries and non EU countries. However in order to provide a clean empirical analysis, they have to focus on a local effect and thus, on specific recipient countries. In addition, these studies neglect the fact that depending on the type of recipients, donors may have different strategies and react differently to one another.

This paper contributes to the small existing literature on interactions among donors by providing new causal evidence. Focusing on one specific type of aid – food aid – I estimate the causal effect of EU food aid allocation on other donors’ allocation. I focus on regular donors, those countries who send food aid every year to at least one recipient. In this paper, EU food aid refers to food aid allocated through the European Union institutions. Food aid sent through bilateral programs of EU members states is considered separately. Even if this study restricts the analysis to the reactions of donors to a change in EU food aid, it is still interesting for policy implications : the EU is the second largest donor of food aid and provides about 10 percent of total food aid. In addition EU member states add a further 10 percent through their bilateral program and are obviously influenced by the EU allocation.

My identification strategy is close to Werker et al. [2009] and Nunn and Qian [2014].<sup>5</sup> I exploit exogenous variation in the timing of the EU reform of food aid policy in 1996 and interact this variable with a country’s probability of receiving food aid from the EU before the reform, thereby introducing variation across countries. When controlling for the levels of the interacted variables, this interaction term is excludable to country specific variables such as food needs, because the timing of the reform is not related with recipient’s needs and thus, allows determining the causal effects of EU food aid allocation on the allocation by other donors. In addition taking advantage of the phase-in of the reform, I am able to look at different reactions of donors depending on the recipients.

5. This type of instrument has a growing importance on the aid literature [Ahmed et al., 2015, Dreher and Langlotz, 2015, Dietrich and Wright, 2015].

I find that if the EU stops allocating food aid to the average recipient country that has always received food aid from the EU before the reform, the number of other donors decreases by almost one on average. I find heterogeneity among donors, with some donors complementing the EU allocation, others substituting it, and others not reacting significantly to the EU allocation. Using the fact that the reform first affects small countries (in the sense of the World Bank definition), I find that, on average, if the EU stops allocating food aid to a small recipient country, the average number of other donors is reduced by 1.4, while if the EU stops allocating to a large country, the average number of other donors increases by 0.3.<sup>6</sup> These findings suggest that donors differentiate their reactions depending on the size of the recipients. It has implications on the type of coordination the international community may implement in order to increase food aid efficiency.

Next I develop a simple model in order to investigate why donors would react to the EU allocation. I allow two types of reactions that have been discussed in the literature. First, donors could react directly to the EU allocation by comparing their allocation to the EU's one. Indeed Annen and Moers [2016] claim that citizens may not care on the absolute impact of aid, which is quite difficult to evaluate, but on its impact relative to aid allocated by other donors. It could also be the case, because the EU is a large donor, the EU is seen as having better information on recipient needs. Second, a donor may react indirectly to the EU allocation because of how it affects the recipient. The donor may be altruistic and motivated by recipient needs. A donor may also be strategic and value ties with a recipient. For instance she could compete with the EU on trade partnership [Fuchs et al., 2015]. Finally, both (direct and indirect) drivers may compensate each other and a donor may not react significantly to the EU allocation.

According to the framework I develop, for small countries, for which bilateral donor-recipient ties are probably weaker, relations between the EU and the other donor matter more than recipient's characteristics. It also may reflect the fact that the absolute level of needs is relatively low in small countries and it is easier for donors to coordinate through a geographical specialization (that is, only one or two donors are needed for food aid sent to a small country). For larger countries, reactions depend on the type of donors. On the one hand, donors outside

6. Small countries, under the World Bank definition, includes the following countries : Antigua and Barbuda, Barbados, Belize, Bhutan, Botswana, Cape Verde, Comoros, Djibouti, Dominica, Equatorial Guinea, East Timor, Fiji, Gabon, Gambia, Grenada, Guinea-Bissau, Guyana ,Jamaica, Lesotho, Maldives, Mauritius, Namibia, Papua New Guinea, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saint Lucia, Sao Tome and Principe, Seychelles, Solomon Islands, Suriname, Swaziland, Trinidad and Tobago and Vanuatu.

the EU value more recipient’s characteristics. On the other hand, EU members tend to react directly to the EU allocation. The theoretical framework provides a typology for donors for which I do not find empirically a significant reaction. These donors are the ones who give the same weight to their ties with the recipient and to the EU.

The remainder of the paper is organized as follows. Section II presents the data and the empirical specification. The EU reform and the identification strategy are presented in section III. Section IV discusses the results and their robustness. Section V describes the model and the typology of donors. Finally section VI summarizes the findings and discuss the implications.

## II. Data and Empirical Specification

### A. Food Aid Statistics

The data comes from the INTERFAIS database and has been provided by the WFP [WFP, 2011]. This article looks at total food aid, whatever the delivery mode, including emergency food aid.<sup>7</sup> This paper looks at the decision of allocating food aid, a 0/1 decision, rather than at the quantities of aid (which will be nevertheless explored in robustness check). Food aid is the amount of food allocated by a donor and reaching the recipient country.<sup>8</sup> In order to pool together all commodities, quantities are converted in equivalent calories according to the nutritional standards of the WFP.<sup>9</sup> The sample is a panel of 144 recipient countries between 1988 and 2011. I focus on 21 regular donors define as countries or institutions who have given food to at least one recipient every year since 1988.<sup>10</sup> Together they represent about 96 percent of total food aid recorded in the data. Regular donors are more likely to react to EU food aid allocation.<sup>11</sup> In this paper the “EU” refers to the European institutions and administration. EU food aid allocation is the one decided by the EU administration, more precisely the European Commission. It does not include bilateral programs of EU member

7. Emergency food aid may be very different from program/project food aid. However the frontier between both types of aid is sometimes fuzzy, for instance Ethiopia has received emergency food aid every year since 1988 from almost all donor countries. In robustness checks, I will exclude emergency food aid.

8. Food aid could be food being delivered or financial assistance that is tied to the purchase of food by the recipient (aid for food).

9. Nutritional standards of the WFP are quite high and food aid which is not channeled by the WFP may have lower nutritional standards. Hence it could induce some measurement errors.

10. Donors are Australia, Austria, Belgium, Canada, Denmark, the European Union, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Saudi Arabia, Spain, Sweden, Switzerland, UN offices except the WFP, the United Kingdom, the United States and the WFP. The UN institutions include the UN OCHA, the HCR, the UNDP, the UNICEF and other similar institutions that depend on the UN.

11. Moreover, data exhaustivity is doubtful in the case of occasional donors, especially non governmental organizations, see appendix A for more details.

States.

In 1988 EU food aid represented almost 18 percent of global food aid. This share has declined to 10 percent in 2000 and only 3 percent in 2011.<sup>12</sup> The EU is the second world largest donor after the US until 2008. In addition, the EU is one of the two largest donors for almost half of the recipient countries and is one of the top four in 75 percent of cases (see figure E1 in appendix A).

Table 1 provides the annual average number of recipients by group of donors for two sub-periods : 1988-1995 and 1996- 2011. The number of recipients of EU food aid is divided by two after 1996. The EU is the only donor with such a large decrease. Other donors also reduce the number of recipients but the magnitude of the drop is smaller. Among European member states, the UK is the only country which increased the number of recipients after 1996 (see table E1 in appendix A). Outside the EU, the largest decrease is seen for Canada, partly because of large budget cuts during the 1990s. On the contrary, Japan and the UN institutions have increased the number of recipients. For the UN institutions, the increase is mainly explained by the role of the WFP. The pattern is similar when looking at the average quantity allocated to recipient countries (see table E2 in appendix A).

### Table 1 about here

I define the set of potential recipients as follows. In a given year  $t$  potential recipient countries are all the countries that have received some food aid from at least one regular donor between 1988 and 2011. Thus, the set includes countries that actually receive no food aid in a given year  $t$ . For instance, in 1988, Afghanistan did not receive food aid from regular donors but is still included as a potential recipient in the sample. Hence the data are perfectly balanced by recipient-donor pairs. The only caveat is state partitions such as East Timor in 2002.<sup>13</sup>

Table 1 underlines a positive correlation across donors' allocation.<sup>14</sup> Obviously this correlation is partly due to similar responses to negative shocks on recipient countries. For instance all donors allocate food aid after dramatic natural disasters such as Haiti earthquake in 2010. However, even if I exclude emergency food

12. The 2008 crisis has dramatically affected the EU food aid budget.

13. In robustness check I define recipient countries in a given year  $t$  as countries that have received food aid from at least one donor at time  $t$ . In this specification, Afghanistan will not be included in 1988.

14. I do not adjust these correlations with the overall budget of food aid. Indeed the US and the EU are more likely to overlap than the EU and Italy, because the budget devoted by the US to food aid is larger. However if I look at the share of recipient  $r$  in each donor's total food aid instead – that adjust for budget size – correlation results are similar.

aid, I still find a positive correlation in the allocation.<sup>15</sup> I observe some variations in the correlation as it is higher for EU members than for extra-EU countries or UN institutions.

The decrease in the number of recipients from the EU is larger for small countries.<sup>16</sup> The EU divided by seven the average number of small countries that receive food aid after the reform, whereas it cut by less than two, the number of large recipients countries. The correlation between aid allocations is higher for large countries than for small countries.

### B. Empirical Specification

In this paper, I investigate how donors react to EU food aid allocation controlling for other determinants such as recipient's needs and geopolitical bilateral effects (between the donor and the recipient). I consider the following specification :

$$(1) \quad FA_{drt} = \beta FA_{EUrt} + X_{drt-1}\Gamma_1 + X_{rt-1}\Gamma_2 + \phi_{dt} + \phi_{dr} + \epsilon_{drt}$$

The index  $d$  refers to donors,  $r$  to recipient countries and  $t$  denotes years. The dependent variable,  $FA_{drt}$ , is a dummy equal to one if donor  $d$  allocates aid to recipient  $r$  at time  $t$ .  $FA_{EUrt}$  is a dummy equal to one if the EU allocates aid to recipient  $r$  at time  $t$ .

In the core part of the paper I focus on the 0/1 decision choice rather than on quantities, because it is easier for a donor to anticipate whether the EU allocates any food aid to a recipient, rather than the exact amount sent. In addition, for a similar budget, depending on the type of commodities and the type of delivery, the quantity of food aid (in caloric equivalent) that eventually reaches the recipient country can be actually different.

The choice of focusing on the extensive margin - the 0/1 decision - is also partly driven by the instrumental strategy applied in this paper. The largest effect of the 1996 reform is on the probability of receiving food aid from the EU : conditional on receiving food aid, the average quantity received by a recipient is not affec-

15. This holds both on the choice of allocating food aid and on the quantities .

16. Small countries are defined following the World Bank definition. It includes the following countries : Antigua and Barbuda, Barbados, Belize, Bhutan, Botswana, Cape Verde, Comoros, Djibouti, Dominica, Equatorial Guinea, East Timor, Fiji, Gabon, Gambia, Grenada, Guinea-Bissau, Guyana ,Jamaica, Lesotho, Maldives, Mauritius, Namibia, Papua New Guinea, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saint Lucia, Sao Tome and Principe, Seychelles, Solomon Islands, Suriname, Swaziland, Trinidad and Tobago and Vanuatu.

ted by the reform. Nevertheless in appendix D, I also look at quantities (caloric equivalent). More precisely, I estimate the reaction of a donor conditional on his giving, in order to avoid the problem of the truncated nature of the outcome. Thus, results must be interpreted conditional on the fact the donor  $d$  decides to allocate food aid to recipient  $r$ . In that case  $FA_{EU(d)rt}$  is the inverse hyperbolic sine transformation (IHST) of the amount of food aid allocated by the EU (or donor  $d$ ) to recipient  $r$ . The transformation is similar to log transformation, as it reduces the influence of outliers, and it is also defined at zero [Burbidge et al., 1988] which is necessary for the EU food aid. IHST of  $x$  is defined as  $\log\left(x + (x^2 + 1)^{\frac{1}{2}}\right)$ . I do not use the logarithm transformation for  $FA_{drt}$ , in order to be consistent with the definition of  $FA_{EUrt}$ . In such a case,  $\beta$  measures how much donor  $d$  increases (or decreases) the quantities allocated to recipient  $r$ , when the EU decides to allocate  $FA_{EUrt}$ , conditional on giving. Results are similar.

$X_{rt-1}$  includes control variables specific to recipient countries that proxy recipient's needs and thus partly determines food aid allocation. I observe food aid the year it reaches the recipient country, not the year a donor decides to give, as it requires time to deliver food aid. For instance, US food aid takes on average six months to be delivered [US Government Accountability Office, 2007]. Hence the decision is more likely based on past needs rather than on current needs, except in the case of natural disasters. Precisely  $X_{rt-1}$  controls for recipient's needs proxied by population size, domestic cereal production per capita and GDP per capita. The literature on aid determinants stresses the potential "population bias". That is to say that if, ceteris paribus, the population doubles, aid receipts would increase by less than two. It could also affect the decision of giving food aid. Hence, I control by the level and square of the logarithm of population. For cereal production, I take the logarithm and its square so as to allow flexibility because I am more interested in the variation than in the level of production. I do not include food imports, so as to avoid endogeneity [Barthel et al., 2014] even if two recipients with the same level of cereal production per capita may still have different needs, because of their different capacity to import food. A recipient may adjust its import, depending on the amount of food aid received. A donor may also tie its aid to food imports. Logarithm and squared of GDP per capita (in 2005 US dollar) are added to control for food insecurity linked with poverty and entitlement [Sen, 1981]. Food aid is also often allocated to refugees from another country or region within the same country. Hence I introduce the share of refugees and internally displaced populations in recipient countries and its square.<sup>17</sup>

17. Data on refugees are provided by the UNHCR. Cereal production data come from FAOSTAT. Data

I also control for the occurrence of a disaster or a conflict, two phenomena that largely explain food aid allocation (especially emergency food aid) : I include a dummy equal to one, whether the recipient country suffers from a disaster, such as drought, fire, flood or earthquake, at time  $t$  and another dummy if the disaster occurred at time  $t - 1$ . In case of a large disaster, food aid delivery could be fast. I also introduce a dummy equal to one if the country is involved in an internal or external conflict at time  $t - 1$ . I also control for the number of contiguous countries that are in conflict, as being near a conflict zone may have negative externalities on food security.

Many papers suggest that the effectiveness of aid depends on the quality of the recipient country. Thus donors are more likely to allocate aid to countries with better institutions. Hence, I include a democracy index (Polity IV) and two indicators on civil liberties and political rights. The less autocratic the country, the more likely it is that food aid reaches the neediest households.<sup>18</sup>

$X_{drt-1}$  is a vector of time-variant variables specific to the donor-recipient pair, that captures changes in the bilateral relationship which can affect the donor's willingness to give. The most important is the type and quality of diplomatic relationships, proxied by the UN vote similarity index constructed by Strezhnev and Voeten [2012]. The allocation of food aid may also depend on whether a donor gives other types of aid such as development aid, because the donor may have better information on the recipient. In addition, the two types of aid could be substitute.<sup>19</sup> Thus I use the current amount of ODA (Official Development Aid) allocated by donor  $d$  to recipient  $r$  rather than the previous one.<sup>20</sup>

I allow the time effect to differ across donors thus I control for donor-year fixed-effect,  $\phi_{dt}$  : it accounts for donor specific trend in food aid budget or for electoral cycles that can affect the allocation of aid [Tingley, 2010].  $\phi_{dr}$  is the donor-recipient pair fixed effect that catches time-invariant specificity such as colonial links, distance or sharing a common language.

$FA_{EUrt}$  the variable of interest is a dummy equal to one if the EU allocates any

are provided by the CRED of UCL for disasters [Guha-Sapir et al.] and by the Center for Systemic Peace for conflicts. GDP data, population and wheat price are taken from the WDI (World Bank).

18. Both indices are constructed by the Freedom House. These variables reduce the sample size, hence I only introduce them in a third specification.

19. I will not interpret either the sign or the magnitude of the estimates given the endogeneity problem if both types of aid are substitute or complement.

20. Data are provided by the OECD Creditor Reporting System.

food aid to recipient  $r$  at time  $t$ . The coefficient of interest,  $\beta$ , is the estimated effect of the food aid allocation by the EU in country  $r$  on the probability of participation of donor  $d$  in country  $r$ . A positive coefficient indicates that, on average, if the EU stops allocating food aid to a specific country  $r$ , it also decreases the probability that a donor  $d$  gives food aid to the recipient country. By contrast, a negative coefficient suggests that if the EU stop allocating food aid to a recipient, other donors compensate and step in. A non significant estimate indicates that I cannot reject the hypothesis that on average, other donors do not react to the EU allocation.

Allocation decisions are often announced before food aid actually reaches the recipient country. Donors are more likely to react immediately to this type of announcement rather than once food aid has been actually distributed. Thus I use contemporaneous allocation rather than the allocation of the EU one year before. In addition, given the increasing share of food aid devoted to emergency donors, are more likely to react to current allocation than to the previous one.

$FA_{EUrt}$  is endogenous because of two problems : omitted variables and reverse causality. First, donors may react in the same way to an unobservable shock. For instance, in 1984, the BBC launched a global media campaign. It contributed to inform people about the large famine in Ethiopia. This campaign led to an unexpected and massive civil mobilization. In reaction, governments increased their food aid to Ethiopia. In this example the unobservable shock is the global media campaign. As I cannot include all advocacy campaigns on food crises (because of lack of data), the OLS estimate will be upward biased. In addition, there is a problem of reverse causality. The EU itself reacts strategically to the allocation of other donors. One could argue that using previous allocation by the EU ( $FA_{EUrt-1}$ ) solves the problem of endogeneity. However  $FA_{EUrt-1}$  could be still endogenous in case of “dynamics among the unobservables” as pointed by Bellemare et al. [2015], meaning that if  $FA_{EUrt-1}$  is correlated with the error term  $\epsilon_{drt-1}$  and that shocks are auto-correlated,  $FA_{EUrt-1}$  is still correlated with  $\epsilon_{drt}$ .

Concerning the estimation strategy, I estimate the equation with a probability linear model with fixed effects. I am not aware of a non-linear procedure that identify parameters in case of a binary outcome coupled with a binary endogenous variable, as well as an individual and time fixed effects. Nevertheless, I acknowledge that this choice has some drawbacks. First, the fitted probability both for the instrumented variable and the outcome variable can go below zero and above one. In addition, it assumes that the marginal effect of the allocation of

food aid from the EU is constant and that the effect of the reform is linear on the probability of receiving food aid from the EU. However, I explore this direction by allowing heterogeneous reactions, depending on the type of recipients and the type of donors.

The following section describes in detail the instrumental strategy based on the EU reform of food aid policy ratified in June 1996.

### III. Instrumental Strategy : The EU Reform of Food Aid Policy

#### EU FOOD AID POLICY AND ITS REFORM

Before 1996, EU food aid was mainly supply-driven : project and program food aid of the EU were administrated by the EU Regulation n°3972/86 of Council of December, 22 1986.<sup>21</sup> Since 1967, EU food aid has been closely linked with the common agricultural policy (CAP) and until 1986, both policies have been explicitly related. Even if it was no more explicitly mentioned after 1986, the main purpose of food aid was still to run down agricultural surplus until 1996. Thus EU reaction to recipients' needs was slow [Clay et al., 1996] and food aid was allocated to many different countries. At the beginning of the 1990s, agricultural surplus decreased due to reforms of the Common Agricultural Policy (CAP) and accordingly, food aid quantities. In parallel the EU was criticized for slowness and unpredictability of delivery within the development assistance community. Hence, after the European parliament election in 1994, the EU decided to launch an external evaluation of its food aid program [Clay et al., 1996].

The evaluation was the main source of recommendations for the reform adopted in June, 27 1996. The report pointed that the EU reached its minimal requirements under the Food Aid Convention. However it also stressed that targeting was poor. Countries with chronic food insecurity were no more targeted than countries with low levels of needs. In addition, these countries often received small amounts and on a one time basis. The report suggested to concentrate food aid on a limited number (around 15) of low-income countries, chronically in food deficit. In addition, the EU was to be able to respond to specific circumstances : temporary food aid gap as well as chronic food insecurity or endemic poverty.

The new regulation n°1292/96 of the Council ratified in June 1996 on program and project food aid [EC, 1996] adopted a large number of the report's recommendations.<sup>22</sup> First, a list of eligible countries was established for project and

21. Project and program food aid are non emergency food aid and more oriented towards development.

22. Emergency food aid is regulated by other regulations.

program food aid corresponding to countries with per capita GDP below 695 USD in 1992. The eligibility cut-off does not concern emergency food aid. Second food aid principles were clearly expressed : aid should promote food security related to poverty, increase the nutritional status of recipient households, reduce food aid dependency and coordinate food aid among EU member states. Food aid meant to alleviate chronic food insecurity should be provided only to countries involved in a coherent national food strategy oriented towards the poor. Third, food aid should take into account local dietary customs and favor local (within a country) or triangular (in a third country) purchases of food aid. In addition, EU should evaluate needs based on food deficit and food security through specific indicators such as the HDI, income per capita, index of well-being, balance of payment, . . . It resulted in four major changes in project/program food aid allocation.

First, the EU reduced the number of recipient countries (see figure 1). The decrease is mainly due to program and project food aid (see figure E2a in appendix A). Even if the reform does not concern emergency food aid, a similar pattern has occurred for emergency food aid, albeit in lower proportions (see figure E2b in appendix A). Interestingly, before 1996, the trend of the number of recipients was parallel for other donors as well, but it did not follow the sharp EU drop in 1996. Given the size of EU food aid and the number of recipients involved, the reform could not be completely implemented in one year. In addition project and program food aid are often scaled over two or three years ; the EU may have decided not to renew them rather than stop an on-going project. The EU decided which countries were to be first affected by the reform and first stopped allocating food aid to small countries (as defined by the World Bank). The amounts of food aid allocated to small countries were on average smaller (see table E2 in appendix A), administrative constraints and bureaucratic ties may also be weaker and these countries may have offered less opportunities in terms of economic and geopolitical development for the EU. As a result, small islands almost stopped receiving food aid from the EU after 1996 and only received emergency food aid from time to time afterwards. For larger countries, the implementation of the reform took longer.

### **Figure 1 about here**

Second, the higher selectivity and the decrease of the budget for program and project food aid resulted in an increasing share of EU food aid devoted to emergency situations (see figure E4 in appendix A).<sup>23</sup> Third, triangular and local

23. "Operations under this Regulation shall be appraised after analysis of the desirability and effectiveness of this instrument as compared with other means of intervention available under Community aid which could have an impact on food security and food aid." [EC, 1996, Chapter 1, Article 1 2.]

purchases became more frequent (see figure E5 in appendix A). Fourth, the new regulation regulated quantities. The volume of aid “granted in a given case shall be limited to the quantities needed by the population affected to cope with the situation for a period not normally exceeding six months”.<sup>24</sup> Meanwhile, the total budget for food aid decreased. Thus, just after the reform, the quantities received by recipient countries did not increase despite the concentration on a smaller number of recipients (see figure E7a in appendix A).<sup>25</sup>

Hence the reform mainly affects the first level of allocation that means to whom the EU allocates aid. I will use this exogenous time variation – from the point of view of other donors – in the EU allocation as an instrument of the probability of receiving food aid from the EU. Figure 2a plots the average probability of receiving food aid from the EU by year. The gray area represents the period between 1995 and 1997. Before 1996, the probability was slowly decreasing; in 1996, there is a sudden drop. Afterwards, the probability is again decreasing on a slower trend.

#### HETEROGENEOUS EFFECT OF THE REFORM ON RECIPIENTS

The reform does not affect all recipient countries uniformly. More exactly the reform affects more in absolute terms, countries that have received food aid regularly before 1996, than countries that have received it irregularly. To illustrate this point, I divide the countries in my sample in two groups, based on the frequency they have received food aid from the EU before 1996. The sample median value is equal to 0.78. Countries that received food aid more often than the median frequency are called “regular countries” and the others “irregular countries”. Regular recipients are on average poorer and more populous; they are also more likely to be affected by a natural disaster or a conflict, than irregular recipients (see table E3 in appendix A that provides descriptive statistics on recipients.) Next, I compute for each group, the average probability of receiving food aid from the EU every year. Figure 2b shows that there is a clear drop in the probability of receiving food aid from the EU, among regular recipients before 1996. Irregular recipients are also affected by the reform, but the impact is smaller.

The relative variation of the probability of receiving food aid before and after the reform shows the same heterogeneity (see figure E6 in appendix A).<sup>26</sup> Second,

24. It was four months in the 1986 regulation [EEC, 1986].

25. However one could expect that the reform may have increased the quantities allocated to recipient that used to receive relatively low amounts of food aid. Figure ?? in appendix A plots the average quantity of food aid received by recipients excluding the three largest recipients – representing on average between one third and half of total food aid allocated by the EU. The pattern is similar.

26. It is possible to observe this effect by looking at the change in the distribution of the average

as I already said, the timing of the implementation of the reform is not the same for small countries and other recipients. I do observe again an heterogeneous effect of the reform for regular and irregular countries, within both types of recipient countries (see figure 2c). Hence, I can investigate donors' reaction to the EU allocation, separately for small and large countries, taking into account the gradual phase-in of the reform.

### Figure 2 about here

Thus the first equation of the decision of giving food aid is :

$$(2) \quad FA_{EUrt} = \lambda Reform_t * P_r + X_{drt-1}\Gamma_3 + X_{rt-1}\Gamma_4 + \phi_t + \phi_r + \epsilon_{rt}$$

and the second-stage equation is :

$$(3) \quad FA_{drt} = \beta FA_{EUrt} + X_{drt-1}\Gamma_1 + X_{rt-1}\Gamma_2 + \phi_{dt} + \phi_{dr} + \epsilon_{drt}$$

with  $Reform_t$  a dummy equal to one if the reform has been implemented (i.e.  $t > 1996$ ) and  $P_r$  the country's propensity to receive food aid from the EU before 1996.  $P_r$  is equal to  $\frac{1}{8} \sum_{t=1988}^{1995} FA_{EUrt}$ , it is the share of years before the reform a country  $r$  receives food aid from the EU.  $\beta > 0$  means that if the EU decides to allocate food aid to recipient  $r$  at time  $d$  the probability donor  $d$  allocates also food aid to recipient  $r$  at time  $t$  increases.

The instrument uses variations induced by the reform across recipients as the reform does not affect them uniformly. I expect  $\lambda$  to be negative : the more often a country received food aid before the reform, the larger the drop in the probability of receiving food aid after the reform. In addition, the interaction term allows me to include year fixed effect in the first stage equation 2, so as to control for changes over time that could be spuriously correlated with EU food aid allocation pattern.  $\phi_t$  also captures the direct and uniform impact of the reform on recipients.  $\phi_r$  controls for the direct time-invariant impact of  $P_r$  on  $FA_{EUrt}$  and for specific relationships between the EU and the recipient. To summarize, the first stage compares the probability of receiving food aid from the EU before and after in countries that were regular recipients and countries that were irregular recipients.

### POTENTIAL CONCERNS

Causal inference using the interacted variable,  $Reform_t * P_r$ , relies on the assumption that, conditional on the controls, the interaction between the reform probability of receiving food aid before and after the reform (see figure E8 in appendix A.

dummy and the recipient's propensity of receiving EU food aid before the reform only affects food aid allocation from other donors through EU food aid allocation pattern. Different concerns could arise when making such assumptions.

First, even if I include years fixed effects, recipient's needs may have evolved differently and could be spuriously correlated with EU food aid allocation pattern before the reform and thus with  $P_r$ . Changes in the recipient's needs could also be correlated with the timing of the reform. However, I do not observe any different trend of recipient's needs proxied by the variables I include. On the contrary, the evolution is quite parallel.

Next, one could worry that regular recipients affected by the reform are concentrated in some specific regions (for instance former USSR countries). Figure 3 shows for each country, the relative change in the average probability of receiving food aid from the EU after the reform. Recipients which are affected by the reform are not concentrated in one specific region.

### Figure 3 about here

Second, other events during the period may have affected the allocation of the EU and of other donors. One could think of the end of the Cold War, the 9/11/2001 attacks or the Paris Declaration on Aid Effectiveness (2005). In order to test the robustness of my result to the choice of the period of analysis, I exclude the Cold War period (until 1990). I also stop the sample in 2005 and in 2001.

Third, a specific concern arises for EU member states. They could have influenced the allocation of EU food aid before and after the reform. If this is true, I do not perfectly correct the problem of reverse causality. The way the EU Commission decides on the allocation and the exchanges with EU representatives seem to exclude such concerns. Depending on recipient's requests, the EU Commission first establishes proposals of food aid. Then, the Food Aid Committee, which includes civil servants from the Commission and EU representatives, agree or disagree with the proposals made by the Commission. In practice, the Committee has never rejected any proposal [Clay et al., 1996]. Moreover, the role of the Food Aid Committee has decreased over the years and is now negligible. The Commission has been much more independent, especially since the ratification of the Lisbon treaty (2009).

Fourth, the EU Commission may have anticipated the ratification of the reform and have started changing its criteria before the reform. Actually, the evaluation

was launched in 1994 just after the European Parliament election and the establishment of a new European Commission. The first conclusions of the report were known before 1996. In Figure 1, it seems that the decrease in the number of recipients actually starts in 1995. In robustness checks, I will advance the timing of the reform to 1994.

Finally one may expect that the effect of the reform on the probability of receiving food aid from the EU is not linear. By construction, the only possible effect for countries that have received food aid every year before the reform is downward or status quo. On the contrary, the probability of receiving food aid for countries that have not received food aid from the EU before the reform is upward or status quo. In order to take into account this non-linearity problem, I specify the effect of the reform in a more flexible way. First, I use a polynomial function of the reform impact. Thus, instead of  $FA_{EUdrt}$  depending only on  $Reform_t * P_r$  I allow it to depend on a higher polynomial degree,  $Reform_t * P_r^2$ ,  $Reform_t * P_r^3$  and  $Reform_t * P_r^4$ . A second possibility is to use a piecewise function of the instrument. It allows the effect to be different for different values of the instrument. In such a case,  $FA_{EUdrt}$  will be a function of  $Reform_t * (P_r < a_1)$ ,  $Reform_t * (a_1 \leq P_r < a_2)$ ...with  $a_1, \dots, a_n$  to be defined.

## IV. Empirical Results

### A. Baseline Results

The OLS estimates of equation 1 for the allocation choice are reported in the first lines of Table 2. Column (1) controls for pair recipient-donor and donor-year fixed effects. The estimate is positive and highly significant. The correlation between the EU allocation and the allocation by other donors is positive and significant at the one percent level. In column (2), I include a range of variables,  $X_{rt-1}$  to control for factors that capture recipient needs. In column (3), additional controls are time-variant recipient variables and related to the quality of recipient government,  $X_{rt-1}$  : a democracy index (Polity IV) and two indices on civil liberties and political rights. In column (4), I include a time-variant donor-recipient variable  $X_{drt-1}$  : the UN vote similarity index. This variable reduces significantly the sample size. Hence, results in column (3) are my baseline results. I also control whether donor  $d$  allocates other types of aid simultaneously to recipient  $r$ .

### Table 2 about here

Table 2 also provides the estimate of the reduced form and the first stage of the 2SLS estimation. The reduced-form effects show that the probability of receiving

food aid from another donor is correlated negatively for the regular recipients after the reform. The effect is significant for two specifications, meaning that indeed the instrument does affect the allocation decision by donors  $d$ . However, in column (3), the estimate is not significant at a 10 percent level.

The first stage estimates show a strong negative correlation between the instrument and the EU choice of giving food aid. For a country that had received food from the EU every year before 1996, the reform induced a decrease in its probability of receiving EU food aid by 53.96 percentage points. Given the average probability of receiving food aid from the EU before 1996, I can estimate the predicted average number of EU food aid recipient countries after the reform : about 42 if all other variables remain constant (compared to 86 before the reform). It is similar to the actual average number of EU food aid recipients. Estimates are quite stable across the different specifications, once I include the controls. The Kleibergen-Paap F-statistic is very large. The statistic may be mechanically augmented by the fact the first-stage equation is almost the same for each donor and is almost duplicated 21 times. This problem of repeated first-stage does not exist however for the bilateral analysis (where there is one estimate per donor). In that case, the statistic is around 100, suggesting that the instrument is not weak (see table 4). I also look at the share of fitted probabilities outside the interval. About 20 percent of observations are below 0 or above 1.<sup>27</sup>

Without any controls, the 2SLS estimate is low and not significant. However, once I control for population size, which has been shown as a key determinant on the allocation of food aid, the estimate becomes significant.<sup>28</sup> In column (2), where I control for time-variant determinants of recipients' needs, the estimate is larger and significant at the one percent level. The effect remains significant when I control for the quality of recipient government and for bilateral determinants, even if the estimates is less precise. Compared to the OLS estimates the effect is almost divided by two. Results suggest that if the EU allocates aid to a recipient country, it increases by five or six percentage points the probability of receiving food aid from another donor. The results are in line with other studies [Knack et al., 2014, Davies and Klasen, 2015] that look at the causal estimates of the interaction among donors and also find positive interactions on average, meaning that donors complement each other.

The sample mean of the probability of receiving food aid from another donor

27. Among fitted probabilities outside the range, 95 percent is below 0 and 5 percent above 1.

28. This estimation is not shown.

is 22 percent and the average probability of receiving food aid from the EU is 41 percent. Therefore, for a recipient country at the mean level of EU probability, the estimate implies that a decrease by 10 percentage point of the probability of receiving food aid from the EU causes a 1.2 percentage point decrease in the average probability of receiving food aid from other donors, that is 5.6 percent of the sample mean. As the EU reform is equivalent to a 30 percentage point decrease of the probability of receiving EU food aid, this leads to a reduction by 0.25 of the number of other donors on average. For a recipient who had always received food aid from the EU before the reform and does not receive it anymore, it induces a decrease of the number of other donors by 0.80.

These results are driven by small countries, which are the first countries affected by the reform of the EU allocation.<sup>29</sup> When I only look at how donors react on average to the EU reform for small countries, I find that donors significantly complement the EU allocation - ie.  $\beta > 0$  (see table 3).

### Table 3 about here

On the contrary, if I focus on large countries I find that donors do not react significantly to the EU allocation. However, I must take into account the fact that the implementation of the reform lasted many years. More precisely, if I look at the dynamic effect of the reform for small and large countries (see figure 4), both types start to be affected after 1996.<sup>30</sup> However, the impact is larger for small countries and constant afterwards. On the contrary, for large countries, the impact of the reform stabilizes only after 2002. In addition it is only after 2002, that I cannot reject the hypothesis that the impact of the reform for small and large recipients is equal. Hence, in the rest of the paper, when I estimate the reaction of other donors in the case of large countries I will exclude the phase-in period, meaning 1996-2002. In such a case, I find that on average, other donors significantly substitutes to the EU -  $\beta < 0$ . Results remain unchanged for small countries, with or without the phase-in period.

### Figure 4 about here

#### *B. Bilateral Reaction*

It is unlikely that all donors react to EU food aid in the same way. Thus, I reestimate equations 2 and 3 for each donor  $d$  allowing for a differentiated response,  $\beta_d$  to the EU allocation.

29. See table E8 in appendix B for a reminder of the list of small and large countries.

30. I run a regression for small recipients and another for large recipients.

$$(4) \quad FA_{EUrt} = \lambda Reform_t * P_r + X_{drt-1}\Gamma_3 + X_{rt-1}\Gamma_4 + \phi_t + \phi_r + \epsilon_{rt}$$

$$(5) \quad FA_{drt} = \beta_d FA_{EUrt} + X_{drt-1}\Gamma_{d1} + X_{rt-1}\Gamma_{d2} + \phi_{dt} + \phi_{1dr} + \epsilon_{drt}$$

I also differentiate the bilateral reaction of donors by the type of recipients (small/large). As already told, for large recipients I exclude the phase-in period (between 1996 and 2002).

Table 4 reports the bilateral estimates for both types of recipients, once food aid allocated by the EU is instrumented. For each donor, column (1) refer to small countries and column (3) to large countries. I observe three possible reactions :  $\beta_d < 0$  and significant,  $\beta_d > 0$  and significant, and finally  $\beta_d$  non statistically different from zero.

#### Table 4 about here

Bilateral reactions are very heterogeneous across donors and across the type of recipients, but the estimates are always between -1 and 1. It suggests that alone, a donor cannot entirely compensate the fact that the EU stops giving to a recipient country and the response is not systematic. A majority of donors seems not to react to the EU allocation mostly in the case of large recipient countries. For small countries, the estimate is not statistically different from zero for 12 donors out of 21, mostly EU members. For large countries, 15 donors do not react significantly to the EU allocation. In this case I observe a clear distinction between EU member states, that tend to react positively (when they react) and extra-EU countries that tend to react negatively (when the effect is significant).

Even if the estimate is not statistically different from 0, I can explore further by testing whether the estimate is negative (respectively positive). I can test  $H_0 \beta_d \leq 0$  against  $H_1 \beta_d \geq 0$ .<sup>31</sup> It will provide more information on donors whose reaction is weak. This will be important further below in the donor topology where I can give an interpretation from the theoretical model to these non-significant reactions. For large countries, the unilateral tests reject at a five percent level, the hypothesis that the estimate is negative for Australia, Canada, Switzerland, France, the Netherlands and Sweden. In addition for Saudi Arabia, Germany,

31. Respectively  $H_0 \beta_d \geq 0$  against  $H_1 \beta_d \leq 0$ . I perform for each estimate, two unilateral tests  $H_0 : \beta < 0$  against  $\beta \geq 0$  and  $H_0 : \beta > 0$  against  $\beta \leq 0$ .

Italy, Spain and the United Kingdom, I reject the hypothesis that the estimate is positive. For small countries, among donors for whom I cannot reject the hypothesis that  $\beta_d$  is equal to 0, I always reject the hypothesis that the estimate is negative (respectively positive) if the point estimate is positive (resp. negative), except for Spain.

For small countries, all donors who react significantly to the EU allocation have a positive coefficient, meaning that they act in the same way as the EU. The only exception is the WFP, which reacts to the EU by stepping in when the EU leaves a country. This finding is expected in the sense that the WFP has a double role : it is a donor who allocates food aid based on its own funding as well as an implementing agency that is dedicated to implement food aid programs decided by other donors. Actually, the WFP always tries first to obtain food aid from other donors through special appeal or core contributions, before spending on its own. Thus, the WFP appears as a donor of last resort, if he does not succeed to obtain food aid from other donors .<sup>32</sup> Among EU members, it seems that Nordic countries, such as Denmark, Finland and Sweden, are the ones who react the most to the EU allocation and follow EU's lead. Results on Canada, the fourth largest donor, are less expected at least with this order of magnitude.

For the recipients, the loss in terms of food aid can be quite substantial. Except Japan, who does not react significantly to the EU allocation, the top donors behave the same way as the EU allocation, regarding small recipients. Hence, the EU reform may have induced a larger decrease on food aid received than the effect of the sole EU withdrawal. Given the average quantities allocated by those donors to small countries, it does not seem possible that the WFP has succeeded in compensating the loss.

EU member states mostly complement the EU allocation, for both small and large recipients. The problem of subsidiarity between EU institutions and EU members is salient. It questions the efficiency of having two levels of food aid allocations, at the country and at the EU level, if both target the same recipients. A solution that could preserve bilateral allocation by EU member states while reducing costs is to increase the number of food aid projects co-financed by the EU and a EU member state. It is already partly the case but it is not systematic.

These estimates do not provide information on why donors react or do not

32. In the data, the WFP does not appear as a donor when the WFP is only the implementing agency.

react to the EU. In the next section, I derive a simple theoretical framework in which I distinguish a donor's reaction to the EU depending on whether they react indirectly because EU's decision affects the way a donor estimates recipient's needs, or directly because he wants to keep up with the EU. Before developing the model, I check the robustness of the 2SLS estimates for all donors together and all recipients together (global average reaction).<sup>33</sup>

### *C. Robustness Checks*

I test the sensitivity of baseline estimates to the sample definition. Estimates are reported in table 5. First, I exclude some recipient countries. In row (2), I exclude countries that were formerly part of the Soviet Union and do not enter the sample until 1991. These countries in addition experienced a large decrease in needs few years after the collapse of the USSR.<sup>34</sup> In row (3), I exclude countries of former Yugoslavia for similar reasons.<sup>35</sup> In row (4), I exclude India and China that could drive results due to their size. Results are similar.

In row (5), I drop each year, the four largest recipient countries of EU food aid. These are where extreme disasters take place and almost all donors give to them. Results remain significant.

Second I change the sample of donors. First, I exclude European member states because they have special and closer links with the EU (row (6)). The estimate becomes negative and non significant. This result is expected given the results obtained in bilateral reactions (section IV.B). Results are mostly driven by small recipient and donors who react the most (positively and significantly) to the EU allocation are EU member states. The average positive effect of EU food aid allocation on other donors' allocation is thus driven by European countries. In row (7), I include all donors (except NGOs because of incomplete data) even if they only allocate food aid to few recipients during few years. In row (8) and (9), I restrict the sample to donors who give food aid often, respectively at least 10 or 20 years (out of 24 years). The estimates are significant at a five level percent. More interestingly, the estimates increase when I restrict the sample of donors to

33. Results are robust and follow the same pattern when I focus only on small countries with the same robustness checks. For large countries (and excluding the phase-in period of the reform), there is one specification for which the estimate is not negative and significant : it is the one where the reform is assumed to begin in 1994. This finding reinforces the idea that large countries are impacted by the reform after small countries. Results are provided upon request.

34. Countries are Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

35. Countries are Croatia, Slovenia, Macedonia, Bosnia and Herzegovina and Serbia and Montenegro. Serbia and Montenegro are pooled together during the whole period, even if Montenegro became independent in 2006.

more frequent donors.

Third, I change the period of analysis in order to exclude events that could affect (food) aid allocation. In row (10), I exclude Cold War years and start the period in 1991. In row (11), I stop the analysis in 2005 as the Paris Declaration on the Effectiveness of Aid, that same year, stressed the importance of coordination among donors and may have had some influence. In row (12), I restrict the period to 1988-2001 as Fleck and Kilby [2010] show that the US have altered their allocation pattern after the 2001 attacks. I still get positive estimates.

Next, I change the first-stage specification. In row (13), in order to investigate whether the European Commission started changing its rules of allocation before the ratification of the regulation, I redefine the dummy  $Reform_t$  to be equal to one after 1995 instead of 1996. The estimate is significant and larger. Rather than interacting the reform timing with the propensity of receiving food aid from the EU before the reform, I instead interact it with previous allocation,  $FA_{UEt-1}$ , (row (14)) or recent past allocation, by computing the propensity of receiving food aid from the EU between 1993-1995 (row (15)). The estimate is no longer significant when I just look at previous allocation. I also use a three year-span because program and project food aid are often multi-annual. Results remains significant when I look at a longer time horizon, suggesting that donors react to more “structural” food aid allocation than instantaneous allocation ( $t - 1$ ) which is less stable. I also compute the propensity of receiving project or program food aid excluding emergency food aid, in row (16) as they were the main targets of the reform. Results are larger and still significant.

In row (17) to row (20), I allow the impact of the reform to be non linear on the probability of receiving food aid from the EU. In rows (17) and (18), I use a polynomial function of  $Reform_t * P_r$ . In row (17), I add a squared term  $Reform_t * P_r^2$ ; in row (18) a cubic term  $Reform_t * P_r^3$ . In rows (19) and (20), instead of using a polynomial function, I use a piecewise function of  $P_r$  and interact each term with  $Reform_t$ . Instruments are thus  $Reform_t * (P_r < a_1)$ ,  $Reform_t * (a_1 \leq P_r < a_2)$ ,  $Reform_t * (a_2 \leq P_r < a_3)$  and  $Reform_t * (a_3 \leq P_r)$ . In row (19), I use quintiles as interval bounds ( $a_1, a_2, \dots$ ). In row (20), I use quartiles. The estimate is slightly higher in magnitude but remains significant. First stages results are provided in table E5 in appendix B.

**Table 5 about here**

## V. A Donor Typology

In the previous section, I show that some donors react significantly to EU food aid allocation. I argue that these interactions may result from two broad categories of behaviors. First, a donor reacts to the EU decision, because he cares about the extent of recipient's needs (which partly depends on EU's action). It could be for altruism [Younas, 2008] or for strategic reasons (related to the recipient). Because the donor reacts to the EU through the impact on the recipient, I call this channel *indirect* or *recipient-driven* interactions. Alternatively, a donor can also react to the EU allocation per se. It could be for coordination purpose or due to a signaling effect. I call this channel *direct* or *EU-driven* interaction.

I found in the previous section that donors tend to complement the allocation of the EU. This could lead to a concentration towards some recipients at the expense of others. However, the policy implications are not the same, depending on whether the donor's reaction is recipient or EU driven. If it is recipient-driven, coordination could be achieved by specializing donors geographically or by delegation to a multilateral agency. If it is EU-driven, coordination could take the form of a joint program, so as to limit transaction costs and projects duplication.

I provide a simple theoretical framework in which a donor react directly and indirectly to the allocation of the EU. I derive a donor typology which classify them according to the importance of interactions driven by recipients' characteristics vis-à-vis interactions driven by the EU.

### A. The setting

For simplicity the model is based on two donors, donor  $d$  and the EU. Each donor can allocate food aid to  $R$  potential recipients. Allocation's decisions are made simultaneously and for tractability, there is no uncertainty and information is perfect.<sup>36</sup> A donor maximizes its current utility.

At each period  $t$ , donor  $d$  has a fixed budget  $A_{dt}$  for food aid and faces  $R$  recipients with specific needs,  $F_{rt}$ . The donor's allocation  $A_{drt}$  is determined by two main competing drivers : recipient's characteristics and allocation by the EU.

Donor  $d$  allocates food aid depending on recipient's needs,  $F_{rt}$  but also depending on geopolitical concerns. Geopolitical bias is driven by time-invariant links,  $G_{dr}$ ,

36. Given the history of food aid allocation, it is quite believable that each donor anticipates well how other donors allocate their aid on average. In addition, the Food Aid convention and the WFP allow the spread of information among donors.

such as colonial history.  $G_{dr}$  can be seen as a positive premium. Geopolitical bias can also vary over time,  $G_{drt}$ , because of diplomatic changes or specific interests at a given period of time. The donor also takes into account EU allocation in his evaluation of needs because of his limited budget : he wants to avoid giving too much or not giving enough.

To summarize, donor  $d$  allocates food aid depending on evaluated needs equal to  $F_{rt} + G_{dr} + G_{drt} - A_{EUrt}$  with  $A_{EUrt}$  the amount of food aid allocated by the EU to recipient  $r$ . A donor wants to minimize the gap between the estimated needs and the quantity of food aid he allocates. Hence, his objective is to minimize  $((F_{rt} + G_{dr} + G_{drt} - A_{EUrt}) - A_{drt})^2$ .

On the other side, donor  $d$  compares directly its own allocation with the allocation done by the EU. It could be so because of competition effects and he wants to appear as more important (see the concept of lead donor developed by Steinwand [2015]). It could also be for domestic reasons. Annen and Moers [2016] rationalize the idea that it is easier for donors to communicate on the relative effectiveness of their aid compared to one another rather than on the absolute effectiveness of their aid. Moreover, they argue that an increasing number of advocacy NGOs provide donor rankings; in that context, the objective is no more to increase the absolute aid effectiveness but to be close to another donor's behavior. In my context, it could be the case that donor  $d$  signals that he has chosen a "good recipient" who receives also from the EU. Hence donor  $d$  is interested in  $A_{drt} - A_{EUrt}$ . Alternatively, it could also be the case that donor  $d$  wants to specialize compared to the EU. In that latter case of specialization, I treat symmetrically the fact of giving more than the EU or giving less. This is a simplifying assumption, which neglects the idea that a donor could want to appear as leading by giving more than the EU. Hence a donor wants to minimize  $\lambda_d (A_{drt} - A_{EUrt})^2$  with  $\lambda_d (\in \mathbb{R})$  the way a donor value the direct comparison with the EU allocation.

As a result, the objective function of donor  $d$  is a weighted sum of both components given its annually predetermined budget,  $A_{dt}$ . Each period  $t$ , a donor chooses  $A_{drt}$  that minimizes :

$$U_d = \frac{1}{2} \sum_{r=1}^R \gamma_d ((F_{rt} + G_{dr} + G_{drt} - A_{EUrt}) - A_{drt})^2 + \frac{1}{2} \sum_{r=1}^R \lambda_d (A_{drt} - A_{EUrt})^2$$

$$\text{subject to } \sum_{r=1}^R A_{drt} = A_{dt}.$$

$\lambda_d$  captures the weight a donor gives to the direct comparison with the EU allo-

cation. Its sign also captures the way the donor compares itself relative to the EU.  $\lambda_d > 0$  means that donor  $d$  wants to allocate its aid the same way as the EU. On the contrary  $\lambda_d < 0$  suggests that donor  $d$  wants to specialize compared to the EU.

$\gamma_d > 0$  captures the weight a donor gives to the recipient and how much recipient's characteristics are taken into account in the allocation process. It captures the indirect interactions between donors. It is defined at the donor level and does not depend on the recipient.  $G_{dr} + G_{drt}$  already captures the fact that donors may give more importance to some recipients. Therefore, the ratio  $\frac{\gamma}{\lambda_d}$  measures the relative importance of interactions driven by the recipient's needs (estimated by the donor) over interaction driven by a direct comparison with the EU allocation.

### B. Reaction function

The first order condition gives a reaction function of  $A_{drt}$  to  $A_{EUrt}$

$$(6) \quad A_{drt} = \frac{\mu_{dt}}{\lambda_d + \gamma_d} + \frac{\gamma_d}{\lambda_d + \gamma_d} G_{dr} + \frac{\gamma_d}{\lambda_d + \gamma_d} G_{drt} + \frac{\gamma_d}{\lambda_d + \gamma_d} F_{rt} + \frac{1 - \frac{\gamma}{\lambda_d}}{1 + \frac{\gamma}{\lambda_d}} A_{EUrt}$$

where  $\mu_{dt}$  is the Lagrangian multiplier associated to donor  $d$  at time  $t$ . The reaction function implies some constraints on the parameters. First  $\lambda_d \neq 0$ , this means that donor  $d$  always weights the EU allocation. Second  $\frac{\gamma}{\lambda_d} \neq -1$ : this means that a donor cannot value the same way the direct comparison with the EU and the recipient's characteristics ( $\lambda = \gamma$  and at the same time, specialize relative to the EU ( $\lambda < 0$ )).

The equilibrium allocation exists and induces restriction on  $\lambda_d$  and  $\gamma_d$  but does not affect the reaction function. First, donors partly allocate their food aid on recipient's needs and characteristics - i.e.  $\lambda \neq 0$ . Second  $\gamma_d \lambda_{EU} + \lambda_d \gamma_{EU} \neq 0$ . It means that on average the EU and donor  $d$  take into account the allocation driven by direct comparison done by each other.

$$(7) \quad A_{drt}^* = \frac{1}{2} F_{rt} + \frac{(\lambda_{EU} + \gamma_{EU})(\mu_{dt} + \gamma_d(G_{dr} + G_{drt}))}{2(\gamma_d \lambda_{EU} + \lambda_d \gamma_{EU})} + \frac{(\lambda_d + \gamma_d)(\mu_{EUt} + \gamma_{EU}(G_{EUr} + G_{EUrt}))}{2(\gamma_d \lambda_{EU} + \lambda_d \gamma_{EU})}$$

Based on this model and the reaction function, I can derive a typology of donors. First, the sign of the ratio provides information on how a donor values its allocation compared to the EU allocation. If  $\frac{\gamma}{\lambda_d} > 0$  then  $\lambda_d > 0$ , meaning that

donor  $d$  wants to complement and copy EU food aid allocation. Alternatively, if  $\frac{\gamma}{\lambda_d} < 0$  it means that donor  $d$  tends to substitute to the EU and specialize compared to the EU.

Second, the magnitude of the ratio  $\frac{\gamma}{\lambda_d}$  indicates whether the allocation by donor  $d$  in reaction of the allocation of the EU is driven by the recipient's estimated needs or rather by the EU itself. Donors whose allocation is more driven by recipient's characteristics ( $|\frac{\gamma}{\lambda_d}| > 1$ ) will be called "Recipient driven". Donors whom allocation is driven by the EU allocation ( $|\frac{\gamma}{\lambda_d}| < 1$ ) will be "EU driven". If the donors value similarly both outcomes, they will be "Neutral".

### C. Typology

Adding an error term to equation (6) and interpreting the allocation not in quantities but on the probability of giving food aid, I obtain the equation (5) I have estimated in section IV.B, with  $\beta_d = \frac{1-\gamma_d}{1+\frac{\gamma_d}{\lambda_d}}$ ,  $\Gamma_{d1} = \frac{\gamma_d}{\lambda_d+\gamma_d}$ ,  $\Gamma_{d2} = \frac{\gamma_d}{\lambda_d+\gamma_d}$ ,  $\phi_{dt} = \frac{\mu_{dt}}{\lambda_d+\gamma_d}$  and  $\phi_{1dr} = \frac{\gamma_d G_{dr}}{\lambda_d+\gamma_d}$ . Hence, I can interpret the coefficient  $\beta_d$  as  $\frac{\gamma_d}{\lambda_d} = \frac{1-\beta_d}{1+\beta_d}$ . It provides me an equivalence between  $\beta_d$  and  $\frac{\gamma}{\lambda_d}$  and a typology presented in table 6.

### Table 6 about here

Finally I can be more precise for neutral donors using unilateral test to know whether  $\beta_d$  is more likely to be positive or negative. Hence for donors for whom I cannot reject the hypothesis  $\beta_d = 0$ , I test the hypothesis  $\beta_d > 0$  and the hypothesis  $\beta_d < 0$ . If I reject  $\beta_d > 0$ , the donor is considered as neutral but recipient driven. If I reject  $\beta_d < 0$ , the donor will be classified as neutral but EU driven. If I reject both hypotheses, the donor will be classified as pure neutral.

I provide a detailed analysis on donor's reaction by investigating the heterogeneous response I observe, depending on the size of the recipient country. Table 7 shows the donor typology by distinguishing small and large recipient countries.<sup>37</sup> For small countries, a majority of donors tends to be EU driven (or neutral but EU driven). In these small countries, needs can be normally fulfilled by a few number of donors. Allocating food aid to these small countries can be a strategy to signal that the donor cares about food aid in general. It could also be the case that bilateral ties with the recipient are weaker than concerns regarding donors interactions. Among donors of small countries, who are EU-driven, there is three

37. Point estimates are provided in table E6 in appendix C.

sub-categories depending on how they react for large countries. A majority have the same type of response for large countries as well : there are mainly EU members plus Australia and Canada. Meanwhile, Nordic donors (except Sweden) are neutral for large countries, as is Japan, valuing recipient's characteristics as much as EU allocation. Finally, bilateral relationships with the recipient are more important when the recipient is a large country, for four donors : the US, Germany, Saudi Arabia and the UN institutions. These donors have thus two different behaviors, depending on the size of the recipients.

For small recipients, the EU allocation tends to be more important on average than for large recipients. This idea is reinforced by the fact there is no donor who is recipient-driven for small countries and on the contrary EU-driven for large countries. Some donors are (neutral-) recipient-driven for both small and large countries. This is the case for two large donors - the UK and the WFP.<sup>38</sup> The WFP appears as recipient-driven for small and large countries, suggesting that the WFP does allocate food aid depending on the needs of recipient countries, in line with its international mandate.

### **Table 7 about here**

## **VI. Conclusion**

Even in the absence of an international framework that improves coordination and interactions between donors, donors do react to each other. In this study, I show that the change in the EU rules of food aid allocation in 1996, which resulted in many countries receiving no longer from the EU, has affected the food aid allocation by other donors. On average, donors complement the allocation of the EU : they stop giving to recipients following EU's withdrawal. I find a large heterogeneity on donor's reactions : EU members and Canada complement the EU food aid allocation and are likely to aggravate the drop experienced by the recipient country. On the contrary, the WFP substitutes to the EU and mitigates the decrease in food aid received. These findings are largely robust to the use of different sample definitions of recipients, donors and time period. They are also mostly robust to alternative specifications.

Donors reaction takes into account the type of recipients. Most donors copy EU's allocation in the case of small countries. On average, if the EU stops allocating food aid to a small country, it reduces by 1.4 the average number of other donors. This direct reaction could be explained by coordination between donors :

38. It is also the case for relatively small donors such as Spain, Italy and Luxembourg

they specialize so as to limit the number of donors in small countries whose needs are relatively small. I cannot formally test this mechanism. For large recipients, if the EU stops allocating to a large recipient, it increases by 0.3 the average number of other donors. This reaction is driven by non European countries who substitute to the EU. EU members do not to react significantly to the EU allocation in large countries, except Austria and Belgium.

I develop a simple model in which I argue that donors react to the EU through two channels : indirect reaction to the EU, based on recipients' characteristics, and direct reaction to the EU, based on a comparison of their allocation to the EU's one. I derive a donor typology from this model and the empirical results. EU member states mostly react to the EU allocation directly, for both small and large recipients. On the contrary, non European countries are driven by comparing their decision to the EU in the case of small countries but are recipient-driven in the case of large countries. The WFP and the UK are recipient-driven. The WFP is in line with its mandate.

These results have implications for global food aid allocation and on an European perspective. First the fact that donors complement the EU allocation could lead to the problem of darling and orphan countries even if the WFP seems to mitigate part of the phenomena. Indeed it means that some recipients will receive from a large number of donors if the EU decides to deliver food aid to them whereas other recipients who do not receive food aid from the EU will receive food aid from a small number of donors. At the European level, it raises the problem of subsidiarity between the EU and EU member states and the efficiency of having two levels of food aid allocations.

## Références

- A. Acharya, A. T. F. de Lima, and M. Moore. Proliferation and Fragmentation : Transactions Costs and the Value of Aid. *Journal of Development Studies*, 42 (1) :1–21, 2006.
- F. Z. Ahmed, E. D. Werker, et al. Aid and the Rise and Fall of Conflict in the Muslim World. *Quarterly Journal of Political Science*, 10(2) :155–186, 2015.
- K. Annen and L. Moers. Donor competition for aid impact, and aid fragmentation. *The World Bank Economic Review*, 2016. doi : 10.1093/wber/lhw019.
- C. B. Barrett and K. C. Heisey. How Effectively Does Multilateral Food Aid Respond to Fluctuating Needs? *Food Policy*, 27(5-6) :477–491, 2002.
- F. Barthel, E. Neumayer, P. Nunnenkamp, and P. Selaya. Competition for Export Markets and the Allocation of Foreign Aid : The Role of Spatial Dependence among Donor Countries. *World Development*, 64(0) :350 – 365, 2014.
- M. F. Bellemare, T. Masaki, and T. B. Pepinsky. Lagged Explanatory Variables and the Estimation of Causal Effects. February 2015.
- J.-C. Berthélemy. Aid Allocation : Comparing Donors’ Behaviours. *Swedish Economic Policy Review*, 13(2) :75–110, 2006.
- F. Bourguignon and J.-P. Platteau. The Hard Challenge of Aid Coordination. *World Development*, 69 :86 – 97, 2015. ISSN 0305-750X. Aid Policy and the Macroeconomic Management of Aid.
- A. Brown, F. Naschold, T. Conway, and A. Fozzard. Aid Transaction Costs in Vietnam. *report for DFID, London : ODI*, 2000.
- J. B. Burbidge, L. Magee, and A. L. Robb. Alternative Transformations to Handle Extreme Values of the Dependent Variable. *Journal of the American Statistical Association*, 83(401) :123–127, 1988.
- E. J. Clay, S. Dhiri, and C. Benson. *Joint Evaluation of European Union Programme Food Aid*. Ministry of Foreign Affairs, Danida, 1996.
- P. Clist. 25 Years of Aid Allocation Practice : Whither Selectivity? *World Development*, 39(10) :1724 – 1734, 2011. ISSN 0305-750X.
- R. Davies and S. Klasen. Of Donor Coordination, Free-Riding, Darlings, and Orphans : The dependence of bilateral aid on other bilateral giving. CESifo Working Paper Series, 2015.

- S. Dietrich and J. Wright. Foreign Aid Allocation Tactics and Democratic Change in Africa. *Journal of Politics*, 77(1) :216–234, 2015.
- S. Djankov, J. G. Montalvo, and M. Reynal-Querol. Aid with Multiple Personalities. *Journal of Comparative Economics*, 37(2) :217–229, June 2009.
- A. Dreher and S. Langlotz. Aid and Growth. New Evidence Using an Excludable Instrument. CEPR Discussion Paper No. DP10811, 2015.
- W. Easterly. The Cartel of Good Intentions : The Problem of Bureaucracy in Foreign Aid. *The Journal of Policy Reform*, 5(4) :223–250, 2002.
- EC. COUNCIL REGULATION (EC) No 1292/96 of 27 June 1996 on food-aid policy and food-aid management and special operations in support of food security. Official Journal of the European Communities, June 1996.
- EEC. COUNCIL REGULATION (EC) No 3972/86 of 22 December 1986 on food-aid policy and food-aid management. Official Journal of the European Communities, December 1986.
- R. K. Fleck and C. Kilby. Changing Aid Regimes? U.S. Foreign Aid from the Cold War to the War on Terror. *Journal of Development Economics*, 91(2) : 185 – 197, 2010. ISSN 0304-3878.
- E. Frot and J. Santiso. Herding in Aid Allocation. *Kyklos*, 64(1) :54–74, 2011.
- A. Fuchs and K. C. Vadlamannati. The Needy Donor : An Empirical Analysis of India’s Aid Motives. *World Development*, 44(C) :110–128, 2013.
- A. Fuchs, P. Nunnenkamp, and H. Öhler. Why Donors of Foreign Aid Do Not Coordinate : The Role of Competition for Export Markets and Political Support. *The World Economy*, 38(2) :255–285, 02 2015.
- S. Gibbons and H. G. Overman. Mostly Pointless Spatial Econometrics? *Journal of Regional Science*, 52(2) :172–191, 2012.
- D. Guha-Sapir, R. Below, and P. Hoyois. EM-DAT : International Disaster Database – www.emdat.be –.
- T. Kim. Strategizing aid : US–China food aid relations to North Korea in the 1990s. *International Relations of the Asia-Pacific*, 2011. doi : 10.1093/irap/lcr010.
- H. Kimura, Y. Mori, and Y. Sawada. Aid Proliferation and Economic Growth : A Cross-Country Analysis. *World Development*, 40(1) :1 – 10, 2012. ISSN 0305-750X.

- S. Knack, L. C. Xu, and B. Zou. Interactions among Donors' Aid Allocations : Evidence from an Exogenous World Bank Income Threshold. *World Bank Policy Research Working Paper*, (7039), 2014.
- C. Kuhlitz, A. Abdulai, and C. B. Barrett. Food Aid Allocation Policies : Coordination and Responsiveness to Recipient Country Needs. *Agricultural Economics*, 41(3-4) :319–327, 05 2010.
- E. Neumayer. Is the Allocation of Food Aid Free from Donor Interest Bias? *Journal of Development Studies*, 41(3) :394–411, 2005.
- N. Nunn and N. Qian. US Food Aid and Civil Conflict. *The American Economic Review*, 104(6) :1630–1666, 2014.
- P. Nunnenkamp and H. Öhler. Aid Allocation through Various Official and Private Channels : Need, Merit, and Self-Interest as Motives of German Donors. *World Development*, 39(3) :308–323, March 2011.
- A. Sen. Ingredients of Famine Analysis : Availability and Entitlements. *The Quarterly Journal of Economics*, pages 433–464, 1981.
- M. C. Steinwand. Compete or Coordinate? Aid Fragmentation and Lead Donorship. *International Organization*, 69 :443–472, 3 2015. ISSN 1531-5088.
- A. Strezhnev and E. Voeten. United Nations General Assembly Voting Data. 2012. URL [http://thedata.harvard.edu/dvn/dv/Voeten/faces/study/StudyPage.xhtml?globalId=hd1:1902.1/12379&studyListingIndex=0\\_9e98c2f40d400826bdd6b6fda8ff](http://thedata.harvard.edu/dvn/dv/Voeten/faces/study/StudyPage.xhtml?globalId=hd1:1902.1/12379&studyListingIndex=0_9e98c2f40d400826bdd6b6fda8ff).
- D. Tingley. Donors and Domestic Politics : Political Influences on Foreign Aid Effort. *The Quarterly Review of Economics and Finance*, 50(1) :40 – 49, 2010. Special Section : Foreign Aid.
- G. Torsvik. Foreign Economic Aid ; Should Donors Cooperate? *Journal of Development Economics*, 77(2) :503–515, 2005.
- US Government Accountability Office. Foreign assistance : Various challenges impede the efficiency and effectiveness of u.s. food aid. Technical report, 2007.
- R. J. Utz. Will Countries That Receive Insufficient Aid Please Stand Up. 2011.
- E. Werker, F. Z. Ahmed, and C. Cohen. How is Foreign Aid Spent? Evidence from a Natural Experiment. *American Economic Journal : Macroeconomics*, pages 225–244, 2009.

- WFP. Food Aid Information System, World Food Programme, available at : <http://www.wfp.org/fais/>, 2011.
- J. Younas. Motivation for Bilateral Aid Allocation : Altruism or Trade Benefits. *European Journal of Political Economy*, 24(3) :661 – 674, 2008. ISSN 0176-2680.
- L. M. Young and P. C. Abbott. Food Aid Donor Allocation Decisions After 1990. *Canadian Journal of Agricultural Economics/Revue Canadienne d'Agroéconomie*, 56(1) :27–50, 2008.
- N. Zahariadis, R. Travis, and J. B. Ward. US Food Aid to Sub-Saharan Africa : Politics or Philanthropy? *Social Science Quarterly*, 81(2) :663–676, 2000.

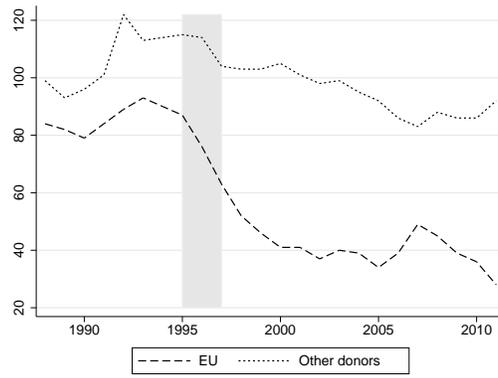
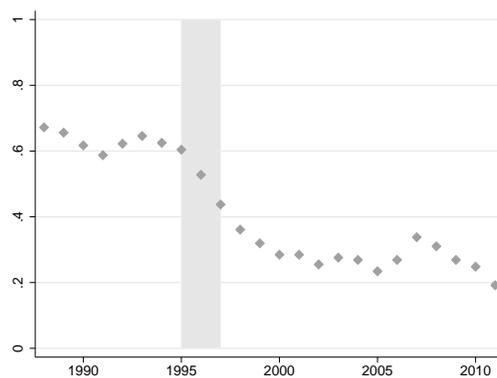
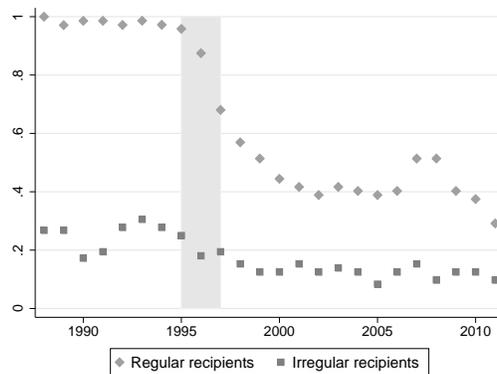


FIGURE 1. : Number of recipient countries

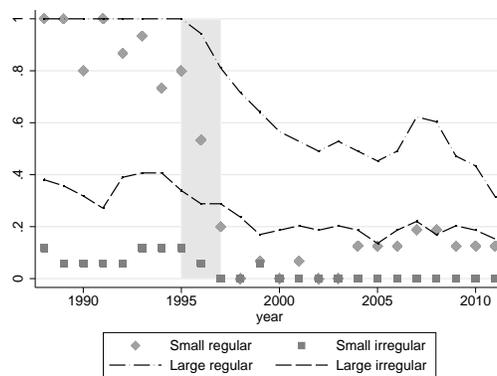
*Note:* For other donors a recipient is a recipient receiving from at least one donor. Pattern is similar if all non regular donors are included.



(a) All recipient countries



(b) Heterogeneous effects



(c) Heterogeneous effects for small and large countries

FIGURE 2. : Average probability of receiving food aid from the EU

*Note:* Regular recipients are countries whose probability of receiving food aid from the EU before 1996 is above 0.78 – the sample median value. Irregular countries are countries whose probability is below 0.78 (see table E8 in appendix D for the list of regular and irregular recipients).

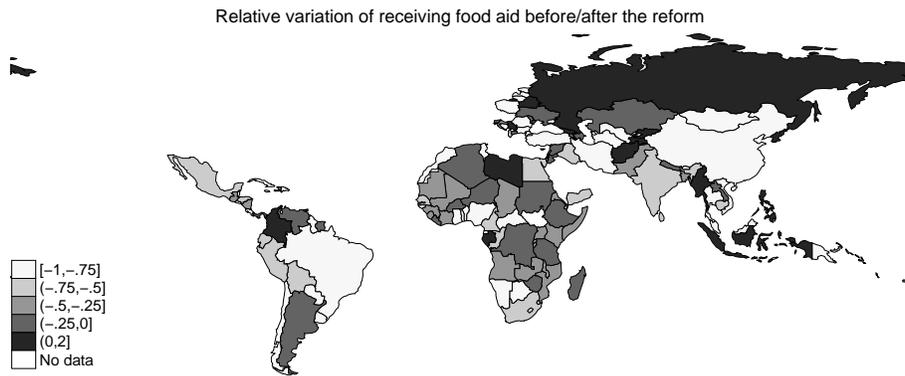


FIGURE 3. : Relative variation of the probability of receiving food aid from the EU

*Note:* the variation is computed as the variation of the average probability of receiving after the reform and the average probability of receiving before the reform over the average probability of receiving before 1996.

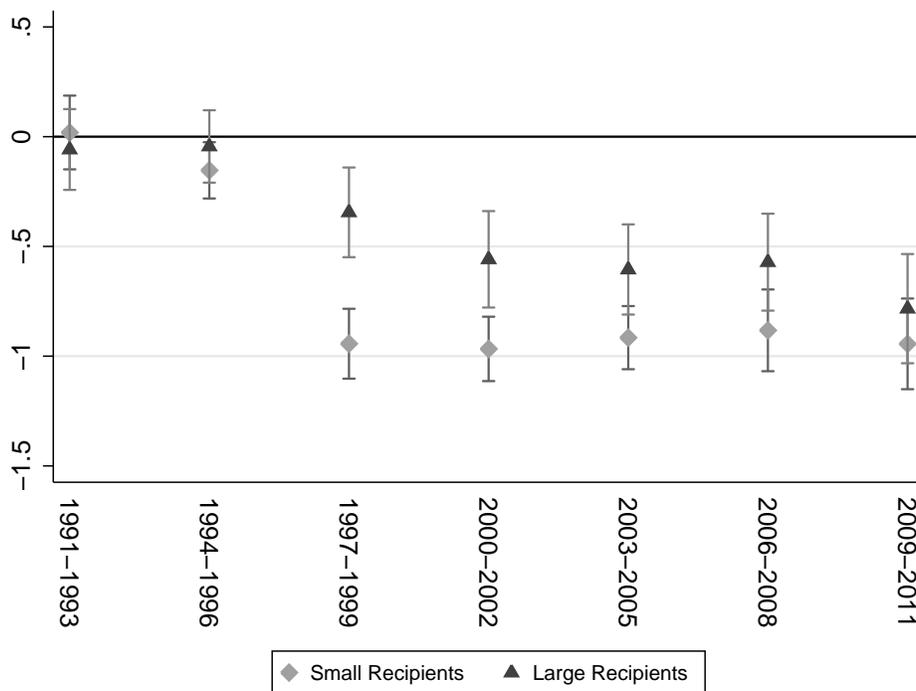


FIGURE 4. : Dynamic effect of the reform on the probability of receiving food aid from the EU

	<b>Number of recipient countries</b>		<b>Correlation with the EU</b>	
	<i>Before 1996</i>	<i>After 1996</i>	<i>All food aid</i>	<i>Excl. emergency</i>
EU	86	44.1	1	1
EU Members	88.3	79.8	0.56	0.47
Non EU members	102.6	91.1	0.51	0.41
UN institutions	17.4	33.8	0.22	0.04
	<b>Number of small recipients</b>		<b>Correlation with the EU</b>	
	<i>Before 1996</i>	<i>After 1996</i>	<i>All food aid</i>	<i>Excl. emergency</i>
EU	14.6	2.7	1	1
EU Members	15.8	10.0	0.49	0.49
Non EU members	18.1	11.9	0.41	0.43
UN institutions	3.2	3.9	0.20	0.29
	<b>Number of large recipients</b>		<b>Correlation with the EU</b>	
	<i>Before 1996</i>	<i>After 1996</i>	<i>All food aid</i>	<i>Excl. emergency</i>
EU	71.3	42.0	1	1
EU Members	72.6	69.8	0.55	0.53
Non EU members	84.5	79.1	0.50	0.53
UN institutions	15.5	30.8	0.19	0.30

TABLE 1—: Descriptive statistics on recipient numbers and correlation among donors

*Note:* INTERFAIS database. Author's calculation. A country is a recipient if he receives any kind of food aid. For grouping donors such as EU members, a recipient is a country receiving food aid from at least one EU member. The quantity is the average annual total amount of food aid (in metric tons) received from the group of donors by recipient countries. The third column provides the correlation of food aid allocation by type of donors with EU food aid allocation for all type of food aid. The fourth column excludes emergency food aid. EU members are Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden and the United Kingdom. Non EU members are Australia, Canada, Japan, Norway, Saudi Arabia, Switzerland and the United States.

Dependent Variable	Has received food aid from $d$			
	(1)	(2)	(3)	(4)
<b>OLS Estimates</b>				
Has received EU food aid	0.0911*** (0.0055)	0.0831*** (0.0055)	0.0833*** (0.0057)	0.0781*** (0.0058)
$R^2$	0.48	0.48	0.47	0.48
<b>Reduced Form Estimates</b>				
Reform $_t$ * $P_r$	-0.0095 (0.0100)	-0.0361*** (0.0108)	-0.0179 (0.0116)	-0.0197* (0.0119)
$R^2$	0.47	0.48	0.47	0.47
Observations	60 814	60 814	55 669	52 821
Donor-recipient pairs	2 856	2 856	2 583	2 561
<b>2SLS Estimates</b>				
Has received EU food aid	0.0190 (0.0201)	0.0657*** (0.0196)	0.0379* (0.0216)	0.0424* (0.0222)
$R^2$	0.47	0.48	0.47	0.47
Dependent Variable	Has received EU food aid			
<b>First-Stage Estimates</b>				
Reform $_t$ * $P_r$	-0.4991*** (0.0104)	-0.5497*** (0.0107)	-0.5396*** (0.0112)	-0.5443*** (0.0117)
$R^2$	0.58	0.59	0.58	0.58
KP F-Stat	2 328	2 623	2 264	2 106
Observations	60 814	60 814	55 669	52 821
Recipients	136	136	123	122
Donor-Recipient FE	Yes	Yes	Yes	Yes
Donor-Year FE	Yes	Yes	Yes	Yes
Any Conflict $_{t-1}$	No	Yes	Yes	Yes
Any Neighbor Conflict $_{t-1}$	No	Yes	Yes	Yes
Any Natural Disaster $_{t-1}$	No	Yes	Yes	Yes
Any Natural Disaster $_t$	No	Yes	Yes	Yes
Log(Cereal Production per capita (MT)) $_{t-1}$	No	Yes	Yes	Yes
Log(Cereal Production per capita (MT)) $^2_{t-1}$	No	Yes	Yes	Yes
Log(Population (million)) $_{t-1}$	No	Yes	Yes	Yes
Log(Population (million)) $^2_{t-1}$	No	Yes	Yes	Yes
Log(GDP per capita \$2005) $_{t-1}$	No	Yes	Yes	Yes
Log(GDP per capita \$2005) $^2_{t-1}$	No	Yes	Yes	Yes
Share of refugees in recipient country $_{t-1}$	No	Yes	Yes	Yes
Share of refugees in recipient country $^2_{t-1}$	No	Yes	Yes	Yes
Democratic Index $_{t-1}$	No	No	Yes	Yes
Political Rights and Civil Liberties $_{t-1}$	No	No	Yes	Yes
UN Vote Similarity Index $_{t-1}$	No	No	No	Yes
Any other aid from donor $d_t$	No	No	No	Yes

TABLE 2—: Donors' reaction to the allocation of EU food aid on the decision stage

*Note:* One observation is a pair donor-recipient and a year for OLS, 2SLS and reduced form, it's a recipient and year for the first stage equation. The sample includes 136 recipient countries, 21 regular donors (except the EU) from 1988 to 2011. Coefficients are reported with standard errors clustered at the pair level in parenthesis. For the first stage equation, donor-recipient fixed effects and donor-year are recipient and year fixed effects.  $P_r$  is the average probability of receiving food aid from the EU before 1996. Table E4 in appendix B provides the 2SLS estimates for control variables. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Dependent Variable	Has received food aid from $d$			
	All years		Excluding 1996-2002	
Countries	Small	Large	Small	Large
Has received	0.1431***	-0.0034	0.1832***	-.0474*
EU food aid	(.0290)	(.0287)	(.0335)	(.0261)
$R^2$	0.44	0.47	0.46	0.48
KP F-Stat	1.9e+04	1 233	5 769	1 750
Observations	8 484	47 185	5 460	30 805
Recipients	27	109	27	109

TABLE 3—: Donor’s reaction depending on the type of recipients

*Note:* One observation is a pair donor-recipient and a year. The sample includes 136 recipient countries, 21 regular donors (except the EU) from 1988 to 2011. Coefficients are reported with standard errors clustered at the pair level in parenthesis. I include controls from column (3) of table 2. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

	Small countries		Large countries	
	2LS Estimates	Sd.Err.	2SLS estimates	Sd.Err.
<b>Non EU members</b>				
Australia	0.2330*	(0.1210)	0.0956	(0.0969)
Canada	0.4770***	(0.1568)	0.1407	(0.1546)
Japan	0.1167	(0.1553)	-0.0875	(0.1193)
Norway	0.2194**	(0.0778)	-0.0537	(0.1063)
Saudi Arabia	0.0156	(0.0490)	-0.1216	(0.0897)
Switzerland	0.0823	(0.0658)	0.1240	(0.1359)
UN Institutions	0.0226	(0.0635)	-0.2655**	(0.1240)
United States	0.3923**	(0.1666)	-0.3003*	(0.1750)
WFP	-0.1911**	(0.0863)	-0.4943***	(0.1229)
<b>EU members</b>				
Austria	0.0614	(0.0761)	0.1755**	(0.0789)
Belgium	0.0997	(0.0989)	0.1409*	(0.0815)
Denmark	0.3634***	(0.0996)	0.0003	(0.1338)
Finland	0.3348**	(0.1356)	-0.1088	(0.1040)
France	0.2257***	(0.0628)	0.0791	(0.0994)
Germany	0.2203	(0.1486)	-0.0057	(0.1317)
Italy	-0.1104	(0.1879)	-0.0434	(0.1004)
Luxembourg	-0.0749	(0.0582)	-0.1769**	(0.0865)
Netherlands	0.1795	(0.1389)	0.0883	(0.1124)
Spain	-0.0770	(0.0483)	-0.0632	(0.1015)
Sweden	0.4378***	(0.1100)	0.0554	(0.1001)
United Kingdom	-0.0225	(0.0365)	-0.0149	(0.0706)

TABLE 4—: Bilateral response to EU food aid allocation

*Note:* One observation is a recipient and a year. For each donor  $d$  the sample includes 27 small countries and 109 large countries, 2 703 observations for the years 1988-2011. Coefficients are reported with standard errors clustered at the recipient level in parenthesis. All regressions control for the full set of baseline controls (see table 2 column (3)). Columns (1) refer to the 2SLS estimates obtained on the sample of small countries; columns (2) to the 2SLS estimates obtained on the sample of large countries after excluding the years between 1996 and 2002. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Specification	2SLS Estimates	Sd.Err.	Observation	K-P F-Stat.
(1) Baseline estimates	0.0379*	(0.0216)	55 669	2 264
<b>Changes in sample definition</b>				
On the recipient side				
(2) W/o USSR	0.0440**	(0.0219)	50 146	2 398
(3) W/o Yugoslavia	0.0413*	(0.0221)	54 136	2 184
(4) W/o China/India	0.0430*	(0.0222)	54 703	2 102
(5) W/o Top 4 recipients	0.0384*	(0.0210)	54 117	2 525
On the donor side				
(6) W/o EU members	-0.0108	(0.0359)	23 858	969.4
(7) All donors	0.0078**	(0.0035)	361 998	15 599
(8) Donors giving at least 10 years	0.0226**	(0.0091)	139 006	5 992
(9) Donors giving at least 20 years	0.0445***	(0.0149)	83 982	3 621
Period				
(10) 1991-2011	0.0413*	(0.0217)	49 684	1 625
(11) 1988-2005	0.0422**	(0.0211)	40 593	2 004
(12) 1988-2001	0.0596**	(0.0257)	30 492	1 110
<b>Changes in the first-stage specification (instrument)</b>				
(13) Reform in 1994	0.0674**	(0.0269)	55 669	1 606
(14) EU food aid in 1995	-0.0010	(0.0345)	55 628	495.4
(15) EU food aid between 1993-1995	0.0483**	(0.0237)	55 627	1745
(16) Only program and project aid	0.0717***	(0.0215)	55 670	1 259
<b>Non linear effect of the reform (instrument)</b>				
(17) Polynomial function (order 2)	0.03709*	(0.02015)	55 669	1 610
(18) Polynomial function (order 3)	0.03714*	(0.02016)	55 669	1 089
(19) Piecewise function (quintile)	0.04200**	(0.02042)	55 669	1 727
(22) Piecewise function (quartile)	0.04719**	(0.02063)	55 669	1 825

TABLE 5—: Robustness checks

Note: Row (1) refers to estimates obtained in column (3) in table 2.

	$\frac{\gamma}{\lambda_d} < 0$ or $ \beta_d  > 1$	$\frac{\gamma}{\lambda_d} > 0$ or $ \beta_d  < 1$
$ \frac{\gamma}{\lambda_d}  < 1$ or $\beta_d > 0$	Substitute / EU driven	Complement / EU driven
$ \frac{\gamma}{\lambda_d}  = 1$ or $\beta_d = 0$	Ruled out	Complement / Neutral
$ \frac{\gamma}{\lambda_d}  > 1$ or $\beta_d < 0$	Substitute / Recipient driven	Complement / Recipient driven

TABLE 6—: Donor typology derived from the model

		Small countries				
		EU	Neutral-EU	Pure neutral	Neutral-recipient	Recipient
Large countries	EU		Austria Belgium			
	Neutral-EU	Australia Canada France Sweden	Netherlands Switzerland			
	Pure neutral	Denmark Finland Norway	Japan			
	Neutral-recipient		Germany Saudi Arabia	Spain	Italy UK	
	Recipient	USA	UN Inst.	Luxembourg		WFP

TABLE 7—: A Donor Typology for small and large recipients

*Note:* Germany is Neutral-EU driven for small recipients and neutral-recipient driven for large recipients. A donor is classified as neutral-EU if I cannot reject the hypothesis that  $\bar{\lambda}_d$  is equal to one and the hypothesis the estimate is positive; as mixed-recipient if I cannot reject the hypothesis that  $\bar{\lambda}_d$  is equal to one and the hypothesis the estimate is negative. A donor is classified as neutral if I cannot reject the null hypothesis of the two unilateral tests.

## A. DESCRIPTIVE STATISTICS

### A1. *Additional information on INTERFAIS data*

According to the WFP “data on global food aid deliveries in metric tons are from the database of the International Food Aid Information System (INTERFAIS), which was developed by WFP as a contribution to a coordinated international response to food aid shortages. INTERFAIS is a dynamic system, which involves the interaction of all users, represented by donor governments, international organizations, non-governmental organizations, recipient countries and WFP field offices. They are sharing information and data on food aid transactions.” There is no doubt that for governmental donor data are exhaustive. At the beginning of the period the set of recipient countries was smaller and increased due to the partition of the USSR, Yugoslavia and the independence of Timor-Leste and South Sudan. I do introduce these new countries in the sample because country partition is often related to food aid allocation. In consequence the panel is almost balanced except for these countries.

Concerning donors, the exhaustiveness of the data is not reached for NGOs and private sector. I interviewed in January 2015 a staff member of Action Contre la Faim - France. It appears from this interview that either all observations (allocations by ACF) for a given year are included either the whole year is missing. In addition there is no referent person that provides information to the WFP. He told me that the WFP obtains contact name depending on meeting assistance that does not allow any consistency over time. Hence it seems that the way the WFP collects reliable information of food aid from NGOs is not systematic.

### A2. *Additional descriptive statistics*

Table E1 provides the average number of recipient countries by regular donor before and after 1996. Table E2 provides descriptive statistics on the average quantities allocated by donors and the correlation across donors.

### **Tables E1 and E2 about here**

Figure E1 details how many time the EU is the first, second, etc largest donor at the recipient level. Half of the time the EU is among the two largest donors and only in 20 percent after the third rank. Figures E2a and E2b show respectively the number of recipient of project/program food aid and emergency food aid for the EU, the EU member states and donors outside the EU. Table E3 provides some descriptive statistics on recipients. EU regular recipient before the reform

are on average poorer, more likely to be affected by a natural disaster or a conflict. They also are more populous. They are more likely to receive food aid from at least another donor and received on average more food aid from other donors.

**Figure E1 to E3 about here**

**Table E3 about here**

*A3. Impact of the reform : graphical illustrations*

Figure E4 plots the share of emergency food aid by groups of donors and its evolution from 1988 to 2011. Figure E5 plots the share of local or triangular purchases for the three groups of donors. Figure E7a plots the average quantity of food aid received by recipient countries of EU food aid. It shows that the reform in 1996 does not affect significantly the quantities received on average by EU recipients. Figure E7b plots the same thing but excluding each year the top three recipients.

Figure E6 plots the relative annual variation on the probability of receiving food aid from the EU for regular and irregular countries. Only regular countries are affected in 1996/1997 by a large decrease in the probability of receiving food aid. Except from this year the relative variation of the probability is quite similar across both groups. On average the variation is negative for both type meaning a global decrease on the probability of receiving food aid from the EU. Figure E8 plots the cumulative distribution of the propensity of receiving food aid from the EU before and after the reform (1996). It shows a large shift to the right suggesting that after the reform the EU concentrates its allocation to a small number of recipients and also a larger variability on the allocation because of a focus on emergency food aid.

**Figures E4 to E8 about here**

B. EMPIRICAL RESULTS : ADDITIONAL TABLES

Table E4 provides the 2SLS estimates for controls variables. Table E5 provides the estimates in the case I specify non-linear effect of the reform on the probability of receiving food aid from the EU.

**Tables E4 to E6 about here**

### C. REACTION ON QUANTITIES

In this appendix section I provide results on the reaction on quantities once a donor  $d$  decides to allocate food aid to a recipient  $r$  (see table E7). Coefficients should be carefully interpret conditional on giving food aid.

For the first stage I allow the EU to allocate zero food aid.<sup>39</sup> In addition I slightly change the definition of  $P_r$ . Indeed I do not define it as the observed probability of receiving food aid from the EU before 1996 but as the average quantities of food aid received before the reform. Hence  $P_r^q$  is now equal to  $\frac{1}{8} \sum_{t=1988}^{1995} FA_{UErt}$  with  $FA_{UErt} \geq 0$ . Thus I estimate the following equations :

(C1)

$$tFA_{drt} = \beta tFA_{EUrt} + X_{drt-1}\Gamma_1 + X_{rt-1}\Gamma_2 + \phi_{dt} + \phi_{1dr} + \epsilon_{drt} \text{ if } FA_{drt} > 0$$

$$tFA_{EUrt} = \lambda Reform_t * P_r^q + X_{drt-1}\Gamma_3 + X_{rt-1}\Gamma_4 + \phi_t + \phi_r + \epsilon_{rt}$$

with  $tFA_{drt} = \ln \left( FA_{drt} + \sqrt{1 + FA_{drt}^2} \right)$  and the same for  $tFA_{EUrt}$ .

Results presented in table E7 suggests that conditional on allocating food aid, a donor increases on average the quantity of food aid he allocates to a recipient. Increasing by one percent EU food aid (in IHST calorie) increases by 0.058 percent on average the amount of food aid (in IHST calorie) allocated by a donor. On average a recipient receives food aid from about seven different donors.

For a recipient that receives the average amount of food aid allocated by the EU (19 200 tons) and also the average amount of food aid allocated by each other donor (11 200) from the average number of donor (6.88) an increase by 10 percent of EU food aid induced an additional amount of food aid of almost 2 400 tons (1920 from the EU, 480 from the other donors). It represents an increase by 2.5 percent of the initial amount of food aid. If the EU allocation has no impact the increase would be about 1.9 percent.

### Table E7 about here

### D. RECIPIENT LIST

Table E8 provides the list of all recipient countries. It also gives the propensity of receiving EU food aid before 1996  $P_r$  and the average probability of receiving food aid from the EU after the reform  $P_r^{1996}$ .

39. I am aware of the truncated nature of EU food aid may induce some bias. However the first-stage is estimated linearly.

**Table E8 about here**

## ADDITIONAL FIGURES AND TABLES

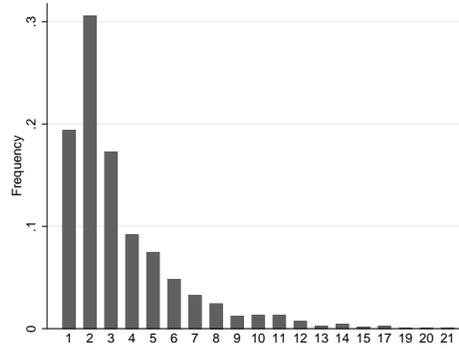
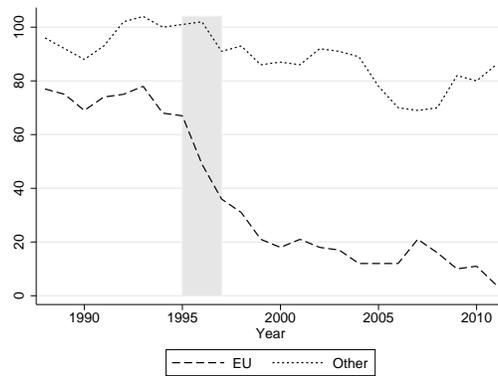
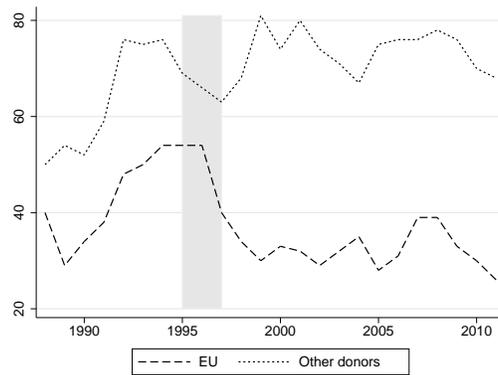


FIGURE E1. : EU donor ranking

*Note:* In almost 20 percent of case, the EU is the largest donor. Source : WFP-INTERFAIS database from 1988 to 2011. Ranking is established depending on the quantity allocated to each recipient.



(a) Project or program food aid



(b) Emergency food aid

FIGURE E2. : Number of recipient countries

*Note:* Pattern is similar if all donors are included.

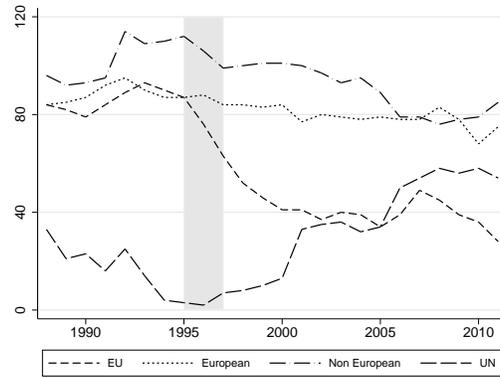


FIGURE E3. : Annual average number of recipients by group of donors

*Note:* For group of other donors it's the annual average number of recipients.

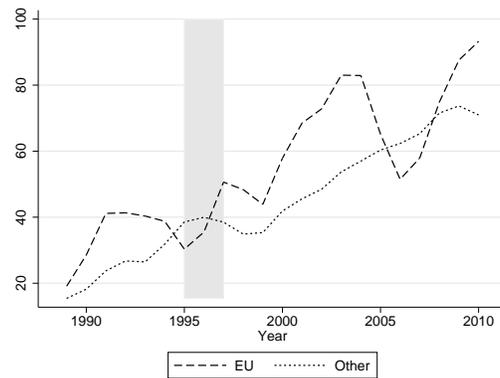


FIGURE E4. : Share of emergency food aid

*Note:* Pattern is similar if all donors without any restrictions are included. Data are smoothed using moving average order 3.

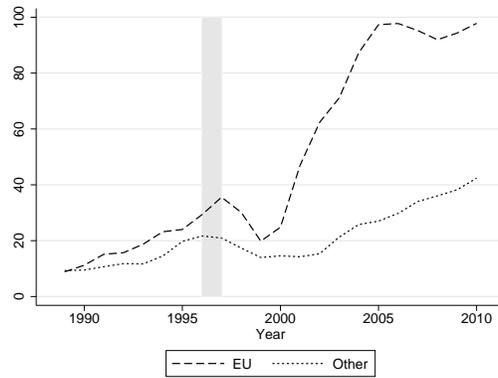


FIGURE E5. : Share of local or triangular purchases

*Note:* Pattern is similar if all donors without any restriction are included. Data are smoothed using moving average order 3.

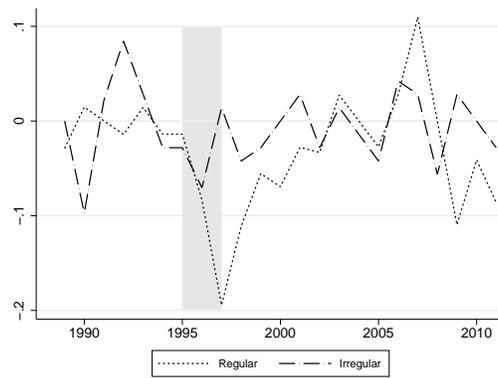
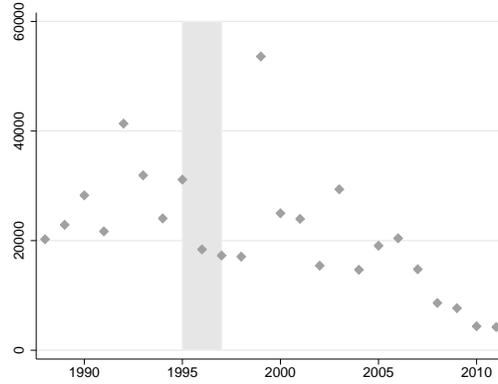
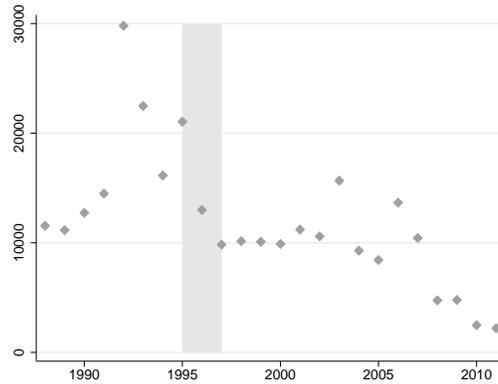


FIGURE E6. : Annual variation of receiving food aid from the EU by type of recipients)



(a) All recipients



(b) Recipients excluding annual top 3

FIGURE E7. : Average quantity received by recipient countries (in metric tons)

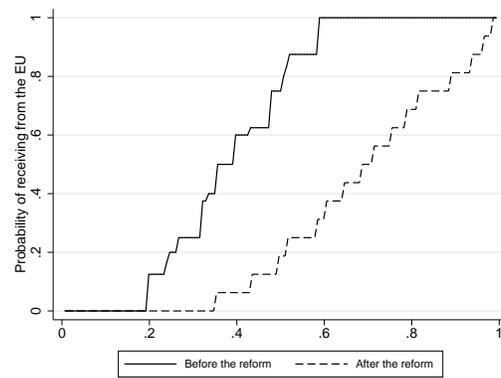


FIGURE E8. : Cumulative distribution of the propensity of receiving food aid from the EU after and before the reforme

	Number of recipient countries	
	Before 1996	After 1996
	N	N
EU	86	44
Inside the EU		
Denmark	45	40
France	31	24
Germany	59	54
Italy	39	37
Netherlands	49	44
Sweden	51	38
United Kingdom	15	18
Outside the EU		
Australia	32	23
Canada	63	42
Japan	46	51
United States	80	72
WFP	12	26

TABLE E1—: Average number of recipient countries by donor and period

*Note:* INTERFAIS database. Author's calculation. A country is a recipient if she receives any kind of food aid. The first column shows the annual average number of recipient countries by donor from 1988 to 1995. The second column shows the same average but over the period 1996-2011.

<b>Recipient countries</b>	$P_r$	$P_r^{1996}$	Small country
Afghanistan	0.625	.75	
Albania	0.375	.125	
Algeria	1	.9375	
Angola	1	.6875	
Antigua and Barbuda	0	0	Yes
Argentina	0	0	
Armenia	0.6	.5	
Azerbaijan	0.6	.5	
Bangladesh	1	.75	
Belarus	0	.0625	
Belize	0.125	0	Yes
Benin	1	.25	
Bhutan	0.75	0	Yes
Bolivia	1	.4375	
Bosnia and Herzegovina	0.25	.0625	
Botswana	0.875	0	Yes

Be continued next page...

<b>Recipient countries</b>	$P_r$	$P_r^{1996}$	Small country
Brazil	0.75	0	
Bulgaria	0.125	0	
Burkina Faso	1	.8125	
Burundi	1	.625	
Cambodia	0.625	.1875	
Cameroon	0.875	.25	
Cape Verde	1	.125	Yes
Central African Rep.	1	.1875	
Chad	1	.75	
Chile	1	0	
China	0.875	.0625	
Colombia	0.625	.75	
Comoros	1	.0625	Yes
Congo	0.875	.4375	
Costa Rica	0.125	0	
Côte d'Ivoire	1	.625	
Croatia	0.167	.125	
Cuba	1	.125	
Cyprus	0	0	
Democ.Rep.Congo	1	.9375	
Djibouti	1	.375	Yes
Dominica	0.875	0	Yes
Dominican Republic	1	.25	
East Timor		.5	Yes
Ecuador	1	.3125	
Egypt	1	.3125	
El Salvador	1	.25	
Equatorial Guinea	0.625	0	Yes
Eritrea	1	.5625	
Estonia	0.6	0	
Ethiopia	1	1	
Fiji	0	0	Yes
French Guiana	0	.0625	
Gabon	0	.0625	Yes
Gambia	1	.25	Yes
Georgia	0.6	.75	
Ghana	1	.25	
Grenada	0.5	0	Yes
Guatemala	1	.6875	
Guinea	0.625	.375	
Guinea-Bissau	1	.125	Yes

---

Be continued next page...

---

<b>Recipient countries</b>	$P_r$	$P_r^{1996}$	Small country
Guyana	1	0	Yes
Haiti	1	.8125	
Honduras	1	.375	
Hong Kong	0	0	
India	1	.5	
Indonesia	0	.375	
Iran	0.25	0	
Iraq	0.625	.25	
Israel	0	0	
Jamaica	0.125	0	Yes
Jordan	1	.8125	
Kazakhstan	0	0	
Kenya	1	.75	
Korea, Democ	0	.6875	
Kyrgyzstan	0.4	.4375	
Laos	0.5	.4375	
Latvia	0.4	0	
Lebanon	1	.6875	
Lesotho	1	.25	Yes
Liberia	1	.8125	
Libya	0	.0625	
Lithuania	0.4	0	
Macedonia	0	0	
Madagascar	1	.875	
Malawi	1	.75	
Malaysia	0.25	0	
Maldives	0	0	Yes
Mali	1	.5625	
Mauritania	1	.5625	
Mauritius	0.625	0	Yes
Mexico	0.375	.125	
Moldova	0.2	.1875	
Mongolia	0.25	0	
Morocco	0.875	0	
Mozambique	1	.625	
Myanmar	0.25	.5625	
Namibia	0.833	.0625	Yes
Nepal	0.875	.8125	
Nicaragua	1	.75	
Niger	1	.8125	
Nigeria	0.125	0	

---

Be continued next page...

---

<b>Recipient countries</b>	$P_r$	$P_r^{1996}$	Small country
Pakistan	1	.625	
Palestine	1	1	
Panama	0	0	
Papua New Guinea	0.5	.0625	Yes
Paraguay	0.75	0	
Peru	1	.375	
Philippines	0	.25	
Poland	0.25	0	
Romania	0.5	0	
Russian Federation	1	.8125	
Rwanda	1	.4375	
Saint Kitts and Nevis	0	0	Yes
Saint Lucia	0	0	Yes
St. Vincent & Grenadines	0	0	Yes
Sao Tome and Principe	0.875	.125	Yes
Senegal	1	.3125	
Serbia&Montenegro	0.5	.5625	
Seychelles	0.25	0	Yes
Sierra Leone	1	.5625	
Slovenia	0	0	
Solomon Islands	0	0	Yes
Somalia	1	.625	
South Africa	0.125	.0625	
South Sudan		0	
Sri Lanka	0.75	.375	
Sudan	1	.9375	
Suriname	0	0	Yes
Swaziland	0.875	.25	Yes
Syria	1	.875	
Tajikistan	0.6	.75	
Tanzania	1	.875	
Thailand	1	.0625	
Togo	1	.125	
Trinidad and Tobago	0	0	Yes
Tunisia	1	.125	
Turkey	0.5	.0625	
Turkmenistan	0.2	0	
Uganda	1	.75	
Ukraine	0	0	
Uruguay	0.875	0	
Uzbekistan	0.2	0	

---

Be continued next page...

---

<b>Recipient countries</b>	$P_r$	$P_r^{1996}$	Small country
Vanuatu	0	0	Yes
Venezuela	0	0	
Viet Nam	1	0	
Yemen	1	.4375	
Zambia	1	.75	
Zimbabwe	1	.875	

TABLE E8—: List of recipient countries

	Quantity allocated to recipients		Correlation with the EU	
	<i>Before 1996</i>	<i>After 1996</i>	<i>All food aid</i>	<i>Excl. emergency</i>
EU	2 394 670	831 311	1	1
EU Members	1 305 302	897 245	0.47	0.28
Non EU members	8 954 894	5 274 221	0.54	0.50
UN institutions	28 170	152 990	0.06	0.02
	Quantity allocated to small recipients		Correlation with the EU	
	<i>Before 1996</i>	<i>After 1996</i>	<i>All food aid</i>	<i>Excl. emergency</i>
EU	29 720	7 369	1	1
EU Members	62 078	35 791	0.36	0.33
Non EU members	383 536	101 064	0.06	0.29
UN institutions	1 225	4 252	0.03	0.15
	Quantity allocated to large recipients		Correlation with the EU	
	<i>Before 1996</i>	<i>After 1996</i>	<i>All food aid</i>	<i>Excl. emergency</i>
EU	2 364 949	825 783	1	1
EU Members	1 243 224	861 386	0.47	0.72
Non EU members	8 571 357	5 173 156	0.54	0.63
UN institutions	27 557	149 285	0.05	0.09

TABLE E2—: Descriptive statistics on food aid quantities and correlation among donors

*Note:* INTERFAIS database. Author's calculation. A country is a recipient if he receives any kind of food aid. For grouping donors such as EU members, a recipient is a country receiving food aid from at least one EU member. The quantity is the average annual total amount of food aid (in metric tons) received from the group of donors by recipient countries. The third column provides the correlation of food aid allocation by type of donors with EU food aid allocation for all type of food aid. The fourth column excludes emergency food aid. EU members are Austria, Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden and the United Kingdom. Non EU members are Australia, Canada, Japan, Norway, Saudi Arabia, Switzerland and the United States.

	<b>Irregular recipients</b>		<b>Regular recipients</b>	
	Before 1996	After 1996	Before 1996	After 1996
Receiving EU food aid	0.25 (0.44)	0.13 (0.34)	0.98 (0.14)	0.47 (0.50)
Receiving food aid from at least another donor	0.56 (0.50)	0.42 (0.49)	0.98 (0.14)	0.90 (0.31)
Quantity received from the EU	52 624 (123 499)	17 139 (29 354)	21 851 (47 594)	19 345 (73 556)
Quantity received from other donors	64 820 (105 531)	47 129 (103 287)	113 921 (235 299)	75 257 (168 026)
Population (millions)	19.49 (35.91)	21.10 (40.15)	44.35 (170.93)	52.97 (195.44)
GDP per capita (\$2005)	4 056.02 (4 140.19)	5 113.34 (5 303.3)	1171.65 (1182.00)	1491.63 (1637.38)
Cereal production (millions of MT)	7.33 (19.12)	7.30 (13.80)	11.68 (52.50)	14.28 (59.64)
Disaster	0.43 (0.50)	0.56 (0.50)	0.52 (0.50)	0.69 (0.46)
Conflict	0.28 (0.45)	0.16 (0.36)	0.31 (0.46)	0.21 (0.41)
Governance index	1.73 (6.83)	3.40 (6.62)	-1.16 (6.31)	1.74 (5.62)

TABLE E3—: Descriptive statistic on regular and irregular recipients

*Note:* Regular recipients are recipients whom probability of receiving food aid from the EU before 1996 is above 0.78. Irregular recipients are recipients whom probability of receiving food aid from the EU before 1996 is below 0.78. Statistics on quantities are conditional on receiving food aid. Standard deviations are in parenthesis.

Dependent Variable	Has received food aid from $d$		
	(2)	(3)	(4)
Any Conflict $_{t-1}$	0.0238*** (0.00699)	0.0231** (0.00713)	0.0228** (0.00746)
Any Neighbor Conflict $_{t-1}$	-0.0145*** (0.00368)	-0.0133*** (0.00375)	-0.0148*** (0.00399)
Any Natural Disaster $_{t-1}$	0.0161*** (0.00342)	0.0187*** (0.00376)	0.0194*** (0.00388)
Any Natural Disaster $_t$	0.00603 (0.00330)	0.00683 (0.00362)	0.0102** (0.00369)
Log(Cereal Production per capita (MT)) $_{t-1}$	-0.00778 (0.0106)	-0.0166 (0.0116)	-0.0176 (0.0119)
Log(Cereal Production per capita (MT)) $^2_{t-1}$	-0.000884 (0.00125)	-0.00150 (0.00154)	-0.00154 (0.00156)
Log(Population (million)) $_{t-1}$	-0.947*** (0.176)	-1.313*** (0.232)	-1.440*** (0.240)
Log(Population (million)) $^2_{t-1}$	0.0275*** (0.00531)	0.0386*** (0.00690)	0.0415*** (0.00709)
Log(GDP per capita \$2005) $_{t-1}$	-0.0412 (0.0416)	-0.0380 (0.0479)	-0.0335 (0.0487)
Log(GDP per capita \$2005) $^2_{t-1}$	0.00437* (0.00221)	0.00506* (0.00250)	0.00542* (0.00254)
Share of refugees in recipient country $_{t-1}$	1.62e-07*** (3.17e-08)	1.57e-07*** (3.17e-08)	1.31e-07*** (3.28e-08)
Share of refugees in recipient country $^2_{t-1}$	-2.26e-14** (7.81e-15)	-2.13e-14** (7.79e-15)	-1.58e-14 (8.08e-15)
Democratic Index $_{t-1}$		0.0000603 (0.000944)	0.000848 (0.000952)
Political Rights $_{t-1}$		0.00875** (0.00304)	0.0106*** (0.00311)
Civil Liberties $_{t-1}$		-0.00642 (0.00375)	-0.0106** (0.00377)
UN Vote Similarity Index $_{t-1}$			0.0361 (0.0389)
Any other aid from donor $d_t$			0.0273*** (0.00570)

TABLE E4—: Control Variables : 2SLS estimates

*Note:* One observation is a pair donor-recipient and a year for OLS, 2SLS and reduced form, it's a recipient and year for the first stage equation. The sample includes 136 recipient countries, 21 regular donors (except the EU) from 1988 to 2011. Coefficients are reported with standard errors clustered at the pair level in parenthesis. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Dependent Variable	Has received EU food aid			
	Polynomial power 2	Polynomial power 3	Piecewise quintile	Piecewise quartile
Reform <sub>t</sub> * P <sub>r</sub>	-1.004*** (0.0530)	-0.890*** (0.114)		
Reform <sub>t</sub> * P <sub>r</sub> <sup>2</sup>	0.437*** (0.0528)	0.145 (0.322)		
Reform <sub>t</sub> * P <sub>r</sub> <sup>3</sup>		0.185 (0.219)		
Reform <sub>t</sub> * (0.125 ≤ P <sub>r</sub> < 0.6)			-0.303*** (0.0109)	
Reform <sub>t</sub> * (0.6 ≤ P <sub>r</sub> < 1)			-0.559*** (0.0145)	
Reform <sub>t</sub> * (0.125 ≤ P <sub>r</sub> < 0.8)				-0.353*** (0.0107)
Reform <sub>t</sub> * (0.8 ≤ P <sub>r</sub> < 1)				-0.660*** (0.0165)
Reform <sub>t</sub> * (P <sub>r</sub> = 1)			-0.575*** (0.0106)	-0.572*** (0.0106)
R <sup>2</sup>	0.56	0.56	0.55	0.55
KP F-Stat	1 610	1 089	1 727	1 825
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Recipient FE	Yes	Yes	Yes	Yes

TABLE E5—: Non linear effect of the reform - first stage estimates

*Note:* One observation is a recipient and year for the first stage equation. The sample includes 136 recipient countries from 1988 to 2011. Coefficients are reported with standard errors clustered at the recipient level in parenthesis. For piecewise specification, reference group is the first quintile/quartile – i.e.  $P_r < 0.125$ . Fourth and fifth quintiles are the same. All regressions control for the full set of baseline controls (see table 2 column (3)). \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Donor	Reaction for large countries	Reaction for small countries
Australia	0,825 [0,594 ;1,135]	0,622 [0,397 ;0,933]
Canada	0,753 [0,434 ;1,254]	0,354 [0,153 ;0,639]
Japan	1,192 [0,805 ;1,791]	0,791 [0,458 ;1,320]
Norway	1,114 [0,784 ;1,591]	0,640 [0,485 ;0,832]
Saudi Arabia	1,277 [0,950 ;1,735]	0,969 [0,825 ;1,139]
Switzerland	0,779 [0,485 ;1,220]	0,848 [0,680 ;1,053]
UN Institutions	1,723 [1,133 ;2,766]	0,956 [0,775 ;1,178]
United States	1,858 [1,027 ;3,846]	0,436 [0,201 ;0,787]
WFP	2,955 [1,828 ;5,577]	1,473 [1,104 ;1,998]
Austria	0,701 [0,532 ;0,912]	0,884 [0,686 ;1,135]
Belgium	0,753 [0,569 ;0,986]	0,819 [0,585 ;1,134]
Denmark	0,999 [0,640 ;1,561]	0,467 [0,310 ;0,667]
Finland	1,244 [0,883 ;1,776]	0,498 [0,284 ;0,798]
France	0,853 [0,610 ;1,183]	0,632 [0,505 ;0,781]
Germany	1,012 [0,652 ;1,570]	0,639 [0,366 ;1,048]
Italy	1,091 [0,784 ;1,526]	1,248 [0,670 ;2,440]
Luxembourg	1,430 [1,073 ;1,936]	1,162 [0,960 ;1,411]
Netherlands	0,838 [0,571 ;1,213]	0,696 [0,421 ;1,102]
Spain	1,135 [0,813 ;1,597]	1,167 [0,995 ;1,371]
Sweden	0,895 [0,640 ;1,244]	0,391 [0,236 ;0,591]
United Kingdom	1,030 [0,817 ;1,301]	1,046 [0,928 ;1,180]

TABLE E6—: Estimates of donors' type

Note: Point estimate through  $\frac{\gamma_d}{\lambda_d} = \frac{1-\beta_d}{1+\beta_d}$ . In brackets the confidence interval at a 10 percent level. Estimates are derived from results obtained in table 4 in section IV.B.

Dependent Variable	Food aid from $d$ (IHST)			
	(1)	(2)	(3)	(4)
<b>OLS Estimates</b>				
EU food aid quantities (IHST)	0.01301*** (0.00173)	0.01020*** (0.00175)	0.01002*** (0.00177)	0.00924*** (0.00175)
$R^2$	0.65	0.66	0.66	0.65
<b>2SLS Estimates</b>				
EU food aid quantities (IHST)	0.04712 (0.03170)	0.05949** (0.02519)	0.05841** (0.02485)	0.07178*** (0.02116)
$R^2$	0.50	0.50	0.50	0.50
<b>Reduced Form Estimates</b>				
Reform $_t$ * $P_r^q$	-0.01353 (0.00888)	-0.02236** (0.00912)	-0.02247** (0.00918)	-0.02812*** (0.00796)
$R^2$	0.65	0.66	0.66	0.65
Observations	13 841	13 841	13 458	12 427
Dependent Variable	EU food aid quantities (IHST)			
<b>First-Stage Estimates</b>				
Reform $_t$ * $P_r^q$	-0.28722*** (0.06092)	-0.37577*** (0.04987)	-0.38480*** (0.04862)	-0.39356*** (0.05319)
$R^2$	0.50	0.52	0.51	0.52
KP F-Stat	22.23	56.77	2.08	53.47
Observations	13 841	13 841	13 458	12 427
Donor-Recipient FE	Yes	Yes	Yes	Yes
Donor-Year FE	Yes	Yes	Yes	Yes
Any Conflict $_{t-1}$	No	Yes	Yes	Yes
Any Neighbor Conflict $_{t-1}$	No	Yes	Yes	Yes
Any Natural Disaster $_{t-1}$	No	Yes	Yes	Yes
Any Natural Disaster $_t$	No	Yes	Yes	Yes
Log(Cereal Production per capita (MT)) $_{t-1}$	No	Yes	Yes	Yes
Log(Cereal Production per capita (MT)) $^2_{t-1}$	No	Yes	Yes	Yes
Log(Population (million)) $_{t-1}$	No	Yes	Yes	Yes
Log(Population (million)) $^2_{t-1}$	No	Yes	Yes	Yes
Log(GDP per capita \$2005) $_{t-1}$	No	Yes	Yes	Yes
Log(GDP per capita \$2005) $^2_{t-1}$	No	Yes	Yes	Yes
Share of refugees in recipient country $_{t-1}$	No	Yes	Yes	Yes
Share of refugees in recipient country $^2_{t-1}$	No	Yes	Yes	Yes
Democratic Index $_{t-1}$	No	No	Yes	Yes
Political Rights and Civil Liberties $_{t-1}$	No	No	Yes	Yes
UN Vote Similarity Index $_{t-1}$	No	No	No	Yes
Any other aid $_t$	No	No	No	Yes

TABLE E7—: Donors' reaction to the allocation of EU food aid on quantities

*Note:* One observation is a pair donor-recipient and a year for OLS, 2SLS and reduced form, it's a recipient and year for the first stage equation. The sample includes 136 recipient countries, 21 regular donors (except UE) from 1988 to 2011. Coefficients are reported with standard errors clustered at the pair level in parenthesis. For the first stage equation, donor-recipient fixed effects and donor-year are recipient and year fixed effects.  $P_r$  is the average probability of receiving food aid from the EU before 1996. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$