Aiding Conflict:
The Effect of U.S. Food Aid on Civil War*

Nathan Nunn† Nancy Qian‡

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Abstract

We estimate the effect of U.S. food aid on conflict in recipient countries. Our identification strategy exploits time variation in food aid shipments caused by fluctuations in U.S. wheat production together with cross-sectional variation in a country's tendency to receive any food aid from the United States. We find that an increase in U.S. food aid increases the incidence of civil conflict in recipient countries, but has no effect on the incidence of inter-state conflict. We further show that the impact on civil conflict is due to food aid increasing the duration of existing conflicts rather than increasing the onset of new conflicts. Consistent with this, we also find that the effects of food aid are most pronounced in countries with a recent history of conflict.

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†Harvard University, NBER, BREAD. Department of Economics, 1805 Cambridge Street, Cambridge, MA, 02138. Email: nnunn@fas.harvard.edu.

‡Yale University, NBER, BREAD, CEPR. Department of Economics, 27 Hillhouse Avenue, New Haven, CT, 06520. Email: nancy.qian@yale.edu.

"*We are unable to determine whether our aid helps or hinders one or more parties to the conflict... However, it is clear that the losses – particularly looted assets – constitutes a serious barrier to the efficient and effective provision of assistance, and can contribute to the war economy. This raises a serious challenge for the humanitarian community: can humanitarians be accused of fueling or prolonging the conflict in these two countries?*" – Written by advisors for Médecins Sans Frontières Amsterdam about the operations in Chad and Darfur (Kahn and Lucchi, 2009, p. 22).

1 Introduction

Humanitarian aid is one of the key policy tools used by the international community to help alleviate hunger and suffering in the developing world. The main component of humanitarian aid is food aid.[1] In recent years, the efficacy of humanitarian aid, and food aid in particular, has received increasing criticism, especially in the context of conflict-prone regions. Aid workers, human rights observers and journalists have accused humanitarian aid of being not only ineffective, but of actually *promoting* conflict (e.g., Anderson, 1999; de Waal, 1997 and Polman, 2010). These qualitative accounts point to aid stealing as one of the key ways in which humanitarian aid is misappropriated to fuel conflict. They highlight how easy it is for armed factions and opposition groups to appropriate humanitarian aid, which is often physically transported over long distances through territories only weakly controlled by the recipient government. Reports indicate that up to eighty percent of aid can be stolen en route (Polman, 2010, p. 121). Even when aid reaches its intended recipients, it can still be appropriated by armed groups, against whom the intended recipients are typically powerless. In addition, it is difficult to exclude members of local militia groups from being direct recipients if they are also malnourished and qualify to receive aid. In all such cases, aid ultimately funds conflict.

A large body of qualitative evidence show that such cases are not rare, but occur in numerous contexts.[2] Nevertheless, it is difficult to improve the design of aid policy with only qualitative evidence. For policy-makers, a question of first-order importance is whether the qualitative accounts reflect extreme cases or are representative of the *average* effect of humanitarian aid on conflict. We address this important question by providing causal

[1]According to data from USAID, among the countries and years in our sample (non-OECD countries between 1971 and 2006), approximately 30 percent of U.S. economic aid was food aid.

[2]As an example, in her recent book, Polman (2010) documents the following examples of large-scale aid theft: Afghanistan (2001 - present), Cambodia (1980s), Chad (2008), Ethiopia (1984, 2001-present), Iraq (early 1990s), Kenya (1980s), Nigeria (1967-1979), Rwanda (1994-1996), Sierra Leone (1990s, 2001), South Africa (1990s), Sudan (1982-present), Thailand (1980s), Uganda (1950s), West Timor (1999) and Zaire (1994-1996, 2001).

estimates of the impact of food aid – a important component of humanitarian aid – on conflicts in recipient countries. To the extent that the data allow, we also identify the types of conflicts and contexts that are most affected by food aid.

The main difficulties for estimating the causal effect of food aid on conflict arise due to reverse causality and joint determination, the biases of which are ambiguous *ex ante*. On the one hand, OLS estimates could exaggerate the effect of food aid on conflict if, for example, the presence of conflict increases the demand for food aid. Similarly, food aid and conflict may be jointly determined by third factors such as the occurrences of political and economic crises. On the other hand, OLS can attenuate the effect of food aid on conflict. This could be due to classical measurement error in food aid. As well, OLS estimates can also be biased downwards if donor governments reduce aid to countries engaged in conflict for political or logistical reasons.

The principal contribution of our study is to develop an identification strategy for estimating the causal effect of U.S. food aid on conflict. Our analysis exploits two sources of variation. First, we exploit exogenous time-variation in U.S. wheat production, which is primarily driven by variation in U.S. weather conditions. As part of the U.S. agricultural price stabilization policy, the government purchases wheat from U.S. farmers at a set price, thus accumulating excess reserves in high production years. Much of the government surplus is then shipped to developing countries as food aid. Hence, U.S. wheat production is positively correlated with U.S. food aid shipments in the following year. Second, we exploit cross-sectional variation in a country's likelihood of being a U.S. food aid recipient, which we measure as the proportion of years that a country receives a positive amount of U.S. food aid during the 36 years of our study, 1971-2006. This allows us to control for time-varying factors with region-specific year fixed effects. Using the two sources of variation together, we instrument the amount of food aid received by a country in a given year with the interaction of last year's U.S. wheat production and the frequency that a country receives any U.S. food aid. Our baseline estimates, which examine an annual panel of 125 non-OECD countries, include country fixed effects that control for all time-invariant differences between countries (including the main effect of the likelihood that a country was a U.S. food aid recipient) and region-specific year fixed effects that control for changes over time that affect countries within each region similarly.

Our identification strategy relies on the interaction term being exogenous conditional on the baseline controls. The strategy follows the same logic as a *difference-in-differences* estimator. To see this, consider the reduced-form estimates. These compare the difference in conflict in years following high U.S. wheat production to years following low U.S. wheat production in countries that regularly receive U.S. food aid relative to countries that rarely receive U.S. food aid.

There are several potential concerns related to the excludability of the instrument. First, the underlying driver of the variation in U.S. wheat production, U.S. weather conditions, may be correlated with weather conditions in aid-recipient countries, which can influence conflict through channels other than U.S. food aid.[3] To address this, our baseline regressions directly control for weather conditions in recipient countries. Second, U.S. production changes may be correlated with global wheat prices, which may also affect conflict in recipient countries. In practice, this problem is avoided because of the U.S. government's efforts to stabilize prices over time. In the data, global wheat prices are uncorrelated with U.S. wheat production over time. Nevertheless, our baseline estimates control for region-specific year fixed effects to capture region-specific changes in wheat prices over time. It also controls for the possibility that changes in global wheat prices may affect recipient countries differently depending on the extent to which they are producers or importers of cereals.

Our main outcomes of interest are measures of the incidence of conflict with 25 or more combat deaths in a country and year. We separately examine the incidence of all conflicts, civil conflicts, and inter-state conflicts. The OLS estimates of the effect of U.S. food aid on conflict are negative, small in magnitude, and statistically insignificant for all forms of conflict. In contrast, the 2SLS estimates identify a large, positive and statistically significant effect of U.S. food aid on the incidence of civil conflict, but show no effect on the incidence of inter-state conflict. The estimates imply that increasing U.S. food aid by 1,000 metric tons (MT) (valued at $275,000 in 2008) increases the incidence of civil conflict by 0.25 percentage points. For a country that receives the sample mean quantity of U.S. food aid of approximately 27,610 MT ($7.6 million in 2008) and experiences the mean incidence of conflict (17.6 percentage-points), our estimates imply that increasing food aid by ten percent increases the incidence of conflict by approximately 0.70 percentage-points. This is an increase equal to approximately four percent of the mean incidence of conflict.

The baseline estimates are consistent with the descriptive accounts of humanitarian aid fueling conflict. However, an alternative explanation for our finding is that U.S. food aid crowds out food aid from other countries, other forms of aid from the United States, or other aid from other countries. According to this explanation, our results are due to a reduction in other forms of aid. We test for this alternative interpretation, which has very different policy implications, and find no evidence that aid crowd-out explains our results. We show that U.S. food aid has no negative effect on other forms of aid from the United States, on food aid from other countries, or on total official development assistance (ODA) from all countries.

To better understand how food aid can affect conflict, we provide several additional results. First, we show that the effect of food aid is more precisely estimated for small-scale civil conflicts with 25-999 combat deaths than for large scale civil wars with 1,000 or more deaths. Second, we show that food aid has little effect on the onset of conflicts, but significantly increases their duration. Finally, we show that the adverse effect of food aid

[3] For example, Miguel, Satyanath and Sergenti (2004) find that positive rainfall shocks reduce the incidence of civil war in African countries. They show that the effect is due to an increase in income experienced by farmers during good rainfall years.

is isolated to countries that experienced some civil conflict prior to the arrival of aid. The three additional results are consistent, and together, they imply that food aid's primary impact is to prolong small-scale civil conflicts.

This study contributes to several literatures. First, it adds to the debate about the effects of foreign aid.[4] Our use of donor-country shocks to instrument for aid provision follows a similar logic as Werker, Ahmed and Cohen (2009) and Ahmed (2010), who exploit oil price shocks and the fact that wealthy oil-rich donors tend to favor Muslim nations to estimate the effects of foreign aid on various macro-economic outcomes. Although they do not examine conflict as an outcome, our finding that aid can have adverse effects is broadly consistent with their finding that aid has no effect on economic growth (Werker, Ahmed and Cohen, 2009) or that aid reduces institutional quality (Ahmed, 2010). Our finding that aid is partly determined by changes in U.S. domestic production adds to the growing empirical evidence that aid is often determined by the strategic or economic needs of donor countries (e.g., Ball and Johnson, 1996; Alesina and Dollar, 2000; Kuziemko and Werker, 2006; and Nunn and Qian, 2010). Our finding that aid can increase conflict is consistent with theoretical and empirical evidence provided by Besley and Persson (2011). It is also consistent with Crost, Felter and Johnston (2012), who find that across municipalities within the Philippines, eligibility for a large World Bank funded foreign aid program is positively correlated with conflict casualties and with Dube and Naidu's (2010) finding of a positive relationship between military aid and conflict in Colombia.[5] Finally, our study is closely related to a large empirical literature examining the determinants of conflict, which we do not attempt to summarize here. We instead refer interested readers to Blattman and Miguel (2010) for an overview of this literature.[6]

The paper is organized as follows. Section 2 provides an overview of U.S. agricultural and aid policies. Section 3 describes our identification strategy and estimating equations. Section 4 describes the data. Section 5 presents the main results. Section 6 explores the mechanisms. Section 7 investigates heterogeneous effects. Section 8 offers concluding remarks.

[4]The benefit of foreign aid for recipient countries is a much studied and controversial subject. See for example Stern (1974), Bauer (1975), Boone (1996), Svensson (1999), Burnside and Dollar (2000), Easterly (2003), Easterly, Levine and Roodman (2004), and Sachs (2006). One source of debate and an important challenge for this literature is identifying the causal effect of aid. For studies focusing specifically on the effects of food aid, see Lavy (1992), Pedersen (1996), Kirwan and McMillan (2007), Levinsohn and McMillan (2007), Quisumbing (2003) and Yamano, Alderman and Christiaensen (2005).

[5]Not all studies of the effects of foreign aid find that aid increases conflict. Collier and Hoeffler (2002) find that total ODA has no effect on conflict globally, while de Ree and Nillesen (2009) find that total ODA reduces conflict. The difference in findings across all studies examining foreign aid and conflict is most likely due to different empirical strategies. In addition, the findings in our study may also differ from the findings of Collier and Hoeffler (2002) and de Ree and Nillesen (2009) because we examine a specific type of aid rather than total ODA. We discuss the relevance of our findings for other types of aid in more detail in the Conclusion.

[6]Most closely related are studies such as Miguel, Satyanath and Sergenti (2004), Dube and Vargas (2009), and Bruckner and Ciccone (2010) that develop strategies to identify the causal effect of income shocks on civil conflict.

2 Background

2.1 Food Aid and Conflict

Aid watchers most frequently point to theft by armed factions on the ground as the primary mechanism through which food aid and other types of humanitarian aid promote conflict. Because food aid is regularly transported across vast geographic territories, it is a particularly attractive target for armed factions, especially in countries where the ruling government has limited control outside of the capital. Armed factions can set up road blocks and "tax" aid agencies for safe passage. For example, accounts from Somalia in the early 1990s indicate that between twenty and eighty percent of food aid shipments were either looted, stolen or confiscated (Barnett, 2011, p. 173). The stolen aid was then traded for arms in neighboring Ethiopia (Perlez, 1992). In Afghanistan, aid organizations in the province of Uruzgan gave over one-third of their food aid and agricultural support to the Taliban. In Sri Lanka, up to 25 percent of the total value of aid was paid to the Tamil Tigers by Dutch aid workers. In the former Yugoslavia, the UN Refugee Agency (UNHCR) gave thirty percent of the total value of aid to Serbian armed forces, and then more bribes to Croatian forces to pass the respective road blocks in order to reach Bosnia (Polman, 2010, pp. 96-104).

The amount of theft can even exceed the value of the food, since convoy vehicles and other equipment are also stolen. In 2008, MSF Holland, an international aid organization working in Chad and Darfur, noted the strategic importance of these goods, writing that these "vehicles and communications equipment have a value beyond their monetary worth for armed actors, increasing their capacity to wage war" (Polman, 2010, p. 105).

One of the most well-established cases of humanitarian aid strengthening rebel groups within a country occurred in Nigeria during the Nigeria-Biafra civil conflict of the late 1960s (Barnett, 2011, pp. 133-147). The rebel leader Odumegwu Ojukwu only allowed aid to enter the rebel controlled region of Biafra if it was shipped on his planes. He charged aid agencies for the use of his airplanes and filled the remaining space with arms and other military equipment. The shipments of humanitarian aid allowed Ojukwu to circumvent the siege that had been placed on Biafra by the Nigerian government. The food aid also allowed Ojukwu to feed his army, the members of which officially qualified for international humanitarian relief because together with the rest of the population, they were malnourished. Many suggest that the shipment of humanitarian aid resulted in the Biafran civil conflict lasting years longer than it would have otherwise (Polman, 2010, pp. 115-119).

In recent years, the most well-known accounts of aid being co-opted by local warlords are from Somalia, where there have been numerous reports of food aid being funneled to the Shabab, a Somali militant group that controls much of Southern Somalia. In addition, the Shabab has demanded that the local offices of the World Food Program pay them a security fee of $20,000 every six months (MacFarquhar, 2010). A recent UN Security Council report writes that "...humanitarian resources, notably food aid, have been diverted to military uses. A handful of Somali contractors for aid agencies have formed a cartel and become important power brokers – some of whom channel their profits – or the aid itself – directly to armed opposition groups" (United Nations Security Council, 2010, p. 7).

Aid is not only stolen by rebel militias, but is also appropriated by the ruling government, its military, and government supporters. In other words, both sides of civil conflicts can benefit from food aid. In Rwanda, in the early 1990s, government stealing of food aid was so problematic that aid shipments were cancelled on several occasions (Uvin, 1998, p. 90). Governments that receive aid often target it to specific populations, excluding opposition groups or populations in potentially rebellious regions. This has been noted to increase hostilities and promote conflict. In Zimbabwe in 2003, the U.S.-based organization, *Human Rights Watch,* released a report documenting examples of residents being forced to display ZANU-PF Party membership cards before being given government food aid (Thurow and Kilman, 2009, p. 206). In eastern Zaire, the leaders of the Hema ethnic group permitted the arrival of international aid organizations only if they agreed to give nothing to their enemies, the Lendu.[7] Polman (2010) describes this phenomenon as common, writing that "aid has become a permanent feature of military strategy. Belligerents see to it that the enemy is given as little as possible while they themselves get hold of as much as they can" (p. 10).

Humanitarian aid workers are aware of the threat of aid theft and have developed a number of strategies for minimizing the amount of theft en route.[8] However, aid can still fuel conflict even if it is successfully delivered to the intended populations. This commonly occurs because the recipient populations either include members of rebel or militia groups, or the recipients are "taxed" after receiving the aid. The most well-known example of this occurred in the Hutu refugee camps near Goma following the Rwandan Genocide in 1994. Hutu extremist leaders taxed Hutu civilians in the camps, and transferred the appropriated aid to their militia. The aid (and physical protection) provided by refugee camps allowed the Hutu extremists to regroup and rebuild their army. The Hutu militia were then able to carry out raids into Rwanda, which contributed to both the First and Second Congo Wars (Terry, 2002, ch. 5; Lischer, 2005, ch. 4).

It is important to recognize that there are other potential channels through which food aid can cause conflict and through which food aid can reduce conflict. An obvious example of the latter is increased economic development. Similarly, if conflict arises because of resource constraints, aid could reduce conflict by reducing those constraints. Our study, which estimates the *average causal effect* of food aid on conflict, captures the net effect of the positive and negative effects of food aid on conflict.

[7] In 2001, six aid workers who gave aid to the Lendu were murdered (Polman, 2009, p. 98).

[8] See Anderson (1999) for a summary of strategies used by aid workers to minimize aid theft and diversion.

2.2 The Determinants of U.S. Food Aid

Although U.S. food aid is comprised of many different types of food, wheat constitutes the largest proportion of aid. During the period of our study, 1971-2006, 63 percent (measured by weight) of all cereal food aid shipments was wheat, and 58 percent of all food aid shipments (cereals and non-cereals) was wheat. The United States is the largest donor of food aid in the world, accounting for approximately 58 percent of global food aid in 1990 and 64 percent in 2000 (Barrett and Maxwell, 2005, p. 12).[9] In terms of wheat, the United States provides 68 percent of total shipments during our sample period (see online Appendix Table A5). Our study focuses on wheat because of its quantitative importance and because U.S. policies for providing price support to U.S. wheat farmers form the basis of our identification strategy.

An important characteristic of U.S. wheat aid, which is mainly governed by Public Law 480 (PL 480), is the role it plays in providing a use for surplus food production. Within the U.S., all forms of food aid are procured by the United States Department of Agriculture (USDA) and administered by either the USDA or the U.S. Agency for International Development (USAID).[10] Although food aid shipments are broadly determined by need, since more aid tends to go to more needy countries, on a year-to-year basis, food aid is, to a large extent, determined by U.S. production (Nunn and Qian, 2010). The USDA accumulates wheat in high production years as part of its price stabilization policies. The accumulated wheat is stored and then shipped as food aid to poor countries. Given the time lag between harvest, storage, and shipment, wheat harvested in year t tends to arrive in recipient countries in the next calendar year, $t + 1$. Therefore, in the empirical analysis, we characterize food aid received in year t as a function of U.S. production in year $t - 1$.

The amount of food aid shipments to countries each year is the outcome of a complicated set of decisions made by a large number of government agencies (Ball and Johnson, 1996). Our empirical analysis assumes that the decision-making process results in accumulated wheat reserves being regularly drawn down through increased shipments of food aid that tend to be disproportionately greater for regular food aid recipients than for irregular recipients. As we show in Section 5, this assumption is supported by the data.

[9] It is followed by the European Union countries, which, in 2000, together accounted for approximately seventeen percent of food aid flows. The other major donors are Japan (six percent), Australia (three percent) and Canada (three percent) (Barrett and Maxwell, 2005, pp. 10-13).

[10] U.S. food aid falls into four broad categories: Type I, Type II, Type III and other. Type I is administered by the USDA and consists primarily of concessional loans with some grants for commodity exports. Title II and III programs are administered by USAID. Title II programs provide donations to meet humanitarian and development needs. These are typically channeled through either recipient governments, NGOs or multilateral organizations like the World Food Programme (WFP). Title III aid is sold to developing countries which can be monetized to generate funds for broader development objectives. The final category includes a number of smaller programs including Food for Progress, Section 416(b), Bill Emerson Humanitarian Trust, and International Food for Education and Child Nutrition, all administered by the USDA (Barrett and Maxwell, 2005, pp. 20-26). Because the data on the volume of aid is not reported by type, our analysis does not decompose food aid into different categories. In addition, our identification strategy only provides an instrument for total food aid and not for different categories of aid.

A significant proportion of the reported value of food aid consists of transportation costs. Using data from 1999-2000, Barrett and Maxwell (2005, pp. 166-168) estimate that only 47 percent of the total value of food aid is the actual value of the commodity itself. The other 53 percent is accounted for by transportation costs.[11] Since our study is interested in measuring the amount of food aid received by developing countries (net of transportation costs), we will measure food aid as the quantity of food aid shipped rather than its reported value.

3 Empirical Strategy

The main challenges for estimating the causal effect of U.S. food aid on the incidence of conflict in recipient countries are the issues of reverse causality and joint determination that were discussed in Section 1. In this section, we motivate and describe our empirical strategy for addressing these difficulties.

To clearly illustrate the variation driving our baseline estimates, first consider the simple case where we use lagged U.S. wheat production (uninteracted) as an instrument for food aid:

$$\begin{aligned} C_{irt} &= \beta F_{irt} + \mathbf{X}_{irt}\mathbf{\Gamma} + \delta_r Y_t + \psi_{ir} + \varepsilon_{irt}, & (1) \\ F_{irt} &= \alpha P_{t-1} + \mathbf{X}_{irt}\mathbf{\Gamma} + \delta_r Y_t + \psi_{ir} + \varepsilon_{irt}. & (2) \end{aligned}$$

Equation (1) is the second stage equation of a 2SLS estimate and equation (2) is the first stage. The index i denotes countries, r denotes six geographic regions and t denotes years.[12] The sample we analyze is a panel of 125 non-OECD countries between 1971 and 2006.

The dependent variable, C_{irt}, is an indicator variable that equals one if there is conflict in country i during year t. F_{irt} is the endogenous variable of interest, namely the quantity of wheat aid shipped from the U.S. to recipient i in year t. $\mathbf{X}_{irt}$ is a vector of country-year covariates that we will motivate and discuss when we present the results. $\delta_r Y_t$ denotes region-specific time trends and ψ_{ir} denotes country fixed effects. P_{t-1}, the amount of U.S. wheat production in the previous year, serves as the instrument. When U.S. production is high, U.S. price stabilization policies generate an accumulation of reserves, which increases the amount of food aid shipped to recipient countries in the subsequent year.

The coefficient of interest, β, is the estimated effect of an additional unit of U.S. food aid on the incidence of conflict. A positive coefficient, $\hat{\beta} > 0$, indicates that, on average, an

[11] Part of the reason for the high shipping costs is that U.S. legislation requires that at least 75 percent of food aid be shipped on U.S. flagged cargo ships that charge inflated rates.

[12] The region classification that we use is taken from the World Bank and consists of the following groups: South Asia, East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, and Sub-Saharan Africa.

increase in the provision of U.S. food aid increases the incidence of conflict in the recipient country.

Conceptually, the identification strategy compares conflict in developing countries in years after U.S. wheat production is high to the years after it is low. Causal inference requires the assumption that lagged U.S. wheat production only influences conflict in recipient countries through U.S. food aid (conditional on the baseline controls). A natural concern about the exclusion restriction is that there may be other (non-linear) changes over time that are spuriously correlated with U.S. wheat production, which may then confound the 2SLS estimates. This concern can be addressed by the inclusion of time-fixed effects. However, we cannot do this with an instrument that varies only over time. Moreover, since changes in U.S. production have larger effects on the aid received by countries that often receive U.S. food aid relative to countries that rarely receive aid (see discussion in section 2.2), the first stage regression in equation (2), which does not account for this heterogeneity, does not fully use the information in the data.

Thus, to allow the inclusion of controls for flexible time effects and to maximize the information used in our regressions, our baseline estimate uses the interaction of lagged U.S. wheat production and a country's propensity to receive food aid from the United States as the instrument for U.S. food aid. The first and second stage equations thus become:

$$C_{irt} = \beta F_{irt} + \mathbf{X}_{irt}\mathbf{\Gamma} + \varphi_{rt} + \psi_{ir} + \varepsilon_{irt}, \tag{3}$$

$$F_{irt} = \alpha \left(P_{t-1} \times \overline{D}_{ir} \right) + \mathbf{X}_{irt}\mathbf{\Gamma} + \varphi_{rt} + \psi_{ir} + \varepsilon_{irt}. \tag{4}$$

Let D_{irt} be an indicator variable that takes a value of one if country i receives any U.S. food aid in year t. Then, $\overline{D}_{ir} = \frac{1}{36} \sum_{t=1971}^{2006} D_{irt}$ denotes the fraction of years between 1971 and 2006 that a country receives any U.S. food aid. φ_{rt} is a vector of region-year fixed effects. All other variables are defined as before.

The instrument $P_{t-1} \times \overline{D}_{ir}$ now varies by country and time period, which allows us to control for year fixed effects. We allow the time effects to differ across regions and control for region-year fixed effects, φ_{rt}, which capture changes over time that affect countries within a region similarly. Note that region-year fixed effects also control for the price of wheat in region r in year t. Also note that country fixed effects control for the main effect, $\overline{D}_{ir}$, which is time-invariant.

Conceptually, instrumenting for aid with the interaction term is similar to a *difference-in-differences* (DD) estimation strategy, where the first-stage estimates compare U.S. food aid receipts in countries that frequently receive U.S. food aid to countries that rarely receive U.S. food aid, in years following high U.S. wheat production relative to years following lower production. The reduced-form estimates makes a similar comparison but with conflict as the dependent variable. The main difference between our strategy and a DD strategy is that the treatment in our study is continuous, allowing us to use all of the variation in the treatment variable for our estimates.

Causal inference using the interacted instrumental variable relies on the assumption that, conditional on the controls, the interaction between lagged U.S. wheat production and a country's tendency to receive U.S. food aid only affects conflict through the provision of U.S. food aid. The main concern with this assumption is that U.S. wheat production may affect foreign conflict through its influence on the world price of wheat (or other crops that are substitutes or complements to wheat).[13] In practice, this is not a serious problem for our estimates for several reasons. First, the region-year fixed effects in our baseline equation flexibly control for all region-specific changes over time and therefore account for any global or even region-specific price changes. For U.S. production-induced world price changes to violate the exclusion restriction, they would need to have systematically different within-region effects on conflict that are correlated with a country's tendency to be a U.S. food aid recipient. Nevertheless, to be cautious, our analysis addresses this possibility with additional controls that capture differential responses of countries to global price changes. We discuss these controls in detail in Section 5. Second, the United States does not dominate global wheat production. For example, in 2000, the U.S. accounted for 10.3% of global wheat production. Finally and most importantly, U.S. price stabilization policies have been quite effective in breaking the link between U.S. wheat production and wheat prices during our period of study. Consistent with this, we find no relationship between total production and average wheat prices measured in real U.S. dollars annually between 1975 and 2006 (the correlation coefficient is 0.003 with a p-value of 0.99).[14]

4 Descriptive Statistics

Our primary outcome of interest, the incidence of conflict, is constructed using data from the *UCDP/PRIO Armed Conflict Dataset*, where a conflict is defined as the use of armed force between two parties that results in at least 25 battle deaths in a year. We examine the occurrence of intra-state conflicts (i.e., civil conflicts), inter-state conflicts and conflicts of all types. An intra-state conflict is defined as a conflict between a government and one or more internal opposition groups, without intervention from other states. An inter-state conflict is defined as a conflict occurring between two or more states. The measure of all conflicts includes intra- and inter-state conflicts, and also a small number of conflicts labelled

[13]This is particularly important given recent evidence on the relationship between commodity prices and civil conflict. See for example Angrist and Kugler (2008), Dube and Vargas (2009), Bruckner and Ciccone (2010) and Bazzi and Blattman (2011).

[14]Data on U.S. wheat prices are from the FAO PriceSTAT (1991-2006) and FAO Price Archive (1973-1990). The figures are the producer price per ton, measured in nominal U.S. dollars. The nominal prices were converted to real prices using the U.S. CPI. We use data from 1975-2006 because 1973 and 1974 are outlier when low U.S. wheat production coincided with the initial OPEC oil shock (October 1973 to March 1974) that drastically increased oil and commodity prices. If we examine all years between 1971 and 2006, but omit 1973 and 1974, the correlation coefficient is -0.08 and the p-value is 0.64. When we examine all years from 1971-2006, the correlation coefficient is -0.29 with a p-value of 0.09.

by UCDP/PRIO as "extra-systemic" or "internationalized" conflicts.[15]

Our measure of U.S. food aid is the amount of wheat aid, measured in thousands of metric tons (MT), shipped to a recipient country in a year from the United States. The data are from the Food and Agriculture Organization's (FAO) *FAOSTAT* database. By measuring aid in terms of volume, we avoid the difficulty in aid valuation described in section 2.2. Data on U.S. wheat production, which is used to construct our instrument, is reported by the U.S. Department of Agriculture (USDA). Production is also measured in thousands of metric tons.

Table 1 presents descriptive statistics for the main variables used in our analysis. There are many conflicts in our sample. Approximately 22 percent of observations, which are at the country and year level, experience some form of conflict with most of these being civil conflicts and periods of continued conflict (i.e., there is conflict in the preceding year).

Although U.S. wheat aid is a small part of total U.S. wheat production (5.9% on average over the sample period), it can be large from the recipient's point of view. The average ratio of wheat aid received from the United States relative to domestic wheat production among observations in the sample is 2.05 and the average ratio of U.S. wheat aid to domestic cereal production is 0.93.

The average country in our sample receives some food aid from the United States in 37 percent of the years between 1971 and 2006. For the median country, this figure is 0.30. Countries range from having never received any food aid from the United States, such as Argentina, Venezuela and South Africa, to countries that received some food aid from the United States every year, such as Honduras, Haiti and Bangladesh.[16]

Our instrumental variables strategy exploits the relationship between U.S. aggregate wheat production, the subsequent accumulation of wheat reserves and shipments of U.S. wheat aid to foreign countries. We examine these links with the data by examining the bivariate correlations between wheat production, accumulated wheat reserves and wheat aid shipments. Figure 1 shows a strong positive relationship over time between the total production of wheat within the United States and the stock of wheat reserves held by the government at the end of the same year (i.e., at the beginning of the following year).[17] As shown, more wheat production is followed by a greater accumulation of reserves. Figure 2 shows the relationship between the beginning-of-year wheat reserves and the amount of wheat shipped as food aid in that year. We observe a strong positive relationship. When there is a greater store of reserves at the beginning of the year, more wheat is subsequently

[15] Extra-systemic conflicts are conflicts between a state and non-state group that occurs outside of the government's territory. Internationalized conflicts are conflicts between a state and a non-state group with intervention from another state. There are very few incidences of these two types of conflicts. Our estimates are qualitatively identical if we exclude these conflicts from our measure of the incidence of any conflict.

[16] For each of the 125 countries in our sample, we report the frequency of receiving food aid from the U.S. in online Appendix Table A1.

[17] Online Appendix Figure A1 shows the year-to-year variation in U.S. wheat production during our sample period.

shipped as food aid. Together, Figures 1 and 2 show that more production leads to greater reserves, which leads to more food aid being shipped overseas.[18]

We next turn to the reduced form-relationship between U.S. wheat production and conflict in recipient countries, which can also be illustrated visually. We first divide the countries in our sample into two groups based on the frequency with which they receive any U.S. food aid during the sample period. We use the sample median value to create the two equally sized groups, $\overline{D}_{ir} \lesseqgtr 0.30$, and refer to countries below the median as "irregular" aid recipients and countries above the median as "regular" recipients.

For each group, we calculate the proportion of countries that are engaged in a civil conflict in each year, which we plot against the one-year lag of U.S. wheat production. Figure 3 shows that there is no correlation over time between lagged U.S. wheat production and conflict incidence among irregular recipients. In contrast, Figure 4 shows that there is a strong positive relationship among regular recipients. Thus, these figures foreshadow our main results by showing that U.S. wheat production leads to more conflict in regular U.S. food aid recipients relative to irregular recipients. In other words, these figures show that the 2SLS estimate of the effect of U.S. food aid on conflict will be positive ($\hat{\beta} > 0$ from equation (3)) as long as the first stage estimate is positive in sign ($\hat{\alpha} > 0$ from equation (4)).

5 Baseline Estimates

5.1 OLS Estimates

We begin the analysis by first reporting the OLS estimates of equation (3), which are presented in panel A of Table 2. Column (1) reports estimates of the correlation between U.S. food aid and the incidence of any conflict for a specification that only includes recipient-country fixed effects and region-year fixed effects. The estimate is very close to zero in magnitude and statistically insignificant. In the remaining columns of the table, we include additional covariates to control for factors that may be correlated with conflict, food aid shipments, or U.S. wheat production. We describe these in detail below. The estimates of columns (2)-(5) show that the OLS correlation between U.S. food aid and the incidence of conflict are unaffected by the inclusion of a number of additional controls that we discuss in the next section. In columns (6) and (7), we separately investigate the effects on the incidence of civil and international conflicts. We find similarly small and statistically insignificant estimates.

[18] Our analysis does not use U.S. wheat reserves to construct the instrument because reserves are potentially endogenous to expectations of future aid shipments and to U.S. foreign policy. Instead, we use U.S. wheat production, which we assume to be determined by exogenous weather conditions in wheat producing regions of the United States, and is, therefore, the exogenous component of wheat reserves that determines food aid.

5.2 First-Stage and Reduced-Form Estimates

The reduced-form and first-stage estimates of equation (4) are shown in panels B and D of Table 2. To address a set of natural concerns over the validity of our strategy, we control for a large set of covariates in the baseline. We motivate and describe them before presenting the results.

The first concern is that U.S. wheat production may be correlated with factors that have differential influences on the incidence of conflict for countries with different levels of $\overline{D}_{ir}$. Specifically, U.S. wheat production may be correlated with U.S. business cycles, U.S. political cycles or oil price shocks during the 1970s and 1980s. To address this concern, we control for the following variables in column (2), each interacted with $\overline{D}_{ir}$: U.S. real per capita GDP, an indicator that equals one in years that the U.S. president is a Democrat and real oil prices.[19] Note that the uninteracted effects of the variables are captured by the region-year fixed effects.

A second concern is that weather conditions that affect wheat growth in the United States may be correlated with weather conditions in recipient countries, which can directly affect conflict.[20] To address this, we control for twelve variables that measure the average temperature in each month of year t and twelve variables that measure total precipitation in each month of the same year. By controlling separately for weather in different months, we account for the fact that different parts of the world have different crops with different growing seasons, and hence, different sensitivities to temperature and precipitation.[21] We also address the possibility that the relationship between weather and conflict may depend on the extent to which a country is a recipient of U.S. food aid. Thus, we also include interactions of the 24 weather controls with $\overline{D}_{ir}$. The estimates are reported in column (3).

Third, regular recipients of U.S. food aid (i.e., countries with a high value of $\overline{D}_{ir}$) could differ from irregular recipients (with a low value of $\overline{D}_{ir}$) in ways that are related to conflict. For example, regular recipients tend to also be recipients of U.S. military aid or other forms of U.S. economic aid (besides food aid).[22] As we report in online Appendix Table A2 countries that are U.S. food aid recipients also tend to receive more economic and military aid from the United States. The country and region-year fixed effects may not control for the effects of U.S. economic and military aid since such aid varies over time and across countries within

[19]The bivariate relationships between each of these measures and lagged U.S. wheat production are reported in online Appendix Table A3.

[20]This is a particular concern given that past studies have found that weather shocks can affect conflict (e.g., Miguel, Satyanath and Sergenti, 2004).

[21]The measures are constructed using country boundaries and monthly weather data measured across grid-cells from the *Terrestrial Air Temperature and Precipitation: 1900-2006 Gridded Monthly Time Series, Version 1.10.* The database contains daily mean temperature (measured in degrees Celsius) and daily mean precipitation (measured in millimeters) for 0.5 degree by 0.5 degree (approximately 56 km by 56 km) grid-cells globally for each month from 1900 to 2006. For documentation see Matsuura and Willmott (2007) and see Dell, Jones and Olken (2008) for a recent application.

[22]For evidence of the causal impact of economic aid on conflict see Crost, Felter and Johnston (2012) and of military aid on conflict see Dube and Naidu (2010).

regions. To address this concern, in column (4), we also control for the interaction of year fixed effects with (i) the average annual amount of per capita U.S. military aid received by a country during the sample period and (ii) the average annual per capita amount of other forms of U.S. economic aid (net of food aid).[23]

Finally, variation in U.S. wheat production can affect international wheat prices, which may, in turn, affect conflict. This concern is mitigated by U.S. price stabilization policies (see section 2.2) and the inclusion of region-year fixed effects. To be cautious, we nevertheless address the possibility that price changes over time may have differential effects on countries within regions. For example, a country's sensitivity to changes in world prices may depend on the extent to which it imports, exports and/or produces wheat or other cereals. Thus, we control for a country's (i) per capita net imports of cereals and (ii) per capita production of cereals, each interacted with year fixed effects.[24] To address the possibility that cereal imports and production can be outcomes of aid, we do not control for time-varying measures of each variable. Instead, we calculate country averages for each variable and control for the interaction of the country-specific measure with year fixed effects.[25] These controls allow the effect of global wheat prices to differ across countries depending on the extent to which they produce or import cereals. Estimates including the additional controls are reported in column (5).

The first stage estimates in panel D show that there is a strong positive correlation between the instrument and food aid shipments. The first stage Cragg-Donald F-statistics for the excluded instrument range between 20 and 39. Thus, it is very unlikely that our estimates are biased by weak instruments. In terms of magnitude, the estimated coefficient in column (5) suggests that for a country that receives some amount of food aid from the U.S. each year (i.e., $\overline{D}_{ir} = 1$), a 1,000 MT increase in U.S. wheat production increases the amount of food aid received in the following year by 3.58 MT. As reported in Table 1, the average value of $\overline{D}_{ir}$ in our sample is 0.37. Therefore, evaluated at the sample mean, a 1,000 MT increase in U.S. wheat production is predicted to increase U.S. food aid shipments by $0.37 \times 3.58 = 1.34$ MT. Multiplying this by the number of countries, 125, gives 167.4 MT, which is an approximate measure of the predicted increase in total U.S. food aid shipments to the world that results from a 1,000 MT increase in U.S. wheat production.

In panel B, the reduced-form effects of our instrument on the outcome variables of interest show that U.S. wheat production increases the incidence of civil conflict. For these regressions, the dependent variable is multiplied by 1,000 for presentation purposes. The

[23]Aid data are from the USAID and population data are from the World Bank's World Development Indicators. The figures are measured in 2007 U.S. dollars per person.

[24]Cereal production and cereal imports and exports are from the FAO's ProdSTAT and TradeSTAT databases. Both are measured in thousands of metric tons. Population data are from the World Bank's World Development Indicators.

[25]Estimates from using contemporaneous or one-year lagged time-varying measures of production and imports, each interacted with year fixed effects are virtually identical to the estimates reported in the paper. They are available upon request.

effect of the instrument on the incidence of all conflicts and intra-state conflicts are positive and statistically significant at the one percent level, while there is no effect on inter-state conflict. Both the first stage and reduced form estimates are stable across the various specifications.

5.3 2SLS Estimates

Panel C of Table 2 reports 2SLS estimates of equation (3). Like the reduced form, the 2SLS estimates remain stable as we introduce the baseline controls in columns (1)-(5). According to the estimates using the full set of baseline controls reported in column (5), a 1,000 MT increase in U.S. wheat aid increases the incidence of conflict by 0.30 percentage-points, an effect that is statistically significant at the one percent level. Columns (6) and (7) show that the effect on overall conflict is driven by an increase in intra-state conflicts and not by inter-state conflicts.[26]

The finding that food aid only affects intra-state conflicts is consistent with the descriptive accounts that tend to emphasize the effect of food aid on fueling local conflicts between rebel groups and the government. We will focus on intra-state conflicts for most of our analysis henceforth. The fact that the 2SLS estimates are positive and larger in magnitude than the OLS estimates indicates that the OLS estimates are attenuated.

To assess the magnitude of the implied 2SLS estimate of the effect of aid on civil conflict, we note that the sample mean of the incidence of civil conflict is 17.6 percentage-points (0.176) and the mean of U.S. wheat aid is 27.6 thousand MT. Therefore, for a country at the mean level of U.S. wheat aid, the estimate from column (6) implies that a ten percent (2.76 thousand MT) increase in U.S. food aid causes a 0.70 percentage-point increase in the incidence of civil conflict, which is four percent of the sample mean.

To assess the plausibility of this sizable effect, it is useful to compare the magnitude to estimates from other studies. The recent study by Crost, Felter and Johnston (2012) uses a regression discontinuity design to evaluate the effect of World Bank aid on civil conflict within the Philippines.[27] The authors estimate that the treatment increases the incidence of conflict during the period when aid is received by 13.2 percentage points (the sample mean of conflict incidence is 49 percent). By comparison, our baseline estimates (e.g., column (6) of Table 2) suggest that sending the average amount of U.S. food aid (27.6 thousand MT) to a country that was previously not receiving any aid would increase conflict by 7.0 percentage points (27.6×0.00254). The comparison shows that the effect of U.S. food aid on conflict in our context is much smaller than the effect of World Bank development aid in the Philippines.[28] Thus, the magnitude of our estimates are within the range of other

[26] Partial correlation plots for the column (5) estimate are reported in online Appendix Figures A2 and A3. As shown, the positive impact of food aid on conflict is not driven by a small number of influential observations.

[27] Village-level aid in this context is 3 (sometimes 4) disbursements of 6,000 USD over a seven-year period.

[28] Note that the dollar value of our treatment is much higher than that of Crost, Felter and Johnston's.

causal estimates in the literature.

5.4 Uninteracted Instrument

We next turn to our 2SLS equations that use the uninteracted instrument, which are given in equations (1) and (2). The vector of controls, $\mathbf{X}_{irt}$, include the time-invariant country controls (i.e., average cereal production, cereal imports, U.S. military aid and U.S. economic aid), each interacted with a time trend rather than time-period fixed effects; annual measures of U.S. per capita GDP, oil prices, and a Democratic president indicator variable; and the 24 weather variables. The 2SLS estimates of equation (1) using only lagged U.S. wheat production, P_{t-1}, as an instrument are reported in Panel C of Table 3. The first-stage estimates are reported in Panel D and the reduced-form estimates are reported in Panel B. For comparison, OLS estimates are reported in Panel A.

The overall findings are similar to the baseline estimates reported in Table 2. The standard errors increase slightly and the point estimates are larger. The OLS estimates continue to show no relationship between food aid and conflict. The reduced-form estimates show that in years following greater U.S. wheat production, recipient countries experience more conflict. These estimates show that interacting lagged U.S. wheat production with the regularity that a country receives U.S. food aid does not bias our baseline results relative to using an uninteracted instrument, although it does increase precision.

5.5 Controlling for Lagged Conflict

The estimates reported up to this point do not control for lagged conflict. This raises the concern that the baseline specification in equations (3) and (4) do not accurately capture the inherent persistence of conflicts. We therefore model the dynamics of conflict by controlling for one-year lagged conflict.

The estimates, which are reported in Table 4, show that we obtain qualitatively similar results when we condition on lagged conflict. The OLS estimates continue to show no relationship between food aid and conflict, while the 2SLS estimates show a large positive effect. The first-stage estimates show a strong relationship between the instrument and U.S. wheat aid shipments. The (long-run) impact of the estimated effect of food aid on conflict is slightly larger but similar to the baseline estimates.[29] Note that controlling for a lagged

The value of a metric ton of wheat in 2009 was approximately \$275. According to the USDA, the average price in 2008/2009 for No. 1 hard red winter wheat in Kansas City, MO was \$7.50 a bushel, which is equivalent to \$275.55 a metric ton. This implies that an increase from no food aid to the sample mean is worth $27,610 \times \$275 = \$7,592,750$ or 7.59 million dollars.

[29]Food aid both has a contemporary direct effect, given by β, and an indirect effect that arises because conflict in this period affects in the conflict next period, which affects conflict in the following period, and so on. In our baseline specification, the full effect of a one-time one-unit increase of food aid on intra-state conflict is β or 0.00254 (column (6) of Table 2). With a lagged dependent variable (with coefficient γ) this same effect is given by $\beta/(1-\gamma)$, which, according to the estimates from column (6) of Table 4, is $0.00157/(1-0.57) = 0.00365$.

dependent variable in the fixed effects equation is unlikely to create the *Nickell Bias* in our setting since our panel contains many years.[30]

5.6 Falsification Tests

In this section, we provide additional evidence for the validity of our identification strategy by undertaking two falsification tests. In the first test, we estimate our reduced form equation, but instead of examining the link between wheat production and conflict, we examine the relationship between U.S. production of food crops that are not used as food aid. If our identification strategy is valid, then U.S. production of foods not shipped as food aid should not have the same effect on conflict as U.S. wheat production.

We examine total production of food crops as classified by the FAO and reported in their database, ProdSTAT. Using total production (by weight) during our sample period (1971-2006) as a measure of the importance of food production, we examine the most widely grown crops in the United States.[31] We then identify the ten most widely-grown crops that are never shipped as food aid during our sample period.[32] In order from the most to the least produced, these are: oranges, grapes, lettuce, cotton lint, onions, grapefruit, cabbages, watermelons, carrots/turnips and peaches/nectarines.

The results of this placebo test are reported in Table 5. Column (1) reproduces the baseline reduced-form estimate from column (6) of Table 2 for comparison. The estimates in columns (2)-(11) show that the estimate for the placebo crops are all close to zero. Unlike wheat, for no other crop do we estimate a positive and statistically significant effect between the constructed instrument and conflict.[33] Overall, the results of this falsification exercise provide confirmation of the validity of our estimation strategy.

The second test checks that our first-stage estimates are not confounded by spurious positive trends between U.S. wheat production and food aid shipments to U.S. food aid recipients. We estimate alternative first-stage equations where the instrument is used to

[30] To obtain a more concrete sense of the magnitude of the bias in our panel, consider the formula originally derived by Nickell (1981) for the case without covariates: $\text{plim}_{N\to\infty}(\hat{\gamma} - \gamma) \simeq \frac{-(1+\gamma)}{T-1}$, where γ is the relationship between the dependent variable in period t and the dependent variable in period $t-1$. In our setting, T=36, and $\hat{\gamma} = 0.57$. Thus, the bias is approximately $\frac{-1(+0.57)}{36} = 0.012$ or by 2.1 percent of the value of γ. This bias is an upper bound since the bias is strictly lower when there are covariates (Nickell, 1981). Moreover, because our main explanatory variable is U.S. food aid rather than the lagged dependent variable, the Nickell bias is further mitigated as it only affects our coefficient of interest indirectly through the correlation between lagged conflict and food aid, which is low ($\rho = 0.09$). The limited influence of the lagged dependent variable on other covariates of interest when the time dimension is moderately large has also been shown using Monte Carlo simulations by Judson and Owen (1999) and Beck and Katz (2004). In the Judson and Owen (1999) setting, with a time dimension of only thirty years and $\gamma = 0.80$, they find that γ is biased downwards by 0.066 and β by 0.006. In the simulations from Beck and Katz (2004), with a 35-year sample and $\gamma = 0.60$, the bias of γ is found to be approximately -0.030 and β -0.018.

[31] The most widely grown crop is maize, followed by wheat, soybeans, sugar cane and sugar beet.

[32] The data are from FAO's ProdSTAT database.

[33] To compare the magnitudes of the coefficients, we present the standardized beta coefficients (since the production of different commodities occurs on very different scales). They are consistently smaller in magnitude than the baseline reduced-form (standardized) estimates.

predict past food aid rather than future food aid. As reported in online Appendix Table A4, we find no relationship between our instrument and past U.S. food aid. The relationship is statistically insignificant, negative, and very small in magnitude. These results support our identification assumptions.

5.7 Additional Robustness Checks

We now check the robustness of our 2SLS estimates. We first examine the sensitivity of the baseline estimates to the use of alternative specifications. Estimates are reported in Table 6 with the baseline estimate reported in column (1) for comparison. Columns (2)-(4) report estimates using alternatively constructed interaction instruments. Rather than interacting lagged U.S. wheat production with a country's average propensity to receive food aid over the sample period, we instead interact lagged production with a country's propensity to receive food aid during the recent past, while controlling directly for this measure in the estimating equation. Note that this variable is time varying and therefore is not captured by country fixed effects. Estimates using an indicator variable for whether the country received food aid in period $t-1$ is reported in column (2). As shown, the estimates are very similar to the baseline estimates, although the standard errors are larger. Next, we consider measures over a longer time horizon and use the proportion of years from periods $t-1$ to $t-2$, and from periods $t-1$ to $t-4$ that a country received food aid from the U.S. to construct the instrument. One shortcoming of this approach is that our sample period is reduced by a number of years that is equal to the time horizon we use in constructing the instrument – i.e., two and four years, respectively. As reported in columns (3) and (4), using these alternative instruments, we continue to obtain positive and statistically significant effects of food aid on civil conflict.[34]

In columns (5) and (6), we show that we obtain qualitatively identical results if we normalize U.S. food aid shipments by the recipient's population or if we measure U.S. food aid and U.S. production in natural logs rather than raw values. In both cases, the results remain robust, and the magnitudes of the estimated effect of food aid, assessed by comparing standardized beta coefficients, are similar. Thus, our results are not specific to our choice of functional form.

We next check the robustness of our estimates to the use of alternative samples. Our baseline sample includes fourteen countries that were formerly part of the Soviet Union and therefore do not enter the sample until 1991. In column (7), we show that we obtain nearly identical estimates if we exclude these countries from the sample.

The quality of the FAO food aid data is poorest in the early years of the sample.[35]

[34]Our choice to report estimates using 2- and 4-year horizons is purely arbitrary. The results are similar for other reasonable horizons that do not reduce the sample size too severely – e.g., horizons less than six years.

[35]For example, in 1971, 150,500 MT of wheat aid from the U.S. is reported as being shipped to an unspecified recipient. The same figure is 134,800 in 1972 and 95,400 in 1973. The amount of unspecified

Hence, we check that our estimates are robust to the omission of the first three years of the sample, 1971-1973. The estimates for the smaller sample, which are reported in column (8), are nearly identical to the baseline estimates.

Finally, we include instrumented one-year leads and lags of U.S. wheat aid. Columns (9) and (10) show that the contemporaneous measure of U.S. wheat aid is similar in magnitude to the baseline estimate with these additional controls. However, they are less precisely estimated because of collinearity between the lags, leads and contemporaneous variables. Nevertheless, the coefficients for the lead and lag variables are statistically insignificant, and smaller in magnitude than the contemporaneous effect. (The coefficient for the lead variable is particularly small in magnitude.) These results are most consistent with U.S. food aid primarily affecting conflict during the year it is received.[36]

For completeness, we consider the effect of wheat aid from other donors. Among the world's largest wheat donors, only two other countries – Canada and Japan – also have agricultural and food aid policies that are donor driven and centered around surplus disposal as in the United States. In online Appendix Table A5 and A6, we show that consistent with this, for only Canada and Japan do we find that lagged production predicts aid shipments. For the two countries, we find that the 2SLS estimates are similar to the estimate for the United States in magnitude, but much less precisely estimated.[37] This is not surprising given that the magnitude of wheat aid shipments from Canada and Japan pale in comparison to the volumes shipped from the United States (see online Appendix Table A5).

6 Mechanisms

6.1 Onset and Duration

Our main outcome of interest, the incidence of civil conflict, reflects both the onset of new conflicts and the continuation of existing conflicts. Anecdotally, there are many accounts of food aid affecting both onset and duration. For example, it has been argued that humanitarian aid during the Nigeria-Biafra civil conflict (1967-1970) strengthened the rebel leader Odumegwu Ojukwu, causing the conflict to last twelve to sixteen months longer than it otherwise would have (Polman, 2010, pp. 114-122). More recently, observers have argued that the aid given to Hutu extremists in refugee camps allowed Hutu leaders to regroup, regain resources, and launch raids and attacks in Rwanda, leading to the First and Second Congo Wars (Polman, 2010, pp. 13-34). To investigate the contributions of onset and duration to the changes in incidence, we separately estimate the effect of food aid on the two outcomes.

wheat aid in 1974 is 10,000 MT, after which it is zero for all but three subsequent years.

[36] An alternative strategy, that sidesteps the issue of collinearity, is to estimate separately the relationship between each measure of U.S. aid and conflict. Online Appendix Table A7 shows that in this case, only the coefficients for wheat aid in period t and wheat aid in period t-1 are positive and statistically significant.

[37] The 2SLS estimate of the effect of donor wheat aid on civil conflict is 0.00283 for Canada and 0.00429 for Japan (compared to 0.00254 for the United States). The standard error is 0.00504 for Canada and 0.01019 for Japan.

To examine the effect on onset, we start with specifications used in previous studies. We first examine onset using the methodology from Collier and Hoeffler (2004), which removes observations that are periods of continued conflict. That is, the sample only includes periods of no conflict and periods of conflict onset. The dependent variable equals one if period t is the first period of a conflict episode. The analysis also includes our full set of baseline control variables. The 2SLS estimate of the effect of U.S. food aid on the onset of civil conflict is reported in column (1) of Table 7. We find a positive, but statistically insignificant effect of U.S. food aid on civil conflict onset.

Column (2) reports estimates using an alternative specification from Fearon and Laitin (2003). Rather than excluding periods of continued conflict from the sample, the authors include all observations and control for the incidence of civil conflict in the previous period. This captures the mechanical relationship between the onset of civil conflict and the presence of conflict in the previous period. This alternative estimation strategy generates a point estimate that is forty percent lower than the estimate reported in column (1) and is also imprecisely estimated.

Next, we examine the effect of U.S. food on the onset of conflict by estimating a hazard model. The event of interest is the onset of civil conflict.[38] Let t index time, i index civil conflicts and $T_i \geq 0$ denote the length, in years, of continued peace (i.e., the duration). The sample includes all country-years that are "at risk" for transition into conflict, i.e., all of the observations for which there was no civil conflict in the previous period. The estimation uses the discrete hazard $h_{it} = \Pr(T_i = t \mid T_i \geq t)$, where it is assumed that h_{it} follows a logistic distribution.[39]

Estimates of the effect of U.S. food aid on a country's transition into civil conflict are reported in columns (3)-(5) of Table 7. Column (3) reports estimates only controlling for the duration of the conflict up until period $t-1$. We allow the effect of duration on the hazard rate to vary in a flexible manner by including a third degree polynomial of duration. In column (4), we also control for the time-invariant country characteristics from our set of baseline control variables: a country's average real per capita GDP over the period, its average annual receipts of U.S. military aid, its receipt of U.S. economic aid (net of food aid), its average import of cereals, and its average production of cereals. Column (5) reports estimates from a specification that also controls for region fixed effects. Consistent

[38] In this context, what one commonly refers to as "survival" in hazard models is continued peace.

[39] In practice, estimation relies on the insight from Allison (1984) and Jenkins (1995) regarding the equality of the log likelihood function of discrete time hazard models and the standard likelihood function for a binary regression model in which y_{it} (an indicator that equals one if the country transitions into conflict at time t) is the dependent variable. The data are structured so that there is an observation for each period that the country is at risk of transitioning out of the current state. The insight that the logit of the discrete-time hazard model can be estimated using a logistic regression model is particularly useful since our independent variable of interest, U.S. food aid, is instrumented with the interaction term using lagged U.S. wheat production. We are thus able to estimate the effect of U.S. food aid on the hazard rate by applying a control function approach that uses the two-step approach from Rivers and Vuong (1988). The two-step approach is implemented by controlling for the first-stage residuals in the second-stage logit regression.

with the estimates from columns (1) and (2), we do not find conclusive evidence that U.S. food aid increases the onset of civil conflict. All three estimates are very close to zero and not statistically significant. Overall, the estimates from columns (1)-(5) do not provide compelling or robust evidence that food aid impacts the onset of civil conflict.

The same hazard model can be used to estimate the effect of food aid on the probability of transitioning out of conflict and into peace. Examining civil conflict offset provides evidence of the impact of food aid on the duration of civil conflict. The estimates, which are reported in columns (6)-(8), provide strong evidence that U.S. food aid decreases the probability of civil conflict offset, thus increasing the duration of already existing conflicts. In all three specifications, the coefficients for U.S. food aid are negative and highly significant.

Overall, the results reported in Table 7 suggest that food aid does not strongly affect the onset of civil conflicts, but that it does have a strong positive effect on the duration of civil conflicts.

6.2 The Scale of Conflict

Descriptive accounts of humanitarian aid tend to stress the role food aid plays in providing an important source of funds for small-scale rebel groups and "refugee warriors." This suggests that food aid may have larger effects on the incidence of small-scale conflicts. To investigate the extent to which our main results are driven by small-scale conflict, we disaggregate our main conflict measure, which includes both small- and large-scale conflicts, into small-scale conflicts with 25-999 battle deaths and large-scale conflicts with 1,000 or more battle deaths.

The estimates are reported in Table 8. For comparison, columns (1)-(3) restate the baseline estimates for all conflicts, intra-state conflicts and inter-state conflicts. Columns (4)-(6) present estimates of the same specifications for the incidence of small-scale conflict. Columns (7)-(9) report estimates for the incidence of large-scale conflicts. The estimates continue to show an effect of food aid on all conflicts, intra-state conflicts, but not inter-state conflicts. The estimated coefficients for small-scale conflicts are larger in magnitude and more precisely estimated than for large-scale conflicts. Comparing the estimated coefficients to the means of the dependent variables, the implied elasticity between conflict incidence and food aid is similar for small-scale and large scale conflicts. Overall, these results do not provide conclusive evidence on the relative effects of food aid on small-scaled versus large-scaled conflicts.

6.3 Crowding-Out of Other Aid

We interpret the main results to mean that U.S. food aid has a direct causal effect on conflict in recipient countries. An alternative explanation is that food aid affects conflict indirectly by crowding out other types of aid. For example, other donor countries or multilateral agencies may respond to an increase in U.S. food aid by reducing their own aid provisions. If these other forms of aid *reduce* conflict, then this form of "crowd-out" can explain why

U.S. food aid increases conflict. Similarly, if the reduction in aid is large enough, then an increase in U.S. food aid could actually cause total foreign aid to decline, which can explain our results if total foreign aid *reduces* conflict. It is important to note that crowd-out does not undermine the causal interpretation of our estimates, but the mechanism of crowd-out is very different from the ones that motivated our study. More importantly, they have very different policy implications.

We explore this possibility by re-estimating equations (3) and (4) with other forms of aid provision as the second-stage dependent variable. We first examine the effect of U.S. wheat aid on total wheat aid provision (from all countries). If U.S. wheat aid is crowding out wheat aid from other countries, then a one-unit (i.e., 1,000 MT) increase in U.S. wheat aid will increase total food aid by less than 1,000 MT. Column (1) of Table 9 reports the point estimate, which is 1.23 and statistically significant. The point estimate, which is close to one, suggests that U.S. aid does not crowd out the provision of wheat aid from other countries. Column (2) estimates the same regression but with cereal aid from all countries, rather than wheat aid as the dependent variable. The point estimate again shows that U.S. wheat aid does not crowd out food aid from other countries. The lack of crowd-out for both wheat and cereal aid is confirmed by the estimates reported in columns (3) and (4), which show that U.S. wheat aid has no effect on the provision of total wheat aid and total cereal aid from non-U.S. donor countries. The point estimates are small, positive and statistically insignificant.

We next turn to the possibility that U.S. food aid crowds out the provision of other types of U.S. aid, such as military aid or economic aid (net of food). Columns (5) and (6) shows that U.S. food aid does not crowd out these other types of aid. In fact, for military aid we find a small positive effect. This could reflect the possibility that U.S. soldiers and peacekeepers are sometimes used to help deliver U.S. food aid and that these expenditures enter total U.S. military aid figures. Columns (7) and (8) test whether U.S. food aid crowds out total foreign aid provision by other countries. The columns report estimates of the effect of U.S. food aid on two measures of total net Official Development Assistance (ODA) from non-U.S. donors, both taken from Roodman's (2007) Net Aid Transfers Dataset. The measure of ODA used in column (7) includes loans and grants net of principal and interest payment on existing loans. The measure used in column (8) is also net of cancelled "Other Official Finance" (OOF) loans, which are typically included as ODA. See Roodman (2007) for further details. We find no evidence of aid crowd-out using either measure. The coefficients in both specifications are small in magnitude, positive, and not statistically different from zero.

6.4 Crowding-Out of Domestic Production

A potential mechanism through which food aid may affect conflict is by crowding out domestic production, lowering the potential incomes of farmers, causing them to move into conflict-related activities. Here we examine this mechanism by testing whether U.S. food aid receipts impact local crop prices and whether it affects local production. The production estimates, reported in columns (1) and (2) of Table 10, show that U.S. food aid has no effect on recipient wheat production or recipient cereal production. The estimated effect is negative, but very small in magnitude and statistically insignificant. This finding is consistent with the existing empirical evidence, which generally fails to find a link between food aid and production (Abdulai, Barrett and Hoddinott, 2005; FAO, 2006, pp. 40-41). Columns (3) and (4) present estimates of the impact of U.S. food aid on domestic wheat prices. Column (3) reports estimates for winsorized price data and column (4) reports estimates for log prices.[40] As shown, we find no significant effect of U.S. wheat aid on domestic prices. However, these findings should be interpreted with caution since the limited availability of the price data forces the sample size to be very small.

7 Heterogeneous Effects of Food Aid

The final part of our empirical analysis examines whether the effects of food aid are heterogeneous across different contexts, the results of which can help guide policy discussions and future studies on food aid. To explore potential heterogeneous effects, we allow the impact of U.S. food aid on conflict to differ depending on particular characteristics of countries, measured by I_{ir}. In some cases, the characteristics also vary over time. In these cases the measure is denoted I_{irt}.

Allowing for heterogeneity, the second stage equation becomes:

$$C_{irt} = \beta_1 F_{irt} + \beta_2 \left(F_{irt} \times I_{ir}\right) + \mathbf{X}_{irt}\mathbf{\Gamma} + \varphi_{rt} + \delta_{ir} + \varepsilon_{irt}, \tag{5}$$

where all other variables have the same definitions as in equation (3). Since the direct effect of the indicator variable I_{ir} is absorbed by the country fixed effects, the only difference between equations (5) and (3) is the addition of the interaction term $F_{irt} \times I_{ir}$.

To establish causality, we instrument for F_{irt} and $F_{irt} \times I_{irt}$ with $P_{t-1} \times \overline{D}_{ir}$ and $P_{t-1} \times \overline{D}_{ir} \times I_{ir}$. The double interaction $P_{t-1} \times I_{ir}$ also serves as an additional instrument. Thus the first stage equation for F_{irt} is:

$$F_{irt} = \pi_1 \left(P_{t-1} \times \overline{D}_{ir} \times I_{ir}\right) + \pi_2 \left(P_{t-1} \times \overline{D}_{ir}\right) + \pi_3 \left(P_{t-1} \times I_{ir}\right) + \mathbf{X}_{irt}\mathbf{\Gamma} + \varphi_{rt} + \delta_{ir} + \varepsilon_{irt}. \tag{6}$$

The other first-stage equation, which is for the interaction term $F_{irt} \times I_{ir}$, is identical to

[40] Due to a small number of very extreme prices, examining the raw price data is essentially meaningless. The extreme prices appear to be due to periods of hyperinflation combined with the imprecision of using annual exchange rate and CPI data to construct the price series. For this reason, we undertake two strategies: winsorizing the data at $1000 per MT or taking the natural log of prices to reduce the influence of extreme values. Winsorizing at other reasonable values produces qualitatively identical results to those reported here.

equation (6), but with $F_{irt} \times I_{ir}$ as the dependent variable. In addition to the baseline set of covariates, $\mathbf{X}_{irt}$ also includes the components of the triple interaction (double interactions and direct effects) that are not absorbed by fixed effects (e.g., $\overline{D}_{ir} \times I_{ir}$ and I_{ir} are absorbed by the country fixed effects).[41]

We begin our analysis by examining whether the effects of food aid are more adverse in contexts that are prone to conflict. We create a straightforward proxy for the propensity for peace: an indicator variable that equals one if there was no conflict in the last five, ten, fifteen or twenty years in country i. This proxy varies over time and enters into equations (5) and (6) as I_{irt}.

The estimates are reported in Table 11, where the baseline estimates are reproduced in column (1) for comparison.[42] Columns (2)-(5) report heterogeneous impacts for countries that experienced no conflict in the recent past. All estimates, except the five-year window estimate, are statistically significant. The coefficients of the interaction terms show the differential effect of food aid between countries that experienced no recent conflict recently and countries that experienced some conflict recently. These estimates are negative, indicating that food aid has less adverse effects on conflict in countries that have recently been peaceful. The estimates in columns (2)-(4) are significant at the 10% level. The estimates in columns (2)-(5) are similar in magnitude across different definitions of past conflict. The sum of the coefficients for F_{irt} and $F_{irt} \times I_{irt}$, as well as the standard errors, are reported at the bottom of the table. This reflects the total effect of food aid for countries that have not experienced conflict in the recent past. The combined effects are all close to zero, suggesting that food aid has no effect on conflict in countries that have been peaceful in recent years. In other words, our baseline estimates appear to be driven solely by countries that have a recent history of conflict.

In light of this finding, we consider the influences of factors that may contribute to recent conflict. We focus on factors that emerge most frequently in the literature: income, political institutions, ethnic diversity, and natural resource dependence (Blattman and Miguel, 2010). Most of these covariates of interest either vary little over time and/or are not available for every year of the sample. We therefore examine time-invariant country-level measures by constructing an indicator variable I_{ir} that equals one if the country characteristic (averaged over all time periods, when relevant) is greater than the median among countries in the sample. It is this measure of I_{ir} that is used in equations (5) and (6).

The results are reported in Table 12, where column (1) reproduces the baseline estimates for comparison. We begin by allowing for heterogeneity by average income, measured by real per capita GDP taken from the Penn World Tables. Given the link between income and conflict, a natural hypothesis is that food aid will have smaller effects on civil conflict

[41] When the heterogeneity characteristic does not vary over time, I_{ir} does not include any additional controls. However, when the characteristic varies over time, then I_{irt} and $\overline{D}_{ir} \times I_{irt}$ is also included in $\mathbf{X}_{irt}$ as they are no longer captured by the country fixed effects (as is the case when the interaction term is I_{ir}).

[42] We do not report the first stage estimates for brevity. They are available upon request.

in higher income countries. The estimates, reported in column (2), show that this is not the case. The coefficient for the interaction term is positive and statistically insignificant.

Column (3) examines whether being well endowed with natural resources can influence the relationship between food aid and conflict. We measure resources as the share of resource rents in GDP, which is taken from the World Development Indicators. The influence is *a priori* ambiguous. On the one hand, resource-rich countries are often observed to be prone to conflict and therefore may strengthen the link between food aid and conflict. On the other hand, resource endowments may reduce the importance of food aid for fighting factions, and thus weaken the link between food aid and conflict. The estimates show that the link between food aid and conflict is weaker in more resource rich countries, which is consistent with the latter hypothesis. However, the differential effect is imprecisely estimated.

A lack of democratic accountability has been associated with more civil conflict. In addition, Besley and Persson (2011) show theoretically and empirically, that lack of accountability can magnify the impact of aid on conflict. We therefore examine the differential impact of food aid on conflict among more democratic regimes, measured using the Polity2 variable from the PolityIV database. As reported in column (4), we do not find evidence that the impact of aid on conflict is weaker for democracies. We find a differential effect that is very close to zero and statistically insignificant.

Finally, we investigate the influence of ethnicity, measured by ethnic diversity and ethnic polarization, which have been found to reduce within country cooperation and to be associated with more civil conflict.[43] Columns (5) and (6) show that consistent with these hypotheses, food aid has a weaker impact on the incidence of civil conflict in countries with low ethnic fractionalization and low polarization, although the interaction terms are not significant at standard levels. Since ethnic diversity and polarization are mechanically correlated (especially for low levels of fractionalization), we include both interaction terms in column (7). The estimates are similar as when they are included individually.

The second set of heterogeneous effects that we examine attempt to provide additional insights into specific mechanisms underlying the relationship between food aid and conflict. We first consider the potential adverse impact that food aid has on the incomes of producers of competing cereal crops. We begin by considering the level of domestic cereal production. The effects are *a priori* unclear. On the one hand, increased food aid could lower the cereal prices and reduce agricultural incomes, which could in turn, reduce the opportunity cost of farmers to fight. On the other hand, reduced food prices raise the real wages of non-cereal producers and thus increases their opportunity to fight. The estimates, reported in column (2) of Table 13 is the net all potentially opposing forces. The sign of the coefficient for

[43] Ethnic diversity is found to be negatively associated with public goods provision and positively associated with conflict. See Alesina and Ferrara (2005) for a review of the literature on ethnic diversity. The measure of ethnic diversity is from Alesina et al. (2003) and the measure of polarization is from the Ethnic Power Relations (EPR) Dataset. An alternative source for ethnic polarization is Montalvo and Reynal-Querol (2005). We choose to use the EPR because of its broader coverage of countries (155 versus 137). The results are qualitatively similar if we use the Montalvo and Reynal-Querol (2005) data.

the interaction term suggests that food aid causes more conflict in low cereal producing countries, although the coefficient is imprecisely estimated.

Next, we consider the importance of road networks in recipient countries. This is motivated by first-hand accounts of armed factions stealing aid during transit, often by setting up road blocks. It follows that, all else equal, road-blocks are more effective where transportation networks are less developed since aid deliveries cannot easily circumvent them in the absence of alternative routes. We test this hypothesis by examining the influence of the annual average of kilometers of roads per capita during the sample period. The estimates reported in column (3) show that food aid has a slightly smaller effect, though statistically insignificant, on conflict in countries with developed road networks.

Given the dramatic shift in foreign policy that occurred when the Cold War ended, we also examine the differential effects of food aid for the Cold War and post-Cold War era. Specifically, we investigate whether the shift in U.S. aid policies that occurred with the end of the Cold War (e.g., Meernik, Krueger and Poe, 1998) influences the link between food aid and conflict. Column (4) shows that the interaction of food aid and a Cold War indicator variable is negative, moderate in magnitude, but statistically insignificant. Thus, the evidence is inconclusive.

The last dimension we examine is the political alliance between the recipient country and the United States. This could affect the links between food aid and conflict if, for example, the United States expended more resources (beyond food aid) to protect the food aid from rebel factions for aid that is targeted to its political allies. We measure alliance with the fraction votes that a country shares with the United States in the U.N. General Assembly taken from Gartzke (2006).[44] Column (5) shows that the differential effect for U.S. allies is negative, moderate in size, but statistically insignificant.

In summary, our examination of heterogeneous effects shows that the positive link between food aid and conflict is isolated to countries that have experienced conflict in the recent past. This result, together with the earlier result that the effect of food aid on conflict incidence is primarily due to increased duration and not onset, suggests that food aid increases conflict by prolonging the duration of civil conflict in regions where conflict is endemic. Consistent with this, we find suggestive evidence that some of the factors believed to contribute to the average incidence of conflict, such as ethnic diversity and polarization, strengthen the link between food aid and conflict. Unfortunately, the examination of other factors yields inconclusive results. Part of this is likely due to the limits of our macro-level analysis. Nevertheless, the large (albeit imprecise) coefficients of several of the interaction effects suggest that heterogeneous effects are likely to be important in reality. Thus, an important takeaway from this exercise is that more in-depth analysis of the effects of aid requires finer variation using richer micro-level data. We discuss this issue more in the next

[44] This measure has been used recently by Qian and Yanagizawa-Drott (2009) and Qian and Yanagizawa (2010).

section.

8 Conclusion

Humanitarian aid is an important international policy tool for providing relief for populations that face endemic poverty. However, recent critics observe that humanitarian aid, and food aid in particular, may promote conflict. This controversial topic has already sparked much discussion among aid watchers. Our study aims to facilitate the discussion by providing rigorous causal evidence of the *average* effect of U.S. wheat aid on conflict in recipient countries.

Our findings show that the concerns of critics are very real and that food aid *promotes* civil conflict *on average*. An increase in U.S. food aid increases the incidence and duration of armed civil conflicts in recipient countries. We rule out the alternative explanation that U.S. food aid crowds out other forms of aid or aid from other countries. We also show that food aid's impacts arises due to an increase in the duration, and not onset, of civil conflicts. Consistent with this, we also find that the adverse effects of food aid are concentrated among countries that experienced civil conflict in the recent past.

At face value, our results appear paint a very pessimistic picture of food aid policy. However, there are several important points to keep in mind. First, the fact that food aid has no effect on conflict in countries that have not recently experienced conflict isolates the problematic consequences we detect to a subset of food aid recipients. Second, the fact that the 2SLS estimates of "randomly" allocated aid are larger than the OLS estimates of endogenously allocated aid could be taken as encouraging. Although the downward bias of OLS estimates can arise for many reasons, some of which we outlined in the introduction, one potential source of bias is the selective distribution of aid to places where it has less of an impact on conflict. Thus, one important avenue for future research is to carefully document the different sources of endogeneity that attenuate the OLS estimates and evaluate the effectiveness of selective distribution of aid in helping to alleviate the harmful effects of food aid.

Finally, we emphasize that this study focuses on one negative consequence of food aid. For policymakers, our results should not be interpreted in isolation, but should be taken as one effect among many. Our results do not contradict the evidence for the important benefits of emergency humanitarian aid. As well, it is important to caution that our results should not be extrapolated to other forms of foreign aid.

In summary, this study takes a small first step towards the larger goal of understanding the costs and benefits of food aid and humanitarian aid policies. A better understanding of the tradeoffs would benefit from additional evidence for a range of different outcomes, thus capturing both the potential benefits as well as the costs of food aid. One set of outcomes include those related to health, such as infant mortality. Unfortunately, since existing country-level health data are often interpolated between survey years and vary little over short periods of time, our empirical strategy, which exploits year-to-year variation in aid, cannot easily be applied to study this outcome.[45] It is also important to better understand the mechanisms that underlie the relationship between food aid and conflict. We have attempted to do this to the extent possible given the available data and our macro-level analysis. Collecting finer-grained, micro-level data could be extremely helpful for future research on understanding the effects of food aid.[46]

[45]For example, much of the the data currently reported by the *World Health Organization* or the *World Bank* are constructed by interpolating between years for which actual data are available. In the future, one may be able to apply our strategy to a panel of health outcomes constructed from the *Demographic Health Surveys*. The surveys began too recently to allow the construction of a sufficiently long panel for analysis today. Most of the *Demographic Health Surveys* (DHS) began in the mid-1990s. These surveys record the completed fertility history of women age 15-49. Using this data for our analysis faces two challenges. First, there are very few births from the 1970s and 80s, which means that currently the resulting panel is too short for our statistical analysis. This can be addressed in the future when the constructed panels will naturally be longer, assuming that U.S. food aid policy does not change and our empirical strategy remains valid at that time. Second, the DHS samples are conditional on women being alive during the year of the survey. Since conflict causes mortality, this raises the concern that DHS samples are affected by the incidence of past conflict.

[46]Two examples of recent studies taking a more micro-oriented approach, although examining military and economic aid, are Dube and Naidu (2010) and Crost, Felter and Johnston (2012).

References

Abdulai, Awudu, Christopher B. Barrett, and John Hoddinott. 2005. “Does Food Aid Really Have Disincentive Effects? New Evidence From Sub-Saharan Africa.” *World Development*, 30(10): 1689–1704.

Ahmed, Faisal. 2010. “The Repression Effect.” Mimeo, University of Chicago.

Alesina, Alberto, and David Dollar. 2000. “Who Gives Aid to Whom and Why?” *Journal of Economic Growth*, 5(1): 33–63.

Alesina, Alberto, and Eliana La Ferrara. 2005. “Ethnic Diversity and Economic Performance.” *Journal of Economic Literature*, 43(3): 762–800.

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. 2003. “Fractionalization.” *Journal of Economic Growth*, 8(2): 155–194.

Allison, Paul D. 1984. *Event History Analysis: Regression for Longitudinal Event Data.* London:Sage Publications.

Anderson, Mary B. 1999. *Do No Harm: How Aid Can Support Peace–or War.* Boulder, CO:Lynne Rienner Publishers.

Angrist, Joshua D., and Adriana D. Kugler. 2008. “Rural Windfall or a New Resource Curse? Coca, Income, and Civil Conflict in Colombia.” *Review of Economics and Statistics*, 90(2): 191–215.

Ball, Richard, and Christopher Johnson. 1996. “Political, Economic, and Humanitarian Motivations for PL 480 Food Aid: Evidence from Africa.” *Economic Development and Cultural Change*, 44(4): 515–537.

Barnett, Michael. 2011. *Empire of Humanity: A History of Humanitarianism.* Ithaca:Cornell University Press.

Barrett, Christopher B., and Daniel G. Maxwell. 2005. *Food Aid After Fifty Years: Recasting Its Role.* London:Routledge.

Bauer, Peter T. 1975. “N.H. Stern on Substance and Method in Development Economics.” *Journal of Development Economics*, 2(4): 387–405.

Bazzi, Samuel, and Christopher Blattman. 2011. “Economic Shocks and Conflict: The (Absence of?) Evidence from Commodity Prices.” Mimeo, Yale University.

Beck, Nathaniel, and Jonathan N. Katz. 2004. “Time-Series Cross-Section Issues: Dynamics, 2004.” Mimeo, New York University.

Besley, Timothy J., and Torsten Persson. 2011. "The Logic of Political Violence." *Quarterly Journal of Economics*, 126(3): 1411–1445.

Blattman, Christopher, and Edward Miguel. 2010. "Civil War." *Journal of Economic Literature*, 48(1): 3–57.

Boone, Peter. 1996. "Politics and the Effectiveness of Foreign Aid." *European Economic Review*, 40(2): 289–329.

Bruckner, Markus, and Antonio Ciccone. 2010. "International Commodity Prices, Growth and the Outbreak of Civil War in Sub-Saharan Africa." *Economic Journal*, 120(544): 519–534.

Burnside, Craig, and David Dollar. 2000. "Aid, Policies, and Growth." *American Economic Review*, 90(4): 847–868.

Collier, Paul, and Anke Hoeffler. 2002. "Aid, Policy and Peace: Reducing the Risk of Civil Conflict." *Defence and Peace Economics*, 13(6): 435–450.

Collier, Paul, and Anke Hoeffler. 2004. "Greed and Grievance in Civil War." *Oxford Economic Papers*, 56(4): 563–95.

Crost, Benjamin, Joseph Felter, and Patrick B. Johnston. 2012. "Aid Under Fire: Development Projects and Civil Conflict." Mimeo, UC Berkeley.

Dell, Melissa, Benjamin F. Jones, and Benjamin A. Olken. 2008. "Climate Shocks and Economic Growth: Evidence from the Last Half Century." Mimeo, MIT.

de Ree, Joppe, and Eleonora Nillesen. 2009. "Aiding Violence or Peace? The Impact of Foreign Aid on the Risk of Civil Conflict in Sub-Saharan Africa." *Journal of Development Economics*, 88(2): 301–313.

de Waal, Alex. 1997. *Famine Crimes: Politics and the Disaster Relief Industry in Africa.* Bloomington:Indiana University Press.

Dube, Oeindrila, and Juan F. Vargas. 2009. "Commodity Price Shocks and Civil Conflict: Evidence from Colombia." Mimeo, NYU.

Dube, Oeindrila, and Suresh Naidu. 2010. "Bases, Bullets, and Ballots: The Effect of U.S. Military Aid on Political Conflict in Colombia." Center for Global Development Working Paper 197.

Easterly, William. 2003. "Can Foreign Aid Buy Growth?" *Journal of Economic Perspectives*, 17(3): 23–48.

Easterly, William, Ross Levine, and David Roodman. 2004. "New Data, New Doubts: A Comment on Burnside and Dollar's 'Aid, Policies, and Growth' (2000)." *American Economic Review*, 94(3): 774–780.

FAO. 2006. "The State of Food and Agriculture: Food Aid for Food Security." FAO Agricultural Series No. 37.

Fearon, James D., and David D. Laitin. 2003. "Ethnicity, Insurgency, and Civil War." *American Political Science Review*, 97(1): 75–90.

Gartzke, Erik. 2006. "The Affinity of Nations Index, 1946-2002." Mimeo, Columbia University.

Jenkins, Stephen P. 1995. "Easy Estimation Methods for Discrete-Time Duration Model." *Oxford Bulletin of Economics and Statistics*, 57(1): 129–138.

Judson, Ruth A., and Ann L. Owen. 1999. "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists." *Economics Letters*, 65(1): 9–15.

Kahn, Clea, and Elena Lucchi. 2009. "Are Humanitarians Fuelling Conflicts? Evidence from Eastern Chad and Darfur." *Humanitarian Exchange*, 43: 20–27.

Kirwan, Barret, and Margaret McMillan. 2007. "Food Aid and Poverty." *American Journal of Agricultural Economics*, 89(5): 1152–1160.

Kuziemko, Ilyana, and Eric Werker. 2006. "How Much is a Seat on the Security Council Worth? Foreign Aid and Bribery at the United Nations." *Journal of Political Economy*, 114(5): 905–930.

Lavy, Victor. 1992. "Alleviating Transitory Food Crises in Sub-Saharan Africa: International Altruism and Trade." *World Bank Economic Review*, 6(1): 125–138.

Levinsohn, James, and Margaret McMillan. 2007. "Does Food Aid Harm the Poor? Household Evidence from Ethiopia." In *Globalization and Poverty.* , ed. Anne Harrison, 561–598. University of Chicago Press.

Lischer, Sarah Kenyon. 2005. *Dangerous Sanctuaries: Refugee Camps, Civil War, and the Dilemmas of Humanitarian Aid.* Ithaca, NY:Cornell University Press.

MacFarquhar, Neil. 2010. "Threats Lead Food Agency to Curtail Aid in Somalia." *New York Times.*

Matsuura, Kenji, and Cort Willmott. 2007. "Terrestrial Air Temperature and Precipitation: 1900-2006 Gridded Monthly Time Series, Version 1.01." University of Delaware. `http://climate.geog.udel.edu/climate/`.

Meernik, James, Eric L. Krueger, and Steven C. Poe. 1998. "Testing Models of U.S. Foreign Policy: Foreign Aid During and After the Cold War." *Journal of Politics*, 60(1): 63–85.

Miguel, Edward, Shanker Satyanath, and Ernest Sergenti. 2004. "Economic Shocks and Civil Conflict: An Instrumental Variables Approach." *Journal of Political Economy*, 112(4): 725–753.

Montalvo, José G., and Marta Reynal-Querol. 2005. "Ethnic Polarization, Potential Conflict, and Civil Wars." *American Economic Review*, 95(3): 796–816.

Nickell, Stephen J. 1981. "Biases in Dynamic Models with Fixed Effects." *Econometrica*, 49(6): 1417–26.

Nunn, Nathan, and Nancy Qian. 2010. "The Determinants of Food Aid Provisions to Africa and the Developing World." NBER Working Paper 16610.

Pedersen, Karl. 1996. "Aid, Investment and Incentives." *Scandinavian Journal of Economics*, 98(3): 423–437.

Perlez, Jane. 1992. "Somalia Aid Workers Split on Troops." *New York Times*, A14.

Polman, Linda. 2010. *The Crisis Caravan: What's Wrong with Humanitarian Aid?* New York:Henry Holt and Co.

Qian, Nancy, and David Yanagizawa. 2010. "Watchdog or Lapdog? Media and the U.S. Government." NBER Working Paper 15738.

Qian, Nancy, and David Yanagizawa-Drott. 2009. "The Strategic Determinants of US Human Rights Reporting: Evidence from the Cold War." *Journal of the European Economic Association*, 7(2-3): pp. 446–457.

Quisumbing, Agnes R. 2003. "Food Aid and Child Nutrition in Rural Ethiopia." IFPRI FCND Discussion Paper 158.

Rivers, Douglas, and Quang H. Vuong. 1988. "Limited Information Estimators and Exogeneity Tests for Simultaneous Probit Models." *Journal of Econometrics*, 39(3): 347–366.

Roodman, David. 2007. "An Index of Donor Performance." Center for Global Development Working Paper No. 67.

Sachs, Jeffrey. 2006. *The End of Poverty: Economic Possibilities of Our Time.* New York:Penguin Books.

Stern, Nicholas H. 1974. "Professor Bauer on Development: A Review Article." *Journal of Development Economics*, 1(3): 191–211.

Svensson, J. 1999. "Aid, Growth and Democracy." *Economics and Politics*, 11(3): 275–297.

Terry, Fiona. 2002. *Condemned to Repeat: The Paradox of Humanitarian Action.* Ithaca, NY:Cornell University Press.

Thurow, Roger, and Scott Kilman. 2009. *Enough: Why the World's Poorest Starve in an Age of Plenty.* New York:Public Affairs.

United Nations Security Council. 2010. "Report of the Monitoring Group on Somalia Pursuant to Security Council Resolution 1853."

Uvin, Peter. 1998. *Aiding Violence: The Development Enterprise in Rwanda.* West Hartford, CT:Kumarian Press.

Werker, Eric, Faisal Ahmed, and Charles Cohen. 2009. "How is Foreign Aid Spent? Evidence from a Natural Experiment." *American Economic Journal: Macroeconomics*, 1(2): 225–244.

Yamano, Takashi, Harold Alderman, and Luc Christiaensen. 2005. "Child Growth, Shocks, and Food Aid in Rural Ethiopia." *American Journal of Agricultural Economics*, 2(5): 273–288.

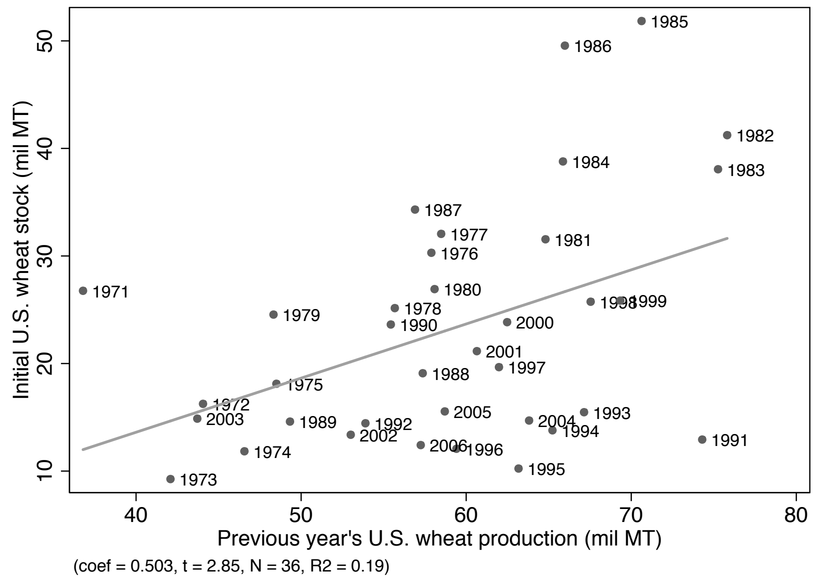

Figure 1: U.S. Wheat Reserves and Lagged U.S. Wheat Production

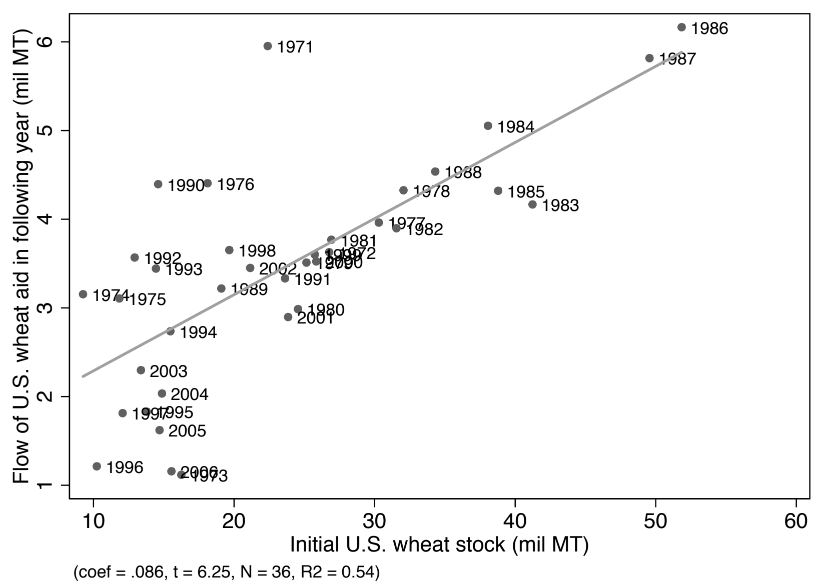

Figure 2: U.S. Wheat Aid and Initial U.S. Wheat Reserves

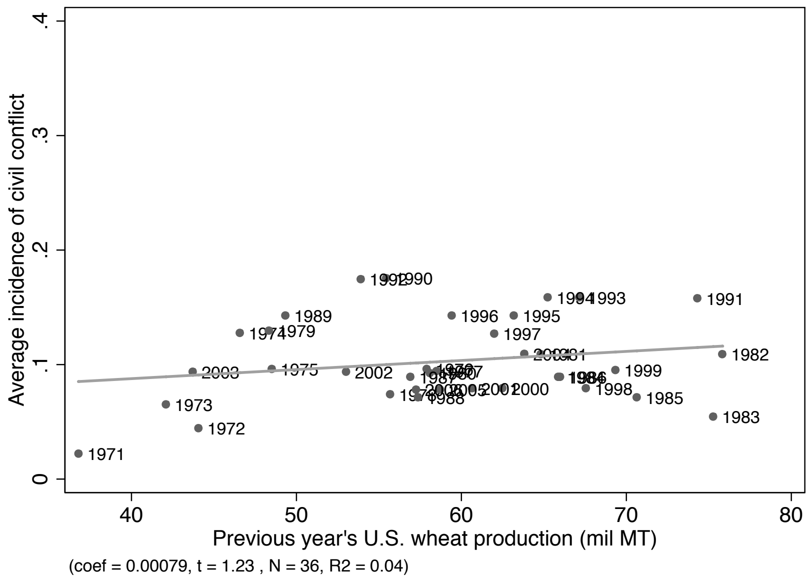

Figure 3: Average Civil Conflict Incidence and Lagged U.S. Wheat Production – Irregular Recipients: $\overline{D}_{ir} < 0.30$

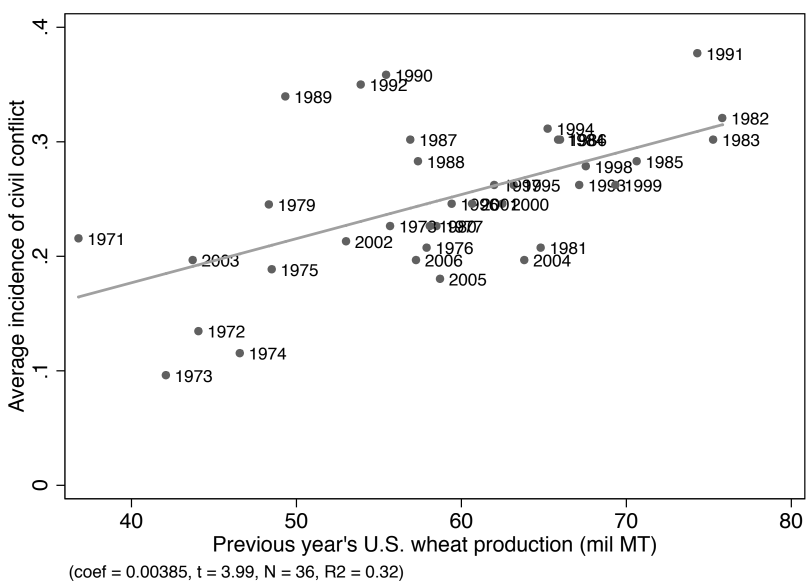

Figure 4: Average Civil Conflict Incidence and Lagged U.S. Wheat Production – Regular Recipients: $\overline{D}_{ir} \geq 0.30$

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.
Conflicts (25+ battle deaths):			
Any Conflict	4,089	0.217	0.412
Intra State Conflict	4,089	0.176	0.381
Inter State Conflict	4,089	0.026	0.160
Onset of Intra State Conflict (all observations)	4,089	0.034	0.181
Onset of Intra State Conflict (observations that follow no-conflict only)	3,377	0.041	0.199
Onset of Intra State Conflict (Hazard Model Sample)	1,454	0.063	0.242
Offset of Intra State Conflict (Hazard Model Sample)	709	0.185	0.391
U.S. Wheat Aid (1000 MT)	4,089	27.61	116.61
Frequency of Receiving Any U.S Food Aid	4,089	0.374	0.312
Lagged U.S. Wheat Production (1000 MT)	4,089	59,053	9,176

Notes: An observation is a country and year. The sample includes 125 non-OECD countries for the years 1971-2006.

Table 2: The Effect of Food Aid on Conflict: Baseline Specification with $P_{t-1} \times \overline{D}_{ir}$ as the Instrument

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Parsimonious Specifications				Baseline Specification		
Dependent Variable (Panels A, B and C):	Any Conflict	Any Conflict	Any Conflict	Any Conflict	Any Conflict	Intra State	Inter State
	A. OLS Estimates						
U.S. Wheat Aid (1000 MT)	-0.00006	-0.00007	-0.00005	-0.00007	-0.00011	-0.00005	-0.00011
	(0.00018)	(0.00018)	(0.00017)	(0.00017)	(0.00017)	(0.00017)	(0.00004)
R-squared	0.508	0.508	0.518	0.534	0.549	0.523	0.385
	B. Reduced Form Estimates (x 1000)**						
Lag U.S. Wheat Production (1000 MT) x Avg Prob of Any U.S. Food Aid	0.00829	0.01039	0.01070	0.01133	0.01071	0.00909	-0.00158
	(0.00257)	(0.00263)	(0.00262)	(0.00318)	(0.00320)	(0.00322)	(0.00121)
R-squared	0.511	0.512	0.521	0.536	0.551	0.525	0.382
	C. 2SLS Estimates						
U.S. Wheat Aid (1000 MT)	0.00364	0.00303	0.00312	0.00343	0.00299	0.00254	-0.00044
	(0.00174)	(0.00125)	(0.00117)	(0.00106)	(0.00096)	(0.00088)	(0.00033)
	D. First Stage Estimates						
Dependent Variable (Panel D):	U.S. Wheat Aid (1000 MT)						
Lag U.S. Wheat Production (1000 MT) x Avg Prob of Any U.S. Food Aid	0.00227	0.00343	0.00343	0.00330	0.00358	0.00358	0.00358
	(0.00094)	(0.00126)	(0.00120)	(0.00092)	(0.00103)	(0.00103)	(0.00103)
Cragg-Donald *F*-Statistic	19.96	39.11	37.46	25.94	28.81	28.81	28.81
Controls (for all panels):							
Country FE	Y	Y	Y	Y	Y	Y	Y
Region-Year FE	Y	Y	Y	Y	Y	Y	Y
U.S. Real Per Capita GDP x Avg Prob of Any U.S. Food Aid	N	Y	Y	Y	Y	Y	Y
U.S. Democratic President x Avg Prob of Any U.S. Food Aid	N	Y	Y	Y	Y	Y	Y
Oil Price x Avg Prob of Any U.S. Food Aid	N	Y	Y	Y	Y	Y	Y
Monthly Recipient Temperature and Precipitation	N	N	Y	Y	Y	Y	Y
Monthly Weather x Avg Prob of Any U.S. Food Aid	N	N	Y	Y	Y	Y	Y
Avg U.S. Military Aid x Year FE	N	N	N	Y	Y	Y	Y
Avg U.S. Economic Aid (Net of Food Aid) x Year FE	N	N	N	Y	Y	Y	Y
Avg Recipient Cereal Imports x Year FE	N	N	N	N	Y	Y	Y
Avg Recipient Cereal Production x Year FE	N	N	N	N	Y	Y	Y
Observations (for all panels)	4,089	4,089	4,089	4,089	4,089	4,089	4,089

Notes: An observation is a country and a year. The sample includes 125 non-OECD countries for the years 1971-2006. The controls included are indicated in the table by Y (yes) or N (no). Standard errors are clustered at the country level. **In panel B, the point estimates and standard errors are multiplied by 1000 for presentation purposes. In panel D, we report first-stage Cragg-Donald *F*-statistics. The Stock-Yogo critical values (with a 5% significance level) are 8.96 and 16.38 for 15 and 10% maximum bias in size, respectively.

Table 3: The Effect of Food Aid on Conflict: Alternative Specification with P_{t-1} as the Instrument

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Parsimonious Specifications				Baseline Specification		
Dependent Variable (Panels A, B and C):	Any Conflict	Any Conflict	Any Conflict	Any Conflict	Any Conflict	Intra State	Inter State
	A. OLS Estimates						
U.S. Wheat Aid (1000 MT)	-0.00000	0.00000	0.00000	0.00000	-0.00000	0.00006	-0.00004
	(0.00019)	(0.00019)	(0.00019)	(0.00019)	(0.00020)	(0.00019)	(0.00003)
R-squared	0.477	0.477	0.481	0.483	0.485	0.460	0.245
	B. Reduced Form Estimates (x 1000)**						
Lag U.S. Wheat Production (1000 MT) x Avg Prob of Any U.S. Food Aid	0.00224	0.00254	0.00254	0.00251	0.00255	0.00183	0.00087
	(0.00078)	(0.00087)	(0.00086)	(0.00086)	(0.00086)	(0.00081)	(0.00042)
R-squared	0.479	0.480	0.483	0.485	0.488	0.461	0.246
	C. 2SLS Estimates						
U.S. Wheat Aid (1000 MT)	0.00506	0.00389	0.00365	0.00365	0.00388	0.00280	0.00130
	(0.00386)	(0.00223)	(0.00204)	(0.00202)	(0.00228)	(0.00165)	(0.00096)
	D. First Stage Estimates						
Dependent Variable (Panel D):	U.S. Wheat Aid (1000 MT)						
Lag U.S. Wheat Production (1000 MT)	0.000443	0.000670	0.000697	0.000699	0.000696	0.000696	0.000696
	(0.000327)	(0.000359)	(0.000374)	(0.000377)	(0.000380)	(0.000380)	(0.000380)
Cragg-Donald *F*-Statistic	8.25	15.17	15.90	14.47	14.79	14.79	14.79
Controls (for all panels):							
Country FE	Y	Y	Y	Y	Y	Y	Y
Region-Year FE	Y	Y	Y	Y	Y	Y	Y
U.S. Real Per Capita GDP	N	Y	Y	Y	Y	Y	Y
U.S. Democratic President	N	Y	Y	Y	Y	Y	Y
Oil Price	N	Y	Y	Y	Y	Y	Y
Monthly Recipient Temperature and Precipitation	N	N	Y	Y	Y	Y	Y
Avg U.S. Military Aid x Region-Specific Time Trend	N	N	N	Y	Y	Y	Y
Avg U.S. Economic Aid x Region-Specific Time Trend	N	N	N	Y	Y	Y	Y
Avg Recipient Cereal Imports x Region-Specific Time Trend	N	N	N	N	Y	Y	Y
Avg Recipient Cereal Production x Region-Specific Time Trend	N	N	N	N	Y	Y	Y
Observations (for all panels)	4,089	4,089	4,089	4,089	4,089	4,089	4,089

Notes: An observation is a country and a year. The sample includes 125 non-OECD countries for the years 1971-2006. The controls included are indicated in the table by Y (yes) or N (no). Standard errors are clustered at the country level. **In panel B, the point estimates and standard errors are multiplied by 1000 for presentation purposes. In Panel C, we also report Conditional Likelihood Ratio (CLR) 95% confidence intervals. In panel D, we also report first-stage Cragg-Donald *F*-statistics. The Stock-Yogo critical values (with a 5% significance level) are 8.96 and 16.38 for 15 and 10% maximum bias in size, respectively. "Avg U.S. Economic Aid" is net of food aid.

Table 4: The Effect of Food Aid on Conflict: Controlling for a Lagged Dependent Variable

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Parsimonious Specifications				Baseline Specification		
Dependent Variable (Panels A, B and C):	Any Conflict	Any Conflict	Any Conflict	Any Conflict	Any Conflict	Intra State	Inter State
	A. OLS Estimates						
U.S. Wheat Aid (1000 MT)	-0.00003	-0.00004	-0.00003	-0.00004	-0.00006	-0.00004	-0.00006
	(0.00008)	(0.00008)	(0.00008)	(0.00008)	(0.00008)	(0.00008)	(0.00003)
R-squared	0.664	0.665	0.669	0.677	0.684	0.677	0.470
	B. Reduced Form Estimates (x 1000)**						
Lag U.S. Wheat Production (1000 MT) x Avg Prob of Any U.S. Food Aid	0.00435	0.00593	0.00607	0.00688	0.00640	0.00560	-0.00110
	(0.00144)	(0.00149)	(0.00155)	(0.00204)	(0.00207)	(0.00214)	(0.00085)
R-squared	0.665	0.666	0.670	0.678	0.685	0.678	0.469
	C. 2SLS Estimates						
U.S. Wheat Aid (1000 MT)	0.00187	0.00171	0.00176	0.00207	0.00177	0.00157	-0.00031
	(0.00088)	(0.00070)	(0.00066)	(0.00067)	(0.00061)	(0.00062)	(0.00026)
	D. First Stage Estimates						
Dependent Variable (Panel D):	U.S. Wheat Aid (1000 MT)						
Lag U.S. Wheat Production (1000 MT) x Avg Prob of Any U.S. Food Aid	0.00233	0.00347	0.00346	0.00332	0.00362	0.00349	0.00357
	(0.00103)	(0.00136)	(0.00127)	(0.00098)	(0.00111)	(0.00099)	(0.00109)
Cragg-Donald *F*-Statistic	20.47	39.55	37.54	25.96	29.12	28.23	27.20
Controls (for all panels):							
Lagged Dependent Variable	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y
Region-Year FE	Y	Y	Y	Y	Y	Y	Y
U.S. Real Per Capita GDP x Avg Prob of Any U.S. Food Aid	N	Y	Y	Y	Y	Y	Y
U.S. Democratic President x Avg Prob of Any U.S. Food Aid	N	Y	Y	Y	Y	Y	Y
Oil Price x Avg Prob of Any U.S. Food Aid	N	Y	Y	Y	Y	Y	Y
Monthly Recipient Temperature and Precipitation	N	N	Y	Y	Y	Y	Y
Monthly Weather x Avg Prob of Any U.S. Food Aid	N	N	Y	Y	Y	Y	Y
Avg U.S. Military Aid x Year FE	N	N	N	Y	Y	Y	Y
Avg U.S. Economic Aid (Net of Food Aid) x Year FE	N	N	N	Y	Y	Y	Y
Avg Recipient Cereal Imports x Year FE	N	N	N	N	Y	Y	Y
Avg Recipient Cereal Production x Year FE	N	N	N	N	Y	Y	Y
Observations (for all panels)	4,071	4,071	4,071	4,071	4,071	4,071	4,071

Notes: An observation is a country and a year. The sample includes 125 non-OECD countries for the years 1971-2006. The controls included are indicated in the table by Y (yes) or N (no). Standard errors are clustered at the country level. **In panel B, the point estimates and standard errors are multiplied by 1000 for presentation purposes. In Panel C, we also report Conditional Likelihood Ratio (CLR) 95% confidence intervals. In panel D, we also report first-stage Cragg-Donald *F*-statistics. The Stock-Yogo critical values (with a 5% significance level) are 8.96 and 16.38 for 15 and 10% maximum bias in size, respectively.

Table 5: Reduced Form Estimates of the Effect of Placebo Instruments on Civil Conflict

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Reduced Form Estimates (x 1000)**. Dependent variable: Incidence of intra-state conflict										
Crop used for instrument:	Wheat	Oranges	Grapes	Lettuce	Cotton lint	Onions	Grapefruit	Cabbages	Watermelons	Carrots & Turnips	Peaches & Nectarines
Mean production, 1971-2006	[59,316]	[9,070]	[5,145]	[3,432]	[3,350]	[2,394]	[2,268]	[1,596]	[1,428]	[1,395]	[1,331]
Lag U.S. Production (1000 MT) x Avg Prob of Any U.S. Food Aid	0.00909	-0.01977	0.04829	-0.07371	-0.03456	-0.09759	-0.00588	-0.08000	-0.34902	-0.22736	0.17813
	(0.00322)	(0.01960)	(0.03094)	(0.10535)	(0.04588)	(0.15061)	(0.08511)	(0.07137)	(0.20577)	(0.13532)	(0.17234)
Standardized beta coefficient	0.452	-0.154	0.212	-0.218	-0.101	-0.210	-0.011	-0.114	-0.430	-0.288	0.198
R-squared	0.525	0.526	0.526	0.526	0.526	0.526	0.525	0.526	0.526	0.526	0.526
Observations	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089

Notes: An observation is a country and a year. The sample includes 125 non-OECD countries for the years 1971-2006. All regressions include the full set of baseline controls (see Table 2 columns (5)-(7) for a full list). Standard errors are clustered at the country level. **The point estimates and standard errors are multiplied by 1000 for presentation purposes. "Onions" are bulb onions and do not include shallots or green onions.

Table 6: The Effect of Food Aid on Civil Conflict: Robustness to Alternative Specifications

	Dependent Variable: Incidence of Civil Conflict									
	Baseline specification	Instrument: Lagged U.S. Wheat Prod x lagged 1-year Food Aid Prob	Instrument: Lagged U.S. Wheat Prod x Lagged 2-year Avg Food Aid Prob	Instrument: Lagged U.S. Wheat Prod x Lagged 4-year Avg Food Aid Prob	Normalizing U.S. wheat aid by population	Taking natural logs of U.S. wheat aid and production	Dropping former Soviet Union countries	Dropping years 1971-1973	Including lagged U.S. Wheat Aid	Including a lead of U.S. Wheat Aid
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
U.S. Wheat Aid (1,000 MT)	0.00254	0.00284	0.00274	0.00284	0.0351	0.165	0.00266	0.00272	0.00439	0.00368
	(0.00088)	(0.00164)	(0.00149)	(0.00159)	(0.0145)	(0.0541)	(0.00091)	(0.00108)	(0.00262)	(0.00289)
U.S. Wheat Aid (year *t*-1)									-0.00289	
									(0.00335)	
U.S. Wheat Aid (year *t*+1)										-0.00112
										(0.00316)
Standardized beta coefficient	0.777	0.866	0.834	0.621	0.681	0.760	0.828	0.837	1.342	1.140
Observations	4,089	3,980	3,870	3,647	4,089	4,089	3,858	3,798	3,980	3,964

Notes: 2SLS estimates are reported. The sample includes 125 non-OECD countries for the years 1971-2006. In columns (1) and (6)-(7), U.S. Wheat Aid in year *t* is instrumented by U.S. wheat production in year *t*-1 x the frequency of receiving any U.S. food aid during 1971-2006. The regressions include the full set of baseline controls. See Table 2, columns (5)-(7) for a list. Coefficients are reported with standard errors clustered at the country level. The table also reports standardized `beta coefficients' for U.S. Wheat Aid.

Table 7: The Effect of Food Aid on Civil Conflict Onset and Duration

	Dependent variable:							
	Civil war onset		Civil war onset			Civil war offset		
	Collier and Hoefler (2004)	Fearon and Laitin (2003)	Logistic Discrete Time Hazard Model			Logistic Discrete Time Hazard Model		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean of Dependent Variable	0.041	0.034	0.063	0.063	0.063	0.185	0.185	0.185
U.S. Wheat Aid (1,000 MT)	0.00102	0.00061	0.000064	-0.000038	-0.000012	-0.000428	-0.000507	-0.000672
(Mean = 27.61)	(0.00088)	(0.00047)	(0.000256)	(0.000241)	(0.000304)	(0.000249)	(0.000224)	(0.000345)
Controls:								
Lagged civil conflict incidence	N	Y	n/a	n/a	n/a	n/a	n/a	n/a
Third-order poly of duration	n/a	n/a	Y	Y	Y	Y	Y	Y
All time-invariant controls	n/a	n/a	N	Y	Y	N	Y	Y
Region fixed effects	n/a	n/a	N	N	Y	N	N	Y
Observations	3,377	4,089	1,454	1,454	1,454	709	709	709

Notes: In all specifications, U.S. Wheat Aid in year *t* is instrumented by U.S. wheat production in year *t*-1 x the probability of receiving any U.S. food aid between 1971 and 2006. In columns (1) and (2), the dependent variable is an indicator that equals one for the onset of a civil war. Both specifications include the full set of baseline covariates. See columns (5)-(7) of Table 2 for a list of these variables. In column (1), observations that are periods of continued conflict are omitted from the sample. The regression in column (2) includes a one-year lag in the incidence of civil conflict as an additional control variable and uses the full sample. Columns (3)-(5) estimate a discrete time hazard model for the incidence of civil war onset. In this setting, survival is continued peace. Columns (6)-(8) estimate a discrete time hazard model for the incidence of civil war offset. In this setting, survival is continued conflict. The coefficients reported in columns (3)-(8) are marginal effects evaluated at means. The control function approach is used to generate IV estimates for the hazard models.

Table 8: The Effect of Food Aid on Small- and Large-Scale Conflicts

	Dependent Variable: Incidence of Conflict								
	All Wars: 25+ Battle Deaths			Small Wars Only: 25-999 battle deaths			Large Wars Only: 1000+ battle deaths		
	Any	Intra State	Inter State	Any	Intra State	Inter State	Any	Intra State	Inter State
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mean of Dep. Variable	0.217	0.176	0.026	0.141	0.120	0.012	0.076	0.056	0.014
U.S. Wheat Aid (1,000 MT)	0.00299	0.00254	-0.00044	0.00170	0.00164	-0.00006	0.00129	0.00090	-0.00038
	(0.00096)	(0.00088)	(0.00033)	(0.00097)	(0.00094)	(0.00016)	(0.00098)	(0.00092)	(0.00035)
Observations	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089

Notes: 2SLS estimates are reported. The sample includes 125 non-OECD countries for the years 1971-2006. U.S. Wheat Aid in year *t* is instrumented by U.S. wheat production in year *t*-1 x the average probability of receiving any U.S. food aid during 1971-2006. All regressions include the full set of baseline controls - see Table 2 columns (5)-(7) for a complete list. Coefficients are reported with standard errors clustered at the country level.

Table 9: The Effect of Food Aid on Other Aid

	Dependent Variable:							
	World wheat aid (1000 MT)	World cereal aid (1000 MT)	Non-U.S. wheat aid (1000 MT)	Non-U.S. cereal aid (1000 MT)	U.S. military aid (1000 real USD)	U.S. economic aid excl. food aid (1000 real USD)	Non-U.S. net ODA (1000 real USD)	Non-U.S. net ODA 2 (1000 real USD)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mean of Dep. Variable	42.06	63.21	13.56	18.82	34,060	60,283	430,128	407,748
U.S. Wheat Aid (1000 MT)	1.226	1.211	0.233	0.133	1,073	776.1	1,923	1,443
(Mean = 27.61)	(0.132)	(0.304)	(0.129)	(0.185)	(484.3)	(639.2)	(1,308)	(933.5)
Observations	4,089	4,089	4,089	4,089	4,089	4,089	4,089	4,089

Notes: 2SLS estimates are reported. The sample includes 125 non-OECD countries for the years 1971-2006. U.S. Wheat Aid in year t is instrumented by U.S. wheat production in year t-1 x the probability of receiving any U.S. food aid during 1971-2006. All regressions control for the full set of baseline controls - see Table 2 columns (5)-(7) for a full list. Coefficients are reported with standard errors clustered at the country level.

Table 10: The Effect of Food Aid on Recipient Country Cereal Production

	Dependent Variable:			
	Recipient wheat production (1000 MT)	Recipient cereals production (1000 MT)	Recipient wheat price (Windsorized)	Recipient wheat price (natural log)
	(1)	(2)	(3)	(4)
Mean of Dep. Variable	4,178.6	10,162.5	527.3	7.77
U.S. Wheat Aid (1000 MT)	-7.206	-7.177	-0.329	-0.0009
(Mean = 27.61)	(5.735)	(9.721)	(0.446)	(0.0039)
Observations	2,368	3,736	1,737	1,737

Notes: 2SLS estimates are reported. The sample includes a maximum 125 non-OECD countries for the years 1971-2006. Due to missing production and price data, the samples are smaller than 4,089 observations. U.S. Wheat Aid in year *t* is instrumented by U.S. wheat production in year *t*-1 x the probability of receiving any U.S. food aid during 1971-2006. All regressions control for the full set of baseline controls (see Table 2 columns (5)-(7) for a full list). Coefficients are reported with standard errors clustered at the country level.

Table 11: Heterogeneous Effects of Food Aid on Civil Conflict: Conflict Prior to Food Aid

	Dependent Variable: Incidence of Civil Conflict				
	(1)	(2)	(3)	(4)	(5)
		20yr window	15yr window	10yr window	5yr window
U.S. Wheat Aid (1000 MT)	0.00332	0.00394	0.00436	0.00394	0.00395
	(0.00158)	(0.00216)	(0.00217)	(0.00228)	(0.00398)
U.S. Wheat Aid x No Past Conflict		-0.00541	-0.00691	-0.00622	-0.00480
		(0.00332)	(0.00397)	(0.00383)	(0.00448)
U.S. Wheat Aid + (U.S. Wheat Aid x No Past Conflict)		-0.00147	-0.00255	-0.00229	-0.00085
		(0.00212)	(0.00329)	(0.00291)	(0.00129)
Observations	4,071	4,071	4,071	4,071	4,071

Notes: 2SLS estimates are reported. The baseline sample in column (1) includes 125 non-OECD countries for the years 1971-2006. The sample size in columns (2)-(5) is slightly smaller due to the availability of past conflict data. U.S. Wheat Aid in year *t* and the interaction of wheat aid and the indicator variable are instrumented with U.S. wheat production in year *t-1* x the probability of receiving any U.S. food aid during 1971-2006, and the triple interaction of the indicator x U.S. wheat production in year *t-1* x the probability of receiving any U.S. food aid during 1971-2006. The regressions also include the relevant double interaction terms. All regressions control for the full set of baseline controls (see Table 2 columns (5)-(7) for the full list). Coefficients are reported with standard errors clustered at the country level. The joint estimate for U.S. wheat aid + U.S. wheat aid x No Past Conflict Indicator, and their *p*-values, are reported in the final row of the table.

Table 12: Heterogeneous Effects of Food Aid on Civil Conflict: Potential Contributors to Civil Conflict

	Dependent Variable: Incidence of Civil Conflict						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
U.S. Wheat Aid (1000 MT)	0.00254	0.00155	0.00270	0.00222	0.00516	0.00770	0.00606
	(0.00096)	(0.00090)	(0.00111)	(0.00141)	(0.00250)	(0.00650)	(0.00291)
U.S. Wheat Aid x Indicator for:							
High income		0.00305					
		(0.00305)					
High Resource Dependence			-0.00030				
			(0.00224)				
High Polity (Democratic)				0.00043			
				(0.00268)			
Low Ethnic Polarization					-0.00469		-0.00372
					(0.00279)		(0.00472)
Low Ethnic Diversity						-0.00743	-0.00270
						(0.00787)	(0.00569)
U.S. Wheat Aid + (U.S. Wheat Aid x Indicator)		0.00460	0.00240	0.00266	0.00047	0.00027	-0.00037
		(0.00276)	(0.00182)	(0.00189)	(0.00091)	(0.00157)	(0.00032)
Observations	4,089	4,089	4,089	3,942	3,635	4,048	3,594

Notes: 2SLS estimates are reported. The baseline sample in column (1) includes 125 non-OECD countries for the years 1971-2006. The sample size in columns (2)-(7) varies according to data availability. U.S. Wheat Aid in year *t* and the interaction of wheat aid and the indicator variable are instrumented with U.S. wheat production in year *t-1* x the probability of receiving any U.S. food aid during 1971-2006, and the triple interaction of the indicator x U.S. wheat production in year *t-1* x the probability of receiving any U.S. food aid during 1971-2006. The regressions also include the relevant double interaction terms. All regressions control for the full set of baseline controls - see Table 2 columns (5)-(7) for the full list. Coefficients are reported with standard errors clustered at the country level. The joint estimates for U.S. wheat aid + U.S. wheat aid x indicator variable (and the standard error) are reported in the final row of the table.

Table 13: Heterogeneous Effects of Food Aid on Civil Conflict: Potential Contributors to Food Aid Misappropriation

	Dependent Variable: Incidence of Civil Conflict				
	(1)	(2)	(3)	(4)	(5)
U.S. Wheat Aid (1000 MT)	0.00254	0.00186	0.00248	0.00353	0.00266
	(0.00096)	(0.00107)	(0.00130)	(0.00143)	(0.00131)
U.S. Wheat Aid x Indicator for:					
Low Cereal Producer		0.00231			
		(0.00286)			
High Road Density			-0.00126		
			(0.00300)		
Cold War Years				-0.00172	
				(0.00129)	
Aligned with the U.S. (U.N. voting)					-0.00117
					(0.00311)
U.S. Wheat Aid + (U.S. Wheat Aid x Indicator)		0.00418	0.00121	0.00182	0.00149
		(0.00248)	(0.00214)	(0.00078)	(0.00226)
Observations	4,089	4,089	4,084	4,089	4,084

Notes: 2SLS estimates are reported. The baseline sample in column (1) includes 125 non-OECD countries for the years 1971-2006. The sample size in columns (2)-(7) varies according to data availability. U.S. Wheat Aid in year *t* and the interaction of wheat aid and the indicator variable are instrumented with U.S. wheat production in year *t-1* x the probability of receiving any U.S. food aid during 1971-2006, and the triple interaction of the indicator x U.S. wheat production in year *t-1* x the probability of receiving any U.S. food aid during 1971-2006. The regressions also include the relevant double interaction terms. All regressions control for the full set of baseline controls (see Table 2 columns (5)-(7) for the full list). Coefficients are reported with standard errors clustered at the country level. The joint estimates for U.S. wheat aid + U.S. wheat aid x indicator variable (and the standard error) are reported in the final row of the table.