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FOOD AID TO SUB-SAHARAN AFRICA: FUNGIBILITY AND EFFECTS ON
MALNUTRITION

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ABSTRACT

Sub-Saharan Africa is the most food insecure region in the entire world, and is one of the largest recipients of international food aid. However, there is no conclusion yet on the effectiveness of food aid. Some believe food aid to be effective, others do not, and some believe food aid is effective only under certain conditions. One primary drawback of existing studies is the overlook of heterogeneity among different types of food aid. I argue that one key factor that determines the effectiveness of food aid is its fungibility. Fungible is an adjective describing goods; being of such a nature as to be freely exchangeable or replaceable. Food aid that is less fungible is more difficult to convert into cash or other goods. I argue that food aid with lower levels of fungibility (such as Emergency Food Aid) is more likely to lower malnutrition indicators in recipient countries rather than food aid with higher levels of fungibility (such as Project and Program Food Aid). To test my argument, I have collected a dataset of sub-Saharan countries from 1988 to 2012. Empirical results show that Emergency Food Aid does indeed have a significant positive impact on malnutrition indicators in Sub-Saharan Africa; Project Aid has no significant impact on these indicators; and Program Food Aid has a negative impact on malnutrition indicators. These findings have important policy implications.

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Chapter 1

Introduction

Many Sub-Saharan states are struggling to meet development goals and are characterized by weak rule of law, poor quality institutions, a lack of accountability, strict controls over information, and high levels of corruption (Bräutigam and Knack, 2004). The region of Sub-Saharan Africa (SSA) also contains more than a quarter of the most undernourished and food insecure people in the world (FAO, IFAD, and WFP, 2014). SSA is home to a quarter of the world's malnourished as well as the world's leading recipient of food aid, so how effective are food aid shipments in lowering these malnutrition rates? While there is a fairly literature on food aid, it is limited in investigating this question at the regional level.

Food aid, its impacts and its effectiveness have been a focus of debate since the US first began their food aid program in the 1950s. The literature is hotly divided on whether food is a success or an instrument that does more harm than good (Clay et al., 1996; Barrett and Maxwell, 2005; Awokuse 2011). Proponents of food aid cite its ability aid the economic development of a country as well as the health of its people (Srinivasan, 1989) and discuss specific case studies in which the introduction of food aid programs has been proven to improve livelihoods (Schubert, 1981; Quisumbing, 2003; Gilligan and Hoddinott 2007; Taren, et. all, 2011). Conversely, some argue that food aid is ineffective, and even abused as a way to further geo-political gains and achieve rent-seeking returns (Eggleston, 1987; Shapouri and Missiaen, 1990; Ball and Johnson, 1996; Clay et al., 1998; Neumayer, 2005). Much of the debate over food aid's effectiveness has been driven by the recent paradigm shifts surrounding food aid. First, the shift from systematic, bilateral food aid flows to response driven, multilateral allocations; and secondly, the emergence of Sub-Saharan Africa as the most food insecure region of the world and leading recipient of food aid.

In order to investigate food aid's effectiveness in SSA, I argue that food aid cannot be evaluated as a singular type of aid, but should be broken down into its three types: Program, Project and Emergency food aid, because these three types of food aid vary significantly in terms of fungibility, one factor that has been overlooked in the majority of the current literature. When a good is fungible, it is exchangeable and easily monetized. Considering the fungibility of aid while evaluating its effectiveness is important as monetized aid and non-monetized aid have different implications for both donors and recipients. The characteristics of each type of food aid are significantly distinct and must be studied as such in order to draw meaningful conclusions about their separate effectiveness's.

I argue that food aid with low levels of fungibility, Emergency food aid, will be the most effective type of food aid and those with more fungibility should be the least effective. To test my hypothesis I have collected a dataset of Sub-Saharan countries from 1988-2012. Empirical results strongly suggest that food aid with low levels of fungibility have success lowering malnutrition indicators in Sub-Saharan Africa. Food aid with high levels of fungibilitty are found to have no significant effect on malnutrition indicators.

The remainder of the thesis will be structured as follows: In the next section, I review the literature. In the following section, I elaborate upon the distinctions that exist between the three types of food aid, and argue the effectiveness of food aid is contingent upon its fungibility. In the next section, I conduct systematic empirical analysis and find Emergency aid, the least fungible category of food aid, to be effective in reducing malnutrition while Program and Project aid, more fungible types of aid, to have no significant impact on malnutrition. Finally, I conclude by discussing the contributions, limitations, and policy implications of this study.

Chapter 2

Literature Review

The overall performance and effectiveness of food aid programs have fallen under scrutiny by policymakers and food aid analysts alike (Barrett and Maxwell, 2005; FAO, 2006). This attention may be attributed to the dramatic way that the norms surrounding donor food aid policymaking have recently evolved. Over the past decade there has been a large shift from bilateral flows of nonemergency aid to mostly emergency shipments distributed through multilateral efforts through NGOs and the United Nations' World Food Programme (WFP) in response to humanitarian crises (Barrett, 2002; Barrett, 2006; Barrett & Maxwell, 2005; Webb, 2003). Investigation into how the impacts of food aid currently stand is necessary.

In 1954, food aid began as a way for the US to cope with growing domestic agricultural surpluses when they began strategically exporting food to countries in need on concessional terms. Now, most developed countries provide food aid, and the general trend has moved from emphasizing food aid as a mode of surplus disposal to emphasizing food aid as a mode of development assistance (Stevens, 2011). However, in this recent paradigm shift in which bilateral transfers are less popular, the US food aid budget—the world's largest—has fallen by more than half in the past 10 years, from nearly $3 billion in 1994 to $1.2 billion in 2004 (OECD, 2005). Other historically large contributors, European and Canadian food aid, have fallen by similar proportions (Lentz and Barrett, 2008).

With the decrease in bilateral food aid transfers, the importance of Operational Agents (OAs), such as NGOs and organizations like the WFP, have increased (Barrett, 2002; Stevens, 2011). Operational Agents determine how aid should be delivered; either as cash, used for local or regional food purchases, or to invest in public goods. They also determine whether in-kind aid should be monetized or directly distributed to recipient households (Lentz and Barrett, 2008). To offset the impact of declining food aid

budgets and the rise of new challenges associated with complex emergencies; Operational Agents and donors must become more effective in targeting their available resources. This has ignited much discussion of prospective policy changes (Lentz and Barrett, 2008).

The 1974 World Food Conference set three main objectives for food aid: to provide emergency relief, to combat hunger and malnutrition, and to promote economic and social development. Additionally, the Food Aid Convention, the international treaty that governs food aid activity, specifically directs donor countries to prioritize recipient country needs, which tend to fall within the objectives set by the World Food Conference (Kuhlgatz, Abdulai, and Barrett, 2010). Donors prioritize the goals differently, but generally attempt to justify their aid as supporting development goals (Stevens, 2011). However, the perception exists among some that food aid donation is influenced less by humanitarian aims and more by "agricultural surplus disposal, donor trade promotion and geopolitical interests" (Barrett and Maxwell 2005). Since the inception of food aid programs, there has been an ongoing debate among analysts on the motivations and prioritization styles of these donors, and on how exactly food aid allocations affect recipients (Barrett and Heisey, 2002; Gabbert and Weikard, 2000; Jayne et al., 2001; Neumayer, 2005). Some observers still espouse the virtues of food aid programs and contend that it has been effective in achieving its objectives while others have the opposite view.

Theoretically, food aid is thought to have the ability to achieve development goals in several ways: First, as does any form of aid, it adds resources that can be used for current consumption or accumulation (Srinivasan 1989). Secondly, because many developing countries lack the foreign exchange necessary to purchase all the food needed to meet their population's nutritional requirements, food aid is seen as a way to cope with variable food import requirements and restricted commercial import capacity (Barrett, 2001). Third, it can increase the domestic availability of food, fostering food security (Maxwell and Smith, 1992). Fourth, to the extent it is targeted correctly at the poor, it can reduce poverty (Awokuse

2011). Also, by potentially improving the health and nutritional status of the poor, food aid can play a role in increasing a person's human capital and future income earning capability (Srinivasan, 1989). Lastly, when specific projects and policies are tied to food aid, and the receipt of the aid is contingent on the project's completion or the policy's implementation, there is a greater likelihood of the execution of those projects and policies (Srinivasan, 1989). It should be kept in mind that these points are theoretical, and the operative word in all of the above is "can" and "has the potential to," rather than "does" and "will."

Proponents of food aid promote instances in which the theoretical benefits of food aid have been applied successfully in reality. Much of this literature is done in the fashion of case studies, focusing on a singular type of aid or location. For example, in his study of the effectiveness of the PL480 program in the 1960s and 70s, Schubert found that nations which received higher amounts of U.S. food aid relative to the size of their populations showed significantly greater improvement in their food supply and the nutritional status of their populations than did nations receiving less or no food aid (Schubert, 1981).

The majority of the literature supporting food aid highlights emergency food aid. Awokuse (2011) cites the success of food aid disaster relief and in assisting several European and East Asian countries improve their economies after periods of major political and economic crises. Severe droughts in Africa led to several case studies on the effectiveness of the emergency food aid sent in response. A study, which took place in Northern Senegal, found that the growth of targeted children who received a newly developed food aid ration improved over a four-month period (Taren, et. all, 2011). In rural Ethiopia, Quisumbing finds that in short-run interventions, being a recipient of food distribution program or a participant in food for work program has a positive direct impact on weight for height in children (Quisumbing, 2003). Gilligan and Hoddinott (2007) produced a similar case study, also done in rural Ethiopia, also exploring the effects of emergency food distribution and food for work programs. They found that participants in the food for work program experienced a reduction in famine risk relative to

five years ago, while a comparison group of non-beneficiaries reported an increase in famine risk over the same period. There was a significant impact of food distribution participation on growth in food consumption, but, surprisingly, they found a negative impact on food security.

Critical analysts argue that food aid has been ineffective and has produced dismal results (Clay et al., 1996). They argue that food aid programs have not fulfilled their promises to alleviate hunger and stimulate economic development in many Asian and Sub-Saharan African nations (Awokuse 2011) and that food aid suffers from debilitating distribution issues in both emergency and non-emergency food aid allocations.

A topic of discussion in the literature surrounds the inefficacy in the distribution of food aid as food aid generally has higher transaction costs and less flexibility than cash aid (Tschirley & Howard, 2003). The data from recent decades of food aid allocation also show that the top recipients are not even necessarily the most needy and food deficit countries (Barrett and Maxwell, 2005). Less food aid donations were available when they were needed most by recipient countries facing chronic food deficits and more expensive food imports.

Additionally, when food aid is monetized, it may be more readily siphoned off by corrupt managers in both the donor and the recipient countries, decreasing the amount of aid received by households (Barraclough, 1991; Sen, 1990). "The recipient country governments have been known to not distribute food aid to the most malnourished households, but have rather favored their political constituents by using food aid as 'payment' for political support" (Awokuse 2011 p. 494). While donors claim to have development goals and humanitarian concerns in mind when allocating food aid, a significant portion of non-emergency bilateral program food aid and project food aid were motivated by both political and economic interests of the donors (Eggleston, 1987; Shapouri and Missiaen, 1990; Ball

and Johnson, 1996; Clay et al., 1998; Neumayer, 2005). Although there are a host of case studies supporting the effectiveness of emergency food aid, some of the worst food aid misuses are to be found in emergency campaigns (Stevens, 2011). It is obvious that there will be difficulties when an attempt is made to supply large quantities of food to countries suffering from a disaster, especially when these countries tend to be impoverished, landlocked, and suffer from inadequate physical and administrative infrastructure. Emergency aid is criticized by some for producing a "disincentive effect"- a lag in the productivity of populations receiving food aid due to the creation of a dependence on food handouts (Schultz, 1960; Isenman and Singer, 1977; Maxwell and Singer, 1979; Cathie, 1981). However, the research of Abdulai, Barrett, and Hoddinott attests that the 'disincentive effect hypothesis' on recipient food production is not supported when one controls for household characteristics (such as age, sex, education, and size and location of land of head of household) as well as for country specific factors (such as colonial ties, geography and climate) (Abdulai, Barrett, and Hoddinott, 2005).

In between the two opposing views on the effectiveness of food aid are those who recognize the mixed success of food aid, but advocate new and improved strategies for making food aid programs more effective in achieving its objectives (Barrett and Maxwell, 2005). In a recent study, Lentz and Barrett (2008) explore several food aid policy regimes and seek to determine which regime produces the greatest positive welfare effect on recipients. They conclude that improved targeting is the most important factor in determining food aid effectiveness (Lentz and Barrett, 2008).

Even when a successful campaign is found, it is often revealed that the successes of food aid programs have at most a small impact on food consumption or nutrition and often only a short-run effect on aggregate consumption (see Yamano, Alderman, and Christiaensen 2005; Quisumbing 2003, Alderman 2003). Case studies which cite success are difficult to apply at a macro level due to the drastic differences in the environments and circumstances in which food aid is introduced. Methods of

distribution or marketing of food aid may work well in one place, poorly in another, and be completely unfeasible and potentially harmful in a third. In terms of the nutritional impact on households following food aid distributions, the literature is limited, conflicting, restricted to comments on food aid in general or narrowly focused on specific case studies that cannot be applied generally. Researchers face a recurring problem in judging the extent to which generalization is justifiable and logical in this field of very limited empirical research and a topic (food aid) whose characteristics can vary considerably depending on how it is used, to whom it is supplied, by whom it is supplied by (Stevens, 2011). There is a tremendous dependence on context in figuring out optimal food aid policy design. "One size fits all approaches are unlikely to best serve food insecure households across the wide range of settings they presently inhabit" (Lentz and Barrett, 2008 p.1167). The literature surrounding food aid and its impacts must be expanded with the introduction of a specific but generalizable analysis of food aid.

While there has been a fair amount of research done on food aid, weaknesses in the literature abound. Much of the literature is concerned with measuring the effects of American aid on agricultural price levels and production in recipient countries. Not only is the literature biased to cover mostly American aid, the recipients most extensively covered are South Asia, and, to a lesser degree on Latin America (Stevens, 2011). While these countries have been focused on due to having received very large amounts of food aid in the past quarter century, it is unclear whether or not the conclusions drawn can be generalized for other food aid recipients. Sub-Saharan Africa (SSA) has replaced South Asia as the major recipient of food aid. However, as of now, general conclusions drawn from regional research in Asia cannot feasibly be applied to SSA based on how different the two regions are. For example, the domestic policy distortions (in general and with respect to agriculture) in SSA appear to be much more deep-rooted and complex than they were in South Asia (Stevens, 2011). SSA also lacks a research infrastructure and suffers tremendously from policy failure and recurring problems with corruption, not to mention the extreme difference between SSA and the rest of the world in terms of soil, climate, and factor

endowments. Those studies that do focus on SSA are often case studies that research the effects of one type of (usually American) food aid to one part of one country. Research on the nutritional impact of food aid on households is comparatively lacking in terms of a measure of evaluating food aid's impact. Very few empirical studies exist on the nutritional impact of food aid on recipients (Awokuse, 2011). The findings from previous analyses on the effect of various direct distribution and supplementary feeding programs on nutritional status have been mixed (Clay et al., 1998). While some studies found that FFW and supplementary feeding programs have positive short-term effects, others found weak and inconclusive evidence to support a positive impact of these programs in the long run. In a survey of supplementary feeding programs, Beaton and Ghassemi (1982) concluded that, relative to the programs' cost, their long-term nutritional impact on participants is rather limited. Although the various supplementary feeding programs have been proven as effective tools in increasing the caloric intake of their recipients, they are not enough to eliminate malnutrition. The programs just mentioned all fall under the category of Project food aid. These analyses only draw specific conclusions that cannot inform the effectiveness of all food aid. Without breaking down food aid into its three distinct types, it is difficult to evaluate "the effectiveness of food aid" because the aid (if not specified, which it usually is not) may be Emergency, Project or Program aid. Since the three types of aid differ in their fundamental characteristics, it can only be projected that each type will effect malnutrition indicators in a distinct way. In order to investigate the impact of food aid on the nutritional status of a population is to clearly recognize that Emergency aid may have a different effect than Project aid, which may have a different effect than Program aid; and then to analyze the findings associated with these effects distinctly.

Chapter 3

Theory

One may simply view "food aid" as homogeneous in its form and purpose. Most believe that food aid is simply free food given to countries whose people are suffering from disasters such as famines and wars. In reality, food aid is more than just humanitarian assistance and the accompanying allocation and distributional issues are much more complex (Awokuse, 2011). Modern international food aid, which began with the passage of United States Public Law 480 (PL 480) in 1954, is defined by Barrett and Maxwell (2005) as having three attributes that distinguishes the international food aid programs from all other forms of food assistance programs: international transfer, payment has a concessional component and a focus on providing food. Fundamentally, the definition of food aid must reflect the international nature of the transactions. Food aid is then normally classified into three broad categories: Program, Project and Emergency food aid (Barrett, 2002).

These categories differ in several ways, the factor I argue as having the greatest impact on the aid's effectiveness being *its level of fungibility*. Fungible is an adjective used to describe goods, and is defined by the Merriam-Webster as "being of such a nature that one part or quantity may be replaced by another equal part or quantity in the satisfaction of an obligation." In other words, if something is fungible, it is exchangeable. Technically, all food aid is fungible, it can be received and then sold at market price for cash. However, each type of food aid operates under a different level of fungibilty due primarily to the nature of the aid transaction and the donor-recipient relationship. Highly fungible aid is easily monetized. When aid is readily monetized, it is then up to the recipient- usually a government or Operating Agency- to choose to allocate these funds appropriately in order to reach the intended population (Lentz and Barrett, 2008). It can be reasonably assumed that highly fungible food aid may not reach intended populations should the recipient entity suffer from any issues ranging from corruption to

organizational inefficiencies and/or a lack of resources. Fungibility is exaggerated in bilateral aid agreements as these are basically private transactions with limited oversight from the international community (Barrett and Maxwell, 2005). Aid with low levels of fungibility is not easily monetized and is more likely to reach intended populations in its original form- food. Aid with low levels of fungibility is categorized by direct deliveries to populations in need, rather than to a third party such as a government or Operating Agency; and by multilateral agreements- as these ensure international pressure on donors and recipients to impact development goals rather than achieve rent-seeking gains. Low levels of fungibility do not ensure the receipt of food aid by populations, but it can be reasonably assumed that less fungible food aid is more likely to directly impact populations rather than highly fungible food aid.

Historically, the vast majority of global food aid could be categorized as Program food aid. Program food aid is foreign aid in the form of food, usually given bilaterally as a government-to-government grant or concessional sale or loan (Barrett and Maxwell, 2005). This form of food aid is usually monetized, or, sold at market prices, and the subsequent funds generated are then free to be used for supplementing government budget allocations for development. The issue with this type of aid and the reason its effectiveness has been questioned in recent years is its fungibility. Because it is not tied to a specific project and is instantly turned into cash, program food aid is usually not used as food assistance directly targeted towards the most impoverished and under-nourished segment of the population (Awokuse, 2011). The size and scope of this form of aid has declined in recent years partially because it has been widely criticized for being fungible and ineffective in reducing food insecurity problems in recipient developing countries (Clay et al., 1991).

Project food aid is not as fungible as Program food aid as it is meant to directly support specific development projects and initiatives. This type of aid is generally given on a grant basis and recipients can include governments, multilateral development agencies or domestic and international non-

governmental agencies (NGO's) such as The World Food Program. Recipients of Project aid tend to fund entities that have goals to alleviate food insecurity of the poor (Shaw and Clay, 1993) such as work-for-food programs (FFW) and food-for-education programs. While the success of such project aid funded programs is spoken to in the literature, it can be seen that as time goes on, project aid is becoming easier to be monetized and the proceeds from such market sales are being used to fund project operational costs of the NGOs themselves. Barrett and Maxwell (2005, p. 13) notes that 'it has become increasingly difficult to differentiate Project and Program food aid flows as the former has become increasingly monetized by NGO recipients much as the latter has been monetized by government recipients'.

Project food aid is unique in that the entity that controls how food aid is manipulated are not the governments of nations but Operational Agencies (OAs)- the NGOs that the food aid is distributed to. The OA does not choose the nature of the food aid it receives. However, it decides whether to convert food aid into cash transfers or into investment in non-food public goods projects, or to convert cash resources into food transfers through local or regional purchases of food commodities (Lentz and Barrett, 2008).This power allows OAs to effectively target. If they receive imperfect aid that doesn't suit the local context and current needs, they have the option to make costly conversions if necessary to better match what is needed. However, Lentz and Barrett (2008) caution that the decision to convert aid form "depends on numerous exogenous factors, including local prices, transportation costs, and corruption levels" (Lentz and Barrett, 2008 p. 1155). While project aid is not as fungible as program aid, whether or not OAs effectively target malnourished households leaves this category of aid still fungible to a large extent.

Although each of the three types of food aid overlap, emergency food aid is least similar to its other food aid counterparts. While program food aid is usually bi-lateral and project food aid can be bi-lateral or multi-lateral, emergency food aid is most often a multilateral effort among nations. This type of aid is the least likely to be monetized for anything other than its purpose, and as the name suggests, comes

in response to regional food insecurity problems due to man-made and natural disasters. As highlighted earlier, the literature on emergency aid is mixed in its support and contempt. Since emergency aid is a multilateral effort that is not easily monetized, its fungibility level is extremely low. We should expect emergency aid to be the most effective type of food aid.
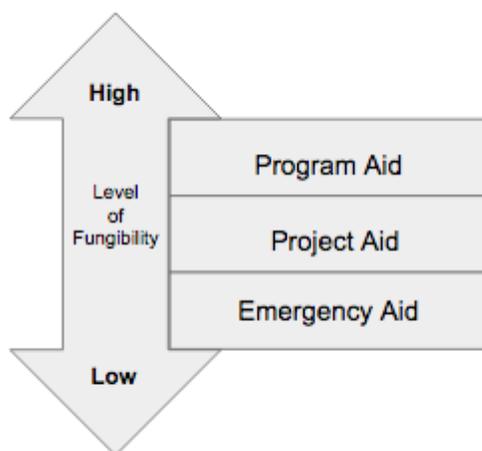
Figure 1: Fungibility of Food Aid

As discussed before, foreign aid differs significantly in its fungibility. As illustrated in Figure 1, Emergency aid is the least fungible category of food aid and Program food aid is the most fungible food aid. Food aid that is fungible has a greater chance of being turned into cash before reaching populations in need. The more fungible an aid type is, the less likely it is to directly influence malnutrition indicators. Thus, we have the three following testable hypotheses:

Hypothesis 1: Emergency Food Aid is the <u>least fungible</u> type of food aid, and it should be the <u>most effective</u>, having a positive impact on malnutrition indicators.

Hypothesis 2: Project Food Aid is fungible due to the majority of funding being allocated at the discretion of NGOs and should have little to no impact on malnutrition indicators.

Hypothesis 3: Program Food Aid is the most fungible type of food aid and should be the least effective, having no impact on malnutrition indicators.

Chapter 4

Empirical Analysis

Dependent Variables

To test the above hypotheses, I have collected a dataset covering Sub-Saharan countries from 1988 to 2012. Possible direct effects of food aid on nutrition include a decrease in the prevalence of malnutrition, better nutrition education, and higher attendance at clinics (Stevens, 2011). In order to investigate the effect food aid shipments have on malnutrition, I use two malnutrition indicators as my dependent variables: Prevalence of Underweight and Prevalence of Wasting.

Prevalence of underweight measures the percentage of children under 5 years of age in a population whose *weight for age* is more than two standard deviations below the median for the international reference population ages 0-59 months (World Bank, 2016). These data were collected from the World Bank Data site and are based off the World Health Organization's new child growth standards that were released in 2006.

Prevalence of wasting measures the percentage of children under the age of 5 whose *weight for height* is more than two standard deviations below the median for the international reference population ages 0-59 (World Bank, 2016). These data were also collected from the World Bank Data site and are based off the World Health Organization's new child growth standards that were released in 2006.

Measuring malnutrition through these two variables is appropriate because the most important indicator for gauging the nutritional status and health of an entire population is actually through the measurement of child (under 5) malnutrition- as measured by poor child growth (WHO, 2016). Poor child growth is most commonly assessed through three anthropometric indices: two of which are prevalence of underweight, or *weight for age*, and prevalence of wasting, which measures *weight for height*. Short-term change in nutritional status, for example, following receipt of food aid, is reflected in changes the under

5's population average weight-for-age. Significant changes in weight-for-age or prevalence of

underweight can also reflect change in weight-for-height, or wasting.
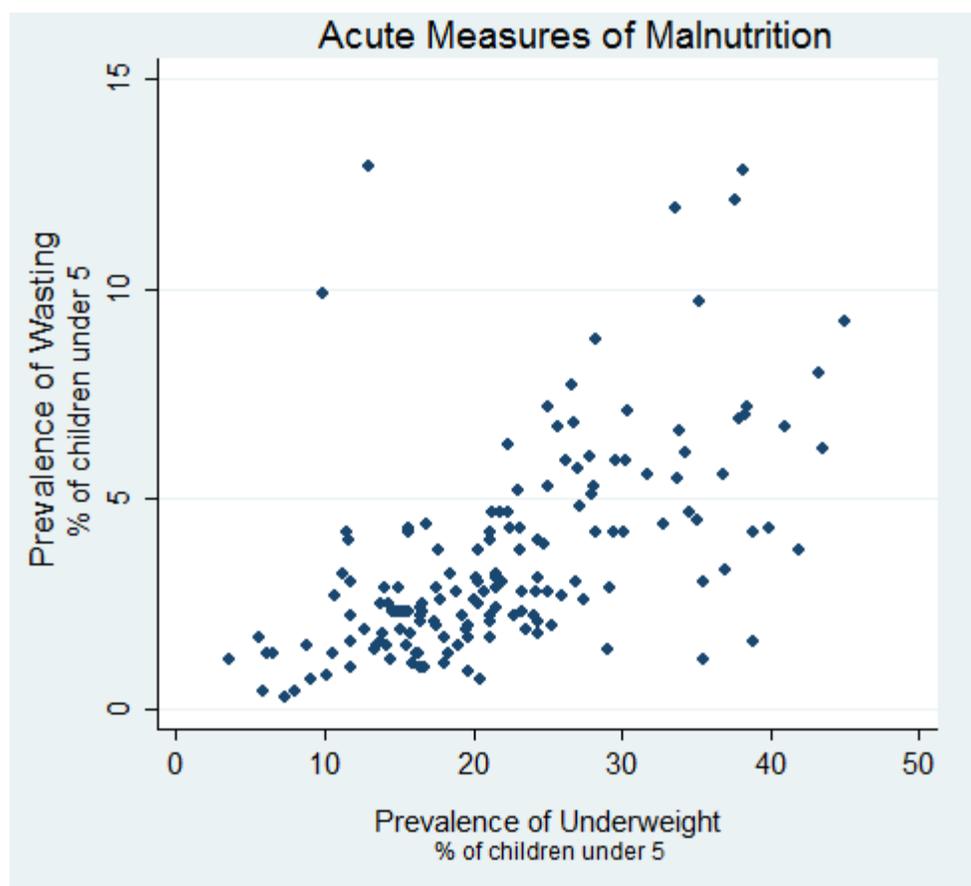
Figure 2: Acute Measures of Malnutrition

As can be seen in Figure 2, the prevalence of underweight and prevalence of wasting are highly

correlated. The two variables have a Pearson correlation of 0.58, significantly at 1% level. While the two

indicators may reflect each other, they are not exactly the same.

Both prevalence of underweight and prevalence of wasting are similar in that they are indicators

of *acute malnutrition*, or malnutrition in the short term. Children who suffer from acute malnutrition carry

an immediate increased risk of morbidity and mortality (WHO, 2016). Acute malnutrition is affected by a

population's immediate access to food. Because food aid shipments (or lack thereof) change a

population's immediate access to food, I have chosen to utilize measures of acute malnutrition rather than measures of chronic malnutrition in order to investigate my hypothesis.

Data for both prevalence of underweight and prevalence of wasting are available since 1988 at intervals of approximately 5 years for each of the countries in Sub-Saharan Africa. These data are collected as percentages.

Independent Variables

The three independent variables are the amounts of Emergency, Program and Project food aid received by recipient countries in SSA. These data were collected from the World Food Program's (WFP) International Food Aid Information System (INTERFAIS). INTERFAIS was developed by WFP as a way to track global food deliveries in metric tons, originally to coordinate international responses to food aid shortages. The database is updated on a yearly basis with data available for each Sub-Saharan country's receipt of Emergency, Program and Project aid since 1988. In its original form, these data reflect the amount of food aid, in metric tons, received by each country in a given year. After these data were collected, they were transformed to reflect the amount of food aid received per capita in each country. Additionally, to deal with the skewed distribution of these data, log transformation was performed before it was run in regression analysis.

Control Variables

In the regression, I also include a battery of control variables that account for malnutrition in Sub-Saharan Africa.

Government Effectiveness & State Capacity

Level of government effectiveness is defined as "reflecting the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies" (World Bank, 2105). One aspect of household food security is availability- an individual's and a households' ability to acquire food. This aspect seriously impacts rural populations (who tend to be the most poor and most in need of food aid), as it is affected by distance and road quality. Governments with poor public services are unlikely to have high road quality or effective food aid deliveries to populations in need, and thus tend to have high malnutrition rates.

These data are taken from the World Bank's *Worldwide Governance Indicators*. This variable ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance. These data are available from 1996 for each country in Sub-Saharan Africa on a yearly basis.

The data I used to measure state capacity comes from the Relative Political Performance Data Set developed by Kugler and Arbetman (1997). Relative Political Performance consists of three measures: Relative Political Extraction (RPE), Relative Political Reach (RPR), and Relative Political Allocation (RPA). For the purposes of this control variable, I only consider RPE, approximates the ability of governments to appropriate portions of the national output to advance public goals. I refer to RPE as State Capacity is defined by Skocpol and Finegold as the ability of a government to administer its territory effectively (Skocpol and Finegold, 1982). Governments with the capacity to administer their territories more effectively than others are more likely to have greater success distributing food aid to their populations in need, which is why I include State Capacity as a control variable. These data are calculated

using a model that is specific to developing societies- which make up the majority of Sub-Saharan Africa. These data range from 0 (low RPE) to 3.5 (high RPE).

During data analysis, I found that the inclusion of government effectiveness as a control variable produced results that were extremely distinct from results in which government effectiveness was omitted. Results in which government effectiveness was included were significant while those in which government effectiveness were not included were not. I will elaborate on these results in the next section.

Democracy

Many researchers have investigated the links between democracy and desirable social outcomes, including reduced child hunger and mortality, and investment in public goods. Based off of existing literature on the subject, Kirk Harris (2014) created a study that found the protection of civil liberties, provided by democracy, is associated with improved food security in SSA. In order to control for the effect of democracy on the Prevalence of Underweight or Wasting in the <5 population, I collected data on each country's level of Democracy through the Polity IV Project (Center for Systemic Peace, 2016). This data ranges from -10 (autocratic) to 10 (democratic).

Conflict

The link between conflict and malnutrition is very complicated and not necessarily direct or causal. However, evidence suggests that a small change in political or social stability can result in the food security of effected households to become seriously upset (Smith, 1998). Additionally, violent conflict and sudden natural disasters are shown to induce significant and immediate food aid response according to the work of Abdulai, Barrett and Hoddinott (2005).

Sub-Saharan Africa has experienced different levels of conflict in different areas of the region since 1988. I have collected data from the UCDP Monadic Conflict Onset and Incidence Dataset (Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Håvard Strand, 2002; Themnér, Lotta & Peter Wallensteen 2014). The conflict data measures the incidence of violent intra-state conflict occurring (versus not occurring) for each year of the study for each of the Sub-Saharan countries. The data was coded as 1 all country-years with at least one active conflict/conflict-dyad and 0 for those experiencing no violent intrastate conflict that year.

GDP per capita, GDP Growth, and Population

I have controlled for both GDP per capita and GDP Growth. Food aid's official purpose is to improve development. Therefore, countries that are more developed and have higher GDPs per capita will most likely receive less assistance through food aid than countries with lower GDP per capita and less development. Including GDP per capita and GDP Growth also allows to control for situations in which donors identify recipients based on their advanced development in order to increase their returns or influence geo-politics. Seeing as population size can be linked to exacerbating the effects of the other control variables included in the analysis, it is also utilized as a control variable. The data for GDP per capita, GDP growth rates, and population all come from the World Bank's *World Development Indicators*. Both GDP per capita and population variables are logged to deal with skewed distributions.

Chapter 5

Results & Discussion

My theory states that the Prevalence of Underweight and Wasting should be most positively impacted by the least fungible type of food aid- Emergency Aid, and least positively impacted by the most fungible type of food aid- Program Aid. To test my hypotheses, I estimate the following model:

$$Malnutrition\ Rate_{i,t} = \alpha + \beta * Food\ Aid_{i,t} + \gamma * X_{i,t} + \varepsilon_{i,t}$$

Where α is the constant. β is the coefficients to be estimated for Food Aid received. γ is a coefficient vector for the matrix of control variables X. ∈ is the error term.

Emergency Aid

First, I examine the effect of Emergency aid on malnutrition. In Model 1, I regress the prevalence of Underweight on Emergency food aid and several control variables including Conflict, State Capacity, Democracy, GDP per capita, GDP Growth, and Population. In Model 2, I introduce Government Effectiveness as an additional control variable. In Model 3, I regress the prevalence of Wasting on Emergency food aid with all control variables except Government Effectiveness. Model 4 is the same as Model 3, but with Government Effectiveness included as a control.

Table 1: Effect of Emergency Food Aid on Malnutrition Indicators in Sub-Saharan Africa

	(1)	(2)	(3)	(4)
	Prevalence of Underweight		Prevalence of Wasting	
Emergency Food Aid	-0.02	-0.67***	-0.19*	-0.37**
	(0.21)	(0.23)	(0.11)	(0.16)
Government Effectiveness		-4.23***		-0.86
		(1.31)		(0.83)
Conflict	2.69**	1.70*	0.01	-0.05
	(1.16)	(1.02)	(0.33)	(0.36)
State Capacity	-2.99*	-3.33**	-0.75	-0.99
	(1.73)	(1.39)	(0.50)	(0.62)
Democracy	0.06	0.21**	-0.02	0.01
	(0.09)	(0.09)	(0.05)	(0.08)
GDP per capita	-7.55***	-9.34***	-0.99***	-1.29***
	(0.93)	(1.02)	(0.31)	(0.49)
GDP Growth	-0.42	-0.47	0.49*	0.84***
	(0.46)	(0.51)	(0.26)	(0.31)
Population	0.33	-0.98	0.01	-0.19
	(0.76)	(0.98)	(0.23)	(0.31)
Constant	75.45***	108.09***	10.41**	15.17**
	(13.85)	(16.50)	(4.93)	(7.00)
Observations	140	97	109	84
Number of Country ID	37	34	33	33
R²	0.332	0.299	0.161	0.226
Chi²	94.55	134.39	25.54	16.32
P > Chi²	0.00	0.00	0.00	0.04

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1   [1]

In Model 1, we can see that the coefficient of emergency aid is negative, but is not statistically significant. In Model 2, I add Government Effectiveness as a control. This variable represents a government's ability to provide public services and enact policy, which influences the efficiency of food aid distribution as well as how effective the aid will be targeted towards the population in need. When we control for Government Effectiveness, the coefficient of Emergency aid is negative and statistically

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[1] When the control variable, Government Effectiveness, is added to the regression analysis, the number of observations drops from 140 to 97. This is due to data measuring Government Effectiveness being available only from 1996-2012 whereas the other data points are available from 1988-2012.

significant at the 5% level.[2]. Substantively, all else being equal, one unit increase in Emergency food aid will reduce a population's prevalence of Underweight by 0.68 units. This result provides support to my hypothesis that Emergency food aid is effective in reducing malnutrition rates.

Regarding other variables, the coefficient of Government Effectiveness is -4.23, statistically significant at the 1% level. All else being equal, one unit increase in Government Effectiveness will decrease the prevalence of Underweight by 4.23 units. The coefficient of conflict is 1.70, statistically significant at the 10% level, indicating that the presence of conflict increases malnutrition rates, all else equal, by 1.70 units. Other statistically significant controls include State Capacity and GDP per capita, both of which have estimated coefficients that are negative. All else being equal, one unit increase in State Capacity would lower malnutrition rates by -3.33 units,. GDP per capita has an estimated coefficient of -9.34, which is statistically significant at the 1% level. Substantively, one unit increase in GDP per capita will lower malnutrition rates by 9.34 units.

In Models 3 and 4, I re-estimate Models 1 and 2 using an alternative dependent variable, prevalence of Wasting. The results are pretty consistent to what we have found in Models 1 and 2. The coefficient of Emergency aid is negative and statistically significant in both models. Substantively, take Model 4 for example, one unit increase in Emergency aid will decrease the prevalence of Wasting by 0.37 units, when all other variables are held constant. We also found economic development measured by GDP per capita has a strong negative impact on the prevalence of wasting. But GDP growth seems to have a positive effect.

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[2] The data on government effectiveness is only available since 1996, including this variable reduces the number of observations to 97.

As Emergency food aid to an affected country increases, malnutrition rates in these countries are positively affected- the prevalence of Underweight and Wasting decrease. These results are consistent with my theory, as Emergency Aid is the least fungible type of food aid. Emergency Aid is the most likely to reach the population in need due to factors discussed in the literature review such as multi-lateral donations and oversight by non-governmental organizations.

Project Aid

Next, I examine the impact of Project Aid on malnutrition and the results are presented in Table 2. The dependent variable is the prevalence of Underweight in Models 1 and 2 and the prevalence of Wasting in Models 3 and 4. Government Effectiveness is included as a control variable in Models 3 and 4.

Table 2: Effect of Project Aid on Malnutrition Indicators in Sub-Saharan Africa

	(1)	(2)	(3)	(4)
	Prevalence of Underweight		Prevalence of Wasting	
Project Food Aid	-0.10	-0.19	0.08	0.03
	(0.31)	(0.30)	(0.08)	(0.09)
Government Effectiveness		-3.37**		-0.74
		(1.36)		(0.83)
Conflict	2.64**	1.54	-0.08	-0.17
	(1.20)	(1.40)	(0.35)	(0.39)
State Capacity	-3.02*	-3.90**	-0.74	-1.22**
	(1.75)	(1.76)	(0.47)	(0.54)
Democracy	0.06	0.21*	-0.03	0.01
	(0.09)	(0.11)	(0.05)	(0.08)
GDP per capita	-7.59***	-9.04***	-0.88***	-1.11**
	(0.95)	(1.01)	(0.33)	(0.44)
GDP Growth	-0.43	-0.35	0.58**	0.94**
	(0.48)	(0.64)	(0.28)	(0.37)

Population	0.30	-1.00	0.04	-0.18
	(0.77)	(0.99)	(0.23)	(0.27)
Constant	76.29***	107.01***	9.16*	13.90**
	(14.55)	(17.60)	(5.13)	(6.16)
Observations	140	97	109	84
Number of Country ID	37	34	33	33
R²	0.331	0.304	0.161	0.206
Chi²	105.59	119.07	22.27	18.21
P > Chi²	0.00	0.00	0.00	0.02

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1 [3]

Project aid can be considered "middle of the spectrum" in terms of aid fungibility as it is not quite like Program aid because it is supposed to be tied to specific projects and outcomes, but not directly reaching populations as food like Emergency aid. However, because it is allocated at the complete discretion of an OA, Project aid is considered fungible and according to my theory, should have a negligible impact on malnutrition indicators.

Empirical results indicate that the coefficient of Project food is estimated to be negative for prevalence of Underweight and positive for prevalence of Wasting. Because these coefficients are negligible and not statistically significant, we can state that Project food aid does not have a substantive effect on malnutrition indicators. These findings support Hypothesis 2. The introduction of Government Effectiveness as a control variable slightly increased the estimated coefficients for Project aid in Models 2 and 4, but both coefficients are not statistically significant The coefficient of Government Effectiveness is -3.37 and significant at the 5% level in Model 2. Other significant control variables include Conflict, State Capacity, and GDP per capita. These results are pretty consistent with what we have found before.

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[3] When the control variable, Government Effectiveness, is added to the regression analysis, the number of observations drops from 140 to 97. This is due to data measuring Government Effectiveness being available only from 1996-2012 whereas the other data points are available from 1988-2012.

Project aid is difficult to evaluate given its very diverse nature. However, something all Project food aid has in common is its tendency to be allocated according to the whims of Operating Agents. While Project aid is supposed to be an improvement upon Program aid, these empirical results suggest that there is not much significant success in impacting malnutrition rates with Project related food aid.

Program Aid

Finally, I examine the models observing Program Aid- the most fungible category of food aid. Again, Models 1 and 2 use the prevalence of Underweight while Models 3 and 4 use the prevalence of Wasting as the dependent variable. Models 2 and 4 include Government Effectiveness as a control variable.

Table 3: Effect of Program Food Aid on Malnutrition Indicators in Sub-Saharan Africa

	(1)	(2)	(3)	(4)
	Prevalence of Underweight		Prevalence of Wasting	
Program Food Aid	-0.01	0.02	0.15*	0.13*
	(0.16)	(0.20)	(0.08)	(0.07)
Government Effectiveness		-3.23**		-0.85
		(1.39)		(0.84)
Conflict	2.68**	1.81	0.00	-0.04
	(1.20)	(1.42)	(0.37)	(0.40)
State Capacity	-3.00*	-3.89**	-0.61	-1.14**
	(1.68)	(1.56)	(0.53)	(0.54)
Democracy	0.06	0.18*	-0.02	0.02
	(0.10)	(0.11)	(0.05)	(0.08)
GDP per capita	-7.56***	-8.53***	-0.78***	-0.94**
	(0.91)	(1.06)	(0.28)	(0.43)
GDP Growth	-0.41	-0.36	0.65**	0.93**
	(0.47)	(0.67)	(0.28)	(0.37)
Population	0.31	-0.82	0.05	-0.14

	(0.73)	(0.97)	(0.21)	(0.25)
Constant	75.74***	100.56***	8.25*	12.11**
	(12.83)	(17.06)	(4.30)	(5.88)
Observations	140	97	109	84
Number of Country ID	37	34	33	33
R²	0.331	0.294	0.139	0.177
Chi²	99.61	104.19	27.38	17.69
P > Chi²	0.00	0.00	0.00	0.02

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1 [4]

Project aid is continuously scrutinized for potential misuse abetted by its fungible nature. Empirical results tell us that the coefficient of aid in affecting the prevalence of Underweight is negative at -0.01 until after the introduction of Government Effectiveness as a control variable at which point it becomes positive at 0.02. However, these coefficients are not significant. The coefficient of Project aid affecting the prevalence of Wasting is positive statistically significant at the 10% level both before and after the introduction of Government Effectiveness as a control variable. Before Government Effectiveness is introduced, the coefficient of Program aid is 0.15, indicating that a one unit increase in Program aid should worsen malnutrition rates by 0.15. After the introduction of Government Effectiveness in Model 4, the coefficient of Program aid lowers slightly to 0.13, statistically significant at 10% level. As with all of the previous tables, significant control variables continue to include Government Effectiveness, Conflict, State Capacity, Democracy and GDP per capita.

Although the estimated coefficients for Project aid's effect on the dependent variables are not large numbers, it is very interesting to find statistically significant results indicating that this aid type

[4] When the control variable, Government Effectiveness, is added to the regression analysis, the number of observations drops from 140 to 97. This is due to data measuring Government Effectiveness being available only from 1996-2012 whereas the other data points are available from 1988-2012.

actually worsens malnutrition indicators rather than having no effect whatsoever. These findings are in support of my third hypothesis.

In general, the empirical results presented in Tables 1-3 support my three hypotheses. Emergency aid is seen to have a significant and positive effect on malnutrition indicators while the effect of Project aid is insignificant and that of Program actually significantly worsens rates in terms of Wasting. Government Effectiveness emerged as an important control variable that was statistically significant throughout Model 2 for each aid type. For each aid type, Models 2 and 4 include Government effectiveness as a control variable while Models 1 and 3 do not. The results are consistent across all three types of food aid that the inclusion of Government Effectiveness increases the estimated coefficient for aid effectiveness from 1 to 2 and from 3 to 4. It is clear as the ability of governments to execute sound public services and implement policy increases, so does the effectiveness of food aid in that country.

Conflict came up as a significant control variable in several of the Models. Of all of the significant controls, Conflict was the only control to maintain a positive coefficient, which indicates a negative impact on malnutrition indicators. For each model, GDP per capita continuously displayed a relatively large, negative, estimated coefficient that was statistically significant. These findings indicate that as GDP per capita increases, malnutrition indicators are lowered, which is consistent with basic development theory.

Chapter 6

Conclusion

The literature on food aid is extensive, but does not provide a clear answer as to how food aid

effects malnutrition in Sub-Saharan Africa. Food aid cannot be studied as a homogenous entity; it is made

up of three major types –Emergency, Project and Program food aid. Each of these aid types have distinct

characteristics, most significantly, different levels of fungibility- or the ability to switch one good for

another. However, the distinct effects on populations due to these differences between aid types,

especially in terms of nutrition, lack investigation within the current literature.

In this paper, I argue that food aid with relatively higher levels of fungibility will be less

successful in diminishing malnutrition rates than food aid that has relatively lower levels of fungibility. I

hypothesize that Emergency aid (the least fungible of food aid types) will be the most effective and that

Program aid (the most fungible type of food aid) will be the least effective. To test my hypothesis, I

collected data at the country level for the region of Sub-Saharan Africa from 1988-2012. In general, my

findings are consistent with my theory; they indicate that Emergency aid does have a significant positive

impact on malnutrition indicators in SSA while Program has a negligible effect and Project aid has a

negative impact on malnutrition. My findings also highlighted the extreme importance of the inclusion of

Government Effectiveness as a control variable.

I believe this analysis can help as a starting point for food aid analysts searching for ways to

investigate and improve food aid efficiencies. This paper may serve as inspiration for food analysts,

researchers, global development workers and policy makers to start considering food aid as more than just

a single entity with homogenous characteristics, instead recognizing the differences between Emergency,

Project and Program food aid in order to create more meaningful research projects and eventual findings.

The most significant policy implication brought forth by these results was failure of Project aid to act as a

significant improvement to Program aid. In theory, aid tied to specific projects and controlled by Operating Agents rather than governments seems like the logical solution to combating misuse of aid by inefficient and/or corrupt recipient entities. However, these findings, that Project aid does not significantly affect malnutrition, indicate that either aid funds are being misused by OAs or that OA targeting is ineffective. In order to combat either of these issues, perhaps oversight for OAs should be increased. This may be achieved through some kind certificate and monitoring program in which OAs receiving food aid must report back to third party consulting agencies in order to maintain OA status; or perhaps the traditional structure of an OA should be re-evaluated with controls in place to prevent misuse of aid funds.

Some caveats to my research design must be noted for future research. First, data on Prevalence of Underweight and Wasting, the dependent variables observed in this study, were only available on an average of every 5 years, in some SSA country's cases, even more infrequently. In general, there were missing data across multiple variables for some of the countries included in the analysis even though I utilized credible data sources such as the World Bank. Secondly, the independent variable utilized- amount of food aid received in metric tons (later transformed to reflect amount received per capita)- is probably not the best stand-alone indicator of quality of food aid received. For example, this variable did not explain nutritional content of food received, type of food group received, or donor information. Finally, and related to my second point, the data I utilized was at the country level and therefore resulted in a country-level analysis. The use of household level data (should it be collected and made available) may result in a more accurate view of how food aid effects the health of individuals. Each of these factors could potentially make a future analysis into the effectiveness of food aid more comprehensive and robust.

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Finance Intern   *July-August 2014*

- Assessed the firm's IOLTA accounts to identify outstanding escrow balances, employed excel to create a detailed report and individual documents for 50+ partners to induce action on relieving balances and ensure compliance with IOLTA account regulations
- Reported directly to the firm's Financial Controller and US Accounting Manager; assessed over 150 matters with escrow balances, communicated with 32 partners and relieved the IOLTA accounts of over $100,000 worth of outstanding funds in a 6 week period
- Developed a Closing Project detailing the status and statistics related to all 1000+ open matters and the partners managing them within all US offices; presented document and strategy for reducing company risk to the firm's Global Accounting Team

Citizen's Campaign for the Environment (CCE)   **Farmingdale, NY**
Paid Internship   *June-August 2013*

- Canvassed as part of the full-time field staff; raised over $10,000 in contact donations in a 10 week period
- Cold called 100+ donors and interacted with 50 contacts a day to obtain donations and signatures supporting public policy change

Leadership Experience

Vole` Penn State Ballet Club   **University Park, PA**

President   *May 2015-Present*

- Sets an agenda for the year and works with executive board members to achieve recruitment, fundraising, outreach, and performance goals; solely responsible for presiding over and obtaining performances for "Performance Company" such as THON, Homecoming, etc..
- Acts as the "face of the organization" for its 150+ members as the main point of contact for external entities such as campus governing bodies, the community, and other dance groups
- Works closely with VP to execute the Inter-Dance Holiday Showcase, a university-wide event and creation of previous work
- Fosters and maintains an open line of communication between the executive board and general members by scheduling and running weekly board meetings and bi-weekly general meetings which discuss future plans and upcoming events such as master classes, etc...

Vice President   *May 2014-Present*

- Organized and executed the semester Showcases for the largest dance organization at Penn State; created and managed a budget used in the application for and the allocation of UPAC funding
- Evaluated and placed all 150+ general members into appropriate class levels, separating 100 performers into proper show pieces; recruited 20 choreographers and an Artistic Director, monitored progress throughout the semester
- Reached out to 16 other dance organizations on campus to create a **PSU Inter-Dance Council** to foster a more efficient community with greater capabilities including the production of a collective Holiday Show and Dance Involvement Fairs

Humanitarian Engineering and Social Entrepreneurship (HESE) Program   **University Park, PA**

GRO Greenhouse Team Leader   *January 2014-Present*

- Led a cross-functional team that has developed affordable greenhouse technology; venture recently named an award nominee by USAID, received a $500,000 grant to replicate the venture's previous success in 5 East African countries in West Africa
- Traveled to Makeni, Sierra Leone for 4 weeks to meet with partners on the ground to discuss business strategy and implementation as well as conduct IRB approved research on nutrition and local supply chains
- Primary author of an in-progress publication detailing the research conducted while in country; baseline study will fill knowledge gaps as well as substantiate the food security issues faced in Sierra Leone and the need for GRO product

Awards and Honors

- Global Challenge Scholar Program (GCSP) Candidate
- Awarded the Chaiken Family Scholarship, "a merit-based scholarship for outstanding students in the College of Liberal Arts."
- Candidate for Penn State's Excellence in Communications Certificate