

# Economic Impact of Refugee Settlements in Uganda\*

J. Edward Taylor<sup>†</sup>, Heng Zhu<sup>†</sup>, Anubhab Gupta<sup>†</sup>, Mateusz Filipiński<sup>‡</sup>, Jaakko Valli<sup>§</sup>, and Ernesto Gonzalez<sup>#</sup>

21<sup>st</sup> November 2016

## Executive Summary

As of October 2016, Uganda was home to more than 800,000 refugees, mostly from South Sudan, Burundi and the Democratic Republic of Congo. It also has one of the most favorable and progressive refugee assistance programs in the world, with freedom of movement, work rights, and land officially set aside for refugees to farm. These policies potentially affect the welfare of refugees as well as the impacts of refugees on host-country populations living around refugee settlements.

Researchers from the University of California, Davis, collaborated with the World Food Programme to document the economic impacts of refugees and WFP aid within a 15 km radius around two refugee settlements in Uganda. Extensive surveys of households and businesses inside and outside the settlements provided data to construct a local-economy impact evaluation (LEWIE) model for the economies in and around each settlement. This model was used to simulate the impacts of an additional refugee household, as well as an additional dollar of WFP aid, on real (inflation-adjusted) total income in the local economy, as well as on the incomes of refugee and host-country households.

Our findings reveal that an average refugee household receiving cash food assistance increases annual real income in the local economy by UGX 3.8 million (\$1,106) at Rwamwanja Settlement, and by UGX 3.7 million (\$1,072) at Adjumani Settlement. These numbers include the income impacts on host-country as well as refugee households. The impacts of refugees receiving aid in food instead of cash are UGX 3.0 million (\$866) and UGX 2.9 million (\$827) at the two settlements, respectively. Our findings indicate that the local income generated by an additional refugee household are significant at both settlements. It is higher for cash than food aid, and it is higher at Rwamwanja than Adjumani.

The income generated by refugees easily exceeds the cost of WFP food aid at both settlements. Net of WFP food aid costs, an additional refugee household receiving cash aid generates UGX 2.3 million (\$671) in and around Rwamwanja and UGX 1.9 million (\$563) at Adjumani. A refugee household receiving aid in food generates net gains of UGX 1.5 million (\$431) above and beyond the cost of WFP food aid at Rwamwanja and UGX 1.1 million (\$318) at Adjumani. The cost of distributing cash using

**\*\* Acknowledgements:** This project was made possible by funds from the United States Agency for International Development (USAID) – through the United Nations World Food Programme (WFP) – and the UC Davis Temporary Migration Cluster. We are greatly indebted to Lucy Auma, Beatrice Nabuzale, Nelson Okao, Moses Oryema, Hamidu Tusiime and Olivia Woldemikael for their excellent assistance in the field. We thank M&E Unit of WFP in Kampala, Samaritans Purse field office in Rwamwanja and World Vision field office in Adjumani for helping out with logistics during fieldwork. We also extend our appreciation to the Office of the Prime Minister (OPM), United Nations High Commission for Refugees (UNHCR) and sub-county offices in Rwamwanja and Adjumani for their support in overall data collection.

<sup>†</sup> Department of Agricultural and Resource Economics, University of California, Davis

<sup>‡</sup> International Food Policy Research Institute (IFPRI)

<sup>§</sup> World Food Programme (WFP), Kampala

<sup>#</sup> WFP, Nairobi

‘Post Bank’ is lower than the cost of delivering food aid; thus, these numbers give a conservative estimate of the net benefits of cash versus food aid.

The income refugees generate above and beyond the cost of WFP food aid is called an “income spillover.” Refugee and host-country households and businesses create income spillovers when they spend their cash on goods and services that are supplied within the local economy. Most of the income spillovers from refugees accrue to host-country households and businesses around the two settlements, because they usually have more productive assets and are in a better position to increase their supply of goods and services as the local demand rises. Refugees also create income spillovers for the rest of Uganda, when households and businesses buy goods and services outside the local economy (that is, beyond the 15 km radius around each settlement).

A unique feature of Uganda’s refugee support policy is that many refugees are provided with land to farm. We find that refugees farm this land intensively; output per unit land is significantly higher for refugees than for host-country farmers around the two settlements. This does not mean that refugees are more efficient than host-country farmers (we find evidence that the opposite is true). However, refugees devote considerably more labor to their plots than host-country farms do, and this results in larger harvests.

Refugee farmers, like host-country farms, create income spillovers when they hire labor from other households and purchase inputs from local businesses. They also contribute to the local food supply and potentially influence food prices. Most of the food that refugees produce is consumed within the household or else sold to other refugees.

Providing refugees with land significantly increases refugees’ impacts on local incomes. The income spillover (net of WFP aid cost) from an additional refugee household receiving cash *and* land in Rwamwanja is UGX 3 million (\$876)—higher than the spillover without land (UGX 2.3 million, or \$671). In Adjumani, the spillover from a refugee household receiving cash *and* land is UGX 2.3 million (\$655), compared with UGX 1.9 million (\$563) without land. Access to land also increases the local income spillovers created by refugees receiving food aid (to UGX 2.1 million, or \$603, in Rwamwanja and UGX 1.5 million, or \$427, in Adjumani).

Given a piece of land to cultivate, an additional refugee household receiving cash in Adjumani creates almost as much income in the local economy as its counterpart in Rwamwanja. By calculating the difference in local income impacts with and without land access, we can get an idea of the local value created by giving land to refugees. The marginal benefit from providing land to a refugee household, taking into account that not all refugees actively farm the land they receive, ranges from UGX 318 thousand (\$92) to UGX 707 thousand (\$205) annually. The highest marginal gains are for refugees who receive aid in cash at Rwamwanja settlement, while the lowest are for cash refugees in Adjumani. The marginal gains are higher in Rwamwanja than Adjumani, and they are higher for cash than food at Rwamwanja settlement, where agricultural potential is relatively high.

# Economic Impact of Refugee Settlements in Uganda

## 1. Introduction

By the end of 2015, the United Nations High Commission on Refugees (UNHCR) recorded the global population of forced displacement at 65.3 million with 21.3 million persons officially classified as refugees. Developing countries host about 86 percent of the world's refugees with over 18 million people under UNHCR's mandate in Sub-Saharan Africa alone. Perhaps just as troubling as the sheer magnitude of displaced people is the growing number of refugees living in protracted displacement, defined as a situation whereby "refugees continue to be in exile for 5 years or more after their initial displacement with no prospects for return in the foreseeable future" (UNHCR, 2016). Estimates in 2013 place around two-thirds of all refugees in a protracted situation, with that number expected to have grown in the past several years. Prolonged displacement in settlements forces refugees to live their lives in limbo and puts them at risk of further hardships as aid and support decrease over time (Aleinikoff, 2015). The hosting of refugees is generally perceived as a burden on the host country, with governments often feuding over whether or not and how many refugees should be allowed entry.

This report challenges the notion that refugees are necessarily a net drain on the host community and brings forth evidence that, under the right circumstances and with external support, refugees can add to the welfare of locals through productive activity and aid spillovers. We address key issues on the effects that refugees have on local host populations through a local economy wide impact evaluation (LEWIE) methodology, focusing on the local community of a hosting nation as a whole. In addition to immediate impacts largely driven by aid spillovers, we consider how refugees living in a settlement for extended periods are able to adapt and become self-sufficient over time.

Refugees benefit from the support of United Nations' agencies and other donors, as well as from the generosity of host countries that offer them asylum. However, recent research focusing on the productive and entrepreneurial activities of refugees challenges the notion that refugees are entirely reliant on aid (Taylor *et al.*, 2016; Omata and Kaplan, 2014). Despite external restrictions on mobility, employment, land use and other rights, refugees have shown themselves to be resilient and resourceful. Entrepreneurial and production activities spring up in the most destitute of refugee settlements, and one can only imagine what might be accomplished if restrictions on refugees' freedom were further removed.

The rise in global refugees and the presence of protracted displacement calls for a new paradigm of applying development oriented interventions to refugee settlements aimed at fostering and nurturing self-sustainable livelihoods. Under the right circumstances refugees, like other groups of people, can thrive. In practice, any form of development assistance must take into consideration the context in which the refugees live and the options that are available to them. One of the key factors to consider is how allowing refugees freedom of movement and providing novel development-oriented aid, such as cash transfers and plots of agricultural land in lieu of in-kind aid, might promote self-reliance and create income spillovers for host-country businesses and households. Recent research finds evidence that refugees can have a significant positive impact on host-country incomes and welfare (Taylor *et al.* 2016).

In collaboration with the United Nations World Food Programme (WFP), we collected data through micro-surveys of households and businesses both inside and outside of two major refugee settlements in Uganda to examine the benefits that hosting refugees can bring to local economies. We also explore the pathways through which these benefits flow, providing insight on the specific policies and institutions that are crucial to facilitating improved living standards for both locals and the displaced. This study extends recent work on refugees' impacts on host economies, by analyzing how the provision of land to refugees alters the economic impacts in and around refugee settlements.

This report is organized as follows. Section 2 briefly describes the refugee settlements we study, Uganda's unique refugee support policies, and the economic activities in which the refugee and neighboring host populations engage. In section 3, we describe the details of WFP food aid provided to refugees, and the welfare implications of aid particularly on consumption and transfers. There is a substantial amount of economic interaction between local Ugandans and refugees, as described in Section 4. In Section 5, we evaluate the impacts of Ugandan refugee settlements on local economies, including on the host population surrounding each settlement. The conclusion, section 6, summarizes key findings and the lessons for Uganda and other refugee-host countries.

## **2. Background on the Ugandan Refugee Situation and Policies**

Uganda has been touted as having one of the most liberal and progressive refugee-hosting policies in the world. The Ugandan setting is different from other host countries by that fact that while refugees are still initially placed in settlements, they have the right to free movement and employment within the country. The refugee children get access to preschool and primary education comparable to that of the nationals. Within the settlements, the UNHCR collaborates with the local government to provide both public service facilities (clinics, boreholes etc.) and plots of land for homesteading at the time of registration. In some settlements refugees are allocated agricultural plots on which they can grow crops.<sup>1</sup> Access to cultivable land helps provide a means of self-sustainability within the settlement and potentially fosters two-way produce trade between refugees and locals. The WFP provides food or cash aid to the refugees in Uganda as in other refugee-hosting nations.

Between the provision of agricultural land, relief aid and freedom of movement, there exist plenty of opportunities for refugees to interact economically with host-country businesses and households around the settlements. Our study reveals that refugees do not survive on aid alone; often they have income-generating activities that allow them to interact with the host-country economy in ways that would not be possible under conventional aid regimes that distribute food to refugees in settlements. Local businesses potentially benefit from refugees' demand for their produce and the availability of refugee labor.

Our surveys were conducted in collaboration with the WFP, and in consultations with the Government of Uganda/Office of the Prime Minister and UNHCR in Uganda. We collected detailed information on the economic activities of both refugee and local host-country households. Separate business surveys were

---

<sup>1</sup>Land is provided for refugee settlements in line with the Refugee Act of 2006 (<http://www.refworld.org/docid/4b7baba52.html>) and the Refugee Regulations of 2010 (<http://www.refworld.org/docid/544e4f154.html>). "Officially gazetted" lands for refugees in some districts are protected regardless of whether or not refugees reside on them. Where land is not gazetted for refugees, the Office of the Prime Minister, Refugee Department (OPM) negotiates with local communities to obtain land for refugees to use.

administered to small shops operating within and in close proximity to the settlements. At the time of our survey in March-April, 2016, Uganda hosted more than 600,000 refugees in eight settlement districts of which we chose two representative sites: Rwamwanja and Adjumani. Together they represented 38.7 percent of Uganda's refugee population<sup>2</sup>. Given the geographical spread of each settlement, a fifteen-kilometer radius area was drawn from each settlement's center.<sup>3</sup> It constitutes what we define as the "local economy." Although any measure of "local" is inherently arbitrary, our measure encompasses the majority of host-country businesses and households that have direct trade interactions with refugees from the two settlements. The data gathered in the surveys enable us to detail refugee and host-country market interactions inside and outside the fifteen-kilometer radius as well as the livelihoods of both refugees and locals, while providing a large amount of individual and household-level information.

Rwamwanja in the south-west is composed mainly of Democratic Republic of Congo (DRC) refugees. Adjumani in the north almost exclusively hosts refugees from South Sudan.<sup>4</sup> These sites were selected to reflect the two major nationalities of refugees seeking shelter within Uganda and two different economic contexts within the host country. Despite cultural and language barriers between refugees and locals, evidence points to a very substantial degree of interactions in product markets, through the buying and selling of goods by households and businesses, as well as in labor markets, primarily host-country business hiring of refugee workers. Refugee livelihood strategies are especially interesting within the Ugandan context as the provision of land and freedom of movement creates an opportunity to examine integration and self-sufficiency questions surrounding large influxes of refugees.

In the south-western settlement, Rwamwanja, each refugee household was allocated a roughly fifty-by-fifty square meter plot of land for crop cultivation (exact plot sizes vary based on land availability). Given that the population of Rwamwanja settlement is large compared to the local population, the amount of agricultural output that refugees in this settlement supply is substantial despite the limited plot size. Land is scarce in the northern settlement of Adjumani. There, refugees are provided with only a fifteen-by-fifteen meter homestead plot and despite close proximity to White Nile, the soil quality is not very conducive for agriculture.

Refugees in both settlements also receive aid and support from NGOs and relief agencies. Various relief organizations operate within the settlements; in particular, the WFP provides recent arrivals (five years or less) and extremely vulnerable households (EVHs) with an in-kind food package on a monthly basis. More recently, the WFP has begun to offer a subset of eligible households the option to switch to cash transfers in lieu of food. Cash transfers are relatively new to all settlements in Uganda; the program was implemented in Rwamwanja only six months prior to our survey. At the time of our survey, a few settlement sites<sup>5</sup> in Adjumani had already been participating in cash transfer aid for one year.

---

2 Accurate as of October, 2016, the population is close to 800,000 with continuing influx of refugees from South Sudan

3 For Adjumani, we constructed the fifteen-kilometer circle for each site, inasmuch as some of the sites were far apart from one another.

4 As we write this report, at least 35 thousand refugees have fled South Sudan into northern Uganda in the past couple of months. A majority of these refugees are hosted temporarily in transit camps in Adjumani settlement.

5 The northern settlement of Adjumani is comprised of 15 sites or Final Distribution Points (FDPs), of which 6 were randomly selected for this study. These sites are scattered in the northern district of Adjumani and are collectively called the Adjumani settlement.

## 2.1. Differences in Socio-demographic Characteristics between Settlements and Groups

The demographics of refugees from the DRC and South Sudan are quite different, especially in terms of culture and farming practices. Congolese refugees situated in Rwamwanja settlement are often from agrarian backgrounds, while the majority of South Sudanese refugees in Adjumani have historically been pastoralists. Table 1 summarizes key demographic variables to facilitate comparisons between refugees across the two settlements as well between refugees and locals.

**Table 1. Socio-demographic Characteristics of Local Host-country and Refugee Populations**

Location	Household (HH) Size	Female Head of HH Ratio	Age of HH Head	Years of Education of HH Head	Proportion of Children (<16)	Single Mother Head*	Child School Enrollment 6 - 16
<b><i>Host-country</i></b>							
Rwamwanja							
a	5.86	0.19	44.3	4.99	0.49	0.14	0.92
Adjumani	5.88	0.31	40.6	4.38	0.51	0.19	0.93
Both	5.88	0.26	42.2	4.64	0.5	0.17	0.92
<b><i>Refugees</i></b>							
Rwamwanja							
a	4.47	0.30	38.4	3.20	0.49	0.21	0.73
Adjumani	5.23	0.84	39.2	2.01	0.59	0.68	0.95
Both	4.93	0.63	38.9	2.48	0.55	0.51	0.89

\* Single Mother Head refers to households where the only adult member is a female and the household has 1 or more children.

Overall, refugees tend to have a smaller household size than locals. The average household size and probability of the head of household being female is significantly lower for refugees from the DRC at Rwamwanja than for the South Sudanese refugees at Adjumani. Within our sample, a much larger proportion of refugee are female headed with children (single mother) when compared to Ugandans. This is likely driven by the nature of displacement between the two refugee nationalities. Many of the refugee households in Adjumani settlement are single mothers who take their children across the border to Uganda, while their husbands stay in South Sudan to work/fight.

Refugee household heads from the DRC on average have one more year of schooling than South Sudanese refugee heads. Both have significantly less schooling than host-country household heads living near the settlements. Taken together, refugee heads of household have on average 2.16 years less schooling than locals. Low levels of education could hamper refugees' access to non-farm jobs. However, it is important to note that since refugees can move freely, it could be the case that those who entered Uganda with sufficient human capital have migrated outside the settlements to the capital city, Kampala,

in search of better livelihood opportunities. If this is indeed the case, then our survey represents a less educated/more vulnerable population of refugees in Uganda.

## 2.2. Employment and Wage Work

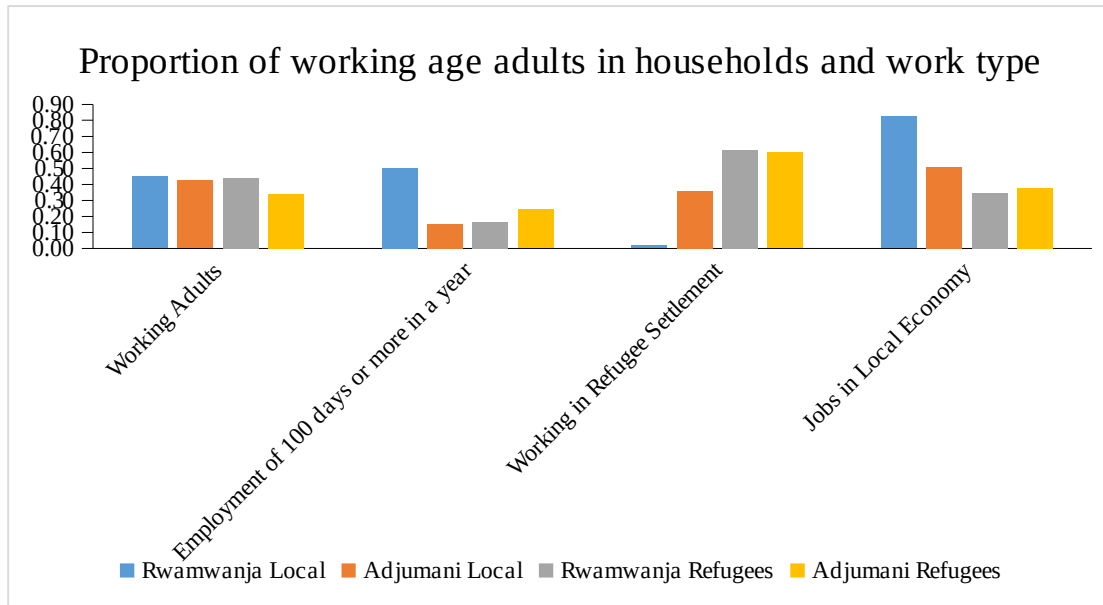
A key aspect of Ugandan refugee policy is freedom of movement and employment. Refugee families may choose to leave the settlement if they wish (this usually entails losing their aid from WFP). Although refugees in host counties that ban employment sometimes still manage to find work under the table, removing barriers undoubtedly allows more individuals to participate in the labor market. We do not have information on refugees who migrate outside the settlement, unless they remain connected to households we surveyed within the settlement. Instead, we focus on local employment to explore how local wage work contributes to the welfare of refugee households.

**Table 2. Wages and Employment**

<b>Location</b>	<b>Daily Wage</b>	<b>Days Employed</b>	<b>Employment Proportion</b>	<b>Proportion in Non-agriculture*</b>
<b><i>Host-country</i></b>				
Rwamwanja	8671	118.2	0.08	0.54
Adjumani	9301	70.3	0.08	0.41
Both	9042	90.2	0.08	0.46
<b><i>Refugees</i></b>				
Rwamwanja	8028	47.9	0.11	0.21
Adjumani	5863	74.1	0.02	0.48
Both	7517	52.1	0.05	0.28

\*Refers to the proportion of employed individuals working in non-agricultural jobs

Table 2 shows that while daily wage rates for refugees and locals in Rwamwanja are statistically indistinguishable, refugees in Adjumani are paid significantly less than the native population. Only 2% of individuals residing in Adjumani refugee settlement are employed in wage work. This contrasts with Rwamwanja settlement, where refugees' participation in the labor market, at 11%, is higher than locals'. Results from simple comparisons in mean employment should not be interpreted as reflecting ease of finding employment for Congolese refugees, as these statistics fail to take into account other individual characteristics that may influence the likelihood of finding wage work. Congolese refugees in Rwamwanja have a relatively lower proportion of employment in non-agricultural work when compared to locals or the South Sudanese. This could be a reflection of the fact that Rwamwanja is situated in an agriculturally intensive region; thus, employment as farm workers is relatively easy to obtain.



**Figure 1: Labor market participation in each group**

\*Proportion of jobs inside/outside refugee settlement and days employed are conditional on being employed in the past 12 months

Figure 1 summarizes labor market participation for working age adults (17-55 years old). South Sudanese refugees have a lower proportion of household members falling in the 17-55 age bracket, and the percentage employed is small. While very few locals work inside the refugee settlements in Rwamwanja, a sizable share of Ugandan nationals who work find employment inside Adjumani refugee settlements, usually in construction or agricultural/livestock production. Over one third of employed refugees work outside the settlement within the local economy, mainly focusing on agricultural and livestock activities.

The importance of wage employment is self-evident for households that have a wage worker (Table 3). The proportion of total income coming from wages varies by region and between refugee and host-country households, but in all cases it remains substantial. Although the percentage of refugees in Adjumani who have wage employment is low, wage workers account for almost half of total annual income in the refugee households that have one or more wage workers.

**Table 3. Proportion of Wages\* to Total Income**

Refugees		Locals	
<u>Rwamwanja</u>	<u>Adjumani</u>	<u>Rwamwanja</u>	<u>Adjumani</u>
0.29	0.48	0.58	0.71

\*refers to the proportion of wage income for households that have a wage worker

Using a regression based method, we are able to determine which individual characteristics are correlated with participation in wage work. Economic theory predicts that individuals with human capital (schooling, work experience, skills) correlated with earnings in a particular type of work are more likely to supply their labor to that type of work (Mincer, 1974). Appendix A1 details the results of a regression



framework to measure the impact of human capital and other individual characteristics on the probability of finding employment. Two results stand out from the employment analysis.

**First**, there exists a significant difference in employment prospects between refugees and locals in Adjumani settlement despite taking observable individual characteristics into account, this gap is not present in Rwamwanja. Taking into consideration individuals' age, gender, education and years since arrival, refugees in Adjumani are 26 percent less likely than their host-country counterparts to participate in all forms of employment, while for non-agricultural employment, they are 8.7 percent less likely to participate than locals. This unexplained gap could be a reflection of cultural barriers, external contexts (Adjumani region has less agricultural activity), and/or other factors not reflected in the model (such as possible differences in unobserved ability or motivation between refugees and host-country workers).

**Second**, years of schooling seem to be largely uncorrelated with the probability of overall employment. This is most likely a reflection that jobs found locally tend to be in agriculture, where formal education is not likely to have a strong influence on the probability of finding work. Indeed, when we only consider non-agricultural employment, the additional impact of one more year of schooling is positive and significant (the exception is Adjumani host-country individuals, for whom the correlation between schooling and non-farm employment is not statistically significant). The results indicate that for Congolese refugees, an additional year of schooling is predicted to increase the probability of non-agricultural employment by 0.7 percent. For the South Sudanese that number is 0.5 percent.

Women seem to have a harder time finding employment in Rwamwanja settlement; however, that does not seem to be the case for women residing in Adjumani. Cultural barriers likely play a role here, inasmuch as South Sudanese refugees are predominately from the Dinka, Kuku or Nuer tribes, which have strict cultural norms for what types of work are suitable for men and women. Men's role in the household is primarily tend to livestock, while most of the agricultural and wage work is done by female members. This could potentially explain why gender is not correlated with employment for the Adjumani region, as females are most likely the ones seeking out for local work often deemed unfit for men. The number of years since arrival has a strong positive correlation with wage employment for South Sudanese refugees, especially in the case of nonagricultural work. This suggests a catch up effect, as refugees adjust to their surroundings, albeit the magnitude of this effect is small at 0.3% increase per year spent in the settlement.

### **2.3. Agricultural and Livestock Activities**

The two settlements differ in terms of access to agricultural land and agricultural environments. In Rwamwanja, nearly all settled refugees are given a roughly fifty-by-fifty-meter plot of land on which to cultivate. The plot of cultivatable land is generally situated very close to where the refugees build their homes. Those residing in Adjumani settlement, however, were only given homestead plot, of which a small section is typically utilized as a garden plot. The primary reason for this difference is a lack of land resources in the northern region. The Office of the Prime Minister (OPM) has to negotiate with the local population to gain access to land for refugees. As a direct consequence, Adjumani settlement is fragmented into fifteen final distribution points (FDPs) for food assistance (cash and food) instead of being one consolidated block like in Rwamwanja.<sup>6</sup>

---

<sup>6</sup> It should be noted that distribution in Rwamwanja occurs in the many villages within the settlement which are fairly

Situated in the southwest of Uganda, Rwamwanja has two rain cycles per year, and thus two agricultural seasons. By contrast, the dryer northern region of Adjumani has only one season of crop production. The overall quality of agricultural land is also better in Rwamwanja; some FDPs in Adjumani are situated on extremely rocky terrain. This has contributed somewhat to the lower proportion of Adjumani refugee households engaged in agricultural activities and their reduced capacity to act as sellers in the local market. Most refugees in the northern settlements grow small patches of vegetables on their homestead land for consumption. A few are wealthy enough to purchase and raise livestock, mainly cows, goats and chicken. The differences in agricultural production and livestock ownership as a means of generating income are displayed in Table 4 and Figure 2.

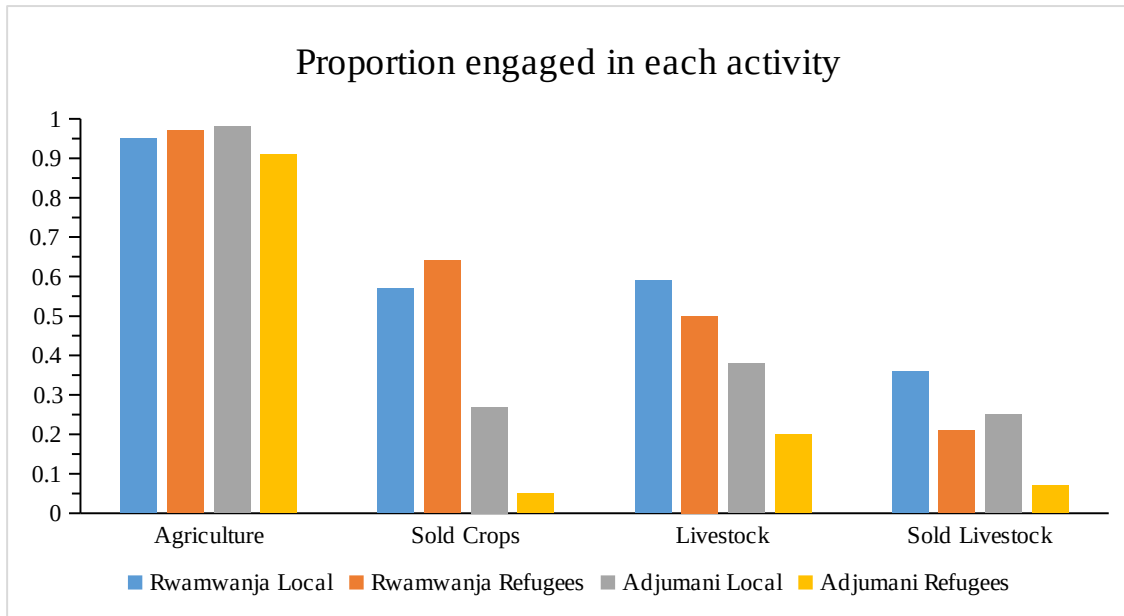
**Table 4. Agriculture and Livestock Activities of Refugee and Host-country Households**

<b>Location</b>	<b>Agricultural Output* (Thousands of Shillings)</b>	<b>Proportion Hiring Labor</b>	<b>Average Land size (square meters)</b>	<b>Livestock Value (Thousands of Shillings)</b>	<b>Number of Animals Owned</b>
<b><i>Host-country</i></b>					
Rwamwanja	2224	0.14	12800	316.94	9.61
Adjumani	361	0.09	9400	295.63	5.64
Both	1362	0.11	10800	304.11	7.34
<b><i>Refugees</i></b>					
Rwamwanja	318	0.16	3600	130.59	2.01
Adjumani	55	0.02	380	45.65	0.80
Both	237	0.08	1600	79.34	1.28

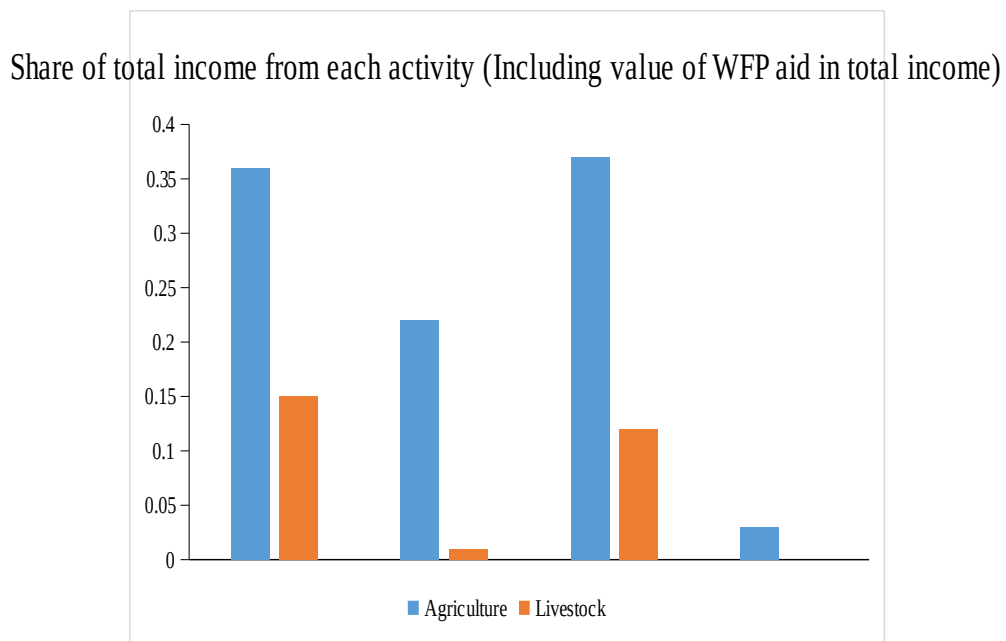
\* Agricultural Output is computed only using households with positive crop production

Although the vast majority of both refugees and locals cultivate crops, the nature of their agricultural activities differ (Figure 2). Refugees typically have much smaller plots of land on which to cultivate, especially in Adjumani where the average cultivated plot size is only 380 square meters (even in Rwamwanja, refugee plots sizes are about 6 percent of that of the locals). As a result, refugee households in Adjumani primarily utilize their plots to grow vegetables to supplement their diets; only around 5 percent sold any of their produce in the last 12 months. This fact is further reflected in the annual amount of agricultural income, which is significantly less for refugee than host-country households.

close to one another if compared to the FDPs in Adjumani.



**Figure 2: Proportion of households engaged in agriculture and livestock activities and sales**



**Figure 3: Proportion of income from agriculture and livestock activities**

The ratio of agricultural to total income is smaller for refugee households (Figure 3), although it is important to note that these numbers are constructed in a way whereby the value of the WFP aid is counted as a part of household total income. Excluding the value of the aid packet from household

income, 81 percent of Rwamwanja refugee households' income over the twelve months prior to our surveys came from agricultural output, compared with 24 percent for Adjumani refugees.

Refugees own less livestock than locals, especially in Adjumani settlement. This disparity is apparent in both the proportion of households owning livestock and the value of livestock owned. One interesting observation is that while a sizeable percentage of refugees own livestock (27 percent), the income they derive from livestock sales is almost negligible. An alternative measure of livestock sales, as the ratio to income excluding the WFP food aid package, does not substantially raise this proportion. In our conversations with refugees, there seemed to be a common perception that livestock are a store of wealth rather than an investment in future income growth. This could potentially explain why so few refugees derive income from livestock sales. Another possibility is the lack of sufficient stocks of animals to justify sales in the first place.

In terms of productivity, we find that refugees are more productive per unit of land than host-country farmers are, as detailed in table 4a below. The composition of crops grown is different between regions and between refugee and host-country households; the majority of households, both refugees and nationals, in Rwamwanja grow mainly maize, whereas refugees at Adjumani cultivate vegetables, and locals grow a mix of sesame and sorghum. The difference in unit-land productivity persists even when we compare households that grow the same crops, albeit at a lower ratio (roughly 1-4 for maize alone).

**Table 4a. Average Agricultural Productivity\* (Shillings per Square Meter)**

Refugees		Host-country	
<u>Rwamwanja</u>	<u>Adjumani</u>	<u>Rwamwanja</u>	<u>Adjumani</u>
194	986	102	137

\* Productivity is calculated only for households with positive crop production

In contrast to land productivity, labor productivity is low on refugee farms. As displayed in table 4b, refugee households in Adjumani devote a startling number of labor-days to farm each square meter of their land endowment. This almost certainly reflects refugees' limited access to other forms of gainful employment in and around this settlement. With lower levels of outside employment, labor is effectively "trapped" on refugee plots at Adjumani; small plots are farmed very intensively by refugee households unable or unwilling to sell their labor elsewhere.

**Table 4b. Per-unit Land Labor Input (In Person-days)**

Refugees		Host-country	
<u>Rwamwanja</u>	<u>Adjumani</u>	<u>Rwamwanja</u>	<u>Adjumani</u>
0.16	1.02	0.02	0.19

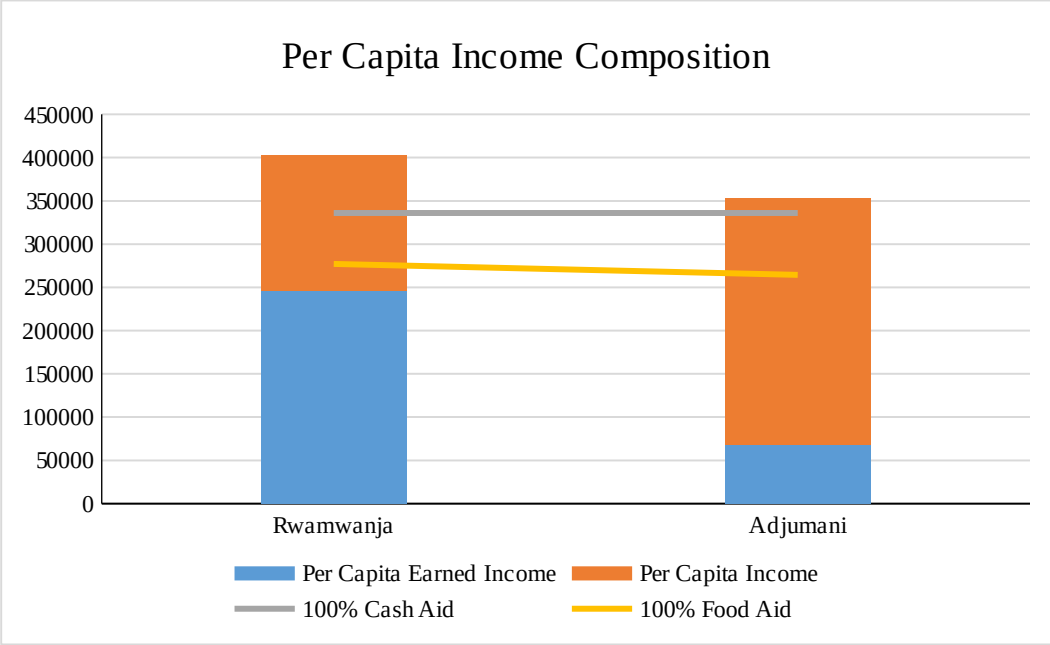
Productivity does not imply efficiency; being more productive per unit of land or labor does not translate into being a more technically competent farmer. A farmer can increase her productivity per unit of land by farming more intensively (allocating more labor-days to a square meter of land), while still

being inefficient (not achieving the maximum output for a given combination of all inputs used). Farmers’ efficiency can be estimated using econometric methods. The most commonly used of these is stochastic frontier analysis (SFA).

The method of estimating productive efficiency of refugee vis-à-vis local farmers using SFA is detailed in Appendix A3. Results from the Rwamwanja settlement support the hypothesis that refugee farmers are just as efficient as local farmers, controlling for land size and household characteristics. In Adjumani settlement, however, we find significant evidence that refugees are less efficient than host-country farmers. In other words, they use too many inputs (particularly labor), and they do not produce enough crop output considering the amount of time and effort that is put in.

**2.4. Income Sources**

A breakdown of income sources provides a clear idea of which livelihood activities besides agriculture are important for generating incomes, and it highlights some of the key differences between the two settlements and between refugees and their Ugandan counterparts.



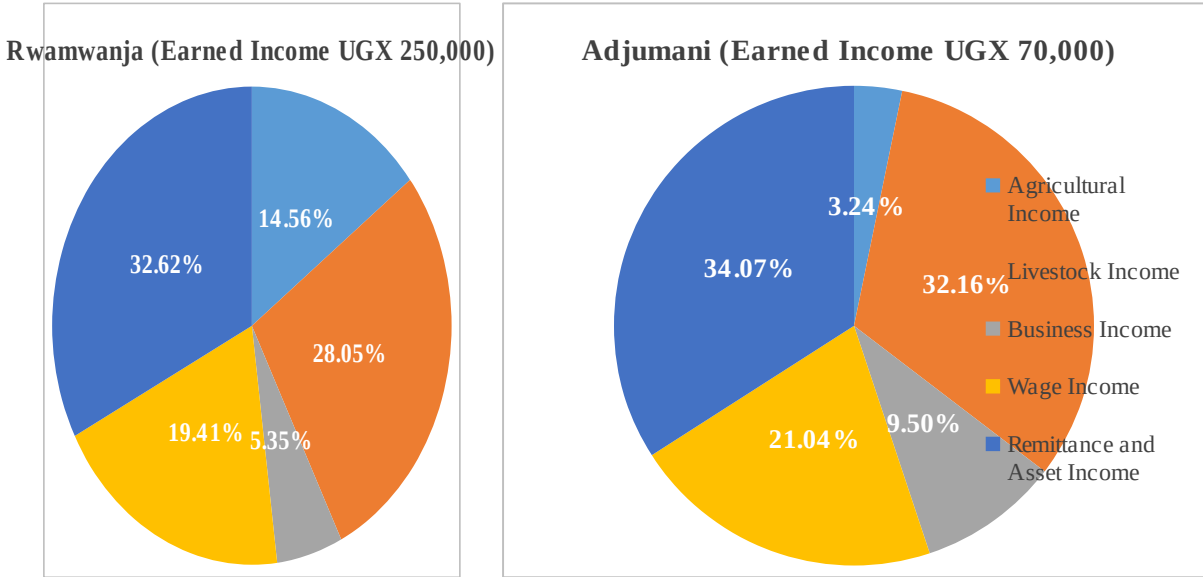
**Figure 4: Per-capita total income composition and comparison with WFP aid**

Figure 4 charts per capita income levels into net earned income from activities and aid income. Net earned income is the income from activities net of aid assistance. We find that per capita annual income for refugees in Rwamwanja is about UGX 400,000 while that for Adjumani is about UGX 350,000. In Rwamwanja, roughly 250,000 of the 400,000 shillings (61%) can be classified as net earned income; while Adjumani refugees are more reliant on assistance with 70,000 out of 350,000 (19%) being derived from non-aid sources. The difference between per capita income and per capita earned income reflects the

average amount of WFP aid that an individual refugee obtains (which is less than the full aid rations due to some households being on half rations). Because the influx of refugees to Adjumani is relatively new, there is a larger proportion of households on full rations, leading to the per-capita aid assistance being larger in that settlement. To facilitate comparison, a small subsection of refugees residing in Adjumani who have settled in Uganda and phased off aid decades ago, are excluded from the tables.

In Rwamwanja settlement, earned income is a rather substantial proportion of total per capita income, while South Sudanese refugees in Adjumani have a much smaller fraction of their income derived from productive activities. As a point of reference the levels of full aid assistance are displayed in the table with solid lines, food aid values were computed using regional median prices, thus are slightly different between the two settlements. The large gap in earned income between settlements is likely due to a myriad of factors, lack of cultivatable land and employment opportunities in Adjumani as well as cultural practices and differences in farming experience prior to displacement. A further breakdown of earned income into each of its components helps us get at what is potentially driving this difference in earned income.

In absolute magnitude, all earned income sources are lower in Adjumani settlement. Comparing the proportion of income generated from each activity in the two settlements, we find that about one third of Adjumani refugees' income is from remittance and asset/transfer income, and that is the most important source of income. The share of income from agricultural activities in Rwamwanja is almost 5 times that of Adjumani, and previous discussions suggest why that is not a surprising result. Also, the business income share is twice as large in Adjumani as in Rwamwanja.



**Figure 5: Earned Income distribution across sources**

While the majority of refugees from the DRC are from an agrarian background, South Sudanese refugees are largely pastoralists. Aside from differences in pre-displacement occupations, the South

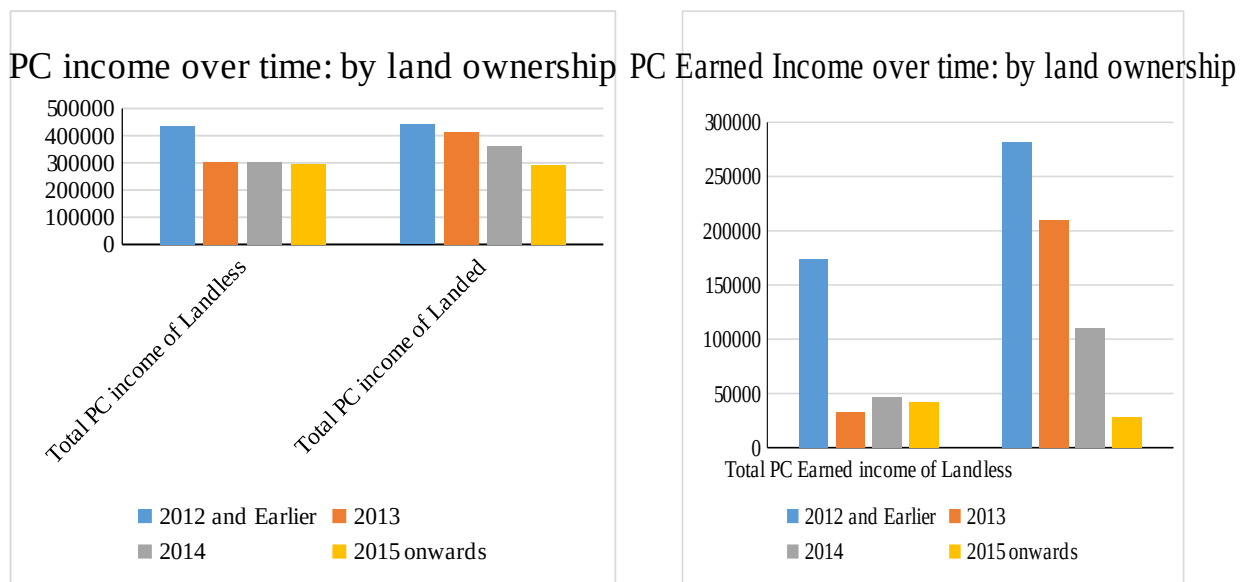
Sudanese are also relatively new arrivals, with an average of 2.9 years of stay, while that number is over 3.6 for DRC refugees. Adjustments over time to life in the settlement is potentially an important factor to consider when there is a learning process and the abilities of the displaced to become self-sufficient improves over time.

### 2.5. Earned Income over Time

With the length of displacement rising over time for large swaths of refugees, an important question is whether or not refugees' ability to generate earned income improves over time. To get at this issue, we separate the refugees in our sample into four arrival time bins: those who arrived in 2012 or earlier, 2013, 2014 and 2015 or later; in addition, refugee households are dichotomously classified as landless (no agricultural land) and landed households.

The earliest arrival cohort of refugees (2012 or earlier) that do not currently own or cultivate land have a per capita income level comparable to those who do have land. However, more recent arrivals with land have a higher income level on average. In terms of earned income, however, the gap between landed and landless refugees is wider. There is a clear pattern of earlier arrivals having a higher income, in both total and earned per capita income.

Although almost all refugees in Uganda receive some land, agricultural land can be transferred to neighbors, usually through informal implicit arrangements (income from renting land to others is part of transfer income). Thus, the comparison of landed and landless refugees is prone to selection problems, as those without any land to cultivate are likely refugees who find no value in farming and instead opt to let out their land in order to pursue other income generating activities.



**Figure 6: Income distribution across time**

Naïve comparisons of average per capita income levels across cohorts fails to take into account factors such as systematic differences in household characteristics. We estimated the correlation between

years since arrival *and* land allocation size on a household's ability to generate income using regression methods.

Appendix A2 summarizes the findings from our regression analysis. Controlling for an array of household characteristics and FDP locations, we find a strong positive correlation between both arrival years and land size on a refugee households' ability to generate earned income, as well as the ratio of earned income to total income. The effects are non-linear, meaning both time spent in the settlement and land size incur diminishing returns, though the rate at which returns diminish is small.

Each additional hectare of land for the refugee household is associated with an additional 110,000 shillings in annual earned income for the household, of which 57,000 is from agricultural output. The number of years spent in the settlement also increases the expected earnings of a refugee household by a smaller magnitude, but the effects are not significant for agricultural production. Without repeated observations on the same household over time to help control for unobserved abilities and other household characteristics, these results should not be interpreted as being causal, but rather, as conditional correlations or impacts on predicted incomes.

### **3. WFP Aid: Cash versus Food**

The largest provision of aid within the two settlements comes from the Government of Uganda through the provision of land and asylum space. WFP, which provides food assistance to refugee households, contributes significantly to the refugees' welfare and income among aid from other partners. WFP's assistance is usually phased out over the course of 5 years: in the first three years each member of the household is given full assistance; assistance is reduced to 50% in the last two years; and it ends once refugees exceed the 5-year limit. Extremely vulnerable individual (EVI) households are identified through annual assessments on the household's ability to generate income, and they are given full rations throughout their stay.

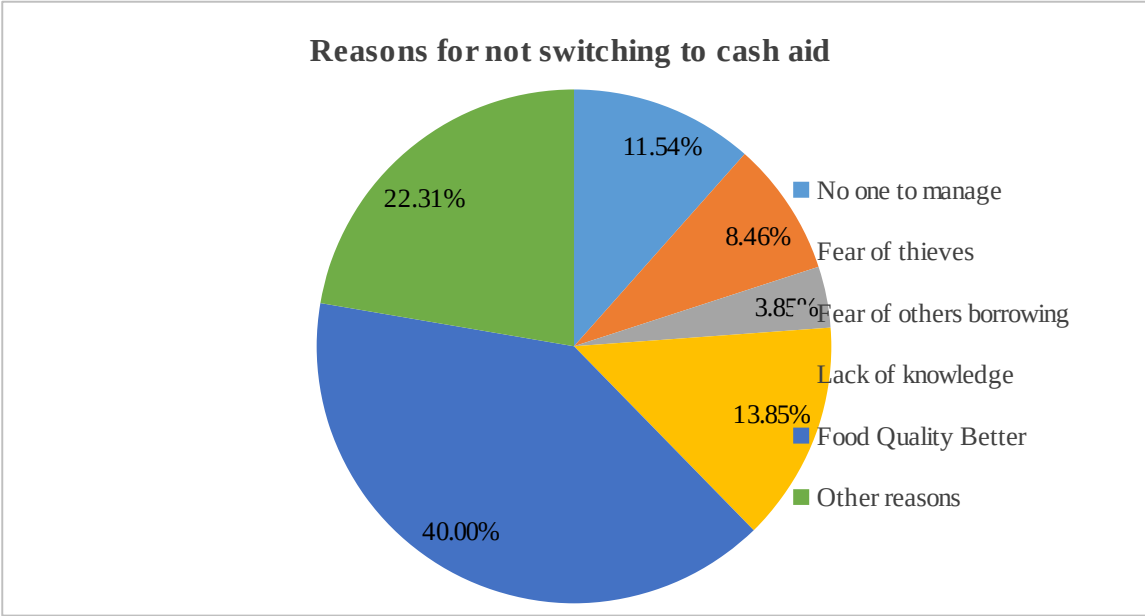
A cash transfer option was made available to subsets of households (varying by settlement) with the amount of transfer aimed to be in line with the food packet value. Eligible households were selected based on arrival year, with different FDP's having their own cutoff dates for eligibility. Previous research on the subject of cash-versus-food generally indicate that while all transfer types improve welfare, cash transfers tend to promote more dietary diversity and is more cost effective than food (Hidrobo et al. 2014).

Although there has been increasing interest in switching into cash transfer modalities from commodity based aid, the impacts of such a switch on a large refugee settlement can be rather ambiguous. Tabor (2002) argues that cash transfers are more efficient and do not distort consumption or production choices, allowing refugees the freedom to choose what to purchase. From a local economy perspective, cash transfers can improve spillovers through promoting increased demand and allowing more production through input purchases; however, if the local supply of goods is inelastic, inflationary effects will ensue. In practice, various factors can influence the relative benefits of which transfer type is better and depends heavily on the context. To this end, we examine several key dimensions such as consumption and production decisions, which may change because of switching from food to cash.

Our survey found that approximately one-third of all refugees given the cash aid option in Rwamwanja subsequently declined the offer. The corresponding fraction for Adjumani refugees is about



one-fourth. Of those who are currently on cash aid, roughly 82 percent in both settlements switched from food assistance to cash the first time the WFP offered them the cash option. About 69 percent of those who switched later on, but not initially, report that they lacked knowledge about the cash aid mechanism. In our sample from the two settlements, 27 percent of the refugee households were offered the option of switching to cash but were still on food assistance.



**Figure 7: Reasons why refugee households did not switch to cash when offered**

The above pie chart provides a description of the possible reasons for not switching from food assistance to cash assistance. Of the 27 percent still on food aid with an existing offer to switch, 40 percent reported that they found the quality of food provided in aid to be better than what they can buy locally. Fourteen percent based their decision on a lack of complete knowledge about the cash aid.

**3.1. Welfare Impacts**

The switch from food to cash transfers potentially facilitates local production activity by increasing the demand for local products and provides a boost to the welfare of both refugees and nationals surrounding the settlements. Refugee households that receive cash are better able to purchase goods in nearby markets as well as expand their economic activities, raising their contribution to local output.

If we monetize the value of the food packet using local market prices of the individual items sold, we find that the sale value of the food packet is below the value of the cash transfer (Table 5). We converted the value of the food packet into a monetary measurement using reported median market prices around each settlement. We found that each dollar of food aid would bring roughly eighty cents if refugees were to sell the food.

The food aid packet consists of four major items: cereal (usually maize), pulses, oil and a corn-soy blend (CSB). In our data the primary item refugee households sold was cereal, the main food type in the aid packet by weight.

**Table 5. Aid Packet Value and Sales**

Food Aid	Rwamwanja	Adjumani
<i><b>Sales value of Food packet/Cash</b></i>		
Full Ration	0.83	0.79
Half Ration	0.78	0.77
EVI	0.78	0.77
<i><b>Sales of Cereals from Food packet</b></i>		
Proportion of households	0.20	0.26
Proportion of items sold (if sales occurred)	0.17	0.09

Sales of other items in the food packet were rare; thus, they are not displayed here. Due to the limited variety of food options in the aid basket, a substantial proportion of households sold some of their food in order to diversify their diets. Since selling of the food packet is officially not allowed, there is some concern that respondents were not completely honest when answering questions about food-aid sales. Therefore, we expect these estimates to represent a lower bound for food-aid sales.

We found a strong negative relationship between an aid-recipient's probability of selling cereals and the number of years a refugee household has been in the settlement, as well as the age of the head of household. Recipients who have been in the settlement longer are likely to be better adjusted and established, thus mitigating their need to sell items from the food packet at a discounted price. Money obtained by selling WFP food aid generally is used to diversify diets and fund investments such as educational expenses. The fact that many refugees sell food aid despite incurring losses points to the value they place on having cash in lieu of food.

### **3.2. Transfer Types, Food Security and Consumption**

Households receiving cash aid are a selective group who opted into the cash program, conditional on being offered the choice. These households could be different from those who turned down the cash offer as well as from others who were not offered the cash option to begin with, making it difficult to draw conclusions by comparing cash and food recipients.

A difference-in-means test on key household characteristics reveals no significant differences between refugees choosing cash versus food; however, it is possible that the two groups differ on unobserved dimensions (preferences, how cash strapped they are, etc.).

In light of this, we estimated the impacts of cash versus food in two ways. The first uses actual receipt of cash transfers as the treatment variable to find the treatment-on-treated (TT) effect. This effect should be thought of as a comparison between cash recipients (those who accepted the cash offer) and all other refugees on food aid, disregarding the problem that they are a self-selected group.

Our second approach estimates the expected result of offering the cash option to a refugee, given that some refugees will accept the cash offer and others will not. It is particularly relevant from a policy point of view, because at the settlements we studied the WFP does not “treat households with cash” but rather gives households the option of receiving cash instead of food. The “intent-to-treat (ITT)” approach makes use of the fact that, conditional on how many years one has been in the settlement, receiving the offer to switch to cash is independent of household characteristics under WFP policy. It answers the question: “What would the impacts be if the WFP gave the option of switching to cash (as opposed to the cash aid itself) to an average refugee household?” It assumes that switching to cash is voluntary.

We used the two approaches to measure, respectively, how cash and the cash aid option affects refugees’ welfare in terms of food security, consumption, consumption diversity, and protein intake.

**Table 6. Estimates of Food versus Cash Aid on Household Consumption**

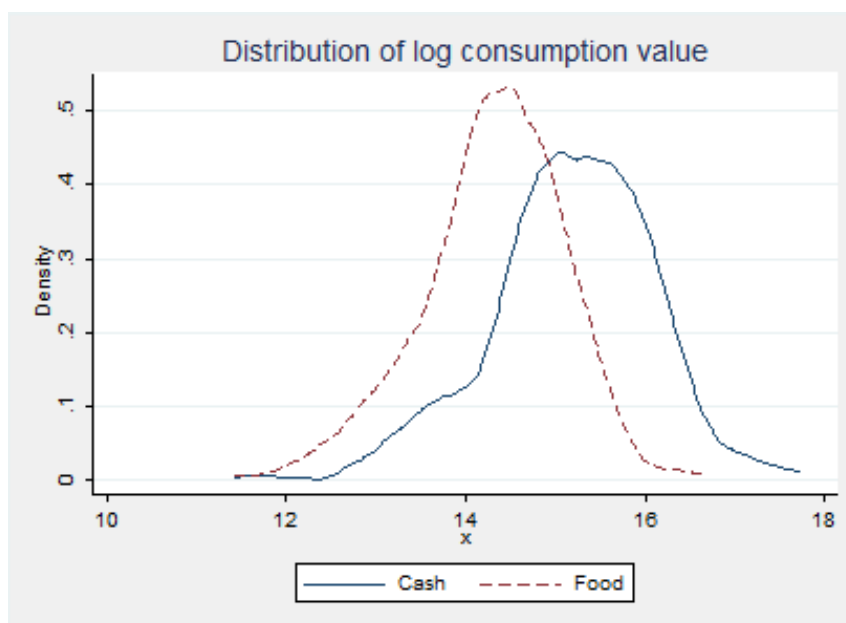
Dependent variable:	<b>Food Security</b>	<b>Log Consumption</b>	<b>Consumption</b>	<b>Consumed</b>
0-1 dummy	<b>Index</b>	<b>Value</b>	<b>Variety</b>	<b>Proteins<sup>#</sup></b>
Treatment on Treated (TT)	0.43*** (0.07)	0.54*** (0.20)	0.98*** (0.15)	0.15*** (0.03)
Intent to Treat (ITT)	0.43*** (0.08)	0.29* (0.16)	0.70*** (0.15)	0.10*** (0.03)
N	750	750	750	750
R-squared/Adj. R-squared	0.22	0.08	0.2	0.09

\* All regressions control for/match based on household characteristics, an asset index, income, years since arrival and dummies for separate geographic clusters. Sample constrained to only contain households receiving either type of aid.

<sup>#</sup>This is a logit regression, marginal effects at the mean reported.

The regression results, reported in Table 6, show that giving cash or giving households the option to get cash has a strong positive association with food security, consumption, consumption diversity, and the probability of consuming proteins (meat, fish eggs) during the week prior to the survey. The food security index is constructed using principal component factor analysis on a set of seven questions pertaining to food consumption levels in the past week.

The TT regressions find that receiving the cash transfer instead of food aid is significantly associated with increases in consumption levels, the variety of food purchases (by almost one whole food item), and the probability of having consumed proteins in the last week (a 15-percent increase). To put the food security index estimates into perspective, a switch from food to cash aid would move a household from the middle of the food security distribution (50th percentile) to the 39th percentile (or top 39%).



**Figure 8: Distribution of consumption among refugees**

A distribution of log consumption levels (Figure 8) illustrates the magnitude and distribution of outcomes associated with switching from food aid to cash transfers. The distribution of logged consumption with cash aid lies uniformly to the right of the distribution corresponding to aid in food. As evident in Figure 8, a 0.54-log point shift is substantial.<sup>7</sup>

Bearing in mind the potential selection issues mentioned earlier, we also display the ITT effects of offering a refugee household the option to switch from food to cash. Naturally, due to some households rejecting the cash offer, the coefficients are smaller in magnitude but still positive and highly significant. If the intent of the WFP were to expand the cash option offer to more refugee households, the ITT estimate would be the estimate of interest. Both the TT and ITT impacts are large considering the size of the cash transfer, and they are consistent across a variety of outcomes and model specifications.

#### **4. Market Interactions between Refugees and Local Households**

In the unique Ugandan setting there exist plenty of pathways through which refugees and locals can interact to have mutually beneficial interactions. Cash and food aid transfers to refugee households, who are a large proportion of the local population, generate increased demand and supply of food and other goods. Businesses in and around the refugee settlements purchase inputs locally while simultaneously providing employment opportunities for everyone within the community.

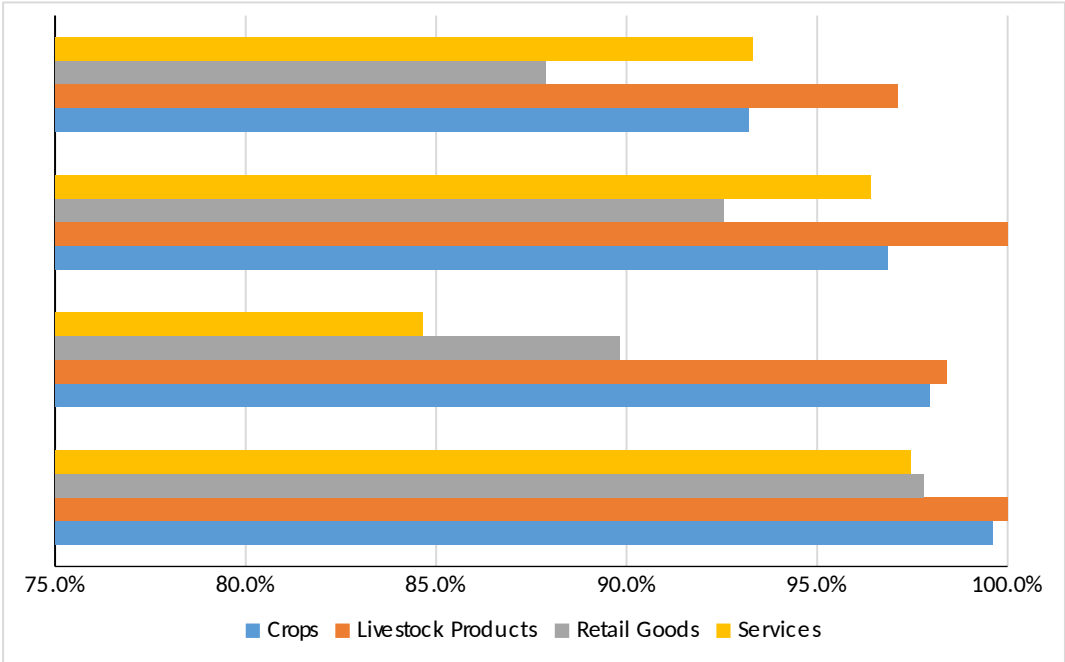
The recent trend of switching from food to cash modalities of aid delivery has the potential to stimulate local economic activity more. When businesses expand their operations to accommodate an increase in demand for their goods and services, their demand for labor and other inputs increases as well.

<sup>7</sup> Our consumption value measure includes food consumed out of the food packet; thus, the effects reported are not due to cash-receiving households simply needing to purchase more food.

This can set in motion a series of income multiplier effects with the surrounding economy. However, if local supply of goods is inelastic, meaning that it does not respond to a rise in demand, then increases in cash aid may result in inflation. Additional policy interventions may then be required to ensure that the refugee assistance generates real benefits for the local population, instead of price inflation. Food aid, on the other hand, increases the supply of food locally, potentially benefitting consumers by driving down the price of food. This benefits food consumers but could have a detrimental effect on local producers who compete, directly or indirectly, with food aid.<sup>8</sup>

**4.1. Market Interactions**

The influx of refugee labor into a local economy can be a stimulus to host-country business and production activities through an expanded labor supply. Reduction of local wages, however, may create undesirable effects by reducing the earnings of local workers.



**Figure 9: Percentage spent on purchases locally by each group**

The provision of land to refugees creates an additional layer of activity through which multiplier effects can unfold. Cultivable land allows refugees to be not only consumers, but also active producers in local commodity markets. Refugees can simultaneously increase local the supply of agricultural goods as food demand rises in refugee and/or host-country households. Figure 9 illustrates the percentages of expenditures refugee and host-country households make within the local economy, that is, out to a radius of 15 km around each settlement, for four categories of goods: crops, livestock products, retail goods and services.

<sup>8</sup> Farmers might compete with food aid directly if they grow the cereal crops that are in the food packet. Farmers might compete with food aid indirectly if local consumers buy cereals made cheaper by food aid, while spending less on other foods that local farmers produce. In theory, consumers could spend more on all kinds of food if food aid makes cereals cheaper, but the finite size of the human stomach limits the extent to which that is likely to happen.

Most expenditures on all goods and by both household groups are within the local economy. Refugees on average spend a higher percentage of their income within the local economy. All livestock product purchases by the refugee population in both settlements are local. Host-country households around Adjumani spend at least 10 percent outside the local economy except for livestock products. About eight to sixteen percent of service expenditures by the host population are made outside the local economy. Taking into consideration the fact that the majority of residents in both Rwamwanja and Adjumani are refugees, local market interactions between refugees and the host community are quite substantial.

#### 4.2. Refugee and Host-country Businesses

In the Ugandan setting, one of the major labor hiring activities locally is through small host-country businesses operating both inside and outside of the refugee settlements. In addition, refugee operated businesses purchase and supply goods locally, adding another layer of interaction and exchange and facilitating spillover impacts.

**Table 7. Businesses within Settlements and the Local Economy**

Summary of Businesses	Refugees		Host-country	
	Rwamwanja	Adjumani	Rwamwanja	Adjumani
Percentage of HHs with business	9.0	5.2	21.9	16.4
<b>Output and Customers</b>				
Value of business (in shillings)	2,089,920	3,268,212	8,681,114	8,609,754
Percentage primarily serving refugees	81	92	24	10
<b>Labor input</b>				
Percent Hiring Employees	18	28	33	22
Average number of employees hired	1.6	2.4	2.1	1.7
Percentage hired from settlement	82	63	7	9
Percentage hired from local economy	12	35	93	54
<b>Other inputs</b>				
Proportion from settlement	0.60	0.38	0.16	0.09
Proportion from local economy	0.37	0.49	0.34	0.25

The sizes of business captured in our survey range from small road-side vendors to relatively large grocery shops and restaurants. A breakdown of the proportion of households operating businesses reveals that fewer refugees have businesses, and the average size of their operations (as reflected in the total value of business assets) is smaller.

Although refugee businesses are fewer and smaller than host-country businesses, the set of activities they perform is similar. The majority of businesses are grocery/corner shops in Rwamwanja and firewood peddler/food processors in Adjumani. Lacking a master list of businesses, enumerators followed

instructions to make the business samples as representative as possible<sup>9</sup>. Strictly speaking, the business samples are not entirely random and we cannot directly compare the proportions of business types between refugees and host country or between sites. Nevertheless, there is little noticeable difference in the types of business operations by refugee status or location in our data.

We asked business owners who their main customer was. The responses indicate that a rather substantial proportion of businesses, including those operated by Ugandan nationals, cater to the refugee community.

Not only do host-country businesses hire refugees; shops operated by refugees employ a rather significant proportion of host-country workers. Of refugee businesses that hired employees, 12 percent and 35 percent reported that their main source of labor was host-country households in Rwamwanja and Adjumani, respectively. Thus, employment appears to be an important way through which refugee businesses improve the livelihood of host-country households near the settlements.

The majority of businesses are family run and do not hire workers. However, refugee shops purchase inputs from host-country businesses. Our survey data reveal that refugee-run shops are much more “local” than host-country shops, in the sense that they purchase a larger proportion of their inputs within the local economy. While one can argue that refugee entrepreneurship is still in its nascent stages, substantial employment of Ugandan nationals and large proportions of local input purchases point towards businesses being a major factor in promoting higher degrees of economic interaction between refugees and their hosts.

## **5. Impact of Refugees and WFP Food Assistance on the Host Country**

A shift in WFP refugee assistance from food to cash has immediate impacts on the host-country economy. When refugee households receive aid in cash, they become a conduit through which cash enters the surrounding economy. Refugees spend their cash on food and other goods inside and outside the settlements, including neighboring villages, and this creates an increased demand for the items refugees consume. Many refugees that receive cash and land invest some of their cash in agricultural or livestock production on their allocated plots. This, along with the in-kind food aid that other refugees receive, increases the supply of food items in the nearby local economy.

Understanding and evaluating the impact of refugees on the local economy in Uganda requires a local economy-wide impact evaluation approach. Below, we first describe the approach and its application to the Ugandan setting then we present our findings.

### **5.1. Local Economy-wide Impact Evaluation (LEWIE)**

The LEWIE methodology was designed to understand the full impact of projects and policy shocks in local economies, including on households and businesses that are affected indirectly by these changes. LEWIE has been used to evaluate the impacts of social cash transfer (SCT) poverty programs on local

---

<sup>9</sup> In the case of markets, enumerators were instructed to skip every to each 3<sup>rd</sup> or 4<sup>th</sup> business. For scattered businesses inside or nearby the settlement, enumerators were told to survey each type of business at least once.

economies in a number of African countries (FAO), as well as the local economic impacts of migration and remittances, tourism, and a variety of other policy and market shocks.<sup>10</sup> We use a LEWIE approach to simulate the impacts of refugee assistance on host-country economies. While LEWIE approach has been previously implemented to evaluate the economic impacts of refugees (Taylor *et al.*, 2016), this will be the first estimation of benefits and costs of refugee assistance for a unique host country setting where the refugees are given plots of land of agriculture and also freely allowed to interact in the host communities.

To construct the LEWIE models, first we construct separate micro-economic models of refugee and host-country households at each settlement, following a rich literature on agricultural household modeling. The starting values of all parameters in the household expenditure and production functions are estimated econometrically with data from the surveys. We estimate separate production and expenditure functions for crops, livestock, retail, other services, and other production activities.

The refugee and host-country household models are then integrated into a general-equilibrium (GE) model of the economy within a 15-kilometer radius of each settlement, Rwamwanja and Adjumani as described earlier. Market clearing conditions determine prices (for non-tradable goods, services, and factors) or net trade with the rest of the country outside the local economy (for tradable goods). These market-clearing conditions link refugee and host country households within each local economy. The economic linkages include refugee households' demand for goods and services sold by host-country businesses and households, refugee business demand for inputs from host-country businesses and households, and refugee workers' supply of labor to host-country as well as refugee businesses. These linkages shape the impacts of refugee aid on host-country businesses and households.

The base solution to the GE model replicates the initial conditions in the economy in and around each settlement. It is the basis for simulating impacts of refugees and aid in the local economy. To get confidence bounds around simulated impacts, we use a Monte Carlo method that makes repeated draws from all of the parameter distributions and, for each draw, recalibrates the base model. This generates multiple (1000) base models on which to simulate the impact of an additional refugee or an additional dollar of refugee aid. The 95-percent confidence intervals are created from the middle 95 percent of the distribution of simulated impacts for each outcome of interest.

A detailed description of the LEWIE methodology is available in Taylor and Filipinski (2014). We used the models to evaluate the impacts of refugee assistance on both refugee and host-country households in and around each of the two refugee settlements, and to compare impacts between cash and in-kind settlements. The LEWIE simulations<sup>11</sup> capture the full economic impact of an additional refugee or an additional dollar of refugee aid on the host-country economy.

For example, a refugee spends her cash in a store or marketplace inside or outside the settlement, and that raises income for the vendor, who then pays a wage to another refugee or to a host-country worker. The store might buy goods to sell from a Ugandan farm or business, which in turn spends its new profit. The refugee might supply some of her labor to a local farm or business, creating new income for the refugee as well as for the farm or business, and possibly affecting local wages to some extent, as well.

---

10 FAO's Protection to Production (PtoP) program: <http://www.fao.org/economic/ptop/home/en/>. Also see *Beyond Experiments in Development Economics* website ([www.beyondexperiments.org](http://www.beyondexperiments.org)).

11 Details of LEWIE simulation methodology for this study is in Appendix A4.



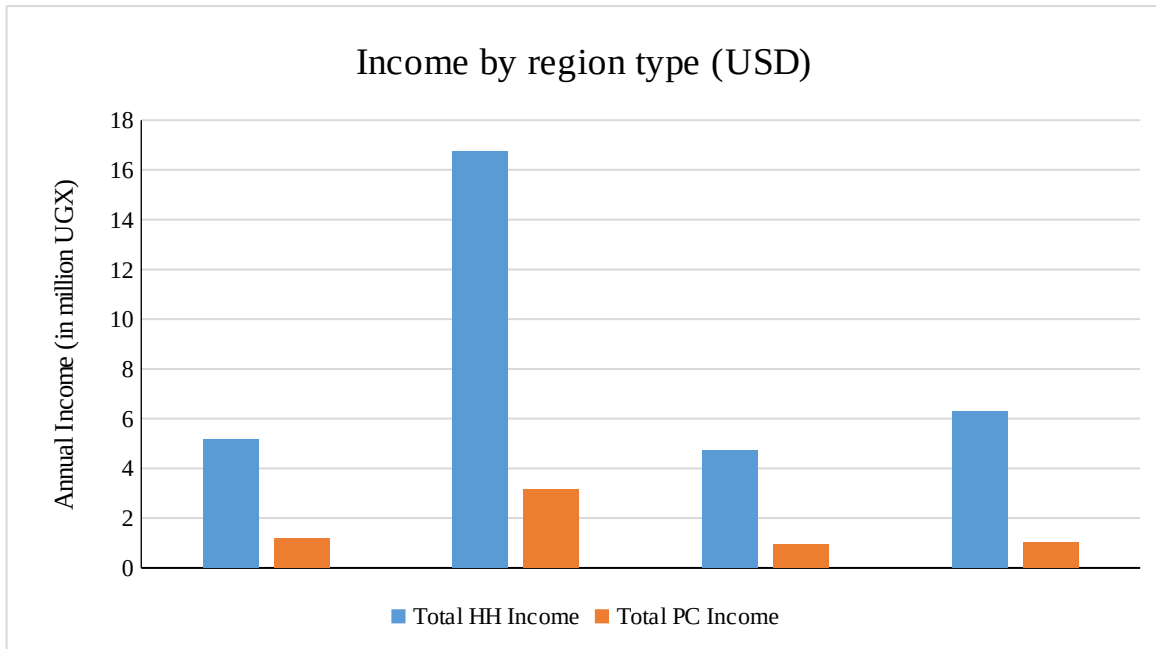
Our simulations do not include the impacts of constructing, maintaining, or expanding refugee settlements. UN agencies and other donors invest in building the refugee settlement, providing services inside the settlement, paying salaries to UN and other aid personnel, purchasing supplies to run the settlement, etc. This spending undoubtedly adds to the impacts of hosting refugees. For example, settlement workers spend income outside the settlement and thus increase the demand for goods and services supplied by local farms and businesses. Because our analysis does not include these expenditures, it is likely to give a lower-bound estimate of refugee impacts on the host-country economy.

## 5.2. LEWIE Experiments

We carried out the following experiments in the LEWIE model to evaluate the economic impacts that refugees living in the Rwamwanja and Adjumani settlements of Uganda have on the local economy out to 15-km around each settlement:

- The simulated impacts of an additional dollar of WFP aid in the form of cash or food.
- Annual impacts of an additional refugee household on total real income. We consider two separate cases for each settlement: first, when the additional refugee household is given cash aid; and second, when the household is given food aid. We assume, in each case, that the additional refugee household is *not* given a piece of land to cultivate
- An identical scenario as in (b) above but in which the additional refugee household is allotted a piece of cultivable land to produce crops.

Before we analyze the results from the LEWIE simulations, Figure 10 shows the average annual incomes and per-capita incomes of the refugees as well as the host-country households around each settlement. On average, refugee households have an annual income of UGX 5.2 million (\$1507) in Rwamwanja and UGX 4.7 million (\$1362) in Adjumani. The per capita incomes of an average refugee in Rwamwanja and Adjumani are UGX 1.16 million (\$336) and UGX 950 thousand (\$275), respectively. The incomes of the refugees in the two settlements are different primarily because of better employment opportunities and agricultural suitability in Rwamwanja; however, the differences are not as startling as the differences in incomes of the local population. In Rwamwanja, an average local household residing in the 15-km radius around the settlement has a total income of UGX 16.75 million (\$4855) annually. In contrast, a local household in Adjumani has a total household income little more than UGX 6 (\$1739) million per year. Average per-capita incomes are also substantially different, with that in Rwamwanja being at least three times that of Adjumani.

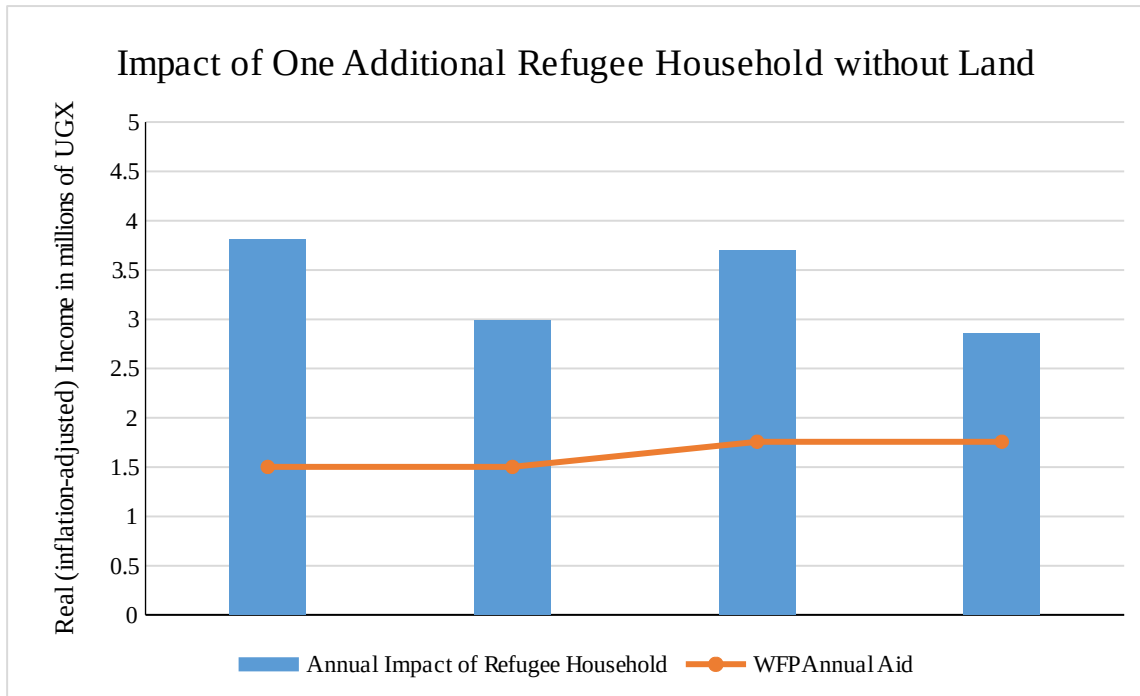


**Figure 10: Total and per-capita income (in million UGX) across household groups**

### 5.3. Refugees Generate Benefits for Local Economies in Uganda

Our findings reveal that an average refugee household receiving cash food assistance increases annual real income in the local economy by UGX 3.8 million (\$1,106) at Rwamwanja Settlement, and by UGX 3.7 million (\$1,072) at Adjumani Settlement. These numbers include the income impacts on host-country as well as refugee households. The impacts of refugees receiving aid in food instead of cash are UGX 3.0 million (\$866) and UGX 2.9 million (\$827) at the two settlements, respectively. Our findings indicate that the local income generated by an additional refugee household are significant at both settlements. It is higher for cash than food aid, and it is higher at Rwamwanja than Adjumani.

The income generated by refugees easily exceeds the cost of WFP food aid at both settlements. The difference between the local income that refugees generate and the cost of WFP food aid is the local income spillover. Net of WFP food aid costs, an additional refugee household receiving cash aid generates a positive spillover of UGX 2.3 million (\$671) in and around Rwamwanja and UGX 1.9 million (\$563) at Adjumani. A refugee household receiving aid in food generates spillovers of UGX 1.5 million (\$ 431) at Rwamwanja and UGX 1.1 million (\$ 318) at Adjumani. The cost of the food packet was imputed using regional median prices and does not reflect the cost of purchasing and distributing food. The cost of distributing cash using ‘Post Bank’ is lower than the cost of delivering food aid; thus, these numbers give a conservative estimate of the net benefits of cash versus food aid.



**Figure 11: An additional refugee household without land significantly increases real (inflation-adjusted) income in the local economy**

Vertical bars are the annual (inflation-adjusted) income impacts of an additional refugee household without land within a 15 km radius of each settlement. The black vertical lines on top of the bars show the confidence bounds. The orange dots show the annual costs of WFP aid.

Refugee and host-country households and businesses create income spillovers when they spend their cash on goods and services supplied within the local economy. Most of the income spillovers from refugees accrue to host-country households and businesses around the two settlements, because these households and businesses usually have more productive assets and are in a better position to increase their supply of goods and services as the local demand rises.

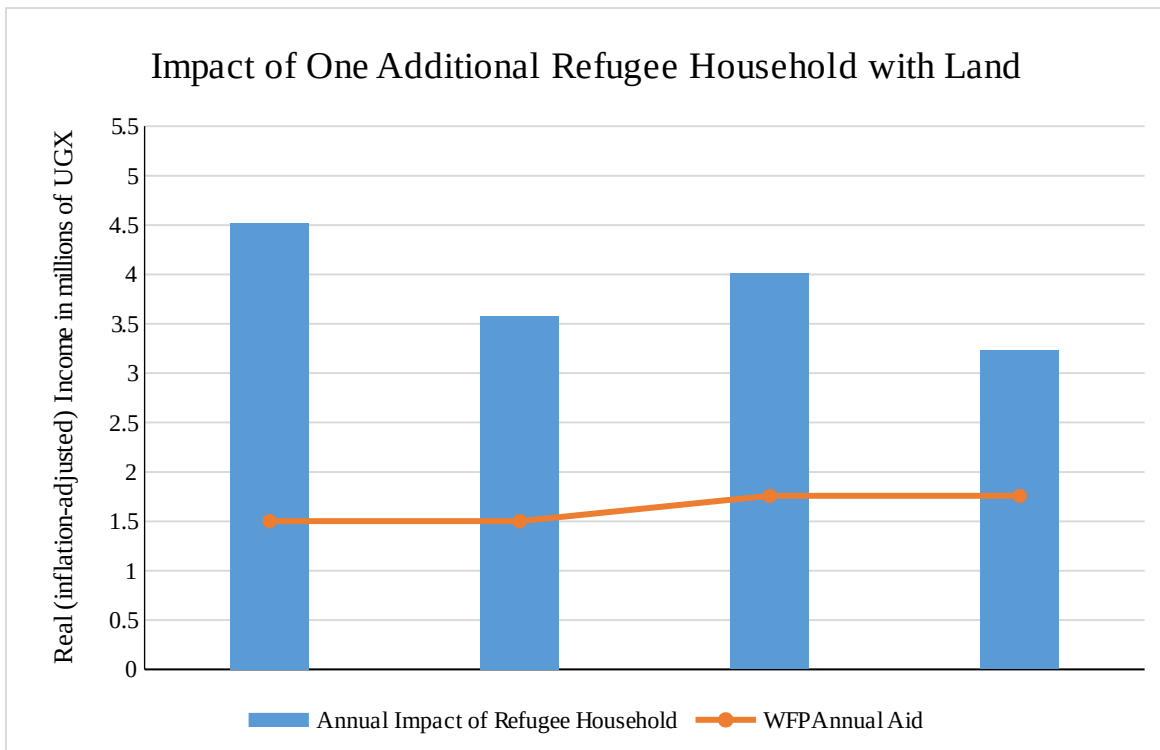
Refugees also create income spillovers for the rest of Uganda. When households and businesses buy goods and services outside the local economy (that is, beyond the 15 km radius around each settlement), they create new demand for businesses in the rest of the country. The income spillovers to the rest of Uganda range from UGX 354 thousand (\$102, food aid refugees at Rwamwanja settlement ) to UGX 1.2 million (\$ 342, cash aid refugees at Adjumani settlement) per refugee household without land.

#### 5.4. Giving Refugees Land Increases the Impact

A unique feature of Uganda’s refugee support policy is that refugees are allotted homestead land upon registering in the settlement. In addition, some settlements (Rwamwanja) are able to provide cultivatable land for agricultural activities. As explained earlier, we found that refugees farm their land intensively; output per acre is significantly higher for refugees than for host-country farmers around the two settlements. This does not mean that refugees are more efficient than host-country farmers (we find evidence that the opposite is true). However, refugees devote considerably more labor to their plots than host-country farms do, and this results in larger harvests per each unit of land.

Refugee farmers, like host-country farms, create income spillovers when they hire labor from other households and purchase inputs from local businesses. They also contribute to the local food supply and potentially influence food prices. Most of the food that refugees produce is consumed within the household or else sold to other refugees.

Providing refugees with land significantly increases refugees’ impacts on local incomes. The income spillover (net of WFP aid cost) from an additional refugee household receiving cash and an average-sized parcel of land in Rwamwanja is UGX 3 million (\$876)—higher than the spillover without land (UGX 2.3 million, or \$671). In Adjumani, the spillover from a refugee household receiving cash and land is UGX 2.3 million (\$655), compared with UGX 1.9 million (\$563) without land. Access to land also increases the local income spillovers created by refugees receiving food aid (to UGX 2.1 million, or \$603, in Rwamwanja and UGX 1.5 million, or \$427, in Adjumani).



**Figure 12: The impact of an additional refugee household is higher with than without land**  
 Vertical bars are the annual (inflation-adjusted) income impacts of an additional refugee household without land within a 15 km radius of each settlement. The black vertical lines on top of the bars show the confidence bounds. The orange dots show the annual costs of WFP aid. We do not include an imputed cost of agricultural land provided to the refugees by the Ugandan government.

Given a piece of land to cultivate, an additional refugee household receiving cash in Adjumani creates almost as much income in the local economy as its counterpart in Rwamwanja. By calculating the difference in local income impacts with and without land, we get an idea of the local value created by giving land to refugees. The marginal benefit from providing land to a refugee household ranges between UGX 318 thousand (\$92) to UGX 707 thousand (\$205) annually. The highest marginal gains are for cash-

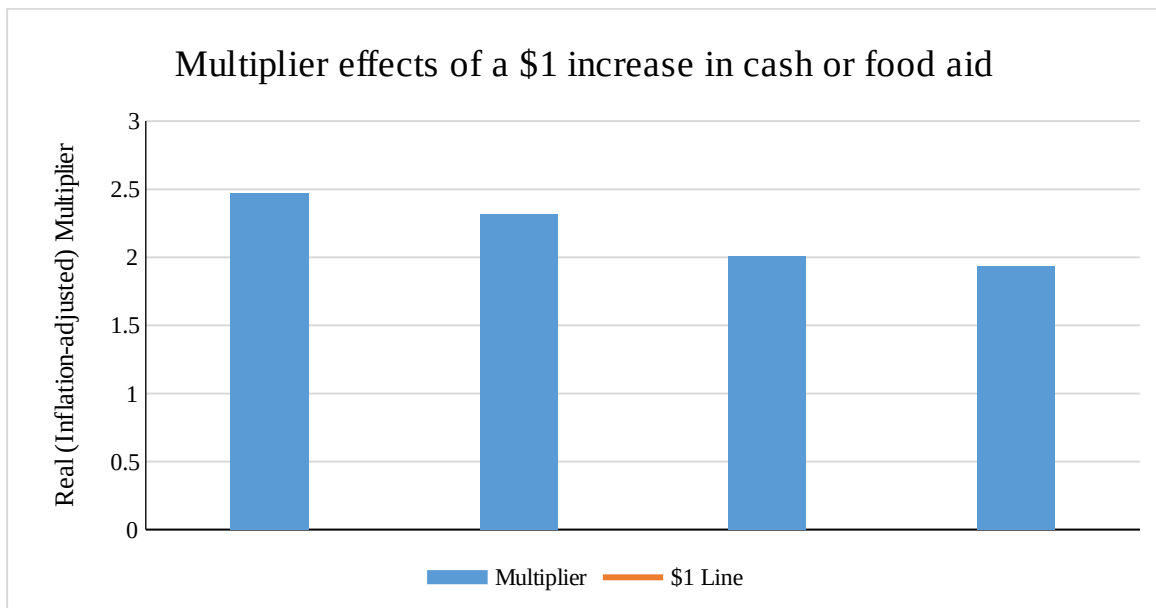
refugees in Rwamwanja, while the lowest are for cash-refugees in Adjumani. The marginal gains are higher in Rwamwanja than Adjumani.

It is not surprising that providing land creates a larger income effect in Rwamwanja, the region with better land and two cropping seasons per year. The impact of land is higher for cash than food aid recipients in Rwamwanja, whereas in Adjumani the marginal impact of land is higher for food-aid recipients.

Giving land to refugees reduces the income spillovers to the rest of Uganda, but only slightly. With land assistance, the income spillovers outside of local economy range from UGX 325 thousand (\$94, food aid refugees in Rwamwanja settlement) to UGX 1.06 million (\$ 308, cash aid refugees in Adjumani settlement). Spillovers to rest of Uganda are slightly smaller if refugees get land because there is more production in the local economy for both refugees and local households, and less reliance on trade outside the region.

### 5.5. The Impacts of Cash Aid Are Higher than the Impacts of Food Aid

The differences in refugee impacts shown above suggest that the form of food aid (cash versus in-kind) matters. We compared the impact of an additional dollar of cash to the impact of an additional dollar's worth of in-kind food aid at each settlement. The results show that food aid has a larger impact on real incomes when it is given in cash instead of in kind.



**Figure 13: The impact of an additional dollar of food aid is higher when it is in cash**

Vertical bars are the real (inflation-adjusted) income impacts of an additional dollar of food aid in cash or in kind within a 15 km radius of each settlement. These are the income multipliers. The black vertical lines on top of the bars show the confidence bounds around each multiplier. The orange line represents the dollar of food aid. The difference between the bar height and red line is the income spillover created by an additional dollar of food aid.

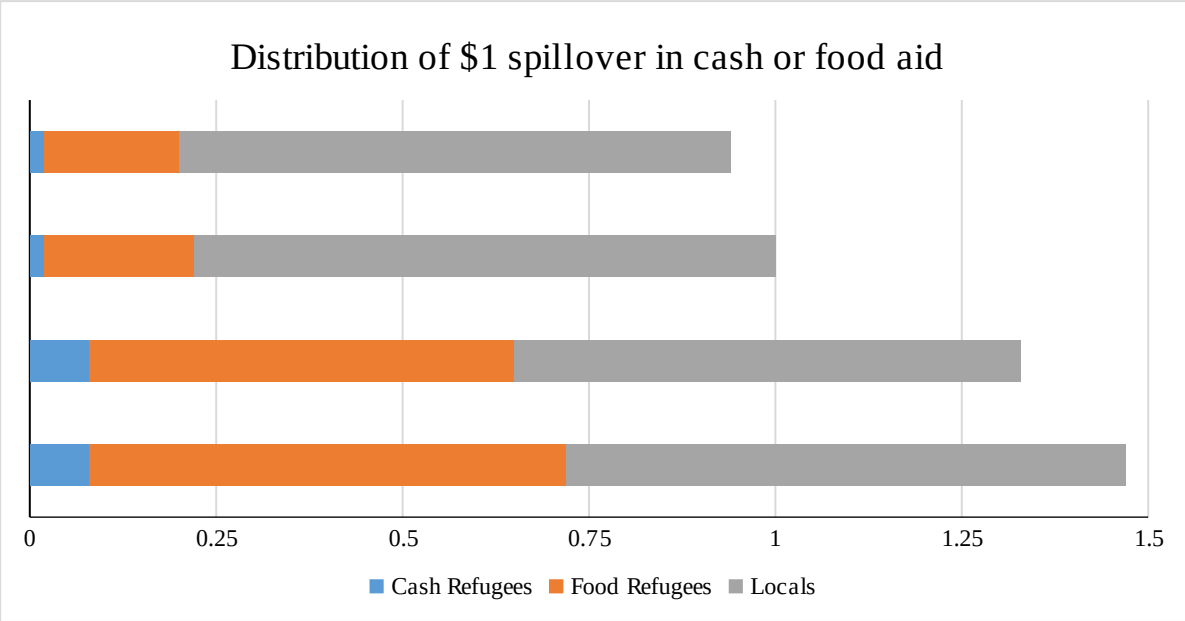
Each dollar of cash aid in Rwamwanja increases total real (inflation-adjusted) income in and around the settlement by \$2.47. This is called the “income multiplier” of an additional dollar of aid in cash. The

impact of an additional dollar of food aid in kind is slightly smaller: \$2.32. The corresponding numbers for Adjumani are \$2.01 and \$1.94, respectively.

The real income spillover effect of a dollar of cash or food aid is the difference between the multiplier and the dollar transferred. Thus, the spillovers for Rwamwanja cash and food are \$1.47 and \$1.32, respectively. For Adjumani, the real income spillovers are \$1.01 and \$0.94 for cash and food, respectively. The local income spillover from an additional dollar of cash aid is higher than that of food aid at both settlements.

**5.6. Host-country Households Benefit Most from Income Spillovers**

An increase of \$1 in cash aid in Rwamwanja increases (creates spillovers) the real income of cash-refugee households by \$0.08, and it creates a spillover of \$0.64 to food-refugee households and \$0.75 to local host-country households. An additional dollar of aid in food in Rwamwanja Settlement raises real income in food-receiving households by \$0.57, leaving a spillover of \$0.08 to cash-refugees and \$0.68 to host households. The largest spillovers in both cases accrue to the local host-country households. The smallest spillovers are to the cash receiving refugee households. Spillovers to food-receiving households are lower in Adjumani than in Rwamwanja. An additional dollar of cash aid creates larger spillovers to host-country households than does an additional dollar of food aid at both settlements.



**Figure 14: The distribution of spillover of an additional dollar**

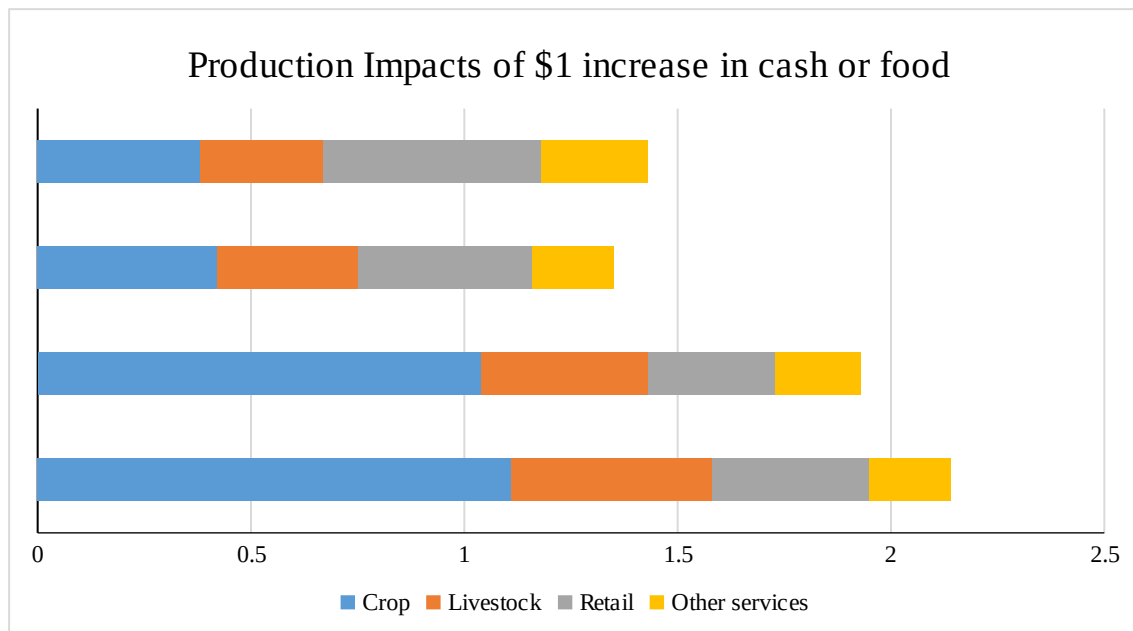
Horizontal stacked bars are the total spillovers of an additional dollar of food aid in cash or in kind within a 15 km radius of each settlement. The spillovers are distributed across cash refugees (blue portion), food refugees (orange portion) and local households (grey portion).

### 5.7. WFP Food Aid Stimulates Production in and around Settlements

The largest production impact is on agricultural production in Rwamwanja settlement, which is more agricultural than Adjumani. The value of crop production rises by \$1.11 for an additional dollar in cash aid. The impacts on crop production are less than half this amount—\$0.42—in Adjumani, where the agricultural potential is lower. A substantial portion of production impacts in Adjumani are captured by the retail sector.

Food aid has more complicated impacts on food production. On one hand, by selling part of their food rations, refugees with aid in food gain cash to spend on other food items, including locally produced crops and livestock products. On the other hand, food aid in kind increases the local supply of food, and this can compete with local agriculture. We find that food aid in kind creates smaller impacts on food production at Rwamwanja and Adjumani settlements: \$1.04 and \$0.38, respectively.

The multiplier effects on livestock production range from 0.29 to 0.47, and they are higher for cash than in-kind food aid. Refugee households in Adjumani spend a smaller share of their income on animal products than those in Rwamwanja, and this helps explain smaller multiplier effects on livestock production in Adjumani. The multipliers on activities supplying other goods and services are in the range of 0.19 to 0.25; for the most part they are similar in and around the two settlements.



**Figure 15: Local production impacts of an additional dollar**

Horizontal stacked bars are the total production impacts of an additional dollar of food aid in cash or in kind within a 15 km radius of each settlement. The production impacts can be attributed to crop production (blue portion), livestock (orange portion), retail (grey portion), and other services (yellow portion).

## 5.8. Total Impact of an Additional Refugee Household

The total impact includes the WFP aid and other transfers that the refugee household receives, income and spillovers that it generates within the local economy and finally the spillovers to rest of Uganda through trade with outside the local economy, which in our case is a 15-km radius around a settlement. Table 8 summarizes the findings of the total impact of a refugee household.

**Table 8: Total Impacts of an Additional Refugee Household**

<i>Total Additional Impact of a Refugee Household (in million UGX)</i>	Without Land				With Land			
	<u>Rwamwanja</u>		<u>Adjumani</u>		<u>Rwamwanja</u>		<u>Adjumani</u>	
	<i>Cas</i>	<i>Foo</i>	<i>Cas</i>	<i>Foo</i>	<i>Cas</i>	<i>Foo</i>	<i>Cas</i>	<i>Foo</i>
	<i>h</i>	<i>d</i>	<i>h</i>	<i>d</i>	<i>h</i>	<i>d</i>	<i>h</i>	<i>d</i>
WFP Aid Value	1.50	1.50	1.75	1.75	1.50	1.50	1.75	1.75
Local Income Spillover	2.32	1.49	1.95	1.10	3.02	2.08	2.26	1.48
Trade with rest of Uganda	0.50	0.35	1.18	0.86	0.49	0.33	1.06	0.76
<b>Total Impact</b>	<b>4.32</b>	<b>3.34</b>	<b>4.88</b>	<b>3.71</b>	<b>5.01</b>	<b>3.91</b>	<b>5.07</b>	<b>3.99</b>

*\* Lacking information on the procurement and logistics costs of food aid, here the WFP aid value is assumed to be the value of the cash transfer, even in the case of refugees receiving food aid.*

We find that the total impacts generated by an additional refugee household are higher when the household receives land. This is true regardless of whether the household gets its WFP assistance in cash or food, and it is consistent across settlements. The total impacts of giving aid in the form of cash are higher than food aid. Finally, giving land reduces trade with rest of Uganda, because there is more production in the local economy to meet the demand from refugees and locals.

## 6. Conclusion

Three major findings emerge from our study of the impacts of refugees and WFP refugee food assistance in Uganda.

First, refugees create positive impacts on local economies in and around the settlements in which they live. An average refugee household receiving cash food assistance increases annual real income in the local economy by UGX 3.8 million (\$1,106) at Rwamwanja Settlement, and by UGX 3.7 million (\$1,072) at Adjumani Settlement. The income refugees generate easily exceeds the cost of WFP food aid at both settlements, and it is large compared with average incomes in households around the settlements. Refugees create income spillovers by demanding goods and services, which in turn stimulates local production. Most local production is carried out by Ugandan households. Because of this, most of the economic benefits that refugees create accrue to host-country households. Many refugees set up businesses that purchase inputs from host-country businesses and households, and many sell their labor to businesses inside and outside their settlements. As local incomes rise, so does the demand for goods purchased outside the local economy. This stimulates trade with the rest of Uganda, transmitting benefits to other parts of the country.



Second, the economic impacts of WFP refugee food aid are significant and positive, but these impacts depend on the form in which this aid is given as well as on the structure of local economies. Local income spillovers are larger when WFP aid is in the form of cash instead of food. Refugee families who receive cash assistance spend most of their cash within the local economy. Those receiving aid in food often sell part of their food allotments in local markets to obtain cash, receiving less than the market value of their food. When refugees sell food aid, there is some downward pressure on local food prices, which benefits food consumers but can adversely affect food producers. We find that WFP aid creates larger positive income spillovers in Rwamwanja, a relatively rich agriculturally area, than in Adjumani, where agricultural potential is lower. In Rwamwanja, agricultural and livestock production increase when new refugee households arrive to the settlement. In Adjumani, refugees have a small impact on agricultural and livestock production but a large impact on nonagricultural activities, particularly local commerce activities.

Third, Uganda's unique policy of providing refugees with access to land benefits refugees while adding significantly to their positive impact on income in and around the settlements. We find that refugees farm their land intensively. They purchase seed, fertilizer, and other inputs from local businesses and sometimes hire labor from local households. The food refugees produce on their plots is an important source of nutrition for refugee households. Refugees sell some of this food in local markets to raise cash, most of which in turn is spent locally, creating new income spillovers.

Uganda's experience offers lessons for other refugee-hosting countries. It reinforces findings from neighboring Rwanda and other countries that refugees can create significant economic benefits for the countries that host them. It suggests that these benefits are larger when refugees can interact with the host-country economy around them, when they receive assistance in the form of cash that can be spent on locally supplied goods and services, and when they have access to land and other resources to produce food and generate income. The potential economic benefits are also larger when governments locate refugee settlements in places where local producers can supply refugees' demands and where there is a potential for refugees to supplement their income by working or establishing businesses. Carefully designed refugee assistance policies can then accomplish the dual goal of assisting displaced people while generating large economic benefits for people living in or around refugee settlements.

## References

- Aleinikoff, T. Alexander. "From Dependence to Self-Reliance: Changing the Paradigm in Protracted Refugee Situations." Policy Brief. *Migrationpolicy.org* (2015).
- Hidrobo, Melissa, John Hoddinott, Amber Peterman, Amy Margolies, and Vanessa Moreira. "Cash, food, or vouchers? Evidence from a randomized experiment in northern Ecuador." *Journal of Development Economics* 107 (2014): 144-156.
- Mincer, Jacob. "Schooling, Experience, and Earnings. Human Behavior & Social Institutions No. 2." (1974).
- Omata, K. and Kaplan, J. "Refugee livelihoods and engagement with host economies", 3 July 2014. <http://www.oxhip.org/2014/03/refugee-livelihoods-and-engagement-with-host-economies/>
- Tabor, Steven R. "Assisting the poor with cash: Design and implementation of social transfer programs." *World Bank Social Protection Discussion Paper* 223 (2002).
- Taylor, J. Edward, Mateusz Filipiński, Mohamad Alloush, Anubhab Gupta, Irvin Rojas, and Ernesto Gonzalez. "Economic Impact of Refugees." *PNAS—Proceedings of the National Academy of Sciences* (2016), vol. 113 no. 27, 7449–7453. <http://www.pnas.org/content/113/27/7449.abstract>.
- Taylor, J. Edward. "Research: Refugees Can Bolster a Region's Economy." *Harvard Business Review*, October 5 (2016); <https://hbr.org/2016/10/research-refugees-can-bolster-a-regions-economy>.
- Taylor, J. Edward and Mateusz Filipiński. *Beyond Experiments in Development Economics: Local Economy-wide Impact Evaluation*. Oxford: *Oxford University Press* (2014).
- UNHCR (2016). <http://www.unhcr.org/en-us/>.

## Appendix

### **Appendix 1: Employment Regression Framework**

The regression output in Table 7 models an indicator variable (0-1) for whether or not an individual is employed on a vector of human capital and other individual characteristics. The parameters in the table should be interpreted as conditional correlations between the variables in the rows and the probability of employment in any type of wage work (Columns 1-2) or in non-agricultural wage work (Columns 3-4). An indicator of refugee status is included in our regressions to pick up differences in employment probability between refugees and host-country individuals, controlling for other individual characteristics. Given our relatively large sample sizes, under general assumptions the estimated regressions are best linear unbiased predictors of employment.

**Table A1. Estimations of Employment by Each Group**

Dependent Variable: 0-1 dummy	All Employment Regressions		Non-Ag Employment Regressions	
	Rwamwanja	Adjumani	Rwamwanja	Adjumani
<b><u>Refugees</u></b>				
Refugee Dummy	0.05 (0.06)	-0.26** (0.05)	-0.005 (0.053)	-0.087** (0.035)
Female	-0.08** (0.03)	-0.04 (0.04)	-0.05* (0.03)	-0.016 (0.023)
Education	0.00 (0.004)	0.005 (0.004)	0.007*** (0.002)	0.005* (0.003)
Years since arrival	0.01 (0.01)	0.01*** (0.001)	-0.006 (0.010)	0.003*** (0.001)
<b><u>Host-country</u></b>				
Female	-0.15** (0.04)	-0.032 (0.02)	-0.07*** (0.024)	-0.04*** (0.016)
Education	0.01* (0.003)	-0.003 (0.002)	0.008*** (0.002)	0.002 (0.002)
Years since arrival	-	-	-	-
N	1243	1727	1243	1727
Pseudo R-squared	0.08	0.15	0.13	0.12

*All specifications control for status as household head, age, age squared and concurrent school enrollment. Coefficients presented are marginal effects evaluated at the mean. Robust standard errors in Parentheses.*

## Appendix 2. Household Income Earning Ability Regression

**Table A2: Household Income Earning Ability Regression Results**

Dependent Variable	Earned Income		
	Earned Income (Thousands of Shillings)	Earned Income proportion	Agricultural Income (Thousands of Shillings)
Arrival Years	115.8** (42.2)	0.038* (.016)	9.88 (7.96)
Arrival Years <sup>2</sup>	-4.9** (1.5)	-0.002** (0.001)	-0.43 (0.29)
Land Size	706.6*** (144.4)	0.289*** (0.016)	366.64*** (32.21)
Land Size <sup>2</sup>	-248.6*** (56.5)	-0.081*** (.011)	-146.4*** (14.17)
N	740	738	740
R-squared	0.17	0.38	0.24

*\* both regressions control for household size, dependent ratio, age, gender and education of the household head, as well as cluster dummies for the separate regions. Standard errors clustered at the FDP level*

### **Appendix 3. Estimating Agricultural Efficiency using a Stochastic Frontier Model**

Comparing the average output per unit of land gives some evidence that refugees are not less productive than host-country farmers. An equally important question is whether they are comparable to host-country farmers in terms of farming efficiency. The distinction between average output per unit of land and technical efficiency is important for understanding the impact of providing land resources to refugees. Being highly productive could be indicative of simply having access to “cheap” inputs, like labor, and applying large amounts of these inputs. In our setting, if the value of refugees’ time is low and access to labor markets limited, refugees will apply more labor days to growing crops. The question of technical efficiency is whether local farmers would have produced the same or more than refugees with the same resources.

To get at this issue, we adopted a stochastic frontier model approach to estimate whether or not refugees use their farming inputs as efficiently as host-country farmers do. The model estimates a production function then generates an efficiency measure for each household ranging from zero to one, with one being fully efficient. The resulting technical efficiency measures then can be regressed on a variable indicating whether a farmer is a refugee or not, along with a vector of household characteristics to see if refugees are less efficient at farming than locals’ conditional on the structure of their household. If the estimate on the refugee dummy variable is negative (positive) and statistically significant, then refugees are less (more) technically efficient than the hosts on a scale of zero to one.

**Table A3: Estimates of Technical Efficiency by Settlement Locations**

<b>Dependent variable:</b> <i>Technical Efficiency measured between 0-1</i>	<b>Rwamwanja</b>	<b>Adjumani</b>	<b>Adjumani Adjusted</b>
Refugee	-0.036 (0.044)	-0.169** (0.066)	-0.252** (0.102)
Arrival Years	-0.000 (0.001)	0.003* (0.001)	0.001 (0.002)
Arrival Years * Refugee	-0.002 (.001)	-0.003 (0.002)	-0.002 (0.003)
Land Size	-0.012* (0.007)	-0.073*** (0.016)	-0.217*** (.077)
N	235	162	94
R-squared	0.05	0.33	0.37

*Model contains controls for family size, female head of household, interactions between refugee dummy and land, education and age of household head*

In the case of Rwamwanja, comparisons of technical efficiency are relatively straightforward as both refugees and locals produce a similar set of crops. Despite locals on an average have larger plots of land, there is substantial overlap of land sizes for comparison purposes. Estimations for Adjumani are complicated since the refugees have much smaller plots than locals have and they produce substantially different goods. To adjust for this difference, a separate specification that restricts the model to only examine households with land sizes under 1 hectare (the vast majority of refugees) and that grow common crops (excludes vegetables, cassava and soy) is performed as a secondary sensitivity check.

The results, presented in Table 4, indicate that at least in the case of Rwamwanja, there is no evidence that refugees are less efficient at farming than locals. The coefficient on the refugee indicator is small (-0.036) and not significantly different from zero. In Adjumani, refugee households seem to be less efficient (-0.169) than locals at utilizing their array of inputs (land, labor, pesticides and fertilizer, capital) for crop production. The adjusted model, which restricts plot size to be under 1 hectare and excludes crops grown only by refugees, finds a higher level of inefficiency than the unadjusted model (-0.252 versus -0.169, both statistically significant at the 5% level).

This inefficiency could be due to unobserved characteristics of the household not captured in our model, but it could also be related to the fact that the south Sudanese refugees historically have been livestock herders. We find no evidence that the refugees who reside longer in the settlements improve their farming efficiency.

#### **Appendix 4. LEWIE Inputs**

The local economy wide impact evaluation (LEWIE) methodology was designed to understand the full impact of projects and policy within the local economies, including households and businesses indirectly affected. In the Ugandan setting, we defined the local economy as the region within a 15 kilometer radius of each settlement. In the Adjumani case, fragmentation of the FDPs made it necessary to create a different definition of the local economy for each FDP, using the same 15 kilometer radius.

LEWIE is constructed from the ground up by survey data to model micro-economic actors (in this case, refugees and locals living nearby the settlements) in the local economy, following a rich literature on agricultural household modeling. Econometric tools are used to estimate starting values of all parameters in a household expenditure and production function; in the Ugandan case, expenditure functions were separately estimated for refugees receiving cash and food to take into account possible differences in consumption patterns. Production functions were estimated separately for crops, livestock, retail, services and other productive activities, the results of which are used as parameters inside the LEWIE model.

After estimating household activities, we model market exchanges between households to create linkages between treated and un-treated households, these linkages allow spillover effects to happen. When a refugee household receives aid in cash or food, these households become a conduit through which the aid enters the surrounding economy. Market clearing conditions determine prices (for non-tradable goods, services and factors) or net trade with the rest of the country outside the local economy (for tradable goods). The economic linkages include refugee households' demand for goods and services sold by host-country businesses and households, refugee business demand for inputs from host-country businesses and households, and refugee workers' supply of labor to host-country as well as refugee businesses. These linkages shape the impacts of refugee aid on host-country businesses and households. Unique to the Ugandan refugee setting, we also introduce a local land endowment to both refugees and locals to capture the additional impacts of providing cultivatable land to the displaced.

The base solution to the GE model replicates the initial conditions in the economy in and around each settlement. It is the basis for simulating impacts of refugees and aid in the local economy. To get confidence bounds around simulated impacts, we use a Monte Carlo method that makes repeated draws from all of the parameter distributions and, for each draw, recalibrates the base model. This generates multiple (1000) base models on which to simulate the impact of an additional refugee or an additional dollar of refugee aid. The 95-percent confidence intervals are created from the middle 95 percent of the distribution of simulated impacts for each outcome of interest. Details of how parameters were chosen are specified below:

##### **1) Marginal Dollar Simulations**

The marginal dollar simulations were done by giving 1 million UGX to a representative refugee household in each of the four categories (Rwamwanja cash, food; Adjumani cash, food). The multipliers are scale invariant; thus this gives the same results as giving a marginal dollar. No labor or land endowment was added to the model.

## 2) Additional Refugee Household Simulations

To simulate an additional refugee household, four types of transfers were taken into account.

### a) A WFP ration transfer, 100% rations at the household\*year level.

It is assumed that all households who just arrived would get 100% rations, which is 28000 UGX per individual per month in cash. In the case of food aid, the value of the food packet was imputed using local median prices, which is 23100 UGX for Rwamwanja and 22050 UGX for Adjumani, also at a per person per month level.

The transfers are then transformed to the annual household level, then converted to Million Uganda Shillings. These numbers were used in the model to simulate what a new refugee household should receive in aid value.

### b) Exogenous transfers from remittances at the household- year level

In addition to WFP aid, exogenous remittance transfers at the household level were included for each round of simulation. The size of the transfer was computed using the average remittance receipt for refugee households in Rwamwanja and Adjumani, including those households who received no remittances. The remittance transfers are included in the additional refugee household simulations, with refugee households in Rwamwanja receiving 0.03124648 million UGX and their counterparts in Adjumani receiving 0.05675754 million UGX on average.

No separate computations were made between cash and food refugees in each settlement.

### c) The Labor endowment increase of an additional refugee household

The total labor endowment in each settlement was created by taking the mean annual labor income, computed using regional wages, of an average refugee household and multiplying by the number of households.

To simulate the increase in labor endowment that an additional refugee household brings in, the average annual labor income was added to the total labor endowment of the settlement. On average, each additional refugee household adds 0.396 million UGX and 0.491 million UGX of labor endowment in Rwamwanja and Adjumani, respectively.

### d) Land increase of an additional refugee household

To introduce land into the LEWIE model, we expand increase the land endowment in each settlement based on the average land endowment for refugee households in Rwamwanja and Adjumani. Previous simulations which do not provide land for the additional refugee household also do not allow that refugee household to produce crops.

To calculate the total income effect of a refugee household with land, it is important to take into account the proportion of refugee households that actively farm their plots.



To do this, we take the difference in total income effects between land and no-land simulations for each of the four refugee household categories (Rwamwanja cash, food; Adjumani cash, food) and multiply the difference by the proportion of refugee households who farm in that category<sup>12</sup>.

The multiplied difference is then the expected increase in total income from providing land to a refugee household (204.8 for Rwamwanja Cash, 171.8 for Rwamwanja food, 92.1 for Adjumani Cash and 109.5 for Adjumani food). Finally, the total income effect of a refugee household with land is computed by adding the expected change in total income effect to the total income of a refugee household without land.

The results of an additional refugee household with land should be interpreted as the “expected total income effect of an additional refugee household with land”, taking into account that not all refugee households choose to farm their plots.

Our simulations do not include the impacts of constructing, maintaining, or expanding refugee settlements. UN agencies and other donors invest in building the refugee settlement, providing services inside the settlement, paying salaries to UN and other aid personnel, purchasing supplies to run the settlement, etc. This spending undoubtedly adds to the impacts of hosting refugees. For example, settlement workers spend income outside the settlement and thus increase the demand for goods and services supplied by Ugandan farms and businesses.

---

<sup>12</sup> An alternative method where the average land transfer is first scaled by the proportion of households that actively cultivate their land, then used as the input in the LEWIE model returned nearly identical results.