The Economics of Hosting Refugees

A Host Community Perspective from Turkana

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Cover Art:
The paintings that are displayed at the front and back covers, "Journey and Hope Continuing" and detail from "Crossing the Gilo River," were generously made available by the painter and "lost boy" Bol Aweng, who fled Southern Sudan in 1987, along with other "lost boys." While spending time in the Kakuma Refugee Camp, he developed his art skills using material available in the camp. Many of his paintings tell stories based on his memories and they can be seen at: http://bolaweng.com/

Acknowledgements

Glossary of terms and abbreviations

GRIplp	Gross Regional Income per local person
GRP	Gross Regional Product
HSNP	Hunger Safety Net Program
IOM	International Organization for Migration
IRC	International Rescue Committee
JRS	Jesuit Refugee Services
KIHBS	Kenya Integrated Household Budget Survey
LWF	Lutheran World Federation
NCCK	National Council of Churches of Kenya
NGO	Non-governmental organization
UNHCR	United Nations High Commissioner for Refugees
WFP	World Food Program
WTK	Windle Trust Kenya

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0. The lost boys of nowhere[1]

In 1991, thousands of South Sudanese boys walked into Kenya.** Having fled war in their own countries, about 20 thousand of these "lost boys" first tried taking refuge in Ethiopia. With no real options to stay, many were killed on their walk back to South Sudan or while attempting to swim the crocodile infested River Gilo, before entering Kenya. Between 7 thousand and 10 thousand were estimated to have made it alive to Kenya at that time, with no possessions besides the clothes on their backs.

The arrival of these "lost boys" eventually transformed how the Kenyan Government approached the issue of refugees. The Government had allowed for the integration of arriving refugees into the Kenyan population up until that point. The arrival of these "lost boys" marked the beginning of the encampment strategy in Kenya. From that point onwards, the refugee screening process was turned over from the Kenyan government to the United Nations High Commission for Refugees (UNHCR) (Verdirame, 1999). The boys were initially housed in a temporary camp located closer to the Sudanese border, in the town of Lokichogio. In June of 1992, the camp was relocated farther south to Kakuma Town, in the central Turkana region, where it has remained since.

Flash-forward 35 years, with more than 180 thousand refugees, the Kakuma Refugee Camp stands as one of the largest urban settlements on the plains of Turkana. The camp currently houses individuals from different nationalities, primarily Sudanese, Somalis and Ethiopians. There is a significant internal economy of goods and services, bolstered by the goods (especially food) and public services provided by international organizations.

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[1] In the local Turkana language Kakuma means "the place of the giant tortoise." (The Turkana word for tortoise is akumurae). But in an ironic twist, in Swahili, the most widely-spoken indigenous East African language, kakuma means "nowhere."

The camp also houses a hospital, and several clinics and schools. Markets for goods and services are much better developed within the camp than in Kakuma town, located just outside the camp, and some report that town residents prefer to go to market in the camp (Grindheim, 2013).

However, all is not well with the camp. In May 2016, the Kenyan Government announced plans to shut down the Kakuma Refugee Camp along with the Dadaab Refugee Camp, which is on the North-East of the country. The plan, however, is not to integrate the refugees into the society. On the contrary, it is about sending the refugees back home or on to other countries. Although officially, that decision was primarily motivated by national security concerns,[2] it also reflected a common resentment towards refugees. Refugees are often perceived to pose an economic burden for the host community, and their presence is thought to lead to increases in crime, violence, and drug use, and degrade cultural values/norms and environmental assets. As of this writing, the government has not implemented its decision to close the camp.

Kakuma presents a concentrated microcosm of the issues and arguments pertinent to a deepening refugee problem in the world. In the wake of escalated violence in the Middle East and Africa, the ongoing refugee crisis has come front and center, especially since it began affecting Europe. As a reaction, an anti-refugee sentiment has emerged in different parts of Europe, which has, perhaps surprisingly, relied on arguments that are similar to the ones used in Africa: refugees are a burden to the host economy, they bring about security challenges and crime, and they are unable to adopt host country values.

The anti-refugee arguments are more universal than one would think. The discourse of burden prevails across years and countries no matter how close the host and refugee communities in terms of relative economic conditions, cultural background, ethnic origin, and religion. Some historians emphasize the striking parallels between past and present. For instance, Knox and Kushner (1999) report that, notwithstanding the idealization that came at a later stage, Jewish refugees were treated with ambivalence and hostility in many destination countries (Knox and Kushner, 1999) during the Second World War. The authors add that "people

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[2] The statement by the Kenyan interior minister Joseph Nkaissery cites "reasons of pressing national security that speak to the safety of Kenyans in a context of terrorist and criminal activities" as the primary motive for the decision. See http://www.theguardian.com/world/2016/may/11/kenya-close-worlds-biggest-refugee-camp-dadaab.

feel that the country should maintain asylum for genuine asylum seekers, but they're always in the past, never today."

The host community of the Kakuma refugee camp benefits from the refugees' presence. There is a large body of anecdotal evidence that highlights both positive and negative effects of the presence of refugee camps on host communities. The jury is out on various aspects of the impact of refugees, and the need for more evidence and reliable methods is clear. But this study on the economic consequences of the refugee presence in Kakuma camp demonstrates an overall positive impact. More conclusive analyses are needed, but this goal is handicapped by the fact that most refugee situations take place in areas that are poor in data and rich in informality.

This study looks into the problems by adopting a host community perspective. Are refugees a burden or a boon for locals? Would locals be better off had the camp never existed? Would they be better off if the camp were to disappear? What determines the net benefits of the camp's presence on the host population in Turkana? In order to answer these questions, we combined available sources of data, surveyed the refugees and locals, built a simulation model, and compared all our findings to come to a conclusion. Although disentangling and measuring the complex interactions between refugees and the locals in Turkana proved to be a daunting task, we believe that our methodologies and findings provide important contributions to our understanding of the problem. Our results include the following.

• *Refugees have a net positive effect on the welfare of locals.* In comparing three cases, encampment with aid, partial integration with aid, and complete integration with or without aid, we found that hosting refugees increases the aggregate income of the host community in all cases.

• *There are, however, both winners and losers.* Those to whom refugees present direct competition in the labor market are likely to incur losses. The owners of fixed factors of production like land and to a certain extent capital will incur gains. Thus, in the absence of policies that redistribute income from the latter group to the former, some groups will remain unsatisfied.

• *The choice of settlement matters:* The economic effects of refugees on host communities depend first and foremost on how refugees are settled in the country. Each settlement scenario, e.g. encampment, partial integration, and complete integration, has its own winners and losers.

- ***Encampment curtails aggregate effects, but concentrate them around the camp.*** Overall, the effects of refugee arrivals are miniscule in the long-term when refugee population is small compared to the hosts and refugees are spread around the country. Encampment, on the other hand, concentrates these effects and, although it also reduces the aggregate effects, the effects become large locally around the camp.

- ***The "lost boys" may never grow up in the camp.*** With protracted encampment, many refugees never end up working in their lifetime; some are born into the camp never acquire skills, others just lose their skills after a prolonged period of forced inactivity. The longer they stay, the less likely it becomes they will find a job, leaving them with no options but to stay and rely on aid for survival.

- ***Dependency creates more dependency.*** With encampment, locals also become dependent on aid, albeit indirectly. Behind the lively economy centered on the camp lies the fact that it is all driven by the transfers received by the refugees, e.g. food aid and remittances from family members abroad. Moreover, the presence of a large refugee population not allowed to move elsewhere creates a situation in which certain local business people can extract economic rents (windfall earnings) from selling to a "captive" population in an isolated area. Potential outside competitors may be kept out by the difficulty of bringing goods in to the area and by informal moves to deny them access to the local market. This creates dependence on the refugee camp and diminishes the incentives among the host population to make longer-term investments in human capital development. As a result, the two way dependence—that is: refugees' dependence on aid and locals' dependence on refugees—becomes a self-reinforcing circle.

There are many dimensions to hosting refugees that we could not cover here. In this study, we solely focused on the economic dimension of hosting refugees. This choice was driven by our objective to quantify the effects in a meaningful way. There are many other aspects of hosting refugees that are equally important, if not more so, that we could not address with the data and methodologies we have. These include, but not limited to, the national security dimension of refugee arrivals (do refugees provide a Trojan horse for groups that use violence to achieve certain goals?), environmental and cultural dimension (what are the contributions of refugees for environmental and cultural degradation), and political dimension (to what extent do refugees play a role in shaping domestic and foreign policy attitudes of different

political forces in the country?). A companion report, Refugee Impacts on Turkana Hosts – A Social Impact Analysis for Kakuma Town and Refugee Camp, Turkana County, Kenya (2016), investigates a number of ethnographic issues in the Turkana region related to hosting refugees. However, even with both studies combined, there remain many gaps to be addressed by future studies.

This study can be read linearly or selectively. In what follows, the study will first describe the physical conditions of the camp and the region in which it is located. In the second chapter, we will introduce our analytical framework and methodologies. Chapter 3 will focus on the impacts of refugee arrivals on Turkana's economy by presenting the results of our simulations and a lengthy empirical analysis. Finally, chapter 4 will discuss alternative scenarios for future policies by simulating the effects of those for Turkana and Kenya. Appendices provide much more material including a summary of the results from our household surveys and a formal description of the simulation model. Those readers who are primarily interested in the data and information about Kakuma and Turkana can focus on the first chapter, the second halves of the second and third chapters, and the appendices A, B, and C. Those who are solely interested in our economic methodology can read the first halves of the second and third chapters, fourth chapter, and the appendix D. Those who are interested in none of them can have a look at the pictures.

Turkana Boy © Harun Onder, Lodwar 2016

1. The city that isn't

Much depends on location. Refugee camps are often built in relatively underdeveloped regions of host countries. There are several reasons for this. First, the opportunity cost of land is typically small in those areas, i.e. the land does not have a high value. Second, sources of conflict that transcend national borders are often close to underdeveloped regions; thus, building the camp there minimizes the distances refugees need to travel to reach the camp. Third, underdeveloped regions are often, but not always, associated with low natural and man-made capital; therefore, by locating the refugees in such environments, less natural and man-made capital are devoted to the service of the refugees, which may in turn diminish potential resentment by the locals. The downside of such location choices is that these regions are also limited in their connectivity to main markets. Later in this study, we show that these limitations shape how refugees affect the host economy from an economic point of view. Before doing that, however, in this chapter, we will provide an overview of the camp and its location.

1.1. Turkana region

The dawn of man occurred over three million years ago in Kenya's Turkana region.[3] Although Turkana was the home of the first use of tools, it has not remained a beacon of economic growth or technological development in more recent years. In fact, it is the poorest region in Kenya today. Nevertheless, this has not prevented many, particularly those threatened by recurring conflicts in neighboring areas, from taking refuge in these once-bounteous lands.

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[3] The earliest use of Stone Age tools is now considered to be near the shores of Lake Turkana in northwest Kenya. (See Sonia Harmand et al. "3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya". Nature 521: 310–315, (21 May 2015).)

Figure 1-1: Map Of Kenya

LEGEND

○	Cities and Towns	──	Main Roads
◉	County Capitals (not all are shown)	──	Railroads
⊛	National Capital	──	County Boundries
≈	Rivers	─·─·	International Boundries

Source: Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

Turkana County is located in a challenging neighborhood. Positioned in the North-West of Kenya, Turkana County is bordered by: (i) Uganda to the West; (ii) South Sudan and Ethiopia to the North and North-East; and (iii) Lake Turkana to the East. The county borders West Pokot and Baringo to the South, Samburu to the South-east, and Marsabit to the East, after Lake Turkana. With an area of 68,680 km², Turkana is the largest county in Kenya.

The region is home to the Turkana people and other smaller tribes, whose traditional livelihoods are nomadic pastoralism. The region is sparsely populated. According to the 2009 census, the county had a population of 855,399 persons. The population density is 12 persons per square km, however densities are well under one person per kilometer for most parts of the region. It has long been one of the poorest regions in Kenya – the 2005 Kenya Integrated Household Budget Survey assessed poverty in the Turkana region at 94.3%, the worst out of Kenya's 69 districts. In participation in education, Table 1-1 shows that the region clearly deviates from the norm in Kenya: school attendance is 44% for primary school and less than 2% for secondary school, compared to the national rural averages of 78 and 16% respectively.

Compared to Kenya averages, Turkana region is significantly less dependent upon agriculture and more upon livestock. Due to the arid conditions of the region, participation in farming tends to be very low (Table 1-1). However, households who do farm tend to concentrate on sorghum, maize, and beans. According to the KIHBS, residents of Turkana region are relatively active in the trade sector, having a slightly higher percentage than the national average of households engaged in the retail or wholesale sectors. It is important to note, however, that these statistics may not be an accurate reflection of the livelihoods of the Turkana people in particular, given the strong evidence that most household surveys are not structured to accurately reveal either the wealth or the livelihoods of pastoral people (Kratle and Swift, 2014). In addition to the misstructuring of the surveys themselves, in-person discussions in the Turkana region suggests that it is common for pastoralists to deny ownership of animals, even if they are physically present, which means that any information extracted regarding these important assets should be considered with some suspicion.

The region has exhibited some improvements over recent decades; however, these have remained modest compared to those in the rest of Kenya. Comparing the data from censuses beginning in 1979 reveals that the Turkana region has experienced improvements in educational attainment in both primary and secondary school, but not at the same rate as the rest

Table 1-1: Data From 2005 KIHBS Basic Report

	URBAN	KENYA	RURAL	TURKANA REGION
Poverty rate	33.7		49.1	94.3
Household size	4.0		5.5	6.5
School Net Attendance ratio (primary school)	83.2		78.3	44.1
School Net Attendance ratio (secondary school)	29.9		15.9	1.4
Proportion of children more than 2 SD (stunting)	25.2		36.7	33.0
Proportion households engaged in crop farming		68.8		12.2
Proportion of households owning livestock		66.0		62.0
Average number of cattle		6.0		23
Average number of goats		10.9		44.5
Average number of sheep		10.7		14
Percentage of households in retail or wholesale		65.5		67.5

Source: KIHBS Basic Report (2005)

of the country (Figure 1-2). Similarly, Kenya as a whole has experienced large increases in electrification since 1989, and decreases in the proportion of households with a dirt floor, while the Turkana region has had only slight improvements in these indicators. Thus, despite some improvements, the region remained lagging when compared to the rest of Kenya.

The transportation system in Turkana County is insufficient. The predominantly road-based transportation system in Turkana falls short of national averages. The region's road network is about 5,496 km including all road classes, translating to approximately 0.08 km road per square km of land. In comparison, Kenya's road density is 0.27 km per square km, which is about 3.4 times higher than Turkana's. The A1 road between Kainuk and Lokichogio (488.5 km), which was constructed in the mid 1980's to bitumen standards, is the backbone of the county's road transport network. Currently, the section between Kainuk and Makutano is in very poor condition, while the rest of the road from Makutano, through Kakuma to Lokichogio is in fair condition. All the remaining road network of 5,007 km (91% of total) is unpaved. There is very limited connectivity by air. There are currently no air transport services at Lokichogio airport as it is under reconstruction, while a few chartered air services are available at Kakuma, Lokitaung, and Lokichar airstrips.

Figure 1-2: Educational Attainment And Household Wealth Indicators, Rural Turkana vs. Other Rural Kenya

a. Primary Education

b. Secondary Education

c. Electricity

d. Dirt Floor
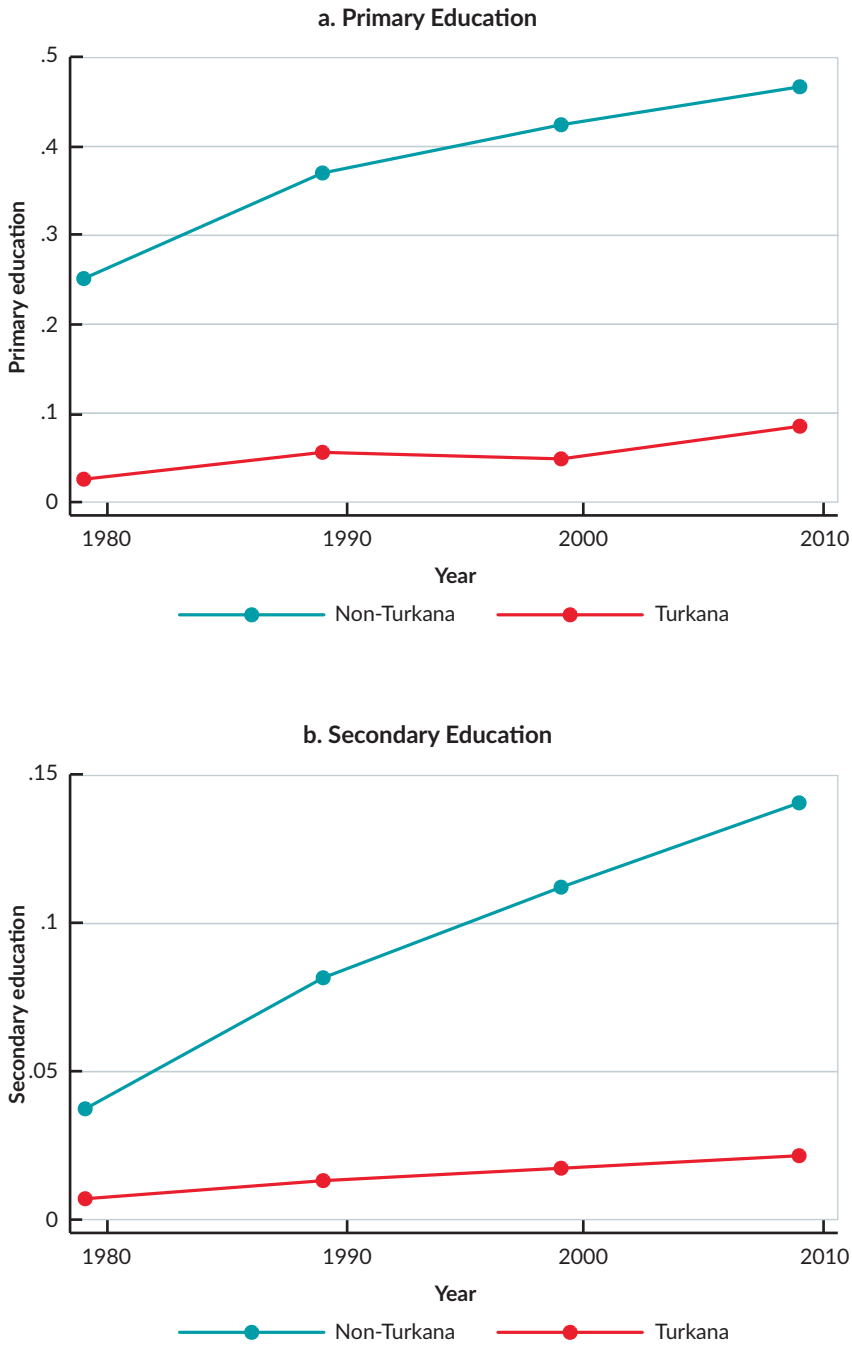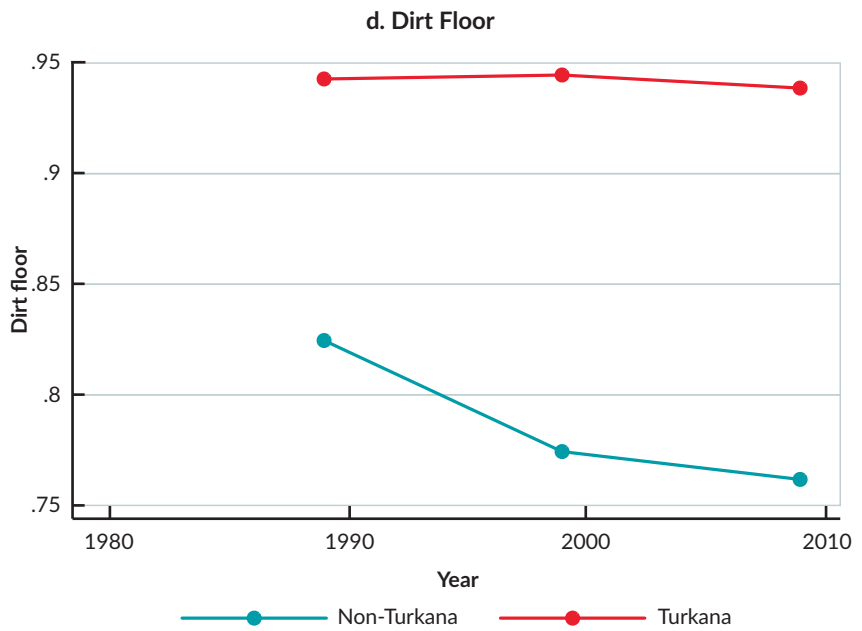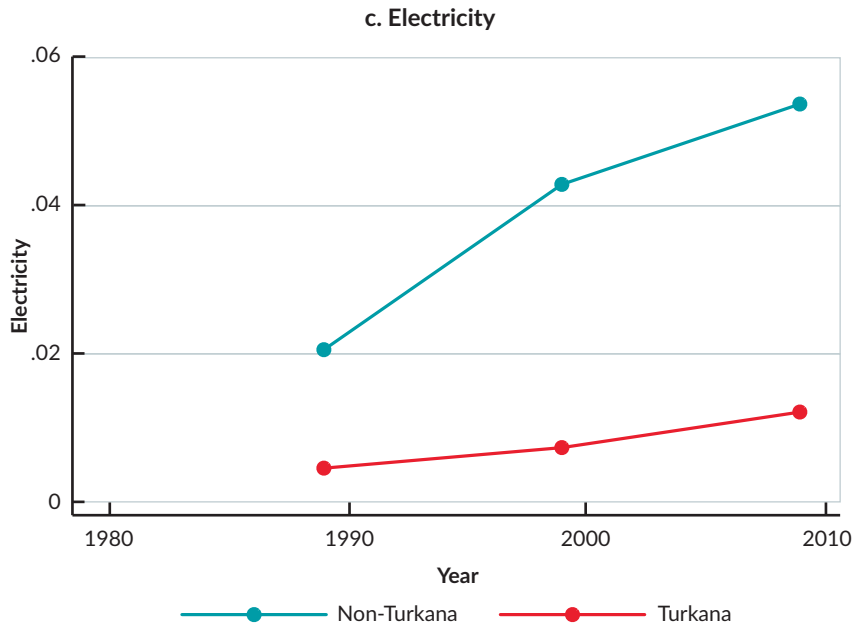
Source: WB staff calculations from IPUMs data

Table 1-2: Comparison Of Average Freight Transport Rate For 20ft And 40ft Container

ORIGIN	DESTINATION	CONTAINER TYPE	DISTANCE (KM)	FREIGHT COST (US$)	RATE PER KM (US$)
Mombasa	Kampala	20ft	1,160	2,700	2.33
Nairobi	Kakuma	20ft	800	2,500	3.13
Mombasa	Nairobi	20ft	488	900	1.84
Mombasa	Kampala	40ft	1,160	3,500	3.02
Nairobi	Kakuma	40ft	800	3,500	4.38

Source: (East African online Transport Agency, 2016) for Mombasa to Nairobi and Kampala http://www.eaotransport.com; UNHCR framework contract for Nairobi to Kakuma.

The shortage of proper infrastructure pushes up transportation fares. Poor infrastructure adds another constraint to the region's long distance connectivity to the main supply markets along with unpredictable road conditions driven by flash floods and insecurity created by banditry and tribal conflicts. Road conditions in Turkana during the rainy season have been noted as one of the primary factors behind the serious disruptions. Table 1-2 shows that it is about 70% more expensive to ship a 20ft container between Nairobi and Kakuma than shipping it between Nairobi and Mombasa, when measured in cost per km of travel.

High transportation costs are reflected in commodity prices. High transportation costs and delays widen the wedge between consumer prices in Turkana and other well-connected regions of Kenya. A World Food Program (WFP) study[4] estimates that, on average, commodity prices increase by about 1.3 percent per additional transport hour from the markets in the producing areas to the county headquarters in the arid regions. In addition, they further increase by about 1.8 per cent for every transportation hour between the county headquarters and the remote markets off the main transport corridors, A1 road in the case of Turkana. Matteis (2010) found that the average rate of price increase of goods between source markets and the Turkana County's furthest main market, Lokichogio, was around 40-50 percent with peaks of up to 80 percent in the case of some commodities such as beans.

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[4] Market dynamics and financial services in Kenya's arid lands, WFP, 2013

Figure 1-3: Refugee Population In Kakuma Camp, Annual
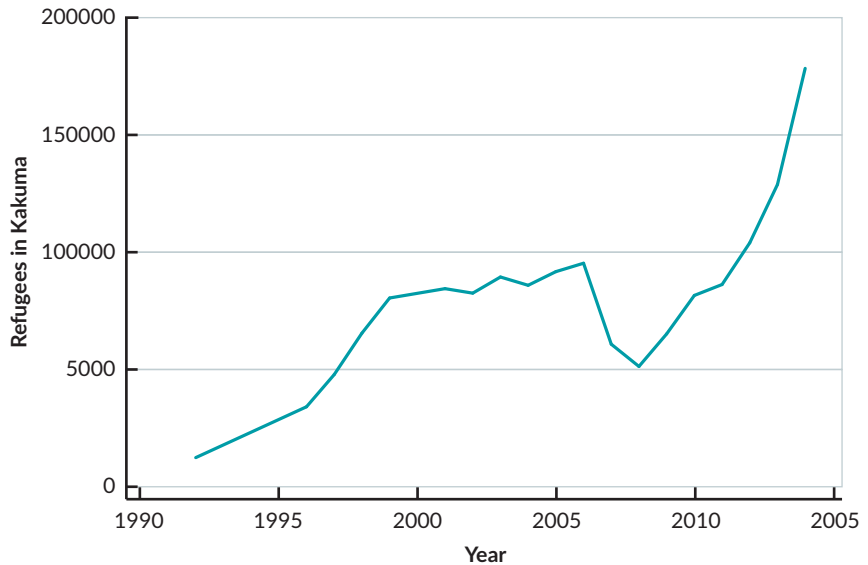
1.2. Kakuma Refugee Camp

The camp has seen many changes over time. The Sudanese "lost boys" were initially housed in a temporary camp located closer to the Sudanese border, in the town of Lokichogio. In June of 1992, the camp was relocated farther south to Kakuma Town, in the central division of the Turkana region, where it has remained since. By October of 1993, the camp housed 35,000 people, a large number especially when compared to the population of Kakuma town, which was reported to be less than 6,000 prior to 1992 (Ohta 2005). The population of the camp has ebbed and flowed over the years (Figure 1-3) with the fortunes of the neighboring countries, but it has never disappeared. It currently houses over 180,000 individuals, the majority of whom are Sudanese, although there are also Somalis and Ethiopians.

In its current position, The Kakuma Refugee Camp is more of a city than a camp. The Kakuma Refugee Camp is located in Turkana County, some 123 kilometers North-West of Lodwar town and 95 kilometres South-East of Lokichogio. The Camp consists of four sub-camps: Kakuma 1 (the oldest and most densely populated), Kakuma 2, Kakuma 3 and Kakuma 4 (the newest). The whole area covered by the camp is about 13.5 km2, and it is located approximately 2 km on the right hand side of the A1 international trunk

road, just after Kakuma town towards Lokichogio. The camp is actually a "small city" of corrugated iron sheet houses with mud/timber walls. The population density within the camp is estimated at between 12,000 – 13,000 persons per square kilometer, which is about 1,000 times that of the host Turkana community.

As a commercial center, Kakuma Refugee Camp overshadows Kakuma town. According to World Bank (2016), the camp has more than 2,150 shops, including 14 wholesalers, while the town has 232 stores. Refugees of various nationalities run their own shops in the camp, often clustering on the basis of ethnic backgrounds. Somalis, Ethiopians, and Sudanese tend to own eateries; the Oromo sell meat; and the Congolese, Burundese, and Rwandese sell vegetables grown in their backyard gardens. While most of the traders in the camp are refugees, local traders have access as well and some operate there. The camp has copy shops and businesses offering international calling and remittance services. It has restaurants that broadcast soccer matches from around the world via satellite TV.

The camp is equipped with significant education and medical facilities. The refugee camp is administered by the United Nations High Commission for Refugees (UNHCR), and is assisted in its duties by a wide range of organizations, including World Food Program (WFP); International Organization for Migration (IOM); Lutheran World Federation (LWF); International Rescue Committee (IRC); Jesuit Refugee Services (JRS); National Council of Churches of Kenya (NCCK); Windle Trust Kenya (WTK); Film Aid International; and Salesians of Don Bosco in Kenya. In 2015, there were 20 primary, 4 secondary, and 11 preschools within the camp. These numbers have vacillated significantly over time depending upon the size of the refugee population. At the time of the camp founding, there were around 7 primary, 2 secondary, and 2 pre-schools. In 2000, 19 schools including 2 secondary schools were established, although these were closed following the repatriation of the South Sudanese refugees. Currently, there is a hospital and at least 6 clinics within the camp. Interviews in the camp revealed, however, that the hospital and clinics are only sparsely stocked as a result of illegal trade in their medications both inside and outside the refugee camp.

Despite having its own bottlenecks, the camp surpasses the rest of the Turkana region in access to education and medical services. According to the latest numbers, Turkana county has four hospitals, nine health centers, and 71 dispensaries, yielding a doctor population ratio of 1:70,000. There are 338 primary school centers and 33 secondary school centers in the region. In

secondary school, the teacher to student ratio is 1:180 (Republic of Kenya, 2015).

The transport system serving the Kakuma refugee camp is significantly better than the average in the county. The Kakuma refugee camp road network consists of main and minor camp roads, which are all gravel/earth roads. The current network is approximately 35 km in total but additional lengths are built as and whenever new settlements are established. The camp also benefits from its proximity the A1 road transport corridor, and being a major demand hub due its large and dense population, which facilitates transportation services on the supply side. However, although within the camp road density is 2.6 km per km^2, these roads are generally in poor/very poor condition and characterized by huge potholes, poor drainage and flooding during the rainy seasons, like the rest of Turkana County. Overall, the camp is better connected with major markets than most other regions in Turkana, which reflects the size of the market, and the intensive nature of the aid operations.

The Kakuma Refugee Camp provides significant, mostly unskilled, work opportunities for members of the host community. Many local women, as well as a number of local children, work in the camp for wealthier refugees, performing such tasks as washing dishes and clothes, carrying food during distribution, and fetching water. For instance, World Bank (2016) reports that, in exchange for carrying around 26 kg of food, women are given 1–2 bowls of food, usually maize and (wheat) flour or sorghum, which can be sold for KSh 100–200 (US\$1–2); this option is preferred to wages, which would amount to KSh 50 (US\$0.50). Sometimes, women are given used clothes as wages. Some local people mend fences in the camp; a fence-mending job that takes a week to complete can fetches an income of KSh 1,000 (US\$10). The building of a new fence, including the collection of shrubs as fence building material, carting it to the site, and building the fence, fetches KSh 3,000 (US\$30).

The refugee camp offers an important market where locals can sell goods they produce. These include milk, meat, firewood, and charcoal. Locals and Somali business people also sell a range of products they bring into the camp, such as pots and pans, cooking utensils, bed sheets, mattresses, and even beds. Women are mostly involved in small businesses focused on food-related products, like food kiosks, butcheries, milk kiosks, etc. The major constraint women face when trying to expand their commercial activities relate to a lack of micro-finance and credit facilities—especially in a context where women cannot provide collateral.

Refugees are considered an asset by the local authorities.
Under Kenya's Devolution process, operative since 2015, Turkana
County economic development authorities recognize that refugees
the county can tap into refugees as a source of skills, resources,
and connections for its own economic development. The Turkana
County Integrated Plan prioritizes economic development
programs that could potentially integrate the refugee and host
communities. (World Bank, 2016)

Turkana Woman © Harun Onder, Lodwar 2016

2. The framework

Assessing the welfare implications of refugee arrivals is a **complex task.** The inflow of refugees into a poor region generates multidimensional effects. Broadly speaking, these effects can be grouped into two categories depending on the mechanisms through which they manifest themselves: those impacting through market mechanisms and those impacting through non-market mechanisms (Figure 2-1). The latter include, but are not limited to, environmental spillovers from the camps including land use change and exhaustion of water sources. These may hurt local consumers and producers alike, and cause health spillovers, and cultural conflicts.[5]

On the other hand, market based mechanisms, which are the main focus of this chapter, feature shocks on both the supply and demand sides of the domestic economy. For example, the refugees' prolonged stay has had a negative impact on the local consumers by creating increased demand, and higher prices, for firewood and wood-burned charcoal, among other items. At the same time, the Kakuma Refugee Camp provides considerable work opportunities for the local population, a large market for host community commodities, and increased economic opportunities for traders in Kakuma town. According to World Bank (2016), the businesses operating in the refugee camp collectively produce an estimated US$350,000–400,000 in monthly sales.

Some shall win, others will lose; will the gains beat the losses? The demand and supply side effects can either complement or conflict with each other, depending on a number of factors. These

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[5] It is important to note from the outset that insights into some of the more subtle, but no less important, effects on social dimensions, for instance the effects on local culture and security, are left out of this study solely due to time and resource constraints faced by this study.

Figure 2-1: Channels Of Transmission In Welfare Impact Of Refugees On Hosts In The Short-Term

Aid, Remittances, Wages

Refugees and Aid Workers

MARKET MECHANISMS   NON-MARKET MECHANISMS

Demand Side Effects
Aid and remittances increase demand for goods and services

Supply Side Effects
Labor force participation; aid packages increase supply of food

Environmental Degradation
Firewood use lead to deforestation; pollution

EFFECTS ON PRICE

EFFECTS ON INCOME

ENVIRONMENTAL AND PUBLIC GOODS EFFECTS

Prices of non-tradable goods increase

Income loss for producers of food provided in aid packages, income gain for producers in non-tradable sectors

Loss in access to natural resources; greater access to public goods through facilities built for refugees

Welfare Impact on Host Communities

factors include the skill types of the locals, tradability of a given sector, and how refugee settlement is handled. Thus, the net effects of refugee arrivals should vary for different groups in the host community. Some will experience gains, and some will incur losses. From an economic point of view, however, the main question is whether the total gains exceed the total losses. If affirmative, with the right redistribution mechanisms, those who incur losses could be compensated, and thus, all could theoretically gain from the refugee arrival.[6]

2.1. Channels of impact

On the supply side, refugee inflow changes the market conditions for food and labor. As far as the food market is concerned, aid could increase the supply. Refugees often sell in local markets the aid provided to them by humanitarian organizations in order to buy non-aid goods. This could depress the prices of aid goods and their close substitutes, especially in the short-term, if the aid goods are procured from outside the area and are not fully tradable by locals. In the case of Kakuma, both conditions are satisfied: aid is purchased internationally or from the rest of Kenya, and difficulties in transportation create supply bottlenecks. Should aid be purchased locally, and with constraints on trade, the supply side price impact is unambiguously positive, as the purchase of aid will reduce the supply available (Binswanger and Quizon, 1988).

In the labor market, if refugee inflow increases the supply of workers, then wages could be depressed. If refugees are allowed to work, then the supply of labor will increase and wages will decrease, especially in the short-term. To the extent that labor is an important input to production, the decrease in wages may work to lower the prices of goods that are labor-intensive in production, like construction. In the case of Kakuma, refugees are not generally allowed to work outside of the camps. A number of refugees have found employment in translation work for the UN and NGOs, as well as other positions within the camp structure, though such employment that has little affect on the local labor market. However, refugees may also work informally outside the camp, and thus provide labor market competition for locals, a complaint that has often been voiced by the Turkana people (Aukot, 2003).

Increased demand affects all non-tradable goods, like housing and restaurants. With an increase in refugee presence and

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[6] In practice, however, there will be obstacles to the implementation of such mechanisms.

humanitarian workers associated with them, the demand for all goods and services increases. Prices in non-tradable sectors like housing, land, restaurants, hotels and haircutting are sensitive to these shocks. Holding the supply fixed, the additional demand will raise their prices. This is particularly true in the short-term. For instance, because the housing supply cannot react very quickly to large increases in demand, prices must adjust as a result of the influx of displaced individuals and humanitarian workers. Similarly, if the supply of tradable goods (goods that can be transported and sold in a location different from where they were produced, like clothing, meat, and machines) cannot adjust quickly as a result of supply bottlenecks, like poor roads, long distances and insecurity, their prices will increase as well in the short-term. Given the poor road network and limited connectivity of the Turkana region, as described in the previous section, it is not unreasonable to assume that transaction costs and delays limit the smooth adjustment of tradable prices and effectively make them locally determined in the short-term. The exception to this case is when the supply of these goods also increases because refugees provide them, like the supplies in the aid packages they receive.

In the long-term, workers moving in from other regions ("a labor reallocation effect") could magnify or mitigate the demand and supply shocks triggered by refugee arrivals. Kakuma represents a somewhat unique case since all foreign workers are housed in a compound adjacent to the camp, and hence do not increase demand for local housing. However, the presence of the camp may indirectly affect local housing markets to the extent that it attracts workers from the region into the housing market in Kakuma town.[7] A perceived existence of new employment opportunities in areas surrounding the camp, and associated increases in wages, may draw individuals from other parts of the region (labor reallocation effect), thus putting more upward pressure on local prices. In addition to their effects on the traditional non-tradables, the demand pressures can also substantially affect the prices of tradable goods, like food and clothing, when trade with other regions is limited.

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[7] Note also that humanitarian workers may present a unique demand-side shock, given the large differences in both their tastes and income relative to the local population. Aid workers may have particularly large impacts in the market for "luxury" items, such as household servants, restaurant meals and certain food items. In addition, the aid agencies themselves constitute a new source of labor market demand, particularly for skilled and semi-skilled individuals.

Overall, the net effects of refugee inflow on prices are determined by both supply and demand shocks, which could move in opposite directions. Given that all of these events described above occur simultaneously, and that some may have positive and some negative price effects, prediction of net effects is complicated. In the market for non-tradables, where demand-side impacts are likely to dominate other effects, prices will go up in the short-term. In the long-term, labor flow into the region could undo some of these price hikes by increasing the supply. In the market for tradables that face supply rigidity, the price of aid-related goods is likely to go down if the aid is imported and if the imports exceed the additional demand generated by the incoming population. If aid is locally purchased, or if the additional demand is greater than the amount of imported aid, prices may increase.

The welfare effects of these shocks are also ambiguous and distributed heterogeneously across different groups in the host community. The impact of refugee arrival on an individual's welfare depends on whether their purchasing power increases or not. This result, in turn, depends upon whether they are a net buyer or net seller of the products that experience price changes, changes in their wage earnings, and upon the shape of the demand curve. For those who can benefit from the increased demand induced by refugees and humanitarian workers, the overall effect may be positive. These groups potentially include landowners and suppliers of non-aid tradables and non-tradables. Net consumers of the types of goods found in the aid basket will also benefit from lower prices. For those competing with refugees in labor market, or producing foods found in the aid basket, effects are likely to be negative.[8]

The complexity of the problem commands a careful approach. In summary, refugee arrivals have both positive and negative effects on market outcomes and on the welfare of different host community groups. This renders a comprehensive assessment of impact challenging. In light of this observation, in what follows, the report develops a novel methodology for assessing the impacts on each channel of transmission, e.g. price, income, and labor reallocation effects, as well as the overall welfare effect.

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[8] It is important to note that this framework revolves around market prices. For rural households that do not participate in markets, prices may not be the relevant mechanism through which to analyze impacts. Households entirely dependent upon their own production prior to conflict may either remain so, or find themselves facing prices which favor their entry into the market, thus transitioning from a state of autarky to one of trade, and vice versa.

2.2. Assessment strategy

Assessing the impact essentially means comparing today's situation to a plausible scenario in which the refugees had not arrived (a counterfactual), something that has proven difficult in the case of Kakuma. Impact, by definition, corresponds to the difference between an actual outcome, which is observable, and a hypothetical case where the effect does not occur, which is not observable. The latter, thus, requires a careful assessment of what could have happened if Turkana had not received any refugees. Unfortunately, there is very little pre-camp information available, and no truly valid counterfactual cases in Turkana– that is, no town exactly like Kakuma which did not host a refugee camp between 1991 and the present, and which was unaffected by the events in Kakuma. In the face of this challenge, the analysis in this report follows a 4-step approach for assessing the implications of refugee arrival and outcomes of alternative policy options going forward:

1. *Empirical base:* use a variety of summary statistics from surveys, analyses of separate data sources, and an imperfect counterfactual (a town similar to Kakuma that did not receive refugees) to generate an empirical base.

2. *Simulations:* build a theoretical model tailored to Kakuma, use the empirical base to calibrate the model, simulate the impact.

3. *Testing the implications:* test the implications of the simulations using econometric techniques; map the results from econometric analyses and simulations onto each other.

4. *Policy experiments:* use the model to simulate the outcomes of possible future policy actions.

The empirical base makes use of prevailing data sources and original household surveys implemented for this study. Prevailing data sources include household characteristics from three Kenyan censuses and a registration census by the Hunger Safety Net Program (HSNP), price data from the Famine Early Warning System (FEWSNET) and the Livestock Information Network Knowledge System (LINKS), refugee counts from UNHCR, and aid delivery statistics from WFP. Details of these sources are provided in Box 2-1. In addition, household surveys were undertaken in both Kakuma refugee camp and in residential areas both near to and far from the camp. Slightly different instruments were used within the camp (the refugee survey) and for households outside the camp (the Turkana survey). Both included modules on household demography, income, and perceptions.

Information on consumption was also collected, albeit in a limited fashion, only intended to detect short-term changes in consumption.

A number of other towns in Turkana were considered to set up imperfect counterfactuals. Finding comparable towns to Kakuma Town proved to be difficult. The candidates needed to have a similar size to Kakuma in 1989, which then had a population of 5887, and were close to the Kitale-Juba highway. Within Turkana province, there are 4 market towns with such characteristics: Lokichar (pop 4887), Lokori (pop 5590), Kangatet (pop 5590), and Lokwal Kalokol (pop 6842). The latter is located off of the main highway, and Kangatet is too close to Lokori, thus they were eliminated from the sample. Security challenges made it impossible to arrive at Lokori, and based on discussions with Turkana and UNHCR staff, it was replaced with Lorugum, located on the main highway west of Lodwar en the route to Uganda, and halfway between Lokichar and Kakuma.

Box 2-1: External Sources Of Data

This report accesses a wide variety of data sources, which are described in detail in this Box, and will be referred to in the remainder of the report.

i. Kenyan Census: We use the Kenyan Census data from years 1979, 1989, 1999, and 2009 (GOK, 1989, 1999, 2009). Data from 1989-2009 were linked to geographic information system shapefiles obtained from the Kenya Open Data initiative website. Household covariates for a 10% subsample from these censuses were used in some of the background statistics above, where available, and were downloaded from the Integrated Public Use Microdata Series International website (IPUMs International 2015).

ii. Hunger Safety Net Program (HSNP): A key source of information on the entire Turkana region is the registration census conducted by the HSNP (2015). This program is one of a variety of cash transfer programs operated by the Kenyan government. HSNP specifically supports the poorest households of Turkana, Mandera, Wajir, and Marsabit counties, with the objective of reducing extreme hunger and vulnerability. Over 140,000 households were registered in the Turkana region, and about 40,000 eventually received support from the program (Fitzgibbons 2014).

The registration dataset intends to be a census of all possible recipients of the program, and was undertaken between October of 2012 and June 2013. The data includes a variety of household covariates, including age, gender, education, and occupation of the household

head, as well as of other family members, livestock holdings, and a predicted consumption variable, which HSNP calls a "proxy means test." We use this data both to provide background statistics as well as to serve as a sample frame for our own household survey.

iii. Price data: Data on prices came from two sources. The Famine Early Warning System (FEWSNET) provided monthly price data on agricultural and some livestock goods from 2000 onwards for 11 markets throughout Kenya. Unfortunately, however, we could only use this data descriptively, since the Turkana markets had significant numbers of missing observations.

Livestock prices from 37 markets between 2004 and 2013 came from the Livestock Information Network Knowledge System, and collaboration between the Government of Kenya, USAID, and the UC Davis GLCRSP group (LEWS 2015). This data averages transactions for different breeds and types of cattle undertaken on market day in each market location approximately twice per month.

iv. UNHCR refugee counts: Annual refugee numbers prior to 2007 have been taken from published UNHCR sources. Monthly refugee numbers between 2007 and 2015 were provided by the UNHCR.

v. WFP statistics: Similarly, information on food aid deliveries was absent prior to 2007. From that date onwards we have monthly food aid deliveries to Kakuma in metric tons.

Lokichogio was included as an additional comparison city; however, it serves a different purpose. This town was the original site of what is now the Kakuma refugee camp. From 1989 until 2011, it served as the base for the substantial infrastructure supporting Operation Lifeline Sudan. It therefore provides an example of what happens when "aid leaves," which may be a potential future scenario for Kakuma. Overall, the household survey for Turkana was implemented in Lorugum, Lokichogio, Lokichar and Kakuma, all located in a very arid region, but also close to a key resource needed for successful pastoralism – rivers. They serve as an important base of operations for many pastoralist households. More information on the selection of the household sample in provided in the Appendix A.

Simulations were performed by using a multi-sector general equilibrium model. In order to capture price, income, and labor reallocation effects of refugee arrivals both in the short-term and in the long-term, the analysis constructs a model that builds on Artuc et al (2008) and Artuc et al (2010). The initial economic envi-

ronment features different geographic regions, one of which is Turkana (based on its population share) one non-tradable sector in each region, and a common tradable sector whose price is given independently. Both refugees and host community members have skilled and unskilled members, who are imperfect substitutes in production of all goods. All workers earn wages that are equal to their marginal productivities. There is also a fixed factor of production in each region (land) that is owned by locals. The economic rents to this factor (i.e. extra profits due to market distortions) are shared by the locals (non-refugee).

This framework pays special attention to mobility of labor across geographic regions and sectors. In the simulation model, the host community members, and if permitted: the refugees, can rationally change jobs across sectors or move to a different region. Such a move is possible at any point in time. The decision to move is based on a comparison between the cost of movement, which is paid only once at the time of movement, and the expected change in the person's lifetime income after that. More details on the features of the model are provided in Box 2-2, and the structure of the model is summarized in the appendix.

Simulations help the analysis on two fronts: first, they help to capture the labor reallocation effect, and second, they help disentangle the short and medium term outcomes. Economic and social impact analyses of refugee arrivals have typically over-looked the labor reallocation effects. This is partially because such effects are difficult to capture in partial equilibrium approaches that are often used to identify how income or price are affected. However, as demonstrated by Artuc et al (2010), to move from calculation of wage effects to welfare effects, one needs to take account of the constant inter-industry gross flows of workers observed in the data. These gross flows are large and have significant effect on welfare calculations. Indeed, due to these flow effects, the short-term outcomes, during which the supply side of the economy is not settled into a new equilibrium yet, could be significantly different than the long-term effects, when all adjustments are completed and the economy reaches a new steady-state. Therefore, thanks to these simulations, the analysis can project both the transition paths of prices, real wages, lifetime income, and labor reallocation across industries and regions, and the permanent shifts in them.

Empirical assessment follows a pragmatic approach. The choice of empirical approach is to a large extent driven by the availability of data. Given constraints in that, the analysis adheres to using a variety of summary statistics, analyses of separate data

sources, and an imperfect counterfactual. For instance, whereas simple comparison of population densities over time is used for assessing the labor reallocation effects, regressions that take advantage of the spatially stratified nature of the price data are used for detecting the price effects in livestock markets. More detailed description of estimation approaches will be described in the section where they are used.

Box 2-2: Simulation Model

The simulation model used in this report comprises a small open economy with 41 symmetric sub-regions, one of which is Turkana. This split is based on computational convenience, and the analysis does not aim to capture any regional differences among other regions in Kenya. Thus, for all practical purposes, the model has "Turkana" and the "rest of Kenya" as main regions.

There are two types of workers: skilled and unskilled. They are imperfect substitutes in a simple Constant Elasticity of Substitution (CES) production function: when more workers of a certain type are employed, marginal productivity of that type decreases, but that of the other type increases.

Local workers and refugees are perfect substitutes provided that they are the same type, e.g. both skilled or both unskilled. In the main analysis, refugees and locals are assumed to have the same proportion of skilled workers (15 percent). This assumption, although simplistic, helps the analysis by shutting down some effects, and helps identify major mechanisms that drive the results that would be difficult to isolate otherwise. While interpreting the results in Chapter 4, implications of alternative skill compositions will be discussed.

Workers are free to change regions and sectors, but they face some frictions in the form of mobility costs. These costs are stochastically determined with identically and independently distributed moving cost (utility) shocks for each region and sector. Workers solve a dynamic optimization problem with perfect foresight, and equilibrium wages clear markets. However, thanks to the mobility costs, wage differentials and gross flow versus net flow differences can be sustained in equilibrium. Workers first learn about the regional shock, and decide the region. After that, they learn about sectoral shock in that region and decide the sector. This structure bears no consequences for results, it is chosen for computational convenience.

There is a tradable good that is freely traded among regions and countries, thus, it has a fixed price. Domestic producers are price

takers in this sector. Each region also has a non-tradable sector, therefore, there are 41 non-tradable sectors, whose prices are determined endogenously within the region. The model allows for segregated markets in different locations.

Simulations abstract from potential skill intensity in either tradable or non-tradable sectors. As above, this is to isolate other channels in identifying the impact of refugees on host community welfare.

Overall, this framework enables studying dynamic characteristics of the problem by contrasting short-run and long-run analysis in the case of population shocks. A brief formal definition of the simulation model is provided in the appendix.

Towns that did not experience an influx of refugees (counterfactual towns) are used for detecting Kakuma-specific effects. By comparing how an indicator changes with distance to Kakuma and how it changes with distance to other towns, the analysis is able to capture some Kakuma specific effects, albeit in an imperfect manner. If these towns are taken as similar prior to the establishment of Kakuma refugee camp, then current outcomes for households in these locations reflect differences resulting from shocks that are unique to each of these places. Yet there are two ways in which the use of these towns as counterfactuals could be invalidated. First, if they experience other types of shocks that cause them to diverge significantly from what would have been an average time trend for the region, and second, if the presence of the refugee camp spills over to them. Because of its presence on an unstable border, Lokichogio is clearly different from the other towns in the sample, and can only be taken as a very loose "future scenario." In the case of the Lokichar and Lorugum subsamples, their use as a counterfactual is more likely to be invalidated by spillovers – i.e., migration of households or price effects that ripple down from Kakuma. These potential problems will be examined in the data, but no strong evidence for them will be found, allowing these two towns to remain among the counterfactuals in our analysis.

As the last step of the analysis, a number of policy simulations are used to shed light on alternative integration options going forward. Whereas the assessment of the impact of refugees on host community welfare takes the status quo as given, policy experiments follow a scenario approach to characterize the future outcomes of alternative policies. Therefore, these are performed by simulations only. Overall, these thought experiments are used to facilitate a discussion on the future of Kakuma Refugee Camp and the communities that have generously been hosting it.

Young Mother © Harun Onder, Lodwar 2016

3. The economics of encampment

I n this section, the results of the analysis will be discussed. First, simulation results are presented to develop a set of a priori effects. These will begin by discussing the impacts on aggregate economic activity, and then switch to specific effects on prices, wages, and incomes. Second, the empirical analysis will assess the effects market by market, e.g. focusing on agriculture, housing, and livestock markets. When possible, separate price, income, and labor allocation effects will be discussed in each individual market.

3.1. Simulation results: prognosis

Encampment restricts the impact of refugees into demand channels only; they are only consumers. Refugees, although not allowed to work, can still increase the demand for both tradable and non-tradable goods. They receive income in the form of aid and remittances, which gives them the purchasing power to buy from the market. For "perfectly tradable goods," this additional demand does not have an effect on market prices because tradability with no supply bottlenecks implies an immediate adjustment of supply to changes in demand, e.g. there is an infinite supply at the fixed market price. This is not the case for the prices of non-tradable goods and those tradable goods where there are supply bottlenecks, whose prices increase in the wake of increased demand. These changes, in turn, have aggregate and distributional consequences.

Aggregate effects

The arrival of refugees boosts economic activity in Turkana. Table 3-1 summarizes the simulations of refugee arrival and its aggregate effects on macroeconomic outcomes. The Gross Regional Product (GRP) of the Turkana region permanently increases by 3.4 percent as a result of the refugee arrival. Gross Regional Income (GRI), which is defined as the regional output minus the refugee

Table 3-1: Simulation Results: Macroeconomic Effects Of Refugee Arrival (Encampment)

	BEFORE ARRIVAL	ARRIVAL YEAR	+5 YEARS	+10 YEARS	+15 YEARS	+20 YEARS	+30 YEARS	+50 YEARS
		(Percentage change from initial equilibrium						
TURKANA								
Gross Regional Product (GRP)	0.0	2.6	3.4	3.4	3.4	3.4	3.4	3.4
Tradable	0.0	-5.7	-7.1	-7.1	-7.2	-7.2	-7.2	-7.2
Non-tradable	0.0	5.7	7.3	7.4	7.4	7.4	7.4	7.4
Employment (locals only)	0.0	1.2	2.8	2.9	2.9	2.9	2.9	2.9
Tradable	0.0	-2.7	-6.0	-6.3	-6.3	-6.3	-6.3	-6.4
Non-tradable	0.0	2.7	6.2	6.5	6.5	6.5	6.5	6.5
Gross Regional Income (GRI)	0.0	2.6	3.4	3.4	3.4	3.4	3.4	3.4
GRI per local person	0.0	1.4	0.6	0.5	0.5	0.5	0.5	0.5
Non-tradable prices	0.0	12.0	7.3	7.0	6.9	6.9	6.9	6.9
REST OF KENYA								
Gross Regional Product (GRP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tradable	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1
Non-tradable	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Employment (locals only)	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Tradable	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
Non-tradable	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Gross Regional Income (GRI)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRI per local person	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-tradable prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes: Gross Regional Income (GRI) is defined as Gross Regional Product minus the wage bill of refugees. In the case of encampment, since refugees are not allowed to work, both concepts are equivalent.

wage bill, is the same with GRP in this case as no refugees are allowed to work.

Incomes of locals increase on a per capita basis after refugee arrival, especially in the short-term. The GRI per local person (GRIplp) in Turkana increases by 0.5 percent in the long-term. In the short-term, however, the effects are larger at 1.4 percent growth. Over time, the initial effects are smoothed over time labor moves across regions and sectors.

Growth also brings about a sectoral transformation. Whereas the non-tradable sector grows by 7.4 percent in the long-term, the tradable sector shrinks by 7.2 percent as resources are allocated to produce more non-tradable goods and services. As the former sector is substantially larger than the latter, the net effect is positive overall growth. This is an expected result: as higher demand pushes up the relative price in non-tradable sector, more resources are allocated from the tradable to the non-tradable sector. Whereas employment in the non-tradable sector increases by 6.5 percent in the long-term, it decreases by 6.3 percent in tradable sector (Table 3-1). Overall, total employment increases by 2.9 percent.

Refugee arrival has negligible effects on the rest of Kenya. Refugee arrival pulls labor from other regions to Turkana. Although these flows have important implications for Turkana economy, they do not have such effects for the rest of Kenya. The bottom panel in Table 3-1 shows that most effects on the rest of Kenyan economy are small enough to be rounded up to zero. Only in employment numbers, is there an observable decrease by 0.1 percent.

Non-tradable sector prices increase permanently with an over-shooting in the short-term. In the short-term, the prices of non-tradable goods surge when refugee arrivals create a demand shock. Over time, however, supply in these sectors adjusts as labor moves in, and prices stabilize around their long-term equilibrium level. In quantitative terms, the non-tradable goods prices increase by about 12 percent in the year of the refugee arrivals in Turkana. Over time, propagation mechanisms bring prices down to their long-term levels that are 7 percent greater than the initial equilibrium.

Distributional effects

Not everyone benefits the same way from the arrival of refugees. Although locals enjoy higher incomes, both in aggregate and per capita terms, from the refugee arrival, not everybody gains from it. Therefore, it is important to identify the potential losers,

which may help establish mitigating mechanisms, e.g. transfers from winners to losers.

Demand-shocks boost real wages in non-tradable sectors. With higher prices in non-tradable sectors, marginal products of workers increase, thus they get paid more. In comparison, as prices in the tradable sector is determined globally, there is no change there. As real wages are defined with respect to changes in consumer prices, e.g. average prices in the region, stagnant wages in tradable sectors indeed denote sharp decreases in real wages in that sector. In comparison, the increase in wages in the non-tradable sector more than offsets the increase in consumer prices. In the long-term, the real wages of skilled workers increase (0.9 percent) more than those of unskilled workers (0.4 percent) in the non-tradable sectors (Figure 3-1). Similarly, skilled workers suffer a bit less (- 0.4 percent) in the tradable sector than unskilled workers (- 0.9 percent).

Short-term effects are more prominent than long-term effects; mobility of labor smooths them over time. Unlike the long-term increases, which are more subdued, wages of both skilled and unskilled workers in the non-tradable sector increases by 5.6 percent immediately after the arrival of the refugees. Similarly, the drop in tradable sector wages is more pronounced in the short-term. The movement of labor from low real wage sectors to high real wage sectors, and also from low real wage regions to high real wage regions, take place over years. As a result, some of the wage hikes in the short-term are undone gradually over time.

When total incomes are taken into consideration, gains are magnified and losses are depressed. In addition to workers in non-tradable sectors, those who own fixed factors of production (like land) also enjoy higher economic rents when demand expands. Simulations allocate these rents equally across the local population. In the long-term, the incomes of those who work in the non-tradable sector increase by 0.7 percent. In comparison, the incomes of those who work in the tradable sector decrease by 0.25 percent. As the non-tradable sector employs more labor than tradable sector in Turkana, the gains dominate the losses. Consequently, the arrival of the refugees has a net positive effect on average income in Turkana.

Figure 3-1: Real Wages And Incomes Of Locals After Refugee Arrival
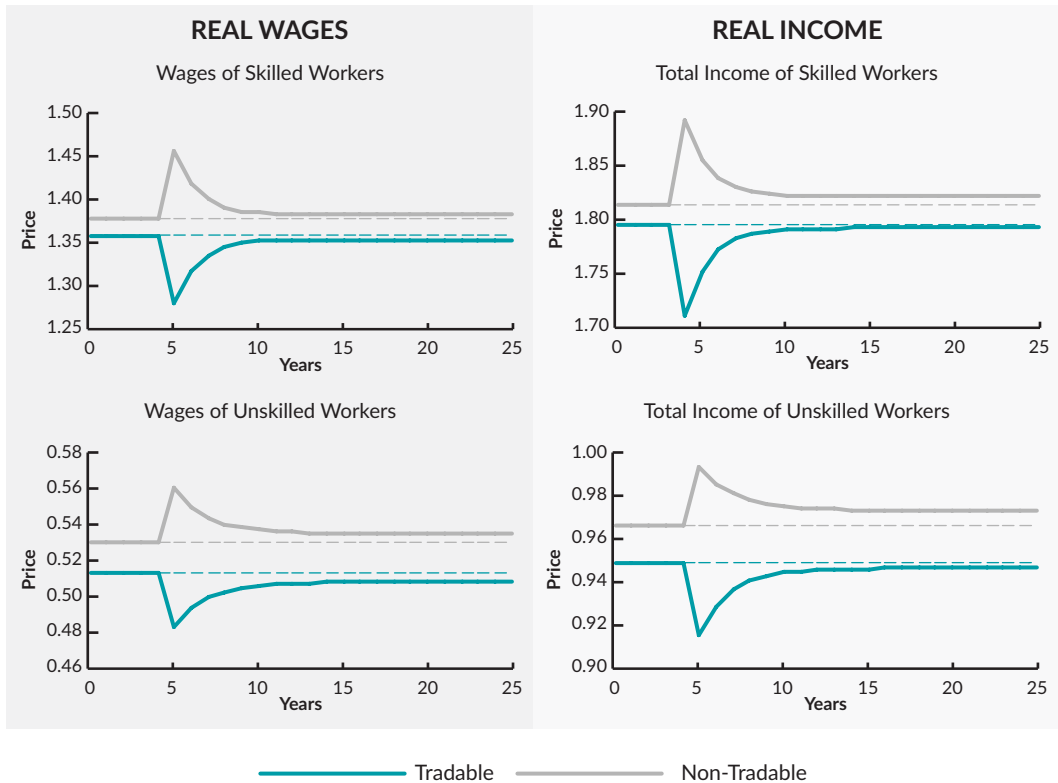
With encampment, everything depends on the transfers received by refugees.
With no additional sources of income or possibility to affect the outcomes through labor markets, refugees could only affect the host community welfare to the extent that foreign aid and remittances grant them purchasing power. Four financial organizations within the Somali trader network, through which remittance transfers are conducted, have been identified at the camp: Dahabshil, Amel, Dalson, and Iftin. Therefore, not only the well-being of the refugees, but also that of the locals depend on the size of those transfers. The higher the aid, the larger the effects in both short-term and long-term.

With market frictions short-term rents are captured by fewer people and for a longer period.
Refugee camps are typically set up in relatively underdeveloped regions everywhere in the world. This possibly reflects the low opportunity cost of land in such environments and that conflicts may be more common in the

neighboring areas. Kakuma, located in the poorest region in Kenya and surrounded by neighbors that are prone to conflict, is not an exception in this regard. However, underdevelopment also means that these regions are likely to suffer from limited connectivity and less developed markets. Both factors increase mobility costs and slow down the transition dynamics upon refugee arrival. As a result, they help transitory rents to be captured by a few privileged groups like producers with market power. In comparison, without these extra frictions, markets adjust relatively more rapidly, and gains are distributed in a more widespread manner.

3.2. Empirical results: evidence

To what extent does data support our simulations? In this section, we investigate the empirical evidence for the effects described by simulations. Given limitations in data, however, tracing the effects over a certain time horizon has proven to be difficult. Therefore, in many cases, a distinction between short-term and long-term effects could not be made. In what follows, the analysis will first look for evidence for the impact of refugee arrivals on prices and production in grain, livestock, agriculture, and housing markets. Next, it will focus on labor markets. Finally, in order to capture wages and income effects, which are not possible to observe properly in data, consumption patterns will be analyzed. In all components, the analysis will not shy away from presenting any meaningful information that was collected as part of this study for documenting the characteristics of the Turkana economy, which may be useful for future studies.

Grain markets

The camp constitutes a major source of demand for food – perhaps larger than the local residents themselves. Refugee households spend at least 60% of their income on food purchases. The top two expenditures in this category are meat (13%) and sugar (13%), followed by cereals (9%) and milk (9%). Purchase of vegetables constitutes only 6% of expenditures (WFP FSOM 2014). In terms of local preferences, interviews with wholesale traders suggest that cow, goat, and camel meat, and cow and goat milk are coming from local markets. Maize and beans are the most widely purchased cereals and pulses, while tomatoes and potatoes constitute the largest percentage of vegetable and fruit sales (Fernandez et al 2014). The total sum of purchases by refugees depends on the number of refugees in the camp and their purchasing power. The higher the number of refugees or the more they can purchase by means of selling the aid packages, receiving remittances, and earning wage labor, the more demand is created. Figure 3-2 shows

Figure 3-2: Refugees And Food Aid To Kakuma
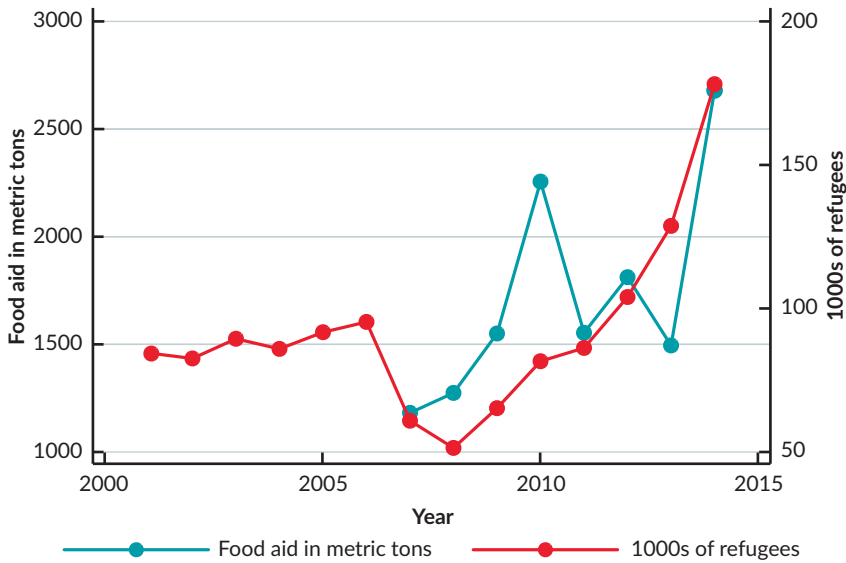
Source: World Bank staff calculations using data from WFP and UNHCR

the available information on refugee numbers in the camp and food aid deliveries. The recent outbreak of violence in South Sudan (from 2013) has clearly caused a recent spike in refugee numbers. The incomes of refugees will be discussed below.

Imperfect market conditions are important determinants of prices. An assessment of market structure in arid regions of Kenya conducted by WFP in 2014 (Fernandez, Kisingu, Wanambwa and Njoroge, 2014) highlights the weak market integration both across local markets and with main supply markets. The refugee camps, however, due to their size and location on transport corridors, tend to have somewhat better functioning markets. However, the lack of local production outside of livestock, milk and a small amount of cereals means that traders must bring other products from some distance. The report suggests that markets are relatively competitive between wholesalers, although the authors do note that wholesalers in Kakuma appear to have a very important role in determining prices – more so than in Dadaab. Interviews with camp residents that were performed by this study suggest that there are 4 to 5 main wholesalers who determine market prices in Kakuma camp.

Figure 3-3: Retail Price Of Corn In Four Markets
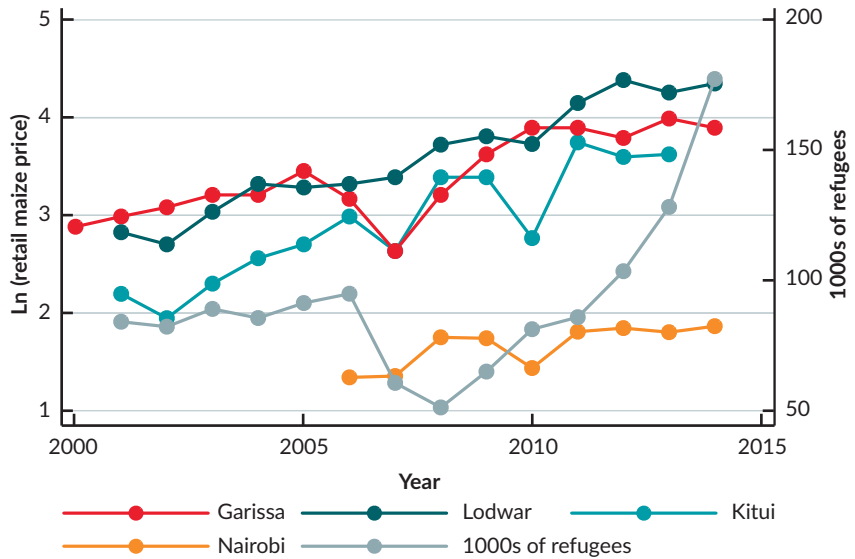
Source: World Bank staff calculations using FEWSNET price data

Refugee camp markets are heavily patronized by host community residents, who take advantage of lower prices of a variety of goods. 62 percent of participants in the Kakuma subsample of the survey for this report stated that they use the market in the camp. This can be attributed to the fact that the prices and products offered there are found to be attractive by locals. In addition, the sheer size of the refugee camp leads to better connectivity to other markets and, thus, availability of a greater variety of goods.

With limited data, no definite conclusions regarding the impact of the camp on local grain prices can be inferred. The grain price data that includes Turkana district is extremely limited: only the retail price of corn is available. Inspection of the dynamics of the retail price of corn (Figure 3-3) show no observable correlation between refugee inflows (the grey line) and corn prices in any market, and no deviations in the Lodwar (Turkana) market from other markets. Running a fixed effects regression with market and year effects using this data reveals a positive correlation between refugee inflows and price, and a negative correlation between aid inflows and price. However, the results are far from statistically significant, and the low number of observations calls into question the validity of the estimates. There is somewhat more price data on livestock prices and sales, which will be discussed in the next section.

Livestock markets

Livestock, the main source of livelihood of the Turkana region, has been affected significantly by the presence of refugees. The present Turkana chief of Kakuma indicates that one of the biggest impacts of the camp was to displace Turkana livestock. In an interview with the World Bank team, he stated that when the refugees arrived in 1991, the site where the camp was based was a bushy forest ecosystem that supported a wealth of indigenous trees. The local people who inhabited that place or moved with their cattle did not want to leave the area and it was only after they were instructed to exit and remain outside of a certain radius from the camp that most eventually left. For some, this process took between 6 months to one year due to their protests. The chief pointed out that even today you can find some old Turkana who spend a lot of time inside the camp because they still believe that this is their land. Over time, the numbers of people in Kakuma grew and many of the local inhabitants remained along the Tarach River so as to have access to water supplies. Many of the pastoralists, particularly during the dry season, move farther and farther away. Earlier on, they moved north towards the South Sudan border, but because clashes with the Toposa have resulted in numerous deaths for the local population, many have recently chosen instead to cross the border to the west to graze their cattle with the Karamojong in Uganda.

Data provides some support for the livestock displacement effect of the camp. HSNP census data shows that livestock holdings in 2011 were quite low in the Kakuma area relative to the rest of the region (Figure 3-4). It bears mentioning that the bulk of the population is not located around the camp (see the accompanying histogram of population distribution on the graph), but that those who do live nearby tend not to have cattle. Cattle holdings increase substantially at about 7 kilometers from the camp. It is also worth noting that the 2011 HSNP data affords us only a snapshot in time, from which it is difficult to draw firm conclusions regarding such a mobile population. This spatial distribution is verified by regressions that control for precipitation (Appendix B).

Some effects of the refugee camp on livestock are localized. When averages across Kakuma households and non-Kakuma households Lorugum and Lokichar (which together represent the counterfactual case) are compared, there are no significant differences in number or value of poultry and livestock cared for, sold, owned, or stolen in the past year. Similarly, no changes in the movement or watering of animals during the past 5 years are reported. There are interesting results, however, when the

Figure 3-4: Livestock Holdings By Distance From Camp
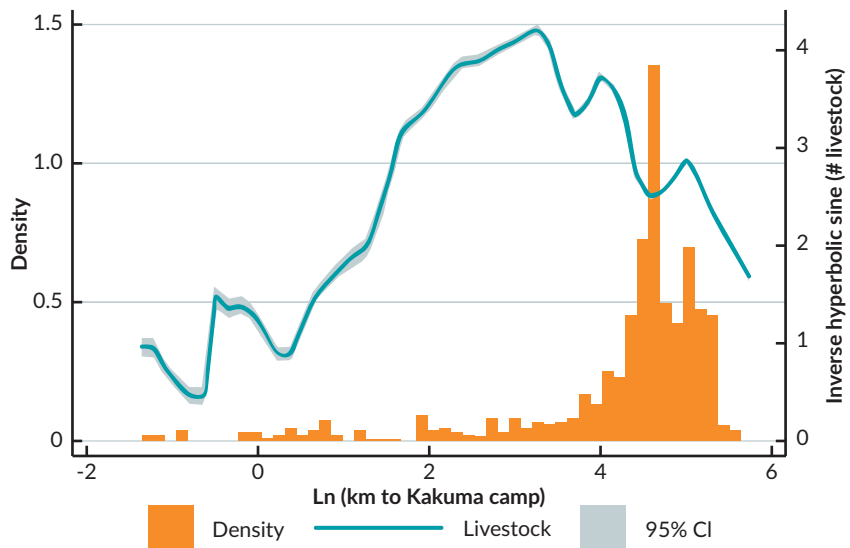
Source: World Bank staff calculations using HNSP 2011 data

patterns across stratification levels -- < 2 km to the city center, 2-8 km, and 8-10 km, are compared between the Kakuma subsample and the subsample for Lorugum and Lokichar. The first panel of Table 3-2 shows that the probability of livestock being stolen is 8 percentage points higher in the Kakuma sub-region, and the value of livestock sold is 7 percent higher, while the value of that cared for is orders of magnitude larger, though possibly driven by very large outliers. Panel b, which considers different distance bands, also show that both the number (column 2) and value (column 6) of animals are higher at distances closer to Kakuma. In addition, the Kakuma sub-region also has a significantly higher probability of cattle stealing close to town. Both the higher probability of cattle stealing and the exchange of cattle care with refugees are elements that were mentioned in interviews with refugees and Turkana.

Despite the herd displacement effect, local producers may benefit from the presence of the refugee camp through higher sale prices for their meat and milk products. Analysis of monthly livestock prices from 2007 to 2013 suggests that increases in refugees and aid are correlated with price increases near the refugee camp (Table 3-3). In particular, a one percent increase in the refugee population results in a 3.5 to 3.8 percent increase in goat prices in Lodwar. There is some evidence that increases in food aid per refugee also induce price increases, probably through their

Table 3-2: The Patterns Of Livestock Economy: Kakuma vs. Other Towns

	(1) HAS ANIMALS	(2) Ln (LIVESTOCK CARED FOR)	(3) Ln (LIVESTOCK OWNED)	(4) PROB (LIVESTOCK STOLEN)	(5) Ln (LIVESTOCK SOLD)	(6) Ln (VALUE ANIMALS IN CARE)	(7) Ln (VALUE ANIMALS OWNED)	(8) Ln (VALUE ANIMALS SOLD)
a. Difference across subsamples								
In Kakuma subsample	0.0527	0.6547	0.1122	0.0833*	0.0734*	2.0260*	0.4101	1.283
	(0.0876)	(0.4732)	(0.4272)	(0.0459)	(0.0405)	(0.9430)	(0.7088)	(1.2050)
N	330	154	154	154	154	154	154	154
r2	0.001	0.007	0	0	0	0.011	0.002	0.005
b. Averages by distance band and subsamples								
Less than 2 km to town	0.2674***	1.5027***	2.5987***	0.3888***	0.5964***	5.4744***	9.6417***	1.2645***
	(0.0441)	(0.2398)	(0.3860)	(0.0319)	(0.0374)	(0.1845)	(0.7018)	(0.0356)
Between 2 and 8 km from town	0.4443***	2.9126***	3.7280***	0.3599***	0.5540***	8.4901***	11.5531***	5.5049***
	(0.0678)	(0.0102)	(0.1033)	(0.0338)	(0.0644)	(0.2735)	(0.1038)	(1.6294)
Between 8 and 10 km from town	0.8053***	2.8437***	3.7662***	0.4993***	0.7709***	8.7966***	11.5422***	5.1682***
	(0.0216)	(0.2377)	(0.1816)	(0.0512)	(0.1129)	(0.7505)	(0.4663)	(0.6603)
Less than 2 km to Kakuma	0.1018	1.0797***	0.5379	0.1529**	0.1361*	3.0915***	1.1637	2.9795***
	(0.0708)	(0.3316)	(0.4438)	(0.0588)	(0.0660)	(0.4011)	(0.7540)	(0.3895)
Between 2 and 8 km to Kakuma	0.0172	0.2715*	-0.2589**	0.0568	-0.0064	1.2345**	-0.2513	-0.4878
	(0.1178)	(0.1330)	(0.1057)	(0.0895)	(0.1430)	(0.4712)	(0.1422)	(1.6336)
Between 8 and 10 km to Kakuma	-0.1053	0.1301	-0.5360**	-0.1421	-0.2281	0.2228	-1.1473	-0.8624
	(0.0841)	(0.2950)	(0.2114)	(0.1321)	(0.2316)	(1.3572)	(1.0050)	(0.7539)
N	330	154	154	154	154	154	154	154
r2	0.419	0.661	0.814	0.49	0.435	0.757	0.948	0.48

Panel a shows the weighted t-test of key outcomes in the livestock module of the household survey. Panel b shows regressions without a constant with the full set of dummy variables indicating the distance strata for Kakuma and the counterfactual towns. This specification means that each coefficient represents the mean of the outcome variable for a given distance and location, tested against the hypothesis of zero. The coefficients indicating distance to Kakuma give the additional effect of being at a particular distance from town in the Kakuma subsample.

Table 3-3: Correlation Between Livestock Prices And Aid

	(1)	(2)	(3)	(4)
Ln (refugees) x Lodwar		0.358*	0.353*	0.377*
		(0.152)	(0.153)	(0.162)
Aid per 1000 refugees x Lodwar	0.009		0.007	0.008**
	(0.004)		(0.004)	(0.003)
Ln (volume sold)				0.109
				(0.089)
Observations	205	205	205	205
Adjusted R 2	0.724	0.736	0.735	0.748

Dependent variable: ln(price in shillings). Regressions include fixed effects at market and year/month level. Data is average monthly price. Standard errors clustered at market level. For female goats, markets are Isiolo, Lodwar, Mulot, Nairobi, and Rumuruti. *p$<$.10, **p$<$.05, *** p$<$ .01. Prices are for female goats of grade 2. Note that prices are not available for Kakuma, but only for Lodwar. We expect that price increases in Kakuma would be larger than those estimated here.

effect on refugee income. The increase in price may be favorable to producers who sell on this market.

Overall, the empirical analysis in this section finds evidence for the simulated increases in livestock prices, but it finds more. The livestock data suggest both benefits and costs to the refugee presence resulting from changes in cattle markets. On the down side, there is a greater propensity for cattle stealing near the camp than near other towns. This is an effect the simulation model, which focuses on market transactions only, could not anticipate by construction. On the other hand, prices for goats are found to increase with increases in food aid. This may benefit local residents if they engage in the market, which seems to be the case closer to Kakuma. However, it also raises the cost of consumption for net buyers of livestock-related goods, as discussed before.

Agriculture

In theory, another potential source of impact of the refugee camp is to provide either incentive for more agricultural production or competition with local production. The household data suggests that agriculture provides at least a partial livelihood for a small number of households around the camp although Turkana region is generally unsuitable for agriculture without

Table 3-4: Summary Statistics Agriculture, Household Survey

	MEAN KAKUMA	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Household farms	0.333	0.005	0.000***	111	219
Farmed with no harvest due to drought	0.108	0.000	.	37	1
Area farmland owned (ha)	31.689	500.000	.	37	1
Value of farm sales	3018.297	36000.000	.	37	1
Farm sales - inputs (not labour)	1215.595	33900.000	.	37	1
Non-labor input costs	1802.703	2100.000	.	37	1
Labor days on the farm	51.111	15.000	.	36	1
Proportion farm production to animals	0.062	0.002	.	32	1
Proportion farm production consumed	0.400	0.200	.	30	1
Proportion farm production sold	0.181	0.140	.	30	1
Proportion farm production gifted	0.085	0.001	.	31	1
Proportion farm production saved	0.165	0.006	.	32	1
Had land dispute	0.432	0.000	.	37	1
Borehole dispute	0.297	0.000	.	37	1

*p<.10, **p<.05, *** p<.01

significant infrastructure investment. In Kakuma, 33 percent of households farmed last year, though 10 percent of these did not harvest due to the fact that drought devastated their crops (Table 3-4). The main crops farmed are millet, maize, sorghum, and legumes. The largest part of production is consumed by the households themselves (40%), with 18% sold, and a similar amount saved. Smaller proportions (6 and 8 percent) are fed to animals or gifted.

Farming households typically have other sources of income. The value of farm sales were around 3000 shillings for the prior growing season; but, if non-labor inputs are taken into consideration, the revenues decreases to 1215 shillings. Given a minimum wage for an unskilled worker in Kenya is 228 shillings per day[9],

[9] http://www.wageindicator.org/main/salary/minimum-wage/kenya

this revenue is easily exceeded by value of labor used on the farm. Thus, about half of farmers also husband animals and 20 percent also own a small business.

Despite the harsh conditions, the camp has a small but positive effect on farming. Although agricultural production is not a large part of the Turkana regional economy, it seems that the refugee camp has provided some demand for products grown locally (Table 3-4). This suggests that the dynamic where food aid drives down local food prices, thus discouraging production, is not at play in this setting.

Housing market- or lack thereof

Refugees and aid workers do not rely on housing services outside the camp directly, but influence the housing market via indirect channels. All international workers who come to Kakuma camp are housed in a compound, and the refugees themselves are limited to the camp. Nonetheless, the refugee situation could affect the housing market when households move to the area seeking jobs – which may increase housing demand – particularly if this activates a previously nascent rental and sales market.

There is qualitative evidence for changing housing dynamics after the establishment of the refugee camp. According to the clerk to the Kakuma Turkana Chief, prior to the refugees' arrival, land was free and available for the Turkana. After the arrival of refugees, some commercialization began. In more rural areas, land is still considered to be communal, while in more urban areas local authorities facilitate the allotment of land. Although the process is still only developing, the tendency is confirmed in the county government's reporting of land titling; the Turkana County Integrated Development Plan for 2013-2018 indicates that in the entire county, three official land titles have been issued (Republic of Kenya, 2015).

With commercialization of land, speculation and illegal practices gained momentum. It is reported to be quite common for local fraudsters to sell the land that belongs to someone who has left to abroad or to other parts of Kenya and then to run away with the money. When the owners return, they find that someone else is occupying that land, and it falls on the chief to resolve the dispute. In addition, the discovery of natural resources – water and oil – have magnified speculations that drive up land prices for locals.

Table 3-5: Summary Statistics From Household Survey, Housing

	MEAN KAKUMA	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Non-traditional roof	0.171	0.256	0.084	111	219
More than one room in house	0.198	0.315	0.025*	111	219
Brick or metal walls	0.036	0.110	0.023*	111	219
Receive water from pipe	0.135	0.265	0.007**	111	219
Owns home	0.991	0.932	0.017*	111	219
Monthly rent for home	1500.000	2233.333	N/A	1	15
Year house built	2004.624	2005.410	0.465	109	212
Date household head began living in current location	1995	1990	0.027*	71	203

*p<.10, **p<.05, *** p<.01

Because land and housing markets are thin, it is difficult to detect impacts in our household dataset. Table 3-5 shows basic comparisons between the Kakuma subsample and the counterfactual towns. The housing in Kakuma seems to be of lower quality – homes are smaller, less likely to have piped water or more modern walls or roofs. Households are more likely to state that they own their home. The rental market does not seem to be active in Kakuma – only one household stated that they rent their home. Household heads who could remember the year that they arrived in their current house (the Turkana use a different calendar) seem to have, on average, arrived slightly later to Kakuma.

The lower quality of the housing in the Kakuma subsample seems to indicate a higher level of poverty, while the higher level of ownership of homes suggests the opposite. Taken together with the qualitative information, however, the overall picture is one of housing and land markets just beginning to be developed in an area where baseline poverty is very high and historical concepts of land ownership do not coincide with ours. The situation seems to be ripe for opportunism, and bears watching in the future.

Labor market

There is no clear evidence to suggest that camp has pushed populations away or pulled them in. Although changing administrative boundaries over time make it difficult to map out popula-

Figure 3-5: Change In Population Density In Turkana From 1989 To 1999, 2009

(a): 1999/1989 Population Density
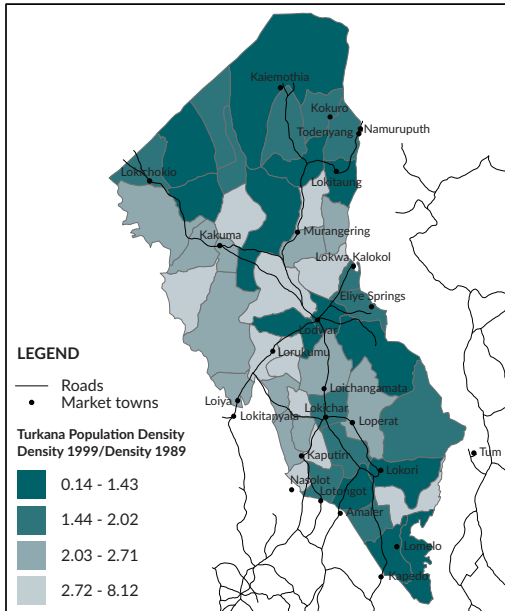
(b): 2009/1989 Population Density
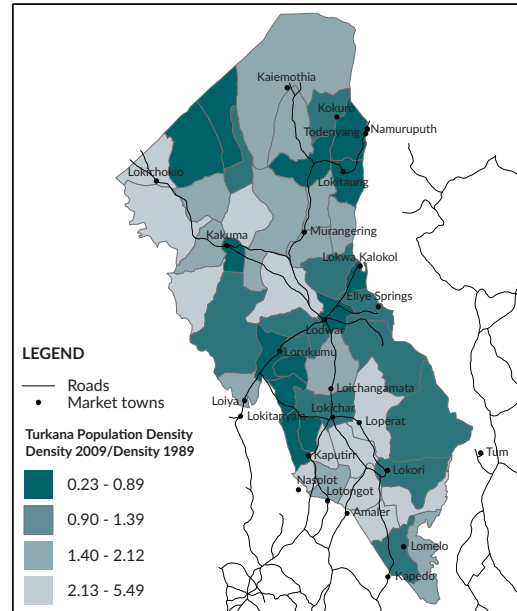
Source: World Bank staff calculations using Kenyan Census data, 1989, 1999, 2009

tion changes in Turkana, the analysis here was able to harmonize the 1989 (pre-camp) and 1999, 2009 sub-location boundaries. Census data then allows for the comparison of spatial population growth rates over the two periods. Figure 3-5 illustrates changes in population density between 1989 and 1999 and between 1989 and 2009. As these are data from the Kenyan census, they do not include refugees.

Our household survey data, however, suggest that there is significantly more in-migration into Kakuma than into the counterfactual villages. Of all the individuals registered in the rosters of the households we interviewed, 8.6% of those living in Kakuma had moved there from other villages, while 5.9% of those living in control towns were in-migrants. It is also interesting to note the timing of those moves (see figure 3-6). Although these numbers denote simple correlations, it appears that the control villages had more in-migrants until around 1992, after which their frequency was higher in the Kakuma sublocation. This frequency remained higher until about 2009, when there was an increase in arrivals from other villages in the control areas. Furthermore, in-migrants into the control cities from Kakuma are rare: out of the 449 individuals who migrated into control cities, only 10 of them were from Kakuma.

Figure 3-6: In-Migrants Into Kakuma And Other Villages Over Time

Kernel density estimate
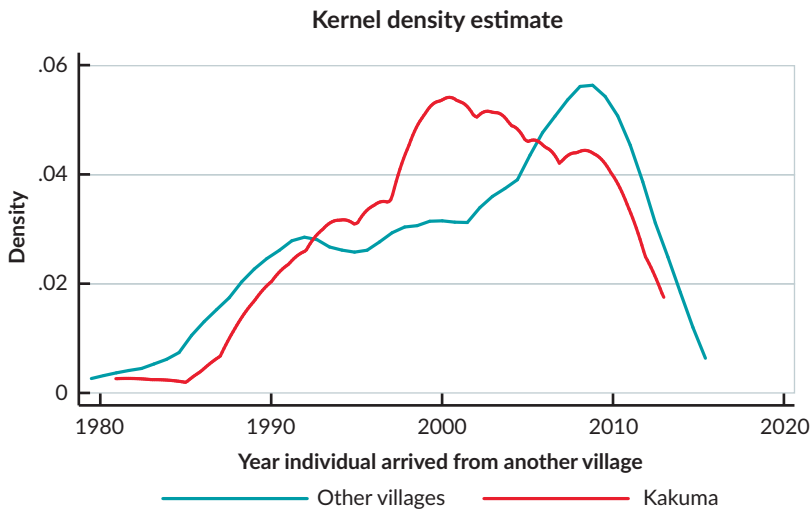
kernel = epanechnikov, bandwidth = 2.4307

The lakeshore subdistricts were among those that shrank or grew very slowly, and the fastest growing subdistricts were mostly located in the center of the country. Along the border with neighboring countries, population tended to stagnate, a situation that may potentially be driven by security concerns. There was large growth in the northwest area and around Kakuma, as well in the southwest. There is no clear evidence that large populations have moved away from the Kakuma area, as they might have if it were the case that the camp worsened local opportunities, nor is there any indication that households have flocked to the Kakuma subregion in order to take advantage of potential jobs provided within the refugee camp infrastructure. Population growth in general appears to occur more significantly along the main roads, outlined in red in figure 3-6.

A smaller share of Kakuma household heads own small businesses than that of counterfactual towns. Table 3-6 shows information from the registration survey conducted for the Hunger Safety Net Program (HSNP) in 2011. The table shows averages of household characteristics in the Kakuma location as compared to other locations within the Turkana region. The largest difference between Kakuma and other Turkana regions is the significantly smaller proportion of the population whose head of household declares themselves to be a small business owner as their main occupation. This does not mean, however, that small businesses

Table 3-6: Occupation Of Household Head, 2011

	(1) OTHER TURKANA	(2) KAKUMA	(3) NORMALIZED DIFFERENCE
Household size	4.672	4.091	-0.198
Farmer/herder/charcoal gatherer	0.252	0.211	-0.068
Small business owner	0.133	0.043	-0.226
Observations	129476	9554	139030

Source: HSNP 2011 data. The last column measures the differences across covariates in terms of standard deviations (normalized differences).

Figure 3-7: Distribution Of Household Head Occupations, HSNP
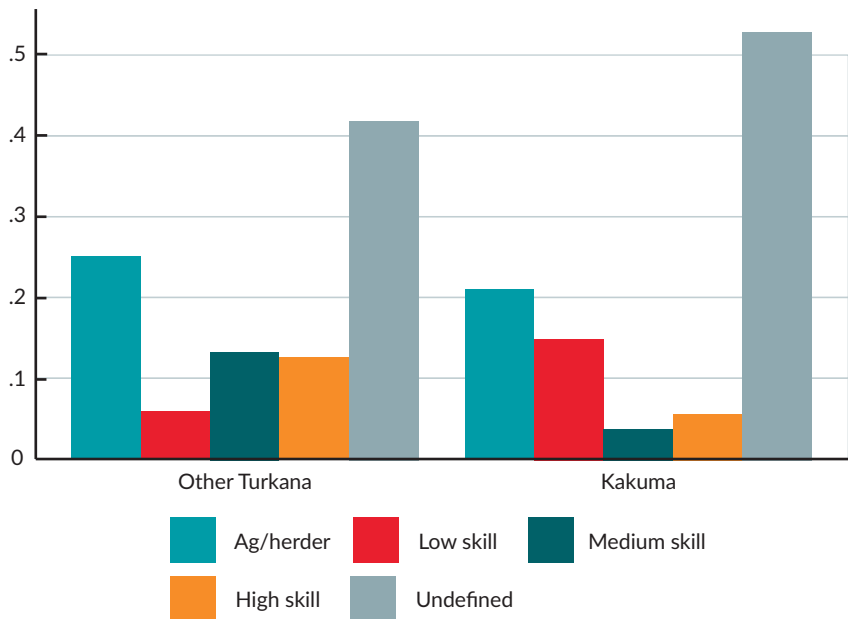
Source: World Bank staff calculations from HSNP data

owner as their main occupation. This does not mean, however, that small businesses cannot provide secondary income to households, as will be shown below.

A larger share of Kakuma household heads work in low skill occupations than that of counterfactual towns. Figure 3-7 shows a slightly different categorization of the HSNP occupational data: agricultural/herder, low skill (including charcoal production),

medium skill jobs (including business ownership), and high skill jobs (professional). There is also an extremely large category of undefined jobs. The bar graph over Kakuma and non-Kakuma locations of Turkana District show significantly fewer household heads who declare agriculture or herding as their main occupation. There are also many more who state that they are employed in a low skill sector, with somewhat fewer in medium skill occupations. It is difficult to interpret these statistics, however, since the majority of individuals in Kakuma do not declare an occupation at all.

A larger share of Kakuma households run a bodaboda (moto taxi) and do manual labor than that of counterfactual towns. Summary statistics of the household surveys show that households in the Kakuma subsample are less likely to have claimed to own a small enterprise. The households located closest to Kakuma, however, are significantly more likely to run a bodaboda service and do manual labor, including firewood collection and loading, than households at similar distances from the control towns (Table 3-7).

Interviews suggest a perception of being better off in Kakuma due to work opportunities. There is a small amount of evidence that this is the case when the enterprise data is examined. At the individual level, the household surveys also collected information on access to wage work. Summary statistics (Table 3-8) of the survey data reveal little wage work in general – 15% of adults between 15 and 60 in Kakuma, and around 9 percent in the counterfactual towns. This difference is, however, marginally statistically significant. In Kakuma, around 30 percent of the wage jobs are located in the camp, while obviously residents in other locations do not have this option. Wages appear to be slightly lower in the Kakuma subsample, although the data is highly skewed, and the sample is small. It also bears mentioning that while Kakuma households are much less likely to have a member with secondary education, they are more likely to have a household head with a bit of primary or primary complete education.

Education improves the odds of finding a wage job in Kakuma more than it does in other towns. Because education levels differ between Turkana and other towns, the analysis should consider the effects of having secondary education on wages. To do this, it controls for a binary variable indicating that a household member has secondary education while estimating the probability of a family having a wage earner and the level of the wage. An interaction term between education and Kakuma is also included to examine if education levels have differential effects in the Kakuma subsample. The estimation results show this to be the

Table 3-7: The Effect Of Camp Proximity On Enterprises

	(1) HAS ENTERPRISE	(2) BODA BODA	(3) SALES	(4) MANUAL LABOR/ FIREWOOD	(5) CONSTRUCT	(6) SKILLED TRADE	(7) Ln (PROFITS)
a. Difference across subsamples							
In Kakuma subsample	-0.1480***	0.0266	-0.1382	0.0934	-0.0246	-0.0529	-0.0973
	(0.0309)	(0.0316)	(0.1337)	(0.1355)	(0.0221)	(0.0806)	(0.3318)
N	330	210	210	210	210	210	131
r2	0.008	0.001	0.004	0.002	0.002	0.002	0
b. Averages by distance band and subsamples							
Less than 2 km to town	0.4470***	0.0191***	0.4789***	0.2949***	0.0441***	0.1970***	9.2299***
	(0.0050)	(0.0061)	(0.0671)	(0.0877)	(0.0055)	(0.0546)	(0.2018)
Between 2 and 8 km from town	0.3543***	0.0391***	0.0391**	0.7113***	0.0391**	0.0391**	9.5531***
	(0.0096)	(0.0176)	(0.0176)	(0.0276)	(0.0176)	(0.0176)	(0.1815)
Between 8 and 10 km from town	0.4991***	0.0613***	0.1437**	0.6933***	0.0403	0.0202	8.4957***
	(0.0613)	(0.0086)	(0.0604)	(0.0432)	(0.0345)	(0.0173)	(0.3382)
Less than 2 km to Kakuma	-0.1393***	0.0620***	-0.2357**	0.1646*	-0.017	-0.0618	0.1881
	(0.0267)	(0.0243)	(0.0973)	(0.0923)	(0.0356)	(0.0994)	(0.2846)
Between 2 and 8 km to Kakuma	-0.1235***	-0.0391**	0.1147	-0.0959	-0.0391**	-0.0391**	-0.943
	(0.0130)	(0.0176)	(0.0725)	(0.0595)	(0.0176)	(0.0176)	(1.0153)
Between 8 and 10 km to Kakuma	-0.1491*	-0.0613***	-0.1437**	0.3067*	-0.0403	0.0909**	-1.6857
	(0.0697)	(0.0086)	(0.0604)	(0.1706)	(0.0345)	(0.0405)	(2.5996)
N	330	210	210	210	210	210	131
r2	0.305	0.079	0.132	0.4	0.027	0.107	0.957

*p<.10, **p<.05, *** p< .01. Outcome variables are binary indicators for whether or not a household has income from a particular source. Columns (2)-(7) only include those with enterprise income. Column (7) is a continuous variable that is the inverse hyperbolic sine of profits (profits can be negative).

Table 3-8: Wage Earners And Wages

	WAGE EARNER IN FAMILY		Ln (WAGE LAST 12 MONTHS)	
In Kakuma subsample	0.0460	0.0532*	-0.6441	-1.7004**
	(0.0389)	(0.0290)	(0.5226)	(0.6057)
Member with secondary education		0.1975***		-0.9357*
		(0.0551)		(0.5081)
Secondary school x Kakuma		0.2471***		1.3293*
		(0.0702)		(0.7512)
N	330	330	37	37
r2	0.001	0.213	0.005	0.013

Ordinary least squares regressions with standard errors clustered at the village level.
Observations weighted by probability of being sampled. *p<.10, **p<.05, *** p< .01.

case – in Kakuma, having a family member with secondary educa-
tion more than doubles the probability of having a wage earner in
the family, and the returns to secondary schooling are higher in
Kakuma than in the counterfactual towns. On average, however,
wages are significantly lower in Kakuma for households without
secondary education: a household in Kakuma without secondary
education has wages 72 percent lower than a household with
secondary education.[10] Furthermore, the marginal effect of living
in Kakuma on wages, for households without secondary educa-
tion, is 81 percent. Clearly, the sample is small here and may be
substantially driven by outliers, so we suspect that the direction is
more accurate than the magnitude.

**Overall, the empirical analysis suggests that refugees do not
compete with the Turkana for low skill jobs – and there is
proportionately more employment in low skill jobs near the
camp.** There is some evidence that the camp provides some
employment opportunities, and that these opportunities show
good returns for individuals with above average levels of educa-
tion. However, it bears mentioning that these opportunities do not
appear to have had a large effect on secondary schooling among
current adults, and that the proliferation of street children seeking
work opportunities in the camp is thought to be one of the largest
problems facing the Turkana community at the moment.

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[10] The marginal effect calculated here is for changing the dummy variable on house-
hold education times Kakuma from 1 to zero. The second marginal effect is for
changing the Kakuma variable from 0 to 1.

Figure 3-8: Per Capita Predicted Consumption And Distance To Camp
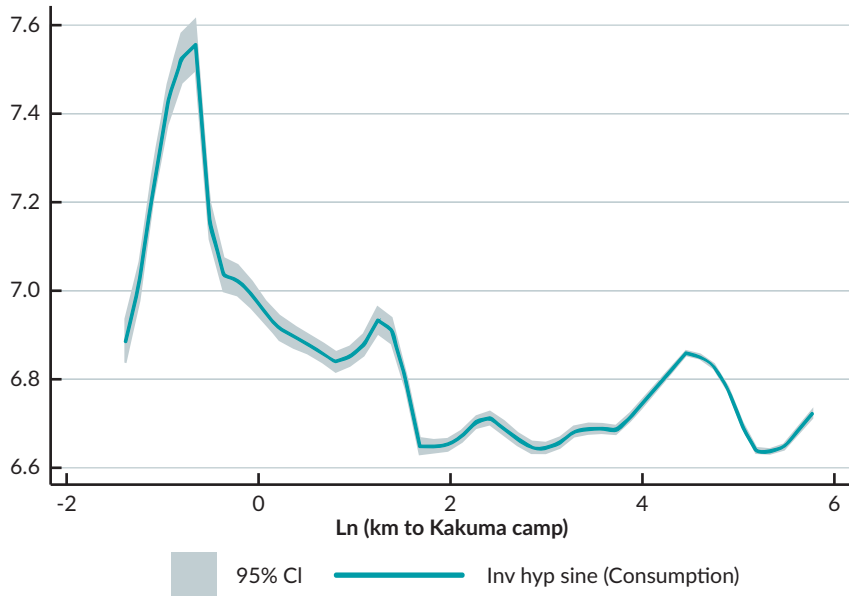
Notes: Figure shows a kernel regression of the HSNP predicted consumption measure on the log-transformed distance to Kakuma camp.

Income and transfers

In the absence of better ways to measure welfare, consumption and self-reported income provide reasonable approximations. Previous sections highlighted both positive and negative effects of refugees on prices, economic activity, and jobs. The analysis showed that while Turkana households near the camp are not more likely to have a wage earner, if they do have a wage earner with some education, they are likely to earn significantly more than similarly educated individuals in the counterfactual town—i.e. a town that did not experience an influx of refugees. On the other hand, those closer to the camp are likely to experience elevated meat prices, and an increasingly complex housing market. Given the complexity of these dynamics, the question remains of what the net effect of camp presence is on income of Turkana households. As income is not observable from independent data, the analysis in this section focuses on consumption habits and self-reported income to infer the effects of refugees on local communities, if any.

From a spatial perspective, the HSNP consumption data suggests that refugees have a positive impact on host community consumption. Figure 3-8 shows the distribution of the HSNP

predicted consumption measure across distance to Kakuma camp. This measure was created with the HSNP registration data that correlated household characteristics with census data on consumption to generate predicted consumption. HSNP calls this a PMT, or proxy means test, which represents the Kenya shillings value of adult household consumption per capita based on 2005-2006 prices. The peak of the per capita consumption variable occurs at about 5 km from the camp, and decreases from that point outward with some variation.

Regression analysis confirms the positive effect of refugees on host community consumption. Using a set of regressions, which parallel those that were applied to livestock herd size from the HSNP data, the analysis confirms the relationship in the figure 3-8. These results are shown in Table 3-9. As with the livestock, estimations first disregard precipitation, and then introduce it as a control in subsequent columns. Consumption is found everywhere in Turkana district to be lower than it is in the circle of households within 5 kilometers of the camp. The point estimates suggest that the consumption measures within 5 km of the camp are up to 35 percent higher than in other parts of the county.

Household surveys also show that those who live close to the refugee camp tend to have higher income and assets. In order to generate a proxy for cash income, the analysis sums up the income categories contained in the household survey: wage income, agricultural income, enterprise income, transfers, income from animal sales, and other sources. Because only the value of the most recent transfer is available, that number is multiplied by the recorded frequency of transfers. Households were also asked to indicate whether they owned particular durable assets, both in 2005 and in 2015. Income per capita and asset ownership by subsample are listed in Table 3-10. Cash income is higher in the Kakuma subsample, and the difference is marginally significant. However, given the variance in the data, this result should be treated with caution. The medians in the data are slightly different – 980 in Kakuma and 816 in the counterfactual towns – but the magnitude is not large. The Turkana in general have very few of the durable assets that are included in the survey – 40 percent of the sample have none of the assets at all. The sum of the potential assets in the Kakuma subregion is slightly higher than that of the counterfactual towns, but this difference is not statistically significant. Similarly, the increase in the number of these assets between 2005 and 2015 is slightly larger in Kakuma than in other sublocations, but this difference is not statistically significant.

The analysis also reveals heterogeneity of the effects on income. In light of simulation results, which showed differential

Table 3-9: Ordinary Least Squares Regressions Of Consumption Per Capita

	(1)	(2)	(3)	(4)
Ln (km to Kakuma camp)	-0.0352*	-0.0380**		
	(0.0186)	(0.0171)		
Inverse km to Kakuma			0.1473***	
			(0.0489)	
5-10 km				-0.3035***
				(0.0554)
11-25 km				-0.2981***
				(0.0513)
26-50 km				-0.2743***
				(0.0566)
51-100 km				-0.1404
				(0.0866)
101-150 km				-0.1658**
				(0.0724)
151-200 km				-0.3467***
				(0.0626)
> 201 km				-0.2825***
				(0.0750)
Ln (precipitation)		-0.1264	-0.1218	-0.081
	138982	(0.1621)	(0.1622)	(0.1369)
N	0.006	137964	137964	136898
r2		0.01	0.011	0.031

*p<.10, **p<.05, *** p< .01. Ordinary least squares regression with standard errors clustered at district level. Dependent variable is log-transformed predicted consumption.

effects of refugees on incomes in different sectors and skill groups, the analysis here also considers heterogeneity in income and consumption according to income sources available to the household. To this effect, Table 3-11 introduces simple interaction terms into the estimates that test for differences in assets and purchases between the Kakuma subsample and the counterfactual towns. The table tests for differences in assets, cash income, and consumption indicators across households with different incomes sources: small enterprise, wage, agricultural and animal sales.

Table 3-10: Cash Income And Assets, Household Survey

	MEAN KAKUMA	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Cash income per capita	12771.446	6450.240	0.056*	111	219
Owned house 2005	0.541	0.530	0.852	111	219
Owned car 2005	0.000	0.000	.	111	219
Owned motorcycle 2005	0.027	0.014	0.393	111	219
Owned bicycle 2005	0.117	0.027	0.001***	111	219
Owned refrigerator 2005	0.000	0.000	.	111	219
Owned television 2005	0.009	0.005	0.624	111	219
Owned radio 2005	0.117	0.082	0.306	111	219
Owned cell phone 2005	0.198	0.192	0.890	111	219
Owned generator 2005	0.000	0.000	.	111	219
Owned computer 2005	0.000	0.005	0.477	111	219
Owned camera 2005	0.000	0.005	0.477	111	219
Sum of assets 2005	1.009	0.858	0.186	111	219
Change assets 2005-2015	0.117	0.082	0.674	111	219

*p<.10, **p<.05, *** p< .01.

Table 3-11: Heterogeneity In Consumption And Assets

	ASSETS 2005	INCOME PER CAPITA	CHANGE ASSETS	PURCHASE FOODS APRIL	PURCHASE LUXURIES APRIL	CHANGE FOOD PURCHASES	CHANGE LUXURY PURCHASES	CHANGE SUGAR PURCHASES	CHANGE TEA PURCHASES	CHANGE MEAT PURCHASES
Small business										
In Kakuma subsample	0.2440	0.8867	-0.1829	0.1663	0.0949	-0.5385**	0.0233	-0.1757**	-0.1776**	-0.1090*
	(0.2114)	(0.8112)	(0.1140)	(0.3773)	(0.1431)	(0.2492)	(0.1198)	(0.0706)	(0.0788)	(0.0599)
Household owns small business	0.4492***	4.2828***	-0.4237*	0.3387	0.2837*	0.1866	0.0515	0.0513	0.0080	0.0306
	(0.0628)	(0.9063)	(0.2234)	(0.2082)	(0.1410)	(0.1291)	(0.0818)	(0.0526)	(0.0319)	(0.0313)
Has enterprise x Kakuma	-0.1832	-0.1007	0.3744	-0.0852	-0.0533	0.4822**	0.0242	0.2489*	0.1140*	0.0919**
	(0.2196)	(1.1071)	(0.2546)	(0.3951)	(0.3111)	(0.2147)	(0.2147)	(0.1351)	(0.0569)	(0.0410)
N	330	330	330	330	330	330	330	330	330	330
r2	0.016	0.204	0.008	0.006	0.016	0.064	0.002	0.093	0.023	0.024

Table 3-11: Heterogeneity In Consumption And Assets *(continued)*

	ASSETS 2005	INCOME PER CAPITA	CHANGE ASSETS	PURCHASE FOODS APRIL	PURCHASE LUXURIES APRIL	CHANGE FOOD PURCHASES	CHANGE LUXURY PURCHASES	CHANGE SUGAR PURCHASES	CHANGE TEA PURCHASES	CHANGE MEAT PURCHASES
Wage earner										
In Kakuma subsample	0.0842	-0.0207	-0.0723	-0.0408	-0.0218	-0.3582	0.0283	-0.0841	-0.1467	-0.0439
	(0.1829)	(0.5348)	(0.0659)	(0.2851)	(0.1238)	(0.2555)	(0.0879)	(0.0577)	(0.0858)	(0.0689)
Household had wages in past year	0.9294***	5.2161***	-0.3492***	0.8580***	0.2720	0.5012***	0.1394	0.0371	0.0308	0.1951***
	(0.2231)	(0.5982)	(0.0689)	(0.1519)	(0.1774)	(0.1202)	(0.1459)	(0.0603)	(0.0596)	(0.0423)
Wage earner x Kakuma	-0.0008	0.0730	0.4756**	0.6117*	0.3070	-0.6096***	-0.0782	-0.1973***	-0.0082	-0.3395***
	(0.2655)	(0.6474)	(0.1873)	(0.3229)	(0.2514)	(0.1983)	(0.1487)	(0.0617)	(0.0912)	(0.0871)
N	330	330	330	330	330	330	330	330	330	330
r2	0.099	0.201	0.006	0.103	0.057	0.011	0.001	0.021	0.009	0.024
Sold animals										
In Kakuma subsample	0.0322	-0.1085	0.0375	0.0625	0.0529	-0.3466	-0.0202	-0.0793	-0.1058	-0.0968
	(0.2497)	(0.3849)	(0.0599)	(0.3840)	(0.1168)	(0.3272)	(0.0928)	(0.0743)	(0.1243)	(0.0655)
Sold animals on market	-0.2851	2.8137***	0.0809	-0.9190***	-0.0727	0.4548*	0.2216*	0.2414***	0.2253*	0.0061
	(0.1655)	(0.1291)	(0.0627)	(0.2288)	(0.1126)	(0.2473)	(0.1051)	(0.0761)	(0.1224)	(0.0710)
Sold animals x Kakuma	0.5504	0.2901	-0.2720***	0.5358	-0.0368	-0.5780	0.0980	-0.2586*	-0.2840	0.0395
	(0.5445)	(0.5860)	(0.0801)	(0.4892)	(0.2005)	(0.3994)	(0.1158)	(0.1336)	(0.2511)	(0.0749)
N	330	330	330	330	330	330	330	330	330	330
r2	0.012	0.089	0.012	0.012	0.003	0.012	0.034	0.008	0.013	0.006
Sold farm products										
In Kakuma subsample	0.0956	-0.0831	-0.0232	0.0415	0.0080	-0.4058	0.0327	-0.1176**	-0.1438*	-0.0825
	(0.1437)	(0.4670)	(0.0567)	(0.3488)	(0.1140)	(0.2643)	(0.1083)	(0.0458)	(0.0773)	(0.0729)
Sold farm products in market	-0.9012***	4.1709***	-0.1193***	-1.8514***	-0.6005***	0.0355	-0.3061***	0.6898***	-0.3180***	-0.1467***
	(0.0643)	(0.3043)	(0.0290)	(0.1191)	(0.0513)	(0.1025)	(0.0342)	(0.0304)	(0.0303)	(0.0153)
Sold farm products x Kakuma	1.1047**	-1.8936**	0.1808**	2.1883***	0.8059***	-0.2086	0.2278	-0.6460***	0.2930***	0.1076
	(0.4056)	(0.6439)	(0.0810)	(0.3922)	(0.1655)	(0.1315)	(0.1738)	(0.1189)	(0.0443)	(0.0840)
N	330	330	330	330	330	330	330	330	330	330
r2	0.005	0.032	0.001	0.005	0.007	0.011	0.001	0.007	0.009	0.005

*p<.10, **p<.05, *** p< .01.

Whereas wage earning and farming households of Kakuma have observed a growth in their assets in the last decade, those who sell animals have observed a decrease. In terms of assets both wage earning and business-owning households had higher asset levels in 2005 as well as higher income per capita, as compared to others. Households with farm income also had significantly higher assets, but they also had higher asset growth since then. While wage earning households also have had significantly higher asset growth in Kakuma than in other places, those engaged in animal sales in Kakuma have had significant decreases. Given that the average baseline measure of assets outside of Kakuma is 0.05, the magnitude of the measured impacts is quite large (.47 for wage earners). However, in practical terms, this implies a difference of one asset.

A temporary cash flow shock that hit the camp in 2015 reveals the heterogeneity of exposure to the camp among the locals. Following the Garissa University attacks in April 2015, all informal money transfer systems were shut down for security reasons, but were then allowed to resume operations in June. During this time, 45 percent of refugees reported that the frequency of their transfers had decreased either slightly or significantly (see Box 3-1 for more detail on refugee transfers). In the meantime, small enterprise households in Kakuma had increases in the number of food purchases and in quantities purchased of measured food items – indicating that they were buffered from the cash flow shock that hit the camp. Wage earning households, on the other hand, were not – they had decreases in food purchases and in quantities of all food items in Kakuma. Animal-selling households had decreases in the number of food items purchased and in the amount of sugar, perhaps indicating that sales of animals are in response to distress rather than market signals. Finally, Kakuma farm households show mixed results on consumption – no significant effects on number of goods purchased between April and June, but decreases in sugar, and increases in tea purchases. In conclusion, business owners and households engaged in farm sales seem to have been buffered from the negative effects of being near Kakuma town between April and June, while wage earning and livestock-selling households seem to have suffered more from the effects of being near Kakuma.

Box 3-1: Remittances To Refugees

Remittances received by refugees are an important source of purchasing power for both refugees and locals. Given the legal restrictions on refugees working outside of the camp, the majority of the camp population relies heavily on sales of food aid and remittances from relatives outside of the camp in order to survive. This large infusion of cash has the potential to strongly impact the local economy – one that has not historically been highly monetized. The majority of the refugees in the household survey reported having received a transfer in the last 12 months (61%).

A variety of formal and informal transfer systems have been operating in the camp. These include formal systems, such as Moneygram, Western Union, and transfers from relatives through MPesa, as well as the transport of cash from Nairobi in suitcases. Only a minority (21%) of the transfers take place through formal services. There is also a small number of very active informal brokerages. All of these were owned by Somalis and, with the exception of Dahabshil, which started in 1989, most began in the mid-2000s. For most of the time since then, there were five main operators. There is an additional South Sudanese broker who has recently begun operation in the camp. This operator claimed to transfer around $75,000 USD per month in early 2015. Note that if these reports are accurate, informal transfers through these brokers total over 3 million USD per year. These dealers also operate other businesses including shops, wholesale businesses, and others. They bring food items, non-food items, technology, communications and other services in the Kakuma area. They also occasionally offer credit services, but only to Muslims.

The importance of these remittances for both refugees and locals alike became clearer after the tragic Garissa University attacks. After April, 2015, when the attacks occurred, all informal transfer systems were shut down for security reasons, but were allowed to resume operations in June. During this time, 45 percent of refugees reported that the frequency of their transfers has decreased either slightly or significantly.

Appendix C provides an analysis of how this interruption affected the consumption of refugees and locals. Anecdotally, refugees reported that the temporary shutdown of the informal transfer systems was detrimental to their ability to obtain cash. However, the impacts on short-term purchases seem not to have been particularly large, a fact that probably reflects some offsetting mechanisms like alternative channels of transfers that are more costly, or relying on small assets for consumption smoothing.

The Turkana, on the other hand, do not depend heavily on cash transfers, but potentially do depend on the cash economy generated by the refugee transfers. The data show larger decreases in the number and quantity of food items purchased by Turkana households near the camp between April and June of 2015, both illustrating the dependence of the local economy on refugee cash transfers, as well as the negative impact of the shutdown of refugee transfer networks during those months on both refugees and the Turkana.

Overall, there is some empirical evidence that those living in the Kakuma subsample have higher income and consumption than those living in the counterfactual areas. However, the measured difference across income and asset variables is not particularly large, nor is it statistically different from zero. Households with access to small businesses and farm income appear to be better-buffered from short-term shocks, while wage-earner and animal-selling households suffer more from them. Farming households and wage-earners also have higher long-term asset growth in Kakuma than in other towns.

3.3. Discussion

The results from simulations and estimations serve different purposes, and by doing so, complement each other. It is important to note that simulations and empirical analysis that have been presented in this chapter capture different dynamics. In particular, the simulations starkly separate short and long-term effects of large shifts in the refugee population. However, in reality, refugees have arrived (and left) continuously over the past 20 years, thus their impacts at any given moment are the accumulation of these short and long-term dynamics. The field data is comprised of both cross-sectional household surveys and some longer panels of prices. The price estimations use only monthly variation, and thus capture short-term effects. The comparisons across different subsets of villages are likely to capture long-term equilibria, though they may be affected by recent, less substantial variation in refugee populations. In addition, the simulations require that markets clear. In reality, markets for non-tradables are very thin, and often function according to traditional norms rather than market signals.

Comparing the simulation results and empirical evidence is rewarding. Simulations provide a very useful benchmark in showing "what would happen under such circumstances." By doing so, it also enables us to identify "unexpected" empirical findings, and investigate why they deviate from our predictions.

Both simulations and empirical analysis suggest increased economic activity near the camp after refugee arrival. Simulations predicted an increase in economic activity in the region where the camp is located. This increase comes with increases in employment in the non-tradable sector relative to the tradable sector in the long-term. The empirical analyses generally support these predictions. We observe an increase in economic activity near the camp, and small but positive wealth effects driven by employment and production opportunities.

Simulations predict a migration towards the camp from other regions; empirical analysis finds only limited support for this prediction. Simulations predicted that Kenyans from other regions migrate towards the refugee camp to take advantage of increased economic opportunities. Empirical analysis shows that there has been some small amount of migration towards Kakuma. However, we find that this migration did not come from other counties in Kenya, but rather from other villages within Turkana. This highlights a possible feature outside the scope of the model: Turkana County is considered a remote and inhospitable region by most Kenyans, and therefore migration to it comes with a substantial cost.

Neither simulations, nor empirics could identify major effects on the rest of Kenya. Simulations showed that the impacts of refugees on the rest of Kenya would remain minimal. The data that we collected do not shed light on the impacts of the refugees on the rest of Kenya. Indeed, this is most certainly not empirically identifiable. However, the fact that many of the impacts of the camp are highly localized suggests that it is unlikely that camp impacts spread far enough from Kakuma to leave the boundaries of Turkana county.

Simulations sharply separated short-term and long-term price effects; empirical analyses could not analyze prices in long-term. Simulations predicted short-term price increases in both tradable and non-tradable goods, with a permanent increase in the prices of non-tradables. Price analysis for non-tradable goods is not possible with the existing data, and therefore there is no empirical analysis to compare with the simulation data. Furthermore, the main non-tradable market for which data collection was attempted – the housing market – is not yet developed enough to generable reliable signals. The empirical results do show responsiveness of livestock prices to refugee population shocks in the short-term, but the series is of insufficient length to examine longer-term impacts.

Simulations separated the impacts by skill group; limitations in data forced us to leave this analysis for the future. Because of the scarcity of skilled labor in the Turkana population, larger sample sizes will be needed to detect heterogeneous impacts by skill group. Overall, the labor market is a key area for interaction of refugees with hosts, and there is scope for more specialized inquiries in the future. An open question is what refugees would choose to do were they allowed free mobility. This is not answerable with the data at hand, and under the constraints of Kenya's current refugee policy. The simulations in the remainder of this report analyze this question. In the future, it would be informative to pilot free movement permits for refugees in order to understand how they might move through Kenya's labor market, and compare the findings with our simulation results.

Collection of better data is crucial to understanding the effects of refugees on the host community. Food and livestock markets are another key arena in which refugees interact with hosts. The current data are not of sufficiently high quality to elucidate the true impact of these interactions. For example, the closest market to Kakuma on which livestock data is available is Lodwar. This market is clearly affected by events in Kakuma, but the true impacts on the local population can only be measured with high frequency (monthly, at a minimum) price data from multiple markets in Turkana and surrounding counties, which does not currently exist.

Turkana Girl © Harun Onder, Lodwar 2016

4. Beyond encampment: what are the options?

Is encampment the best option for settling refugees? The analysis has so far shown that the refugee arrivals have a net positive effect on the host community in aggregate, but this effect is unevenly distributed. The discussion highlighted that both the scale and the distribution of these effects are shaped by policy choices and the institutional environment. The settlement choice for refugees, e.g. encampment vs. integration, plays a particularly important role in determining the pace, distribution, and magnitude of those effects. In addition, the rules that regulate the interactions between the refugees and the host community, the degree of market development in the host region, and the connectivity of the host region could also influence the magnitude of economic costs and benefits that arise from refugee arrival.

In this chapter, we will provide a forward-looking comparison among alternative options. The analysis will first simulate the implications of alternative refugee settlement policies. Starting from the status quo, which is an encampment scenario, alternative integration options will be compared in terms of their transitory and permanent effects on host community welfare. Next, the focus will be switched to a discussion on how different institutional factors like market development, transportation costs, and mechanisms of aid distribution could affect the impact of refugees on host community welfare in such integration scenarios.

4.1. Settlement scenarios

This section discusses the outcomes of alternative policies regarding refugee settlements. The analysis starts from the status quo, where all refugees are settled in the camp, have no legal permits for work outside the camp, receive some transfers in the form of international aid and remittances, and consume both tradable and non-tradable goods in Turkana. Next, in order to

assess the extent to which overall effects of the refugee presence on host community welfare would change, simulations of alternative settlement policies are employed. To this effect, three scenarios will be used to demonstrate the implications of alternative policies for aggregate economic activity, employment, wages and incomes of host community members residing both in Turkana and in the rest of Kenya. These scenarios are the following:

- *Partial integration scenario (PIS):* only skilled refugees are allowed to work outside the camp, they can move to any location in Kenya; unskilled refugees remain in the camp; both refugee types continue to receive the same levels of aid and remittances.

- *Complete integration scenario (CIS):* all refugees are granted legal permits to live and work anywhere in Kenya; they continue to receive the same transfers.

- *Decampment scenario (DS):* the camp is shut down, and all refugees are repatriated back home or on to another country.

In all cases, the shift in refugee settlement policy should affect incomes and employment in both Turkana and the rest of Kenya. Refugees constitute approximately one fifth of Turkana's population. Therefore, their integration into the work force could create major ripple effects, especially through labor markets in the case of CIS. The immediate effects should be significant for Turkana, especially in the short-term. As people respond to changes in prices and income "with their feet", e.g. they relocate to other regions or sectors, therefore, the effects should gradually be absorbed by the rest of Kenya and, thus, be diffused over time.

Unlike Turkana, the effects of alternative settlement scenarios are likely to be small for the rest of Kenya. As the entire refugee population from the Kakuma Camp constitutes less than half a percent of the Kenyan population, the fully diffused effects are likely to be small. The most important effects are likely to be observed in Turkana during the transition phase. In other words, in these policy experiments, most of the impact should be concentrated spatially (around the camp) and temporally (dynamics of transition). This likely outcome once again emphasizes the need for an approach that focuses both on equilibrium outcomes and the dynamics of transition.

With partial integration (PIS), skilled locals of Turkana are crowded out in the short-term, but not much so in the long-term. Our simulations show that, with the addition of skilled refugees into the labor force, the employment of skilled locals

decreases initially in both tradable and non-tradable sectors (Figure 4-1). At their peak, these reductions are 6.4 percent and 5.5 percent, respectively. In the long-term, however, most of these reductions are undone, and while there remains a 0.9 percent loss in the employment of locals in the non-tradable sector, there is a 0.7 percent gain in the tradable sector. In comparison, PIS has a small and heterogeneous effect on the employment of unskilled locals. Following partial integration, the employment of unskilled workers in the tradable sector shows a monotonic but small increase; by the end of the projection horizon, there is a 0.9 percent gain. In comparison, the employment of unskilled locals in non-tradable sector first increases by 1.3 percent, but then decreases by 0.9 percent in the long-term.

Complete integration leads to crowding out of both skill-types. With the inclusion of all refugees into the job market, 4 percent of the skilled locals in the tradable sector and 8.5 percent of them in the non-tradable sector relocate in the short-term. In comparison, about 8.9 percent and 7.1 percent of the unskilled refugees in the same sectors, respectively, do the same. In the long-term, however, these shocks are partially mitigated in the non-tradable sector and reversed in tradable sector. In the non-tradable sector, the net decrease in the employment of unskilled locals fall back to 5.8 percent, and that of skilled locals drop to 6.6 percent. In tradable sector, the employment of both skilled and unskilled workers recovers and increases by 7 and 6 percent, respectively.

4.2. Results

Participation of refugees in the labor force affects locals' welfare through both supply and demand channels. Integration of refugees increases both the labor supply and refugees' purchasing power. Whereas the former are likely to push wages down, the latter could increase them by pushing prices up. Overall, the magnitude of these effects vary by sector and by integration scenarios, thus, the net effects on prices, income and employment are also case specific.

Demand side effects are particularly important in the decampment scenario (DS). In PIS and CIS, integration boosts refugees' demand for goods and services. This puts pressure on non-tradable goods prices. However, the pressure is counteracted by increasing labor supply, which reduces wages. The net effect is ambiguous. In contrast, when refugees are sent back home or to onto others countries, there is a negative demand shock and no effect on the supply side. Therefore, the prices of non-tradable goods should plummet in the short-term with no ambiguity.

Figure 4-1: Employment Dynamics In Turkana Under Different Settlement Scenarios
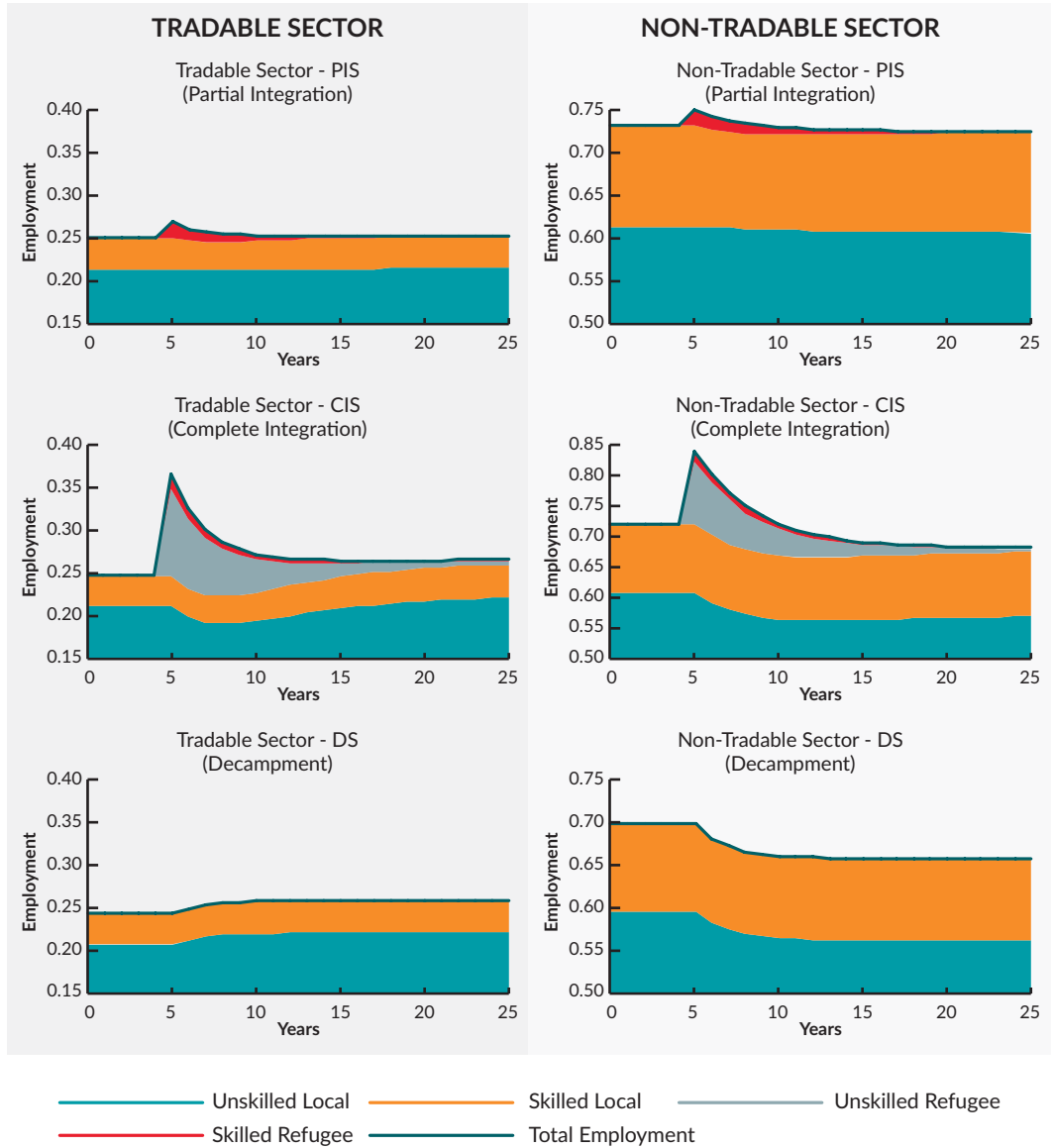
Aggregate effects

Integrating refugees diffuses economic activity across Kenya, especially under the CIS. In the short-term, the integration of refugees creates a temporary boom in Turkana's economy under both scenarios (Tables 4-1 and 4-2). However, as both refugees and locals move to other regions pursuing higher wages, Turkana's GRP decreases by 0.4 percent in PIS and 2.9 percent in CIS in the long-term. In both cases, the fall in economic activity is driven by a shrinking non-tradable sector. As labor moves out to other regions, local demand for non-tradables decreases, forcing a decrease in production. In the meantime, other regions in Kenya enjoy increases in economic activity by an average of 0.1 percent in PIS and 0.4 percent in CIS.

Non-tradable prices surge temporarily with integration, and collapse with decampment; they settle in long-term lows in all cases. Tables 4-1, 4-2, and 4-3 show the price dynamics under different refugee settlement scenarios. With PIS, the price of non-tradables in Turkana increases by 2.3 percent before stabilizing at 1 percent below the integration level. In comparison, the CIS generates higher increases at 7.1 percent before settling at -6.3 percent. The initial surge in these prices come from the fact that with more purchasing power, refugees consume more, which creates a demand shock, which is absent in the case of decampment scenario. Overtime, however, with gradual reallocation of labor, the pressure is eased, and prices fall back to levels lower than before the integration. This follows from the fact that some refugees, who were consuming both tradable and non-tradable goods while in camp, move to other regions. Under the decampment, with complete loss of demand generated by the refugees, relative prices fall by 10.3 percent initially, but are stabilized at a 6.5 percent decrease after long-term adjustments.

Despite a small reduction in the long-term, integration boosts per capita income in Turkana during the transition. Although integration diffuse economic activity, transition generates higher GRI per local person (GRIplp) in Turkana. In the case of PIS, the GRIplp rises by 1.6 percent following the integration, which gradually goes back to initial levels in the long-term. In comparison, CIS leads to a greater increase in GRIplp, 9.4 percent. This also converges back to zero in the medium term and to a small negative effect in the long-term. Thus, in both cases, although permanent effects on GRIplp are small in Turkana, there are substantial transitory gains for about 25 years during the run up to a new equilibrium.

Table 4-1: Simulation Results: Macroeconomic Effects Under Partial Integration Scenario (PIS)

	BEFORE INTEGRATION	INTEGRATION YEAR	+5 YEARS	+10 YEARS	+15 YEARS	+20 YEARS	+30 YEARS	+50 YEARS
	(Percentage change from initial equilibrium							
TURKANA								
Gross Regional Product (GRP)	0.0	4.7	0.1	-0.3	-0.4	-0.4	-0.4	-0.4
Tradable	0.0	6.9	1.2	1.1	1.1	1.2	1.2	1.2
Non-tradable	0.0	4.0	-0.3	-0.7	-0.8	-0.9	-0.9	-0.9
Employment (locals only)	0.0	-0.8	-1.2	-0.8	-0.6	-0.5	-0.4	-0.4
Tradable	0.0	-1.6	-1.1	0.0	0.5	0.8	0.9	0.9
Non-tradable	0.0	-0.5	-1.2	-1.1	-1.0	-0.9	-0.9	-0.9
Gross Regional Income (GRI)	0.0	0.8	-1.6	-1.1	-0.7	-0.6	-0.5	-0.5
GRI per local person (GRIplp)	0.0	1.6	-0.5	-0.3	-0.2	-0.1	-0.1	-0.1
Non-tradable prices	0.0	2.3	-0.6	-0.8	-0.9	-0.9	-1.0	-1.0
REST OF KENYA								
Gross Regional Product (GRP)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Tradable	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Non-tradable	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Employment (locals only)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tradable	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	-0.1
Non-tradable	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Gross Regional Income (GRI)	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
GRI per local person	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-tradable prices	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes: Gross Regional Income (GRI) is defined as Gross Regional Product minus the wage bill of refugees.

Table 4-2: Simulation Results: Macroeconomic Effects Under Complete Integration Scenario (CIS)

	BEFORE INTEGRATION	INTEGRATION YEAR	+5 YEARS	+10 YEARS	+15 YEARS	+20 YEARS	+30 YEARS	+50 YEARS
	(Percentage change from initial equilibrium							
TURKANA								
Gross Regional Product (GRP)	0.0	15.1	0.3	-2.1	-2.7	-2.8	-2.9	-2.9
Tradable	0.0	21.6	7.4	7.0	7.4	7.7	7.8	7.9
Non-tradable	0.0	12.9	-2.0	-5.1	-6.0	-6.3	-6.4	-6.5
Employment (locals only)	0.0	-3.6	-7.0	-5.2	-3.9	-3.3	-2.9	-2.8
Tradable	0.0	-6.5	-6.3	0.2	3.6	5.1	6.0	6.2
Non-tradable	0.0	-2.6	-7.2	-7.0	-6.5	-6.2	-6.0	-6.0
Gross Regional Income (GRI)	0.0	2.3	-5.3	-4.7	-3.9	-3.6	-3.3	-3.3
GRI per local person (GRIplp)	0.0	6.1	1.9	0.5	0.0	-0.3	-0.4	-0.5
Non-tradable prices	0.0	7.1	-3.5	-5.3	-5.9	-6.1	-6.3	-6.3
REST OF KENYA								
Gross Regional Product (GRP)	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.4
Tradable	0.0	0.0	0.3	0.3	0.2	0.2	0.2	0.2
Non-tradable	0.0	0.0	0.4	0.5	0.5	0.5	0.5	0.5
Employment (locals only)	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Tradable	0.0	0.1	0.0	-0.3	-0.4	-0.4	-0.5	-0.4
Non-tradable	0.0	0.1	0.3	0.3	0.3	0.3	0.3	0.3
Gross Regional Income (GRI)	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.1
GRI per local person	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Non-tradable prices	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2

Notes: Gross Regional Income (GRI) is defined as Gross Regional Product minus the wage bill of refugees.

Table 4-3: Simulation Results: Macroeconomic Effects Under Decampment Scenario (DS)

	BEFORE INTEGRATION	INTEGRATION YEAR	+5 YEARS	+10 YEARS	+15 YEARS	+20 YEARS	+30 YEARS	+50 YEARS
		(Percentage change from initial equilibrium						
TURKANA								
Gross Regional Product (GRP)	0.0	15.1	0.3	-2.1	-2.7	-2.8	-2.9	-2.9
Tradable	0.0	21.6	7.4	7.0	7.4	7.7	7.8	7.9
Non-tradable	0.0	12.9	-2.0	-5.1	-6.0	-6.3	-6.4	-6.5
Employment (locals only)	0.0	-3.6	-7.0	-5.2	-3.9	-3.3	-2.9	-2.8
Tradable	0.0	-6.5	-6.3	0.2	3.6	5.1	6.0	6.2
Non-tradable	0.0	-2.6	-7.2	-7.0	-6.5	-6.2	-6.0	-6.0
Gross Regional Income (GRI)	0.0	2.3	-5.3	-4.7	-3.9	-3.6	-3.3	-3.3
GRI per local person (GRIplp)	0.0	6.1	1.9	0.5	0.0	-0.3	-0.4	-0.5
Non-tradable prices	0.0	7.1	-3.5	-5.3	-5.9	-6.1	-6.3	-6.3
REST OF KENYA								
Gross Regional Product (GRP)	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.4
Tradable	0.0	0.0	0.3	0.3	0.2	0.2	0.2	0.2
Non-tradable	0.0	0.0	0.4	0.5	0.5	0.5	0.5	0.5
Employment (locals only)	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.1
Tradable	0.0	0.1	0.0	-0.3	-0.4	-0.4	-0.5	-0.4
Non-tradable	0.0	0.1	0.3	0.3	0.3	0.3	0.3	0.3
Gross Regional Income (GRI)	0.0	0.0	0.2	0.1	0.1	0.1	0.1	0.1
GRI per local person	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Non-tradable prices	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2

Notes: Gross Regional Income (GRI) is defined as Gross Regional Product minus the wage bill of refugees. In the case of decampment, since no refugees work before the decampment or after it, both concepts are equivalent.

CIS diffuses the effects of refugees on host communities more aggressively than PIS. A comparison of tables 4-1 and 4-2 shows that, although the signs of aggregate effects are similar in different integration scenarios, the complete integration scenario brings out more pronounced effects in magnitude. This is true in both transition dynamics and the long-term outcomes.

Decampment leads to permanent income loss in Turkana. Shutting down the camp imposes a negative demand shock in Turkana economy. As a result, the GRP decreases by 3.3 percent permanently. With labor moving out to other regions, the GRIplp initially decreases by 1.4 percent, and then stabilizes on a 0.5 percent loss in the long-term.

In Turkana, decampment and CIS have interestingly similar effects on long-term incomes; yet, getting there is painful in the former and gainful in the latter. Under both scenarios, the GRP decrease significantly (-3.3 percent in DS, -2.9 percent in CIS) and GRIplp registers a small decrease (both -0.5 percent) decades after the shift in settlement policy. However, whereas decampment decreases GRP even in the short-term (by 2.6 percent), CIS increases it substantially (up to 15.1 percent) with refugees joining the labor force at local level first. A similar outcome is also observed in per capita incomes of locals. Decampment decreases the GRIplp even in the short-term (-1.4 percent) and CIS increases it (up to 6.1 percent) before both scenarios converge. In the latter case, the positive effect lasts for more than a decade, albeit at a decreasing level.

The effects of the integration scenarios on the prices in the rest of Kenya are positive but insignificant. As labor movement out of Turkana is small compared the rest of Kenya's population, the prices of non-tradable goods in the rest of Kenya are only increased by less than half a percent.

Distributional effects

Skill compositions of refugees and locals matters in integration scenarios. Participation of refugees in the labor force increases the labor supply. How this affects local real wages depends on the skill composition of refugees who join the labor force. When only skilled refugees work, as in the case of the PIS, they increase productivity and wages of unskilled workers. This follows from the fact that these two types of workers are imperfect substitutes in production. At the same time, they reduce the wages of skilled workers, because they are perfect substitutes. When all refugees join the labor force, both channels are operative for all skill groups. Therefore, the net effects could vary by sector.

Figure 4-2: The Effects Of Alternative Integration Policies On Real
Wages And Incomes In Turkana
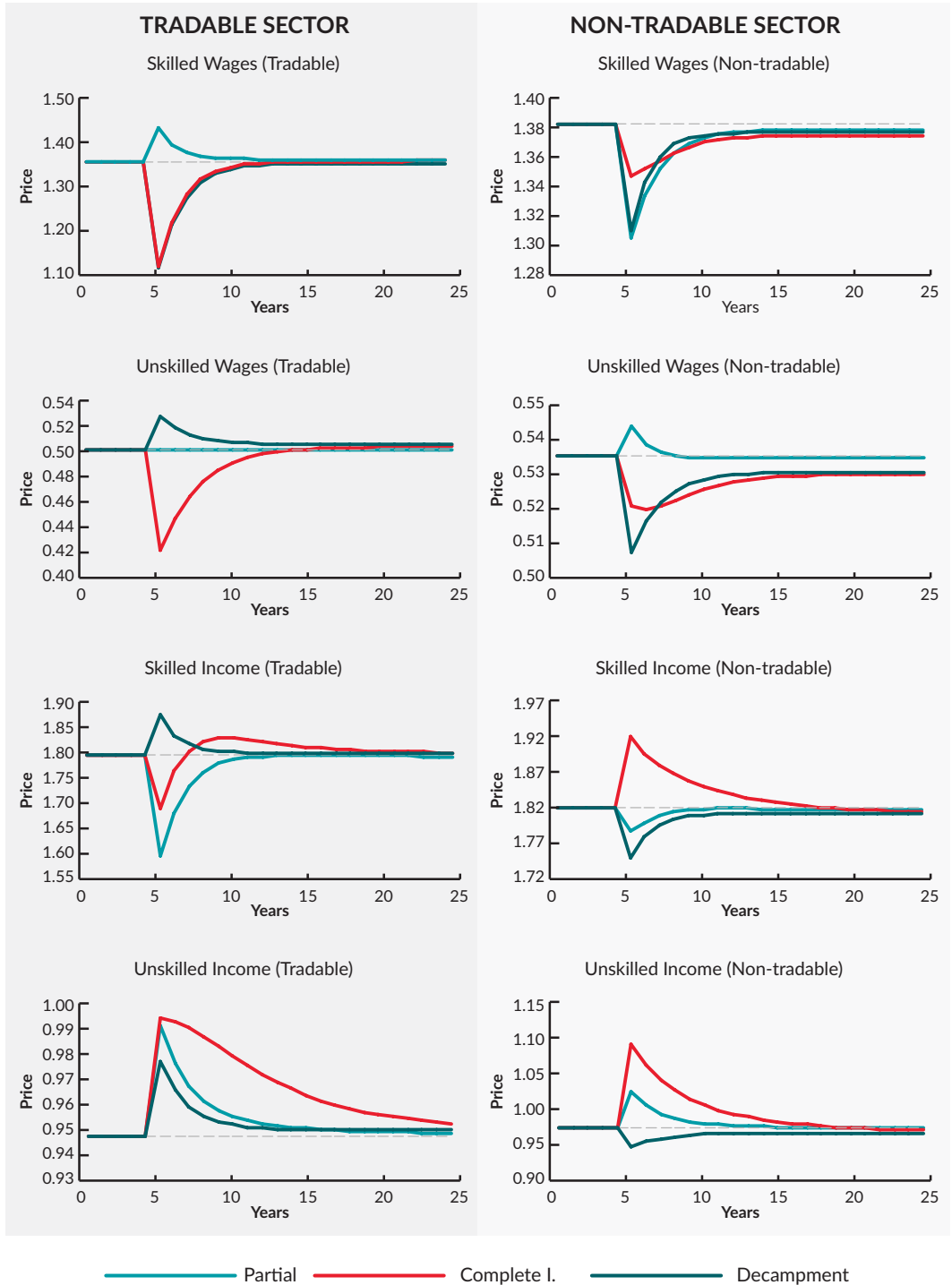
The direct effects settlement scenarios on real wages is generally negative in Turkana. The upper panel in Figure 4-2 shows the dynamics of real wages in Turkana. Wages in Turkana's non-tradable sector decrease permanently in all cases with the exception of unskilled wages under CIS. In the case of the latter, a skill complementarity effect dominates the competition effects, thus, productivity and wages increase.

In cases of partial and complete integration, the decrease in wages follows from the increase in the labor supply that dominates the increase in demand. This is an expected result as all refugees were already consumers before the integration, but none of them were working. Indeed, the largest of these short-term drops, an approximately 18% decrease, occurs in the wages of both skill groups in the tradable sector under a CIS as prices are fixed, and demand side effects are not operative in the tradable sector.

Effects operate through different channels in the case of decampment. Unlike the integration scenarios, the story is primarily on the demand side with decampment. With a sudden fall in demand upon the repatriation of refugees, prices drop in non-tradable sectors, pulling down wages. In the tradable sector, however, there is no direct demand side effect as prices are fixed. Thus, nominal wages are initially not affected, but with a sharp decrease in non-tradable prices, they increase in real terms. This is corrected overtime with labor movements and rebalancing in relative prices.

In the long-term, real wages converge back to their initial levels in Turkana. In the long-term, the wages in both the tradable and non-tradable sectors converge back to their initial levels under all scenarios, with small differences remaining of less than a percentage point. The reason for such a regression back to the origin is because Turkana represents a small part of Kenyan economy, with or without refugees. Thus, any large deviations from Kenyan averages are corrected by labor movements in the long-term.

The effects of settlement scenarios on real wages in the rest of Kenya are small. With the exception of small increases in unskilled wages under the skill-based permits scenario (PIS), real wages in the rest of Kenya decrease as a response to the integration. However, these decreases are often less than a percent.

For most types of economic agents, an equal redistribution of economic rents and profits would be sufficient to offset the short-term losses in wages under PIS and CIS. Income dynamics

exhibit significant differences from wage dynamics. This is mainly because the former takes into consideration the returns to fixed factors of production. For instance, the incomes of unskilled workers register short-term gains up to 5.3 percent in the non-tradable sector and up to 4.6 percent in the tradable sector in PIS. In the long-term, they go back to the initial levels. In comparison, gains are even larger in CIS: up to 12.4 percent in the non-tradable sector, and 5 percent in the tradable sector. In all the cases discussed so far, the incomes converge back to the initial levels in the long-term and remain in the vicinity with small positive margins.

Turkana's skilled locals are more likely to suffer short-term losses even after fixed factor incomes are redistributed. Incomes of skilled labor loses up to 1.9 percent of their value in the non-tradable sector and 11 percent in the tradable sector following PIS.[11] In the long-term they go back to their initial level. In comparison, the impact on incomes of skilled workers is more favorable in the case of decampment scenario. Skilled workers gain up to 5.5 percent additional income in the non-tradable sector, but they suffer a loss of 5.8 percent in the tradable sector.

Even with an egalitarian redistribution of rents and profits, the wage losses in non-tradable sectors are not being offset when decampment is chosen. The bottom panel of Figure 4-2 shows that real incomes of skilled and unskilled workers remain in the red even after the (equal) redistribution of rents and profits. In decampment, not only the non-tradable wages but also the returns to fixed factors of production decrease. As a result, the redistribution of rents and profits fall short of fully compensating the short-term losses in wages in non-tradable sector.

4.3. Discussion

The analysis in this report highlights important findings. Simulations and empirical analysis in this report shed light on important aspects of refugee arrivals and associated policy choices regarding their settlement. These can be summarized as follows:

1. *Positive aggregate effects:* In aggregate terms, the arrival of refugees generates a positive economic effect on the host community; this is especially true when there is a fixed factor of production like land.

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[11] Note that this is result is primarily driven by the assumption that the PIS enables only skilled refugees to work. If it did the opposite, e.g. let unskilled refugees work only, then those who make income losses would be unskilled locals.

2. ***Uneven distribution of effects:*** Although the aggregate effect is positive, there are both losers and winners in the host communities. In the absence of mitigating transfers, some groups may face net losses while others face net gains that are larger than those losses.

3. ***Concentration in space:*** Encampment concentrates both gains and losses in the vicinity of the camp. By doing so, it reduces the potential aggregate gains for the entire economy while increasing the gains for those beneficiaries in the vicinity of the camp.

4. ***Concentration in time:*** Both refugee arrivals and integration of refugees may have transitory effects in the vicinity of the camp that can be different from the permanent effects in the long-term.

5. ***Scaling and diffusion of effects by integration:*** Integrating the refugees into society increases their positive economic effects in aggregate terms. However, it also diffuses these effects across all regions in the host country. Partial integration does this partially.

Whereas the first three effects are suggested by both simulations and empirical investigations, the last two are forward looking and based on simulations only. In what follows, a number of observations regarding these results will be discussed.

The relevance of aid and how to distribute it

In the case of encampment, the aid and remittances received by refugees are crucial for the positive impact of refugees on the local economy. If refugees are not allowed to join the labor force, their contributions to the local economy that occur via market mechanisms are limited to their exchange of goods and services with locals. Without foreign aid, either in the form of cash or in kind transfers, or remittances, they do not have any purchasing power or goods to sell. They also have no means to survive. Therefore, the magnitude of aid and remittances are key drivers of refugee impact on host communities in the case of encampment.

Refugees, when integrated, could contribute positively to host economy even in the absence of aid and remittances. Although the transfers received by refugees add to their positive impact, additional simulations show that the positive impact remains when aid is phased out after integration. Table 4-4 shows the effects of complete integration on GRP and relative prices when transfers to refugees stop 5 years after the integration. Comparing

Table 4-4: Macroeconomic Effects Of Complete Integration With No Transfers

		Rest of Kenya: Gross Regional Product (GRP)					
	INTEGRATION/ DECAMPMENT YEAR	+5 YEARS	+10 YEARS	+15 YEARS	+20 YEARS	+30 YEARS	+50 YEARS
	(Percentage change from initial equilibrium)						
TURKANA							
Gross Regional Product (GRP)	15.1	-0.8	-2.7	-2.9	-3.0	-3.0	-3.0
Non-tradable Prices	7.1	-6.8	-6.5	-6.5	-6.5	-6.5	-6.5
REST OF KENYA							
Gross Regional Product (GRP)	0.2	0.4	0.4	0.4	0.4	0.4	0.4
Non-tradable Prices	0.1	0.1	0.0	0.0	0.0	0.0	0.0

these results with those in tables 4-2 reveals the similarity between integration-with-aid and integration-without-aid cases. Overall, differences are within a tenth of a percentage point margin in the short-term and long-term, and less than a percentage point in the few years after the aid ceases. For the rest of Kenya, the differences are rounded up to zero, and the gross output increases by 0.4 percent in the long term under both scenarios. In other words, aid complements and magnifies the effects of refugees, however, the bulk of the results are driven by labor market participation.

Who should receive the aid, refugees or the host government?
An often-discussed idea is that, once integration takes place, the foreign aid that goes to the refugees could be centralized in the hands of local authorities to provide support with possible costs borne by hosting refugees. A background analysis to this report (Behzadan et al, 2016) discourages such motives of centralization.

Whereas centralized aid mechanisms could trigger Dutch Disease type of symptoms (declines in tradable sectors, as resources are drawn to produce non-tradable goods and services), direct aid to refugees is less likely to do so. Remittances and aid paid directly to individuals are typically more successful in actually finding their way into the hands of refugees compared to official foreign aid that trickles down from the top. This difference turns out to be important for economic outcomes. This is because consumption patterns change with income. In particular, the marginal propensity to consume non-tradable

goods (e.g. services) increases with income. Examples of these non-tradable services are housekeeping, childcare, lawn care, nannies, butlers, or chauffeurs. Poor people often do not purchase such services in the market (they have a lower income elasticity of demand for these services than do wealthier people). Poor people on the other hand tend to spend more of any increased income on tradable goods. Increased production of tradable goods to meet this demand generates more externalities (i.e. additional economic activity and employment in ancillary goods and services) than do increased services. Hence, a foreign transfer that eventually finds its way into the pockets of wealthier rather than poorer people increases the relative demand for non-tradables and reduces tradable sector production by an even greater amount (by forgoing both the primary production and ancillary goods and services that support it). This generates an increased reliance on imported goods and a consequent reduction in economic growth. An empirical cross-country investigation by Behzadan et al (2016) lends credence to such differences between official aid and direct transfers like remittances.

An important exception to this observation is the direct fiscal costs incurred, or that should be incurred, by the host government. Hosting refugees often impose direct fiscal costs on the host government. These could arise from different forms of public good provisions, e.g. security services. These costs should be measured carefully and mitigating transfers should be provided as part of international aid efforts. This is particularly important when the host country is in the low-income category. The governments in these countries typically lack the necessary resources to finance such efforts. In addition, they suffer from significant inefficiencies in tax collection in the form of low tax collection capacity and high informality. Therefore, the offsetting transfers should be made available directly to the government. The alternative, e.g. giving all money directly to the refugees and leaving it to the government to tax them for provision of public goods, could lead to significant waste and under-provisioning of public goods.

Market power and transportation costs

Market imperfections could further concentrate the refugee-related rents in the hands of small interest groups. Overall, encampment creates economic rents. Lack of sufficient competition in certain markets like retail, land, housing, and livestock in the vicinity of the camp could reallocate some of these rents disproportionately towards those who control the businesses, thereby reducing the total benefits that could be received by the society at large.

In Turkana, there are signs of such market power. A background study for this report (Oka, 2016) suggests the presence of a small group of highly influential local traders in the Kakuma market. These 3 – 5 traders have operated in Kakuma town like a cartel continuously between the years 2005 and 2015. Similarly, there are only two bus companies that operate between Kakuma and Nairobi. The existence of concentrated market power typically leads to inefficiently low supply and high consumer prices as in the case of transportation costs. These practices both reduce the overall gain the host community could receive from hosting refugees and distort the allocation of gains.

High transportation costs also strengthen the concentration of rents by leading to supply bottlenecks and reducing the mobility of labor. High transportation costs help sustain an unequal allocation of refugee related rents via both goods and labor market channels. In the goods market, with high transportation costs and delays in shipments, the supply of otherwise tradable goods adjusts more slowly than usual. This, in turn, keeps prices inflated and supply suppressed for a longer period of time. Thus, the short-term gains and losses for the respective groups are magnified in this case. In the labor market, mobility costs operate in a similar way. When mobility costs are high, the minimum real wage differential that can induce people to move from one region to another are also high. Therefore, with high mobility costs, real wage differences among regions could remain high even in the long-term.

Rents and skills acquisition

The restrictions on refugee employment and mobility changes their incentives for acquiring skills. The absence of employment prospects diminishes refugees' incentives to develop their skills as manufacturers, traders, and merchants. Instead, they are more likely to depend on aid, remittances, and limited basic economic activities that can be performed within the camp. These induced distortions rob the Turkana region of valuable human capital (some refugees have more marketable skills than the host population in this remote and impoverished part of Kenya), it generates an unhealthy local dependence on the refugee camp (not as a source of growth but of monopoly rents), and it induces severe pressure on the local natural environment (in particular, firewood and groundwater supplies).

Locals may also suffer from distorted incentives. The possibility of refugee related rents, which are made possible by the excessive market power of a small number of traders and certain other groups in the local population, creates an economic windfall that

engenders dependence on the refugee camp and diminishes the incentives to make longer term investments in human capital development. The extra market power of the host region buyers (that is afforded by the refugees' larger search costs and their spill-over effect on the host population) and their consequent improved terms of trade with refugees further reduces the locals' incentive to develop their skills. Hence the barriers against the participation of refugees in the labor force reduce skills development in the Turkana region as well. As a result, the two-way dependence, that is, refugees' dependence on aid and locals' dependence on refugees, becomes a self-reinforcing state.

In the long-term, disincentives to acquire skills could rob both the Turkana region and Kenya of additional welfare gains. While both refugees and locals find it less attractive to acquire skills, the former for the lack of opportunities and the latter for the opportunity to extract rents, they become stuck in low productivity sectors. Therefore, in the long-term, average productivity in Turkana, and in Kenya, decreases along with incomes and welfare. A background study for this report (Chisik et al, 2016) show that, when refugees are integrated, although the host may be worse off in the short run, the reduced dependency could improve their welfare in the longer-term horizon.

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Appendices

A. Household survey

Sampling for the refugee survey was intended to be proportional to the ethnic populations contained in the camp, with some oversampling of small populations. Table A-1 shows the number of households sampled compared to the number of individuals present in official camp statistics. All other refugee groups present in the camp that we did not sample (Burundians, Rwandans, etc.) represented less than 4 percent of total camp population.

Table A-1: Sampling By Ethnicity Among Refugee Population

Ethnicity	NUMBER SURVEYED	PERCENTAGE OF TOTAL	NUMBER IN CAMP (OFFICIAL STATISTICS)	PERCENTAGE IN CAMP (OFFICIAL STATISTICS)
Somali	40	23.4	56,178	31
Dinka	50	29.4	89,973	50
Nuba	11	6.5		
Darfuri	20	11.8	9,785	5
Congolese	20	11.8	9,045	5
Ethiopian	29	17.1	7,821	4

Note: The camp number for Dinka/Nuba is for camp residents classified as South Sudanese, who are not separated by ethnicity for UNHCR statistics. The official camp number also does not break down Sudanese refugees by ethnicity – we apply the "Sudan" number to the Darfur population.

For the Turkana household survey we sought to sample enough households around Kakuma and in two counterfactual cities in order to be able to detect a 0.2 standard deviation change in income, a power calculation based on data collected by Pascaline Dupas. This gave us a preferred sample size of 352. Defining counterfactual cities was difficult, and we decided upon two cases. First, towns that had a similar size to Kakuma in 1989, and were on the Kitale-Juba highway. Kakuma at this time had a measured population of 5887. Within Turkana province, there are 5 market towns that had a similar size to Kakuma in 1989, or at least as near as we can tell from the sublocation data available from the 1989 census. These are: Lokichar (pop 4887), Lokori (pop 5590), Kangatet (pop 5590), and Lokwal Kalokol (pop 6842). These towns are shown in Figure A-1.

Figure A-1: Final Sample Of Towns For Household Survey
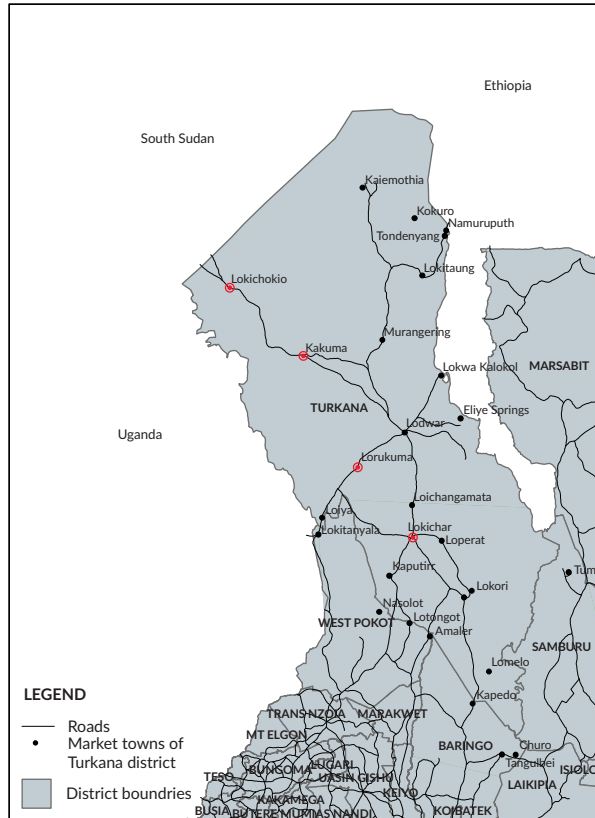
Because Lokwa is found off of the main highway, and Kangatet is very close to Lokori and somewhat to the east of the main highway, we eliminated these from the sample. Unfortunately, security challenges made it impossible to arrive at Lokori during the time of our fieldwork. Our Turkana and UNHCR colleagues suggested the town of Lorugum, located on the main highway west of Lodwar en route to Uganda, which is halfway between Lokichar and Kakuma.

In addition, we decided to add Lokichogio as a potential comparison city, but one that offers a slightly different comparison than do Lorugum and Lokichar. This is because Lokichogio was the original site of what is now the Kakuma refugee camp. In addition, it was, from 1989 until 2011, home of the substantial infrastructure supporting Operation Lifeline Sudan. It is, therefore, a study in what happens when "aid leaves," which is one of several different future scenarios for Kakuma.

Sampling was stratified by distance from the center of each city. Distance rings included less than 2 kilometers from center, 2-8 kilometers from center, and 8-10 kilometers from center. Two villages were randomly sampled in each distance ring, and households randomly sampled from within these. In cases where villages were too small to provide sufficient numbers of households, additional villages were added. This commonly occurred in the more distant villages, which tended to be composed of very few households. At final count, the sample was collected in 19 villages around Kakuma, Lokichar, Lorugum, and Lokichogio. The total number of households in each subsample is shown in Table A-2:

Table A-2: Sampling By Ethnicity Among Refugee Population

Subsample	NUMBER OF HOUSEHOLDS
Kakuma	111
Lokichar	116
Lorugum	103
Lokichoggio	118
Total	448

Below, we provide various summary statistics from the surveys.

Table A-3: Summary Statistics Livestock From Household Survey

	MEAN KAKUMA	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Household cares for animals	0.450	0.475	0.675	111	219
Dist. to watering hole increased	0.500	0.510	0.912	50	104
Movement of animals increased	0.520	0.567	0.583	50	104
Location of grazing changed	0.660	0.721	0.441	50	104
Value of animals cared for	146222	129442	0.739	50	104
Value of animals owned	129382	144768	0.737	50	104
Value of animals sold	6624	4264	0.237	50	104
Number of livestock owned	35.260	49.240	0.365	50	104
Number of livestock cared for	37.600	44.731	0.668	50	104
Number of livestock sold	2.260	1.288	0.095*	50	104
Number of livestock consumed	1.560	1.548	0.977	50	104
Number of livestock dowried	5.300	2.510	0.351	50	104
Number of livestock died	5.480	5.337	0.947	50	104
Number of livestock stolen	3.480	5.990	0.255	50	104
Number of poultry owned	1.300	1.019	0.790	50	104
Number of livestock stolen	0.460	0.442	0.838	50	104
Number of poultry cared for	1.440	1.606	0.914	50	104
Number of poultry sold	0.120	0.067	0.551	50	104
Number of poultry consumed	0.080	0.135	0.630	50	104
Number of poultry dowried	0.000	0.058	0.416	50	104
Number of poultry died	0.080	0.096	0.892	50	104
Number of poultry stolen	0.040	0.154	0.300	50	104

*p<.10, **p<.05, *** p<.01

Table A-4: Summary Statistics Enterprise Household Survey

	MEAN KAKUMA	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Household owns small business	0.297	0.447	0.008**	111	219
Household has boda boda business	0.051	0.026	0.379	59	151
Household has a store/sells product	0.186	0.245	0.502	59	151
Household sells firewood or other manual labor	0.576	0.550	0.801	59	151
Household works in construction	0.017	0.040	0.470	59	151
Household has other semi-skilled business	0.102	0.086	0.739	59	151
Profits from enterprise sources over last 6 months	12813	9961	0.572	33	98

*p<.10, **p<.05, *** p<.01

Table A-5: Summary Statistics Wage Earnings And Household Demographics

	MEAN KAKUMA	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Has member employed for wage in past 12 months	0.153	0.091	0.093*	111	219
Number of members employed by NGO or UN	0.294	0.250	0.771	17	20
Number members working in camp	0.294	0.000	0.008**	17	20
Proportion of wage earners working in camp	0.294	0.000	0.008**	17	20
Proportion ages 16 to 60 employed with wage	0.424	0.398	0.610	17	20
Total household wage in last 12 months	125128.235	254283.900	0.087*	17	20
Number of current household members	4.730	4.726	0.987	111	219
Household head with no education	0.667	0.763	0.064*	111	219
Member with secondary education	0.162	0.329	0.001**	111	219
Proportion ages 6 to 15 enrolled in school	0.270	0.196	0.220	71	137
Number current members age 5 or less	0.486	0.612	0.227	111	219
Number of current members ages 6 to 15	1.351	1.352	0.999	111	219
Number of current members ages 16 to 60	2.640	2.521	0.457	111	219
Number of current members older than 60	0.243	0.228	0.799	111	219
Number ages 6-15 enrolled in school	0.369	0.233	0.122	111	219

*p<.10, **p<.05, *** p<.01

Table A-6: Summary Statistics Animals, Lokichogio And Kakuma

	MEAN LOKI	MEAN KAKUMA	P-VALUE DIFF	OBS LOKI	OBS KAKUMA
Household cares for animals	0.280	0.450	0.007**	118	111
Dist to watering hole increased	0.636	0.500	0.226	33	50
Movement of animals increased	0.606	0.520	0.446	33	50
Location of grazing changed	0.636	0.660	0.828	33	50
Value of animals cared for	193475	146222	0.528	33	50
Value of animals owned	162884	129382	0.555	33	50
Value of animals sold	7206.061	6624.060	0.850	33	50
Number of livestock owned	40.545	35.260	0.726	33	50
Number of livestock cared for	41.818	37.600	0.812	33	50
Number of livestock sold	1.818	2.260	0.608	33	50
Number of livestock consumed	1.394	1.560	0.767	33	50
Number of livestock dowried	9.545	5.300	0.526	33	50
Number of livestock died	7.727	5.480	0.544	33	50
Number of livestock stolen	13.636	3.480	0.033*	33	50
Number of poultry owned	0.909	1.300	0.700	33	50
Number of poultry cared for	0.455	1.440	0.389	33	50
Number of poultry sold	0.091	0.120	0.771	33	50
Number of poultry consumed	0.000	0.080	0.305	33	50
Number of poultry dowried	0.000	0.000	.	33	50
Number of poultry died	0.364	0.080	0.348	33	50
Number of poultry stolen	0.000	0.040	0.420	33	50

*p<.10, **p<.05, *** p<.01

Table A-7: Summary Statistics Farming, Lokichogio And Kakuma

	MEAN LOKI	MEAN KAKUMA	P-VALUE DIFF	OBS LOKI	OBS KAKUMA
Household farms	0.203	0.333	0.026*	118	111
Area farmland owned (ha)	50.498	31.689	0.455	24	37
Value of farm sales	3812.917	3018.297	0.776	24	37
Farm sales - inputs (not labor)	2012.917	1215.595	0.767	24	37
Non-labor input costs	1800.000	1802.703	0.997	24	37
Labor days on the farm	41.083	51.111	0.363	24	36
Proportion farm production to animals	0.036	0.062	0.368	17	32
Proportion farm production consumed	0.511	0.400	0.298	17	30
Proportion farm production sold	0.107	0.181	0.363	15	30
Proportion farm production gifted	0.034	0.085	0.270	17	31
Proportion farm production saved	0.118	0.165	0.384	17	32

*p<.10, **p<.05, *** p<.01

Table A-8: Summary Statistics Enterprises, Lokichogio And Kakuma

	MEAN LOKI	MEAN KAKUMA	P-VALUE DIFF	OBS LOKI	OBS KAKUMA
Household owns small business	0.246	0.297	0.383	118	111
Household has boda boda business	0.029	0.051	0.518	70	59
Household has a store/sells product	0.129	0.186	0.493	70	59
Household sells firewood or other manual labor	0.429	0.576	0.174	70	59
Household works in construction	0.000	0.017	0.278	70	59
Household has other semi-skilled business	0.014	0.102	0.056	70	59
Household receives government transfers	0.600	0.492	0.220	70	59
Profits from other sources over last 6 months	9315.517	12813.636	0.379	29	33

*p<.10, **p<.05, *** p<.01

Table A-9: Summary Statistics Wage Work And Household Demographics, Lokichogio And Kakuma

	MEAN LOKI	MEAN KAKUMA	P-VALUE DIFF	OBS LOKI	OBS KAKUMA
Number of current household members	4.576	4.730	0.592	118	111
Household head with no education	0.737	0.667	0.244	118	111
Member with secondary education	0.331	0.162	0.003**	118	111
Number current members age 5 or less	0.686	0.486	0.110	118	111
Number of current members ages 6 to 15	1.237	1.351	0.504	118	111
Number of current members ages 16 to 60	2.458	2.640	0.297	118	111
Number of current members older than 60	0.186	0.243	0.372	118	111
Number ages 6-15 enrolled in school	0.254	0.369	0.282	118	111
Has member employed for wage in past 12 months	0.085	0.153	0.110	118	111
Proportion ages 6 to 15 enrolled in school	0.177	0.270	0.175	71	71
Total household wage in last 12 months	234440	125128	0.202	10	17

*p<.10, **p<.05, *** p<.01

Table A-10: Summary Statistics Transfers, Lokichogio And Kakuma

	MEAN LOKI	MEAN KAKUMA	P-VALUE DIFF	OBS LOKI	OBS KAKUMA
Cash transfers received	0.144	0.144	0.999	118	111
Uses hawala or dahabshil transfers	0.000	0.062	0.310	17	16
Transfers have decreased	0.235	0.250	0.925	17	16
Amount of last transfer	5226.471	7700.000	0.503	17	16

Table A-11: Summary Statistics Income And Assets, Lokichogio And Kakuma

	MEAN LOKI	MEAN KAKUMA	P-VALUE DIFF	OBS LOKI	OBS KAKUMA
Income per capita	8281.181	12771.446	0.303	118	111
Predicted consumption (HSNP)	489.737	437.547	0.351	118	111
Owned house 2005	0.483	0.541	0.387	118	111
Owned car 2005	0.000	0.000	.	118	111
Owned moto 2005	0.000	0.027	0.073	118	111
Owned bicycle 2005	0.068	0.117	0.198	118	111
Owned refrigerator 2005	0.000	0.000	.	118	111
Owned television 2005	0.008	0.009	0.966	118	111
Owned radio 2005	0.085	0.117	0.418	118	111
Owned cell phone 2005	0.102	0.198	0.040*	118	111
Owned generator 2005	0.000	0.000	.	118	111
Owned computer 2005	0.000	0.000	.	118	111
Owned camera 2005	0.000	0.000	.	118	111
Assets 2005	0.746	1.009	0.037*	118	111
Change assets 2005-2015	0.102	0.117	0.853	118	111

*p<.10, **p<.05, *** p<.01

B. Herd size regressions

The analysis here tests the relationship between average herd size and distance to Kakuma, controlling for precipitation. The first two columns use a log distance specification, which is insignificant both including and excluding precipitation. The third column uses the inverse of distance to Kakuma, which puts significant weight on observations close to the camp, and hence picks up part of the non-linearity present in the data. The last column in these regressions contains a semi-parametric estimation of the effect of distance, controlling for precipitation, in each distance bin. Each bin contains about 11,000 households, and the closest bin to Kakuma is eliminated, so that the coefficients indicate the additional effect of being at a particular distance from the camp. The regressions suggest that the variation in livestock observed in the graph is a jump that occurs at greater than 8.9 km from the camp, and is robustly different until at about 70 km of distance. From 70 to 113 km (nearing Lodwar), livestock holdings are not statistically different far from the camp than they are right next to it, and there are slight bumps at very far distances.

Table B-1: Distribution Of Cattle Herd Sizes By Distance To Kakuma

	(1)	(2)	(3)	(4)
Ln (km to Kakuma camp)	0.0451	0.0685		
	(0.1952)	(0.1986)		
Inverse km to Kakuma			-0.9037***	
			(0.1692)	
8.9-45 km				1.9072***
				(0.4934)
45-71 km				1.8475***
				(0.4676)
71-89 km				1.2115
				(0.7286)
89-101 km				1.2513**
				(0.6051)
101-108 km				0.3217
				(0.5891)
108-113 km				-0.0446
				(0.5817)
113-126 km				1.0391**
				(0.4640)
126-152 km				1.6395***
				(0.4550)
152-173 km				1.0437
				(0.7258)
173-201 km				0.3871
				(0.6520)
>201 km				-0.0588
				(0.5764)
Ln (precipitation)		0.9896	1.0275	0.6486
		(0.7499)	(0.7498)	(0.5491)
N	138982	137964	137964	137964
r2	0.001	0.025	0.049	0.159

Dependent variable: Inverse hyperbolic sine of herd size. OLS regressions with standard errors clustered at the location level. *p<.10, **p<.05, *** p< .01.

C. The effect of remittances on consumption in Kakuma

Refugee Camp

Table C-1 reports indicator variables for if households purchased particular food and "luxury" items in April, before the informal transfer shutdown, and then the totals of items purchased in each category for both April and June. The mostly commonly purchased items are phone cards, sugar, tea, meat, and rice.

Table C-1: Consumption And Consumption Changes In Refugee Camp Households

	MEAN	SD	OBS
Food items			
Purchased sugar April	0.060.965	0.185	170
Purchased tea April	0.918	0.276	170
Purchased milk April	0.553	0.499	170
Purchased meat April	0.818	0.387	170
Purchased fish April	0.371	0.484	170
Purchased rice April	0.647	0.479	170
Purchased fruit April	0.347	0.477	170
Purchased coffee April	0.300	0.460	170
"Luxury" items			
Purchased home brewed alcohol April	0.012	0.108	170
Purchased beer (factory) April	0.047	0.212	170
Purchased tobacco April	0.106	0.309	170
Purchased mirat April	0.024	0.152	170
Purchased henna April	0.124	0.330	170
Purchased incense April	0.159	0.367	170
Purchased phone cards April	0.929	0.257	170
Purchased cloth April	0.312	0.465	170
Purchased soap April	0.618	0.487	170
Purchased diapers April	0.235	0.425	170
Purchased makeup April	0.224	0.418	170
Changes in purchases			
Number of foods purchased April	4.918	1.792	170
Number of foods purchased June	4.965	1.727	170
Number of luxuries purchased April	2.788	1.419	170
Number of luxuries purchased June	2.871	1.486	170

We also consider changes in quantities purchased of the most commonly purchased foods (Table C-2). For phone cards, sugar, and meat, the percentage of the population for whom purchases decreased between April and June was slightly higher than the percentage for whom they increased. For rice and tea, it was the opposite.

Table C-2: Consumption Quantity Changes, Refugee Data

Product	PROPORTION DECREASED	PROPORTION STAYED THE SAME	PROPORTION INCREASED
Phone cards	26	60	14
Sugar	32	47	21
Tea	8	79	13
Meat	27	52	21
Rice	13	65	21

It is unclear from these summary statistics whether or not these changes are due to the changes in the transfer environment. To elucidate this, we calculate the mean values of the change variables for refugee households that receive transfers and those that do not, and for those who said that there was a decrease in their transfer frequency between April and June (Table C-3). Clearly, those whose consumption decreased the most were those who do not receive transfers. These individuals consumed less of a variety of goods, on average, than those who receive transfers. This may be a result of lower spending by those receiving transfers, and therefore less opportunity to earn money for individuals without this source of income. Among those who receive transfers but had their transfer quantity decrease, their consumption of all goods either did not change, on average, or decreased. This is in contrast to those who had no change in transfer frequency, or who experienced increases in quantity of all items measured, with the exception of phone cards.

Table C-3: Change In Refugee Consumption Quantities Conditional On Transfers

	HAS TRANSFERS	NO TRANSFERS	P-VALUE DIFF	DECREASE TRANSFERS	NO CHG TRANSFERS	P-VALUE DIFF
Change in quantity purchased (-1, 0, 1)				*Of those with transfers:*		
Sugar	-0.025	-0.289	0.062*	-0.119	0.077	0.267
Tea	0.103	-0.065	0.043**	0.000	0.184	0.078*
Meat	0.018	-0.208	0.185	-0.194	0.292	0.021*
Rice	0.140	-0.031	0.188	0.000	0.250	0.144
Phone cards	-0.102	-0.140	0.714	-0.178	-0.038	0.323

*p<.10, **p<.05, *** p< .01

Overall, it appears that there were small decreases in refugee consumption as a result of decreases in transfers. It is possible that these decreases in consumption affected non-transfer recipients through decreases in consumption of these goods and others, and perhaps through decreased economy activity in general. Did these changes spill over the camp boundaries? The next section examines consumption changes within the household survey population in Kakuma Town and other locations.

Kakuma

We collected similar information regarding transfer behavior from non-refugee households (Table C-4). Very few of them stated that they received transfers at all, and for those who did receive transfers, the main mechanism was MPesa.

Table C-4: Transfer Behavior, Turkana Households

	MEAN KAKUMA TOWN	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA
Cash transfers received	0.144	0.082	0.081*	111	219
Uses informal transfers	0.062	0.000	0.296	16	18
Transfers have decreased	0.250	0.056	0.117	16	18
Amount of last transfer	7700.000	1239.056	0.004**	16	18

*p<.10, **p<.05, *** p< .01

Similarly, we requested households tell us about consumption behavior in April and June, using a list of products quite similar to those in the refugee survey. In the April consumption variables, two comparisons are notable. First, the Turkana purchase many fewer consumption items than the refugees – the refugees on average purchased almost five different items of those listed in April, while the Turkana purchase less than two. This suggests that they are more cash-poor than the refugees. Second, purchases are marginally higher of some items in the Kakuma Town subsample. These include purchase of water, fish, coffee, tobacco, and clothing. This does not translate into significantly larger differences in food or "luxury" items, but is suggestive of slightly higher consumption in Kakuma.

Interestingly, on average there are very small increases in the number of food and luxury goods purchased between April and June, but these increases are smaller (and marginally significantly so) in Kakuma. When we consider changes in quantity purchased for the goods that are relatively frequently purchased by the Turkana (sugar, tea, meat, and phone cards), there have been decreases in quantities purchased of these goods, and decreases that are larger in the Kakuma subsample.

Table C-5: Consumption Behavior, Household Survey

	MEAN KAKUMA TOWN	MEAN NON-KAKUMA	P-VALUE DIFF	OBS KAKUMA	OBS NON-KAKUMA	REFUGEE VALUE
Purchased sugar April	0.631	0.680	0.184	219	219	0.965
Purchased water April	0.108	0.018	1.000***	219	104	NA
Purchased tea April	0.568	0.607	0.244	219	104	0.918
Purchased milk April	0.297	0.297	0.504	219	104	0.553
Purchased meat April	0.207	0.242	0.240	219	104	0.818
Purchased fish April	0.054	0.009	0.994*	219	104	0.371
Purchased coffee April	0.009	0.005	0.688	219	104	0.300
Purchased home brewed alcohol April	0.045	0.032	0.725	219	104	0.012
Purchased factory produced alcohol April	0.009	0.009	0.496	219	104	0.047
Purchased tobacco April	0.243	0.187	0.882	219	104	0.106
Purchased khat April	0.000	0.014	0.108	219	104	0.024
Purchased incense April	0.018	0.027	0.301	219	104	0.159
Purchased phone cards April	0.180	0.201	0.327	219	104	0.929
Purchased clothing April	0.180	0.128	0.898	219	104	0.312
Number of food items purchased April	1.874	1.858	0.534	219	104	4.918
Number of luxury items purchased April	0.676	0.598	0.783	219	104	2.788
Change in food purchases	0.568	0.863	0.032**	219	104	
Change in luxury purchases	0.342	0.333	0.541	219	104	
Change in sugar purchased April-June	-0.310	-0.264	0.332	140	104	
Change in tea purchased April-June	-0.179	-0.075	0.192	120	104	
Change in meat purchased April-June	-0.353	-0.043	0.049**	46	104	
Change in phone card purchases April-June	-0.143	0.125	0.170	24	104	

*p<.10, **p<.05, *** p< .01. P-values in this table indicate the probability that the value in the Kakuma subsample is less than the value in the non-Kakuma subsample.

In a regression framework, this last finding remains robust to weighting the observations and clustering standard errors (Table C-6). This is particularly true for food items, where the number of different items purchased dropped significantly in the Kakuma subsample, as well as the quantity, though not significantly so.

Table C-6: Consumption Change Regressions, Household Survey

	SUGAR	TEA	MEAT	NUMBER OF FOOD ITEMS	NUMBER OF LUXURY ITEMS
a. Purchase good (0/1)					
In Kakuma town subsample	-0.1129*	-0.1466**	-0.0876*	-0.4299**	0.0225
	(0.0587)	(0.0587)	(0.0496)	(0.1754)	(0.0892)
N	330	330	330	330	330
r2	0.005	0.008	0.004	0.009	0
b. Increase, no change, or decrease in quantity					
In Kakuma town subsample	0.0483	-0.0796	-0.325		
	(0.1138)	(0.1070)	(0.2125)		
	198	159	63		
	0	0.002	0.02		

*p<.10, **p<.05, *** p< .01. Dependent variables in panel a. are indicators for whether a household changed their purchasing of a good (the difference between the binary indicator for June and April). In panel b., the dependent variable measures whether or not the quantity of a good purchased decreased (-1), remained the same (0), or increased (1). Observations are weighted by sampling probability and the standard errors are clustered at the village level.

D. Formal description of the simulation model

Introduction of Notation

Indices

- r: region index

- i: sector index

- s: skill index, we use $s = l$ for low skill, and $s = h$ for high skill.

- m: ethnicity (local/refugee) index, we use $m = 1$ for local and $m = 2$ for refugees.

Parameters

- $\alpha^{r,i,l}, \alpha^{r,i,h}$: CES production function parameters

- ρ: CES production function parameter

- $K^{r,i}$: fixed input of sector i product in region r

- $\xi^{r,i}$: labor input share of sector i product in region r

- θ^i: Cobb-Douglas consumption share of sector i output

- β: discount factor

- $C_1^{r,s,m}(r')$: moving cost friction from region r to region r', m and skill s

- $C_2^{i,s,m}(i')$: moving cost friction from sector i to sector i', for a worker of type m and skill s

- ν_1: regional moving cost shock (ϵ) scale parameter

- ν_2: sectoral moving cost shock (ε) scale parameter

Random Shocks

- ϵ_t^r: regional moving cost shock (extreme value type II with scale ν_1). These shocks are individual specific and iid random with no memory.

- ε_t^i: sectoral moving cost shock (extreme value type II with scale ν_2). These shocks are individual specific and iid random with no memory.

Variables

- $y_t^{r,i}$: output in sector i in region r

- $p_t^{r,i}$: price of sector i output in region r

- ϕ_t^r: price index in region r

- $L_t^{r,i,s,m}$: number of type m skill s workers in region r and sector i

- $w_t^{r,i,s}$: real wage of skill s workers in region r and sector i

- $U_{1,t}^{r,i,s,m}$: present discounted utility of type m skill s workers in region r and sector i after realizing the regional shock (before the sectoral shock)

- $U_{2,t}^{r,i,s,m}$: present discounted utility of type m skill s workers in region r and sector i after realizing the sectoral shock (after the regional shock)

- $V_{1,t}^{r,i,s,m}$: expected value of type m skill s workers in region r and sector i before the regional shock

- $V_{2,t}^{r,i,s,m}$: expected value of type m skill s workers in region r and sector i before the sectoral shock (after the regional shock)

- $\mu_{1,t}^{r,i,s,m}(r')$: probability of moving to region r', of a type m skill s worker in region r and sector i

- $\mu_{2,t}^{r,i,s,m}(i')$: probability of moving to sector i', of a type m skill s worker in region r and sector i

- $M_t^{r,i}$: expenditure on sector i product in region r

The Model

Production

Assume that there are N sectors and R locations in the economy. Skilled and unskilled workers are imperfectly substitutable. Local and refugee workers of the same skill level are perfect substitutes.

We define the Constant Elasticity of Substitution (CES) labor input of industry i in region r as

$$L_t^{r,i} = \left[\alpha^{r,i,l}(L_t^{i,r,l,1} + L_t^{i,r,l,2})^\rho + \alpha^{r,i,h}(L_t^{i,r,h,1} + L_t^{i,r,h,2})^\rho\right]^{\frac{1}{\rho}}, \quad (1)$$

where the output is a function of capital, $K^{r,i}$, and labor input:

$$yt^{r,i} = \left(L_t^{r,i}\right)^{\xi^{r,i}} \left(K^{r,i}\right)^{1-\xi^{r,i}}, \tag{2}$$

and wage equation for $m = 1, 2$ (for local or refugee worker):

$$w_t^{r,i,s} = \frac{p^{r,i}}{\phi_t^r} \frac{\partial y_t^{r,i}}{\partial L_t^{i,r,s,m}} \tag{3}$$

$$= \frac{p^{r,i}}{\phi_t^r} \frac{\alpha^{r,i,s} y_t^{r,i}}{(L_t^{i,r,s,1} + L_t^{i,r,s,2})}, \tag{4}$$

Utility

The utility function is Cobb-Douglas. We can use the real wages as money-metric instantaneous utility. Note that the workers maximize present discounted expected utility, not instantaneous utility.

We need to define the price index implied by the Cobb-Douglas utility function

$$\phi_t^r = \exp(\theta^i \sum_i \log(p^{r,i})), \tag{5}$$

here we are assuming identical preferences across workers in all regions. The instantaneous utility is simply the real wage

$$w_t^{r,i,s}, \tag{6}$$

The utility is the present discounted value

$$
\begin{aligned}
U_{1,t}^{r,i,s,m} &= w_t^{r,i,s} + \beta \max_{r'} \left(E_\varepsilon U_{2,t+1}^{r',i,s,m} + \epsilon_t^{r'} \right), & (7) \\
U_{2,t+1}^{r',i,s,m} &= \max_{i'} \left(E_\epsilon U_{1,t+1}^{r',i',s,m} + \varepsilon_t^{i'} \right). & (8)
\end{aligned}
$$

we define expected values as

$$
\begin{aligned}
V_{1,t}^{r,i,s,m} &= E_\epsilon U_{1,t}^{r,i,s,m}, & (9) \\
V_{2,t}^{r,i,s,m} &= E_\varepsilon U_{2,t+1}^{r,i,s,m}. & (10)
\end{aligned}
$$

Bellman equations

$$
\begin{aligned}
V_{1,t}^{r,i,s,m} &= w_t^{r,i,s} + \beta V_{2,t+1}^{r,i,s,m} + \Omega_{1,t}^{r,i,s,m}, & (11) \\
V_{2,t}^{r,i,s,m} &= V_{1,t+1}^{r,i,s,m} + \Omega_{2,t}^{r,i,s,m}. & (12)
\end{aligned}
$$

where

$$
\begin{aligned}
\Omega_{1,t}^{r,i,s,m} &= -\nu_1 \log \mu_{1,t}^{r,i,s,m}(r), & (13) \\
\Omega_{2,t}^{r,i,s,m} &= -\nu_2 \log \mu_{2,t}^{r,i,s,m}(i). & (14)
\end{aligned}
$$

The Ω equations are difficult to derive, they are based on the extreme value distribution.

Dynamic labor supply

Workers first choose region

$$
\mu_{1,t}^{r,i,s,m}(r') = \frac{\exp(\beta V_{2,t}^{r',i,s,m} - C_1^{r,s,m}(r'))/\nu_1}{\sum_{r''} \exp(\beta V_{2,t}^{r'',i,s,m} - C_1^{r,s,m}(r''))/\nu_1}, \qquad (15)
$$

then workers choose industries

$$
\mu_{2,t}^{r,i,s,m}(i') = \frac{\exp(V_{1,t}^{r,i',s,m} - C_2^{i,s,m}(i'))/\nu_2}{\sum_{i''} \exp(V_{1,t}^{r,i'',s,m} - C_2^{i,s,m}(i''))/\nu_2}, \qquad (16)
$$

Labor supply in time t

$$L_t^{r,i,s,m} = \sum_{i'} \left(\sum_{r'} L_{t-1}^{r',i',s,m} \mu_{1,t}^{r',i',s,m}(r) \right) \mu_{2,t}^{r,i',s,m}(i), \qquad (17)$$

We solve the Bellman equation by iteration.

Demand and Supply Equations for Non-traded sectors

Total expenditure sector i product in region r is

$$M_t^{r,i} = \theta^i \sum_{i'} \sum_{s} \sum_{m} w_t^{r,i',s,m} L_t^{r,i',s,m}, \qquad (18)$$

thus demand is equal to

$$\frac{M_t^{r,i}}{p_t^{r,i}}, \qquad (19)$$

supply is given by the production function above.

$$y_t^{r,i}, \qquad (20)$$

it is useful to derive the price at time t with respect to price in time 0

$$\frac{p_t^{r,i}}{p_0^{r,i}} = \frac{M_t^{r,i}}{M_0^{r,i}} \frac{y_0^{r,i}}{y_t^{r,i}}. \qquad (21)$$

Solution Algorithm

The solution algorithm has two components: (i) solution of the initial steady state and (ii) solution of the transition.

(i) Initial Steady State:

Guess the value $V_{1,0}^{r,i,s,m}$ and labor allocation $L_0^{r,i,s,m}$ arrays. Assume that all prices are equal to zero. Consider the parameters of the model as given.

- Calculate wages given $L_0^{r,i,s,m}$ using equation (4)

- Calculate probability of industry change given $V_{1,0}^{r,i,s,m}$

- Calculate $V_{2,0}^{r,i,s,m}$

- Calculate regional moving probabilities
- Calculate implied value $V_{1,0}^{r,i,s,m}$

Table 1: Calibration of Parameters

Parameter	Description	Value
β	discount factor	0.95
ν_1	scale parameter	0.6
ν_2	scale parameter	0.6
C_1	moving friction	3.22
C_2	moving friction	3.22
σ	elasticity of substitution	2.0
$\alpha^{r,i,l}$	CES share of unskilled	0.5
$\alpha^{r,i,h}$	CES share of skilled	0.5

- Calculate implied labor allocations given the guessed labor allocation and moving probabilities.

- Continue until the guessed values and labor allocation ($V_{1,0}^{r,i,s,m}$ and $L_0^{r,i,s,m}$) are equal to the implied values and labor allocations

(ii) Transition:

This procedure is similar to the steady state solution. Rather than guessing a values for a single time, we need to guess an time entire series. We also need to guess prices since they can change after a shock. we can start with the steady state labor allocation, we don't need to guess the series for labor allocation. See Artuc, Chaudhuri and McLaren (2008) for details.

(iii) Calibration Parameters:

We set the discount factor $\beta = 0.95$. We set the scale parameters $\nu_1 = \nu_2 = 0.6$, and the friction parameters $C_1^{r,s,m} = C_2^{i,s,m} = 3.22$. The size of Turkana region is calibrated to be equal to around 2.5 % of Kenya, where the total labor force is calibrated to be approximately 38 million. We assume that 15% of the labor force is skilled. The aid for the refugees is assumed to be about 50% of the unskilled wage. The elasticity of substitution between skilled and unskilled labor is equal to $\sigma = 2.0$, following previous

research. We assume that skilled and unskilled workers have equal CES shares in the production function, $\alpha^{r,i,l} = \alpha^{r,i,h} = 0.5$, and agents have equal consumption shares for traded and non-traded goods, $\theta^i = 0.5$. Labor share in the production function is assumed to be equal to $\xi^{r,i} = 0.6$.