The Human Capital Effects of Hosting Refugees: Evidence from Kagera

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Abstract

In the last decade the number of international child refugees significantly increased and in 2015 about half of the refugees were children. According to the available literature the impact of forced migration on human capital in host countries has still to be explored. This paper estimates both the short and the long term human capital consequences of hosting refugees fleeing from the genocides of Rwanda and Burundi in the Kagera region of Tanzania between 1991 and 2010. The study uses longitudinal data from the Kagera Health and Development Survey and the identification strategy relies on the fact that forced migration causes an exogenous shift in human capital supply. Preliminary results suggest that the impact of hosting refugees on children living in Kagera decreases child labor in the short run (between 1991 and 1994). The results are heterogeneous across genders and class ages. The study aims at understanding the mechanisms behind the variation in human capital due to the forced migration shock exploring different channels.

1 Introduction

The unavoidable forced migration is one of the main consequences of any civil conflict which is also a priority in the 2030 Agenda for Sustainable Development. The United Nations Population Division and Affairs (2015) reports that in 2015 the total global stock of international migrants was about 244 million, of which about 65.3 million are forced migrants and about 21 million are refugees (half of whom are children younger than 18 years old).

About 1 million refugees moved to Tanzania in 1993-1998 due to the violent civil conflict that spread in 1993-1994 in Burundi and Rwanda. These conflicts caused hundreds of thousands of casualties in just a few months. In some regions of Tanzania, refugees outnumbered natives five to one (Whitaker (2002)). The shock was exacerbated by a series of natural topographic barriers (chain of mountains, natural reserves, lakes) which separated the eastern part of northern Tanzania from the west. According to Ruiz and Vargas-Silva (2016) these geographical barriers in addition to the proximity to both Uganda and Rwanda borders effectively resulted in a natural experiment in which the western region was heavily affected by the refugee inflow.

The Kagera region is located in the north-western corner of Tanzania bordered by neighboring countries Uganda, Rwanda and Burundi. It is also the most remote region from the capital Dar es Salaam. The region is typically rural with agriculture serving as the main economic activities where it employs about 80 percent of the working population Baez (2011). Its primary production include banana and coffee in combination with rain-fed annual crops, maize, sorghum and cotton **?**. Fishing and livestock farming are culturally important, but despite their potential they contribute little to the regions' economy and both sector remain underdeveloped. According to the 2013 census the total population of Tanzania stood at 48 million of which 44.8 % are under the age of 15. Despite existing regulations against child labour, the phenomenon is still very widespread with about 34.5% (5,006,889) of children aged 5-17 involved in some form of economic activities. The incidence of child labour is

also very predominant in poor and rural areas. According to the 2014 Tanzania Child Labour Survey report, child labour intensifies as one move away from the capital of Dar er Salaam.

This paper estimates the human capital consequences of hosting refugees in Tanzania (Kagera region). In particular, it studies the short and long term impact of the refugees influx on child labor and youth employment. Also, this study seeks to explore which mechanisms cause this variation in human capital accumulation. We explore the impact of changes in school enrollment, in food prices and in the sector composition of the local labor market.

The impact of migration on host countries

Currently there is a large literature on the impact of voluntary migration on host countries studying wide range of immigrant outcomes. The assimilation of immigrants with the host societies has been a source of much research focusing on outcomes such as labor market outcomes, education, and health to name a few. (Whitaker (2002); Hansen and Lofstrom (2003); Bolesta (2002); Bevelander and Lundh (2007); Bevelander and Lundh (2007)).

The impact of immigrants on the labor market performance of the natives is another well investigated area. (Chiswick (1989); Card (1990); Altonji and Card (1991); LaLonde and Topel (1991); Pischke and Velling, 1994; Borjas et al. (1997); Friedberg (2001); Fairlie and Meyer (2003)).

But closer to the topic of this paper is the stream of the literature that focuses on the impact of forced migration in host countries. Ruiz and Vargas-Silva (2016) find that forced migration shock significantly decreases the probability of being an employee outside the household. Maystadt et al. (2012) provides evidence that on average there are positive impacts of the refugee influx on the consumption of the households. They find an increase in agricultural labor productivity and income diversification among the poor. Alix-Garcia and Saah (2010) find more volatile prices of agricultural commodities, but positive effects in non-food consumption.

The impact of migration on human capital

In terms of the impacts of migration on school attainments and education of the immigrants there is a vast literature providing mixed evidence. In looking into the impact of migration on educational attainment, one aspect that has received ample attention is with the case of second generation migrants. Gang and Zimmermann (2000) using the German data find that both ethnicity and the size of diaspora affects the school attainments of second generation migrants. Trejo (2003) using current population survey in the US, finds that improvements in earnings for the second generation Mexican in the US can be explained by the return to their human capital that was acquired in the US. Algan, Dustmann, Glitz, and Manning, (2010) provide evidence that Second-Generation Immigrants in France, Germany and the United Kingdom have smaller gaps with natives in educational attainment compared to first generation migrants. In the case of Western European destination countries, Heath and Cheung (2007) find that controlling for parental class and parental education, second-generation minorities whose parents came from less-developed non-European origins have substantially lower test scores or exam results during the period of compulsory schooling than do the majority groups in the countries of destination. Betts and Lofstrom (2000) find that the upper half of the immigrant population has been and continues to be at least as highly educated as the upper half of the native population. Observed decline in mean level of immigrants? education relative to natives reflects decline in relative educational status of the bottom half of the immigrant population. Educational attainment increased among immigrants in absolute terms but decline in relative terms.

The literature studying the impact of forced migration (due to conflict) on human capital however scarce suggest that forced migration has negative impacts on school attainment in the context of conflict. (Chamarbagwala and Morán (2011); Balcells and Justino (2014); Verwimp and Van Bavel (2014)).

Moreover, the impact of forced migration on human capital in host countries has

still to be explored. To the best of our knowledge the only paper that addresses this issue is Baez (2011) finds that childhood exposure to this massive arrival of refugees in Kagera reduces, schooling by 0.2 years (7.1%) and literacy by 7 percentage points (8.6%) and undermines child health.

2 Data description

This study combines both the Kagera Health and Development Survey (KHDS) and the Tanzania Panel Survey.

The KHDS survey is longitudinal and includes information about households in different areas of Kagera before and after the forced migration shock (for 1991, 1994, 2004, 2010). Using 2010 data (about 17 years after the shock) allows us to also explore the impact of hosting refugees on human capital in the long run. The survey has detailed information on children labor outcomes as it specifies if the child is enrolled in school and in which type of labor activity he is involved (agricultural, non-agricultural self-employment, wage employment). The Tanzania Panel Survey includes information about school enrollment, if the child has worked in the previous 7 days and on how many hours he has worked.

Table 1: Summary statistics

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Share of female	0.52	0.5	0	1	14321
Age	25.082	19.57	0	110	14289
Paid employment	0.074	0.261	0	1	11463
Farm work	0.298	0.457	0	1	6950
Self Employment	0.069	0.253	0	1	11900
Child to adult ratio	1.237	1.022	0	7	15784
Child Labor	0.025	0.156	0	1	16580
Youth Employment (15<Age<24)	0.068	0.252	0	1	16580
School Enrolment (5<Age<17)	0.593	0.491	0	1	5036
Log(1/Distance to Brundi)	-4.639	1.082	-5.335	0.511	15994
Log(1/Distance to Rwanda)	-4.193	0.902	-4.868	0.511	15994
Household Size	8.149	4.383	1	34	16580
District population per KM2	299.259	394.557	23.415	1010.85	16580
Rain Sd	3.269	0.518	2.562	4.489	16574
Ward	69.037	40.102	1	131	16580
Education level of the HH head	1.027	0.114	0	2	16570
HH head is married	0.134	0.072	0	1	16579
HH head is female	0.065	0.044	0	1	16579

Table 2: **Variables description**

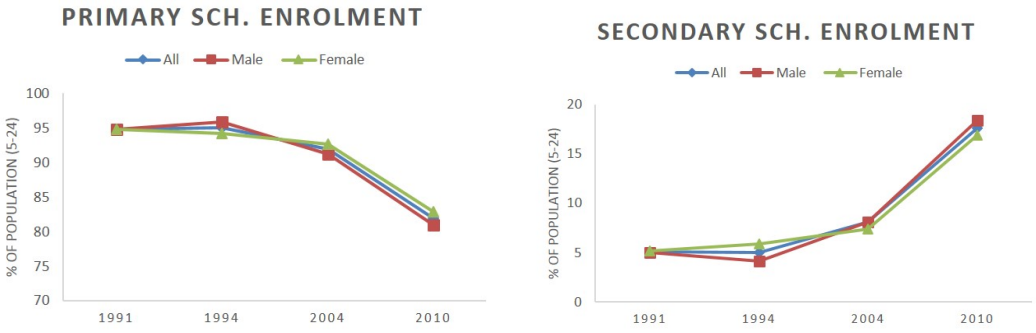
Variables	Description
Household variables	
Education of HH head	Equal to 0 if HH head has no eduction, 1 if HH head has some primary eduction and 2 if HH head has some secondary or university education
Female head (Dummy)	Equal to 1 if HH head is female 0 otherwise
Married head (Dummy)	Equal to 1 if HH head is married , 0 otherwise
Household size	Total number of persons in household
Share of children in the household	Total number of children divided by the total number of adults in a household
Individual variables	
Age	Age of the individual
Sex (Dummy)	Sex of the individual; Equal to 1 if Female and 0 if Male
Ward	Categorical variable defining the ward where the individual works
Farming and Livestock(Dummy)	Equal to 1 if individual was engaged in farming or livestock
Self-employment(Dummy)	Equal to 1 if individual was worked for self/household non-farm business
Employee(Dummy)	Equal to 1 if individual worked for someone outside the household
District variables	
District population	Total number of residence in a district(Source: National Bureau of Statistics, Tanzania)
Average rainfall	Standard deviation of the daily precipitation of district for the previous five years(Source: NASA predictions database)
Shock related variables	
Distance to Burundi	Euclidean distance from base community to border with Burundi in kilometers(Source: Fisher,2004)
Distance to Rwanda	Euclidean distance from base community to border with Rwanda in kilometers(Source: Fisher,2004)

Figure 1 below shows the school enrolment trends between 1991 and 2010. Primary school enrolment in Figure 1a decreases over time after the shock due to the influx of refugees, especially in the long-run (2004-2010) of about 15 percentage points. Both secondary and tertiary school enrolment instead steadily increase. This last pattern is partly to due to the school reform that took place in Tanzania in 1994 and that will be accounted for in the analysis controlling for year fixed effects.

Figure 2 below describes the trends of the children-in-work shares between 1991 and 2010. The graphs suggest that in the long-run child labor increases, especially in non-agricultural self-employment and in wage employment (Figures 2b, c):

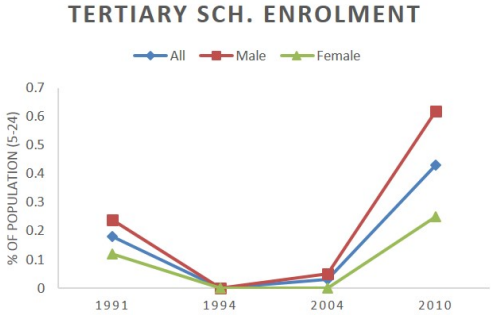
Figure 3 below describes the trends of the youth employment shares (age 15-24) between 1991 and 2010. The graphs suggest that in the long-run youth employment increases, especially in non-agricultural self-employment and in wage employment (Figures 3b, c).

Figure 1: School enrolment rates for children between 7-14 years old by year



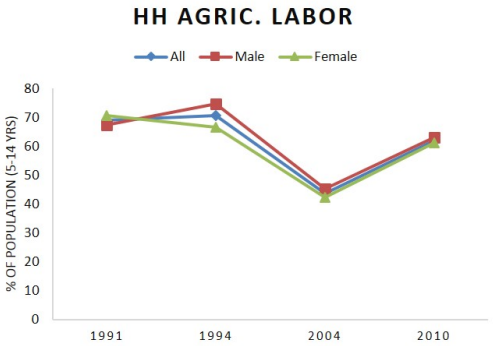
a) Primary

b) Secondary

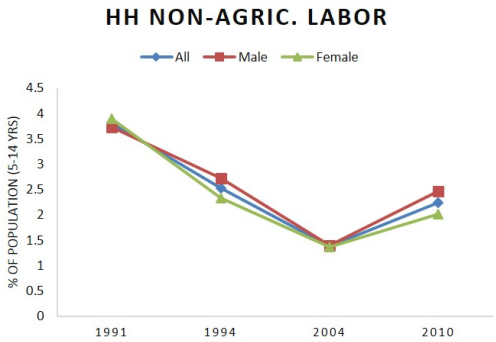


c) Tertiary

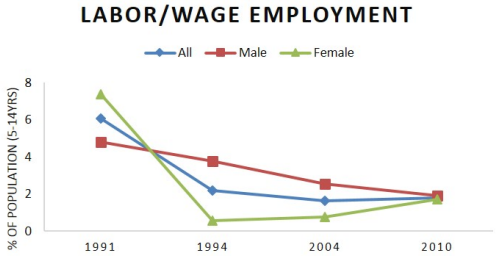
Figure 2: Share of children between 7-15 years old in work by economic sector and year



a) Agriculture

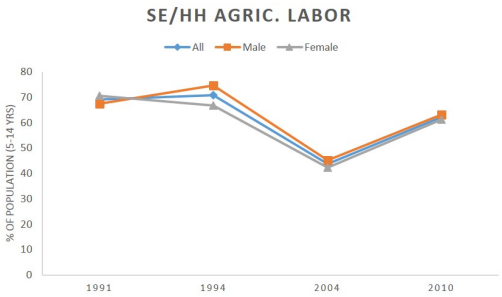


b) Non-agricultural S.E.

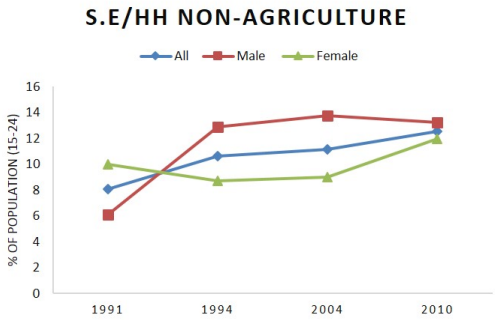


c) Wage employment

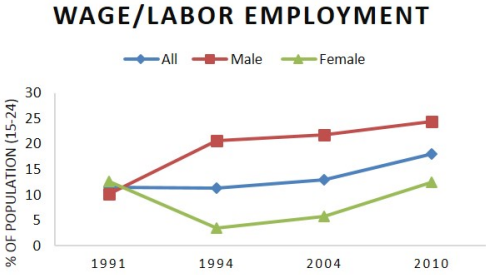
Figure 3: Share of population between 15-24 years old in work by economic sector and year



a) Agricultural



b) Non-agricultural S.E.



c) Wage employment

3 Empirical Strategy

3.1 Estimation Strategy

We estimate the impact of the forced migration shock in the Kagera region both in the short and in the long-run using the model below similarly to Ruiz and Silva (2015):

$$Y_{it} = \alpha_1 + \delta_i \gamma_w + \alpha_3 t + \alpha_4 D_{it} + \alpha_5 X_{it} + u_{it} \quad (1)$$

Y_{it} is the binary outcome of interest for individual i at time t (child/youth being in work, school enrollment). δ_i is the individual fixed effect, γ_w represents the ward dummies, t is the time dummy (2010 = 1, that is, the after "shock" period). D_{it}: is the measure of the intensity of the forced migration shock and is the log of the inverse of the distance to the border (for the first period this variable is set to zero), X_{it} are the individual, household and regional control variables listed in Table 2.

3.2 Identification Strategy

The identification of the forced migration impact on human capital in Kagera exploits the exogenous nature of the migration shock from Burundi and Rwanda. The civil conflicts that happened in those countries in between 1991-1993 caused an exogenous migration shock in the Tanzanian region of Kagera. Also, location of forced migrants was affected by a series of geographical barriers and logistical decisions and implied that refugees were concentrated in the West region of Kagera. This set up generates a natural experiment which enables the exploration of the impacts of forced migration on human capital. The inverse of the distance from the community of residence during the first round of the survey to the borders of Rwanda and Burundi is used to identify the impact of the forced migration shock on the outcomes of interest similarly to Baez (2011) and Ruiz and Silva (2015). Ruiz and Silva (2015) have already showed that the distance was not capturing other differences between communities as there is no significant linear relationship between the educational level of individuals in the

pre-shock period (a proxy for economic conditions) and the distances from the borders.

4 Main Results

4.1 Short term effects

In this section we report some basic results that show the impact of the forced migration shock on both child labor and youth employment in the short-run (1991-1994), right after the exposure to the large influx of refugees in Kagera. All the regressions include individual fixed effects and are run on children who were between 7 and 15 years old in that time period.

Table **??** shows the impact of the refugee shock on child labor using as an indicator of the shock both the inverse of the distance from Burundi and the inverse of the distance from Rwanda. The results suggest that right after the influx of refugees in Kagera, being one Km closer the border with Rwanda decreased the probability of a child of being working in the previous 7 days of 6 percentage points at the 10% level of significance.

Table 3 shows that the results are heterogeneous for children in different class ages. The probability of being in the workforce decreases of about 6 percentage points for younger children between 7 and 12 years old, while it increased of about 28 percentage points for older children between 13 and 15 years old. These results hold both when using as a measure of the refugee shock the inverse of the distance from Burundi and from Rwanda and are significant at the 1% level of significance.

Table 4 shows that the impact of the refugee shock is heterogeneus also across genders. The probability of a boy of being in work in the past week decreases of about 10 percentage points when children get closer to the border with Rwanda or Burundi, while being more exposed to the migration shock does not have any significant effect on girls.

Table 5 looks for heterogenous age effects of the refugee shock for boys and girls separately. The findings show that the probability of working decreases when being in

the 7-12 class age, both for boys and girls. For girls of about 20 percentage points, both when considering as an explanatory variable the inverse of the distance to Burundi and the inverse of the distance to Rwanda. For boys, of about 20 percentage points when looking at the distance from Rwanda and 14 percentage points when looking at the distance from Burundi. All the results are significant at the 1 percent level of significance.

Table 6 shows the impact of the forced migration shock on the probability of a child to work in a specific economic sector. The results suggest that children working in agriculture are those who are mostly affected by the shock. The probability of a child to be working decreases of about 5 percentage points, both when using as a proxy for the shock the inverse of the distance from Rwanda and from Burundi. Results are significant at the 5 % level of significance.

Finally Table **??** shows the impact of the forced migration shock on youth employment for young individuals between 15 and 25 years old by economic sector. The results suggest that a unitary increase of the inverse of the distance to the border with Rwanda and the border with Burundi significantly increases the probability of a young individual of being working in agriculture of about 4 percentage points, while it significantly decreases the probability of being a wage employee of about 2 percentage points.

Overall, the preliminary results show that the intense influx of refugees that affected Rwanda between 1991 and 1994 decreased child labor, in particular for boys and for younger children. The results also suggest that this effect may be due to a decrease in the employment of children in the agricultural sector. Further analysis will explore the mechanisms behind these results e.g. changes in household income due to the shock or if to changes in household schooling decisions. Also, the preliminary results show that the large influx of refugees in Kagera redistributed young workers to different economic sectors, decreasing their participation to the wage employees sector and increasing it in more informal agricultural activities.

Table 3: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by class age between 1991 and 1994 (short-run)**

VARIABLES	(1) child labor 7-12 Burundi	(2) child labor 13-15 Burundi	(3) child labor 7-12 Rwanda	(4) child labor boys 13-15 Rwanda
Ishock_int_bu	-0.058**	0.287***		
	(0.026)	(0.041)		
Ishock_int_rw			-0.075**	0.267***
			(0.031)	(0.050)
Child F.E.	yes	yes	yes	yes
Year F.E.	yes	yes	yes	yes
Observations	805	213	805	213
R-squared	0.321	0.986	0.329	0.976
Number of hhid	707	201	707	201

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 4: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by sex between 1991 and 1994 (short-run)**

VARIABLES	(1) child labor girls Rwanda	(2) child labor boys Rwanda	(3) child labor girls Burundi	(4) child labor boys Burundi
Ishock_int_rw	-0.048	-0.120**		
	(0.040)	(0.051)		
Ishock_int_bu			-0.020	-0.108***
			(0.033)	(0.037)
Child F.E.	yes	yes	yes	yes
Year F.E.	yes	yes	yes	yes
Observations	527	491	527	491
R-squared	0.228	0.406	0.219	0.419
Number of hhid	442	443	442	443

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 5: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by sex and class age between 1991 and 1994 (short-run)**

VARIABLES	(1) child labor girls Rwanda	(2) child labor boys Rwanda	(3) child labor girls Burundi	(4) child labor boys Burundi
Ishock_int_rw	0.122**	0.064		
	(0.049)	(0.078)		
I7_12RW	-0.190***	-0.205***		
	(0.040)	(0.063)		
D712	-1.197***	-1.202***	-1.159***	-1.002***
	(0.270)	(0.276)	(0.258)	(0.334)
Ishock_int_bu			0.120***	0.022
			(0.045)	(0.072)
I7_12BU			-0.170***	-0.146**
			(0.035)	(0.069)
Child F.E.	yes	yes	yes	yes
Year F.E.	yes	yes	yes	yes
Observations	527	491	527	491
R-squared	0.457	0.515	0.457	0.509
Number of hhid	442	443	442	443

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 6: **Linear probability model estimates of the effect of intensity of the refugee shock on child labor by type of work between 1991 and 1994 (short-run)**

VARIABLES	(1) Wage employment Burundi	(2) Agriculture Burundi	(3) Non agric. S.E. Burundi	(4) Wage employment Rwanda	(5) Agriculture Rwanda	(6) Non agric. S.E. Rwanda
Ishock_int_bu	-0.004	-0.055**	-0.002			
	(0.004)	(0.026)	(0.004)			
Ishock_int_rw				-0.009	-0.067**	0.004
				(0.006)	(0.030)	(0.006)
Child F.E.	yes	yes	yes	yes		
Year F.E.	yes	yes	yes	yes		
Observations	1,018	1,018	1,018	1,018	1,018	1,018
R-squared	0.036	0.371	0.186	0.043	0.372	0.187
Number of hhid	883	883	883	883	883	883

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

4.2 Long term effects

Using the data from 2004 and 2010, we test the persistency of the refugee shock of 1993. The results show that as time passes, the decrease in child labor trend that we observed in the short term disappears. In fact, as we get closer to the borders with Burundi and Rwanda, the likelihood of child labor increases over time. This effect holds across both genders and different age groups.

Table 7: **Linear probability model estimates of the effect of intensity of the refugee shock on child labor between over (1991 and 2004-2010) (long-run)**

	(1)	(2)
VARIABLES	Burundi	Rwanda
	2004	
Ishock_int_bu	0.066***	
	(0.011)	
Ishock_int_rw		0.076***
		(0.013)
Observations	4,209	4,209
R^2	0.245	0.246
	2010	
Ishock_int_bu	0.017**	
	(0.007)	
Ishock_int_rw		0.020***
		(0.007)
Observations	4,649	4,649
R^2	0.202	0.201

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 8: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor across age between 1991 and 2004-2010 (long-run)**

VARIABLES	(1) child labor 7-12 Burundi	(2) child labor 13-15 Burundi	(3) child labor 7-12 Rwanda	(4) child labor 13-15 Rwanda
		2004		
Ishock_int_bu	0.066***	0.062***		
	(0.014)	(0.010)		
Ishock_int_rw			0.079***	0.065***
			(0.016)	(0.012)
Observations	3,206	1,003	3,206	1,003
R^2	0.266	0.129	0.267	0.127
		2010		
Ishock_int_bu	0.024***	-0.012		
	(0.007)	(0.009)		
Ishock_int_rw			0.028***	-0.014
			(0.008)	(0.010)
Observations	3,703	946	3,703	946
R^2	0.221	0.061	0.220	0.059

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 9: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by gender between 1991 and 2004-2010 (long-run)**

VARIABLES	(1) child labor girls Rwanda	(2) child labor girls Burundi	(3) child labor boys Rwanda	(4) child labor boys Burundi
			2004	
Ishock_int_rw	0.081***		0.068***	
	(0.013)		(0.015)	
Ishock_int_bu		0.070***		0.061***
		(0.012)		(0.013)
Observations	2,099	2,099	2,110	2,110
R^2	0.265	0.265	0.231	0.231
			2010	
Ishock_int_rw	0.021***		0.018**	
	(0.008)		(0.009)	
Ishock_int_bu		0.018**		0.016**
		(0.007)		(0.008)
Observations	2,308	2,308	2,341	2,341
R^2	0.218	0.219	0.186	0.188

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 10: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by age and gender between 1991 and 2004-2010 (long-run)**

VARIABLES	(1) child labor girls Rwanda	(2) child labor girls Burundi	(3) child labor boys Rwanda	(4) child labor boys Burundi
		2004		
Ishock_int_rw	0.078***		0.050***	
	(0.015)		(0.017)	
I6_12RW	0.004		0.022*	
	(0.013)		(0.012)	
D612	0.121***	0.120***	0.138***	0.120**
	(0.041)	(0.041)	(0.046)	(0.046)
Ishock_int_bu		0.068***		0.048***
		(0.013)		(0.015)
I6_12BU		0.003		0.015
		(0.011)		(0.011)
Observations	2,099	2,099	2,110	2,110
R^2	0.270	0.269	0.235	0.233
		2010		
shock_int_rw	-0.042***		-0.042**	
	(0.015)		(0.017)	
Ishock_int_rw	0.006		-0.016	
	(0.011)		(0.014)	
I4_12RW	0.020		0.040***	
	(0.012)		(0.013)	
D412	0.295***	0.297***	0.313***	0.295***
	(0.041)	(0.041)	(0.046)	(0.045)
shock_int_bu		-0.046***		-0.046***
		(0.013)		(0.016)
Ishock_int_bu		0.004		-0.010
		(0.010)		(0.013)
I4_12BU		0.018		0.031***
		(0.011)		(0.011)
Observations	2,308	2,308	2,341	2,341
R^2	0.238	0.240	0.204	0.205

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

5 Secondary Results - Youth employment

The refugee arrival in Kegara had increased the youth employment in the agriculture sector. The impact on wage employment or self employment is not statistically significant. However this positive impacts disappear when considering the long term effects.

Table 11: **Linear probability model estimates of the effect of intensity of the refugee shock on youth employment between 1991 and 1994 (short-run) by gender**

VARIABLES	(1) Burundi Total	(2) Rwanda Total	(3) Burundi Girls	(4) Rwanda Girls	(5) Burundi Boys	(6) Rwanda Boys
Ishock_int_bu	-0.000			0.001		-0.002
	(0.006)			(0.010)		(0.006)
Ishock_int_rw		-0.001	0.000		-0.003	
		(0.008)	(0.012)		(0.008)	
Observations	4,116	4,116	2,145	2,145	1,971	1,971
R^2	0.063	0.063	0.062	0.062	0.072	0.072
Number of hhid	2,788	2,788	1,467	1,467	1,324	1,324

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 12: **Linear probability model estimates of the effect of intensity of the refugee shock on youth employment between across sectors, between 1991 and 1994 (short-run)**

VARIABLES	(1) employee Burundi	(2) employee Rwanda	(3) farm worker Burundi	(4) farm worker Rwanda	(5) selfemp Burundi	(6) selfemp Rwanda
Ishock_int_bu	-0.004		0.016*		-0.006	
	(0.005)		(0.009)		(0.005)	
Ishock_int_rw		-0.006		0.010		-0.008
		(0.006)		(0.012)		(0.006)
Constant	0.309	0.287	1.057**	0.988*	-0.034	-0.048
	(0.189)	(0.186)	(0.506)	(0.526)	(0.260)	(0.259)
Observations	4,116	4,116	4,116	4,116	4,116	4,116
R^2	0.032	0.032	0.022	0.020	0.040	0.041
Number of hhid	2,788	2,788	2,788	2,788	2,788	2,788

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 13: **Linear probility model estimates of the effect of intensity of the refugee shock on youth employment between 1991 and 2010 (long-run) by gender**

VARIABLES	(1) Burundi Total	(2) Rwanda Total	(3) Burundi Girls	(4) Rwanda Girls	(5) Burundi Boys	(6) Rwanda Boys
Ishock_int_bu	-0.025***			-0.027**		-0.030***
	(0.005)			(0.010)		(0.011)
Ishock_int_rw		-0.027***	-0.029**		-0.032**	
		(0.005)	(0.011)		(0.013)	
Constant	-0.097	-0.085	-0.831	-0.896	-7.294***	-7.707***
	(0.436)	(0.426)	(0.525)	(0.541)	(1.903)	(1.854)
Observations	3,015	3,015	1,556	1,556	1,459	1,459
R^2	0.526	0.525	0.511	0.516	0.481	0.490
Number of hhid	2,643	2,643	1,457	1,457	1,350	1,350

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 14: **Linear probility model estimates of the effect of intensity of the refugee shock on youth employment between 1991 and 2010 (long-run)**

VARIABLES	(1) employee Burundi	(2) employee Rwanda	(3) farm worker Burundi	(4) farm worker Rwanda	(5) selfemp Burundi	(6) selfemp Rwanda
Ishock_int_bu	0.003		-0.033***		-0.000	
	(0.003)		(0.005)		(0.003)	
Ishock_int_rw		0.003		-0.038***		-0.001
		(0.004)		(0.005)		(0.003)
Observations	3,015	3,015	3,015	3,015	3,015	3,015
R^2	0.170	0.170	0.446	0.450	0.101	0.101
Number of hhid	2,643	2,643	2,643	2,643	2,643	2,643

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

6 Mechanisms

6.1 Schooling

The paragraph below shows the impact of the forced migration shock in Kagera on school enrolment of children living in the host communities. Tables 15-18 explore the short-run impact while Tables 19-**??** explore the long-run effect.

6.1.1 Short-run

Table 15 shows that in the short-run, between 1991 and 1994 the probability of a Kagera native child decreased of about 5 percentage points at a 5 percent level of significance when being one Km closer to Rwanda. Table 26 suggests that only girls are affected by the shock.

Table 20 shows that the immigration impact has heterogeneous effects class ages and that only childre enrolled in primary school are significantly affected (column 3). Their probability of being enrolled decreases of 7.6 percentage points when being one Km closer to the border with Rwanda and significant at the 5 percent level. The impact is lower even if still negative and significant when looking at distance from Burundi in column 1.

The results in Table 21 column 1 shows that only girls are affected by the forced immigration shock and their probability of being enrolled in school significantly decreases of about 11 percentage points when closer to the border with Rwanda if they are enrolled in primary school.

Table 15: **Linear probability model estimates of the effect of intensity of the refugee shock on schooling between 1991 and 1994 (short-run)**

	(1)	(2)
VARIABLES	Burundi	Rwanda
Ishock_int_bu	-0.016	
	(0.018)	
Ishock_int_rw		-0.047**
	(1.076)	(1.034)
Observations	1,018	1,018
R^2	0.296	0.308
Number of hhid	883	883

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 16: **Linear probability model estimates of the effect of intensity of the refugee shock on schooling by gender between 1991 and 1994 (short-run)**

	(1)	(2)	(3)	(4)
VARIABLES	school enrol girls Rwanda	school enrol girls Burundi	school enrol boys Rwanda	school enrol boys Burundi
Ishock_int_rw	-0.049*		-0.045	
	(0.026)		(0.047)	
Ishock_int_bu		-0.010		-0.021
		(0.028)		(0.036)
Observations	527	527	491	491
R^2	0.335	0.322	0.304	0.295
Number of hhid	442	442	443	443

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 17: **Linear probility model estimates of the effect of intensity of the refugee shock on schooling by age between 1991 and 1994 (short-run)**

VARIABLES	(1) child labor 7-12 Burundi	(2) child labor 13-15 Burundi	(3) child labor 7-12 Rwanda	(4) child labor boys 13-15 Rwanda
Ishock_int_bu	-0.036*	-0.008		
	(0.021)	(0.045)		
Ishock_int_rw			-0.076***	0.011
			(0.021)	(0.049)
Observations	805	213	805	213
R^2	0.375	0.905	0.396	0.905
Number of hhid	707	201	707	201

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 18: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by age and gender between 1991 and 1994 (short-run)**

VARIABLES	(1) child labor girls Rwanda	(2) child labor girls Burundi	(3) child labor boys Rwanda	(4) child labor boys Burundi
Ishock_int_rw	0.039		-0.013	
	(0.034)		(0.067)	
I6_12RW	-0.113***		-0.036	
	(0.033)		(0.053)	
D612	-0.001	0.016	-0.125	-0.054
	(0.125)	(0.129)	(0.170)	(0.151)
Ishock_int_bu		0.064*		-0.005
		(0.034)		(0.047)
I6_12BU		-0.100***		-0.018
		(0.030)		(0.041)
Observations	527	527	491	491
R^2	0.464	0.447	0.306	0.296
Number of hhid	442	442	443	443

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

6.1.2 Long-run

Tables 19-26 show that also in the longer run between 1991 and 2004 the probability of a child living in a host community in Kagera decreased, especially for younger children enrolled in primary schools, both for boys and girls.

Similarly, tables 19-26 show that the probability of being enrolled in school in Kagera decreased also between 1994-2010 and especially for children enrolled in primary school, both for boys and girls.

Table 19: **Linear probility model estimates of the effect of intensity of the refugee shock on schooling between 1991 and 2004 (long-run)**

	(1)	(2)
VARIABLES	Burundi	Rwanda
shock_int_bu	0.003	
	(0.004)	
Ishock_int_bu	-0.005*	
	(0.003)	
shock_int_rw		0.005
		(0.005)
Ishock_int_rw		-0.007*
		(0.004)
Observations	2,659	2,659
R^2	0.026	0.028

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 20: **Linear probility model estimates of the effect of intensity of the refugee shock on schooling by age between 1991 and 2004 (long-run)**

VARIABLES	(1) child labor 7-12 Burundi	(2) child labor 13-15 Burundi	(3) child labor 7-12 Rwanda	(4) child labor boys 13-15 Rwanda
shock_int_bu	0.001	0.010		
	(0.002)	(0.010)		
Ishock_int_bu	-0.002	-0.022**		
	(0.002)	(0.009)		
shock_int_rw			0.001	0.023*
			(0.003)	(0.013)
Ishock_int_rw			-0.002	-0.032**
			(0.003)	(0.012)
Constant	0.965***	1.213***	0.969***	1.388***
	(0.046)	(0.141)	(0.061)	(0.194)
Observations	2,192	467	2,192	467
R^2	0.020	0.059	0.021	0.072

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 21: **Linear probability model estimates of the effect of intensity of the refugee shock on schooling by gender between 1991 and 1994 (short-run)**

VARIABLES	(1) school enrol girls Rwanda	(2) school enrol girls Burundi	(3) school enrol boys Rwanda	(4) school enrol boys Burundi
shock_int_bu	0.001	0.010		
	(0.002)	(0.010)		
Ishock_int_bu	-0.002	-0.022**		
	(0.002)	(0.009)		
shock_int_rw			0.001	0.023*
			(0.003)	(0.013)
Ishock_int_rw			-0.002	-0.032**
			(0.003)	(0.012)
Constant	0.965***	1.213***	0.969***	1.388***
	(0.046)	(0.141)	(0.061)	(0.194)
Observations	2,192	467	2,192	467
R^2	0.020	0.059	0.021	0.072

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 22: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by age and gender between 1991 and 2004 (long-run)**

VARIABLES	(1) child labor girls Rwanda	(2) child labor girls Burundi	(3) child labor boys Rwanda	(4) child labor boys Burundi
shock_int_rw	-0.002		0.011	
	(0.004)		(0.007)	
Ishock_int_rw	-0.009*		-0.022*	
	(0.005)		(0.011)	
I6_12RW	0.008*		0.013*	
	(0.004)		(0.007)	
D612	0.031*	0.031*	0.062**	0.062**
	(0.017)	(0.017)	(0.030)	(0.030)
shock_int_bu		-0.003		0.008*
		(0.005)		(0.004)
Ishock_int_bu		-0.008		-0.017*
		(0.005)		(0.009)
I6_12BU		0.007*		0.012*
		(0.004)		(0.006)
Observations	1,302	1,302	1,357	1,357
R^2	0.029	0.029	0.056	0.053

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 23: **Linear probility model estimates of the effect of intensity of the refugee shock on schooling between 1991 and 2010 (long-run)**

	(1)	(2)
VARIABLES	Burundi	Rwanda
shock_int_bu	0.004*	
	(0.002)	
Ishock_int_bu	-0.008***	
	(0.002)	
shock_int_rw		0.008**
		(0.003)
Ishock_int_rw		-0.009***
		(0.002)
Observations	3,715	3,715
R^2	0.036	0.039

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 24: **Linear probility model estimates of the effect of intensity of the refugee shock on schooling by age between 1991 and 2010 (long-run)**

VARIABLES	(1) child labor 7-12 Burundi	(2) child labor 13-15 Burundi	(3) child labor 7-12 Rwanda	(4) child labor boys 13-15 Rwanda
shock_int_bu	0.003	0.004		
	(0.002)	(0.007)		
Ishock_int_bu	-0.003**	-0.018***		
	(0.001)	(0.004)		
shock_int_rw			0.002	0.016*
			(0.002)	(0.010)
Ishock_int_rw			-0.004**	-0.022***
			(0.002)	(0.005)
Observations	2,853	862	2,853	862
R^2	0.020	0.061	0.021	0.068

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 25: **Linear probility model estimates of the effect of intensity of the refugee shock on schooling by gender between 1991 and 2010 (long-run)**

VARIABLES	(1) school enrol girls Rwanda	(2) school enrol girls Burundi	(3) school enrol boys Rwanda	(4) school enrol boys Burundi
shock_int_rw	0.005		0.009*	
	(0.003)		(0.005)	
Ishock_int_rw	-0.008***		-0.011***	
	(0.002)		(0.004)	
shock_int_bu		0.002		0.007*
		(0.003)		(0.004)
Ishock_int_bu		-0.007***		-0.009***
		(0.002)		(0.003)
Observations	1,860	1,860	1,855	1,855
R^2	0.037	0.035	0.051	0.046

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

Table 26: **Linear probility model estimates of the effect of intensity of the refugee shock on child labor by age and gender between 1991 and 2004 (long-run)**

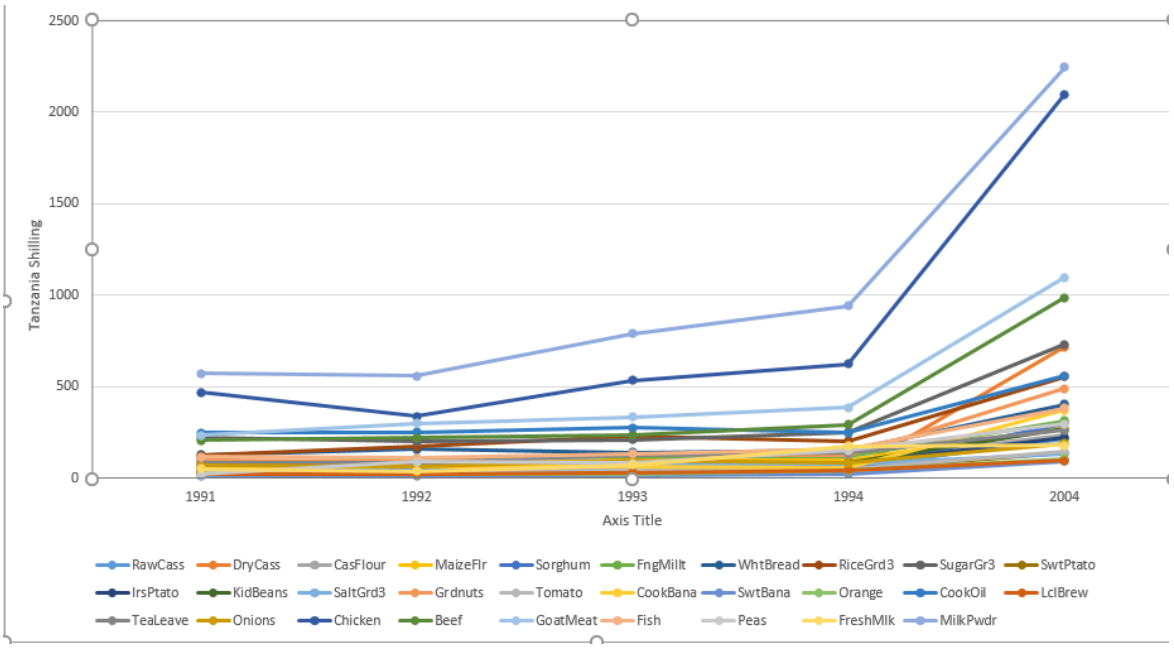
VARIABLES	(1) child labor girls Rwanda	(2) child labor girls Burundi	(3) child labor boys Rwanda	(4) child labor boys Burundi
shock_int_rw	0.003		0.009	
	(0.003)		(0.005)	
Ishock_int_rw	-0.020***		-0.020***	
	(0.005)		(0.006)	
I6_12RW	0.018***		0.013**	
	(0.005)		(0.005)	
D612	0.074***	0.074***	0.062**	0.061**
	(0.020)	(0.020)	(0.024)	(0.024)
shock_int_bu		-0.001		0.006
		(0.003)		(0.004)
Ishock_int_bu		-0.017***		-0.018***
		(0.004)		(0.005)
I6_12BU		0.016***		0.012**
		(0.004)		(0.005)
Constant	0.949***	0.930***	0.979***	0.977***
	(0.027)	(0.029)	(0.052)	(0.059)
Observations	1,860	1,860	1,855	1,855
R^2	0.069	0.068	0.067	0.063

Notes: Cluster robust standard errors in parentheses, the cluster is the variable defined as "cluster" in the KHDS.
*** p<0.01, ** p<0.05, * p<0.1
The dependent variables are variables defined at the child level. Refugee intensity is measured at the household level. Estimated with the variables described in Tab. 2

6.2 Food prices

The data from the Kagera Health and Development Survey (KHDS) reported in the graph below show that prices increased slightly from 1992 to 1994 and then as expected sharply from 1994 to 2004. The literature confirms this trends. Alix-Garcia and Saah (2010) shows that the refugee influx led to an increase in the prices of non-aid food items whereas aid-related food items experienced modest changes in prices. The increase in food items could be one channel through which the refugee influx affected the region. The higher price of food items meant higher return to agriculture labor and higher income for families who in return could invest more on their children education.

Figure 4: **Change in food prices in 1991-2004 according to the KHDS.**



7 Conclusion

One of the main outcome of any civil conflict is the unavoidable forced migration which is also a priority in the 2030 Agenda for Sustainable Development. Child labor accounts for one of the largest problems in Tanzania. The incidence of child labor for children of age 6-17 is high (28.8%) compared to the world average, and even higher, 35% in rural areas). More importantly, the incidence of hazardous child labor in the age class 6-17 is high, about 21.5% (ILO, 2014). The school attendance age between 6-17 years old is of 71.3%, and much lower (28.7%) if children are in work. This paper estimates the human capital consequences of hosting refugees in Tanzania (Kagera region). In particular, it studies the short and long term impact of the refugees influx on child labor and youth employment. Also, this study seeks to explore which mechanisms cause this variation in human capital accumulation such as changes in school enrollment, in household income/consumption and in the sector composition of the local labor market are candidates.

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