Appendixes for *The Welfare of Syrian Refugees: Evidence from Jordan and Lebanon*

Appendix A: A Welfare Assessment using JD-HV3 Data

Introduction

As a consequence of the Civil War in the Syrian Arab Republic that began in the spring of 2011, 4.4 million Syrians have fled their homes to seek asylum in the neighboring countries: Turkey, Lebanon, Jordan, Iraq and the Arab Republic of Egypt. As of November 2015, almost 634,000 Syrians are registered as refugees with the UNHCR in Jordan.

The focus of this chapter is to apply the same methodology used in chapter 2 to the JD-HV3 data and to present the main findings of the poverty and welfare analysis of Syrian refugees living in host-communities (non-camp) in Jordan. A poverty profiling exercise is undertaken to provide *prima facie* overview of poverty distribution among refugees. Poverty and welfare analyses were carried out to identify the socioeconomic and demographic characteristics that can best predict the level of welfare and poverty of Syrian refugees, and to test assumptions about poverty predictors.

The identification, through econometric models, of specific characteristics which make refugee households either more resilient or more vulnerable to economic poverty, help form judgments on the vicissitude of welfare. A total of four models are estimated to predict the welfare and poverty of Syrian refugees in Jordan using the JD-HV3 data.

The chapter is organized as follows. The next section discusses the data used in the analysis in detail. The third section provides a poverty profile of non-camp Syrian refugees living in Jordan. The fourth section provides an overview of the analysis undertaken to identify the best predictors of poverty and welfare and the fifth section concludes.

Data

ProGres registration data

Part of the analytical work undertaken in this study makes use of the profile Global registration system (ProGres) database. The ProGres database includes information on all 600,000+ registered refugees in Jordan. Data are collected during first registration and updated at re-registration (every 12 months) or whenever significant changes in households occur. Registration takes place at UNHCR registration centers or through mobile registration missions organized by UNHCR to reach refugees in remote areas of the country. Through the ProGres questionnaire, data on name, date of birth, place of birth, gender, age, date of arrival in Jordan, fled date from Syria, religion, ethnicity, destination in Jordan, origin in Syria, formality of entry, border-point from Syria into Jordan, former occupation, education level and specific needs, are collected, but it does not include welfare indicators.

Home Visits data

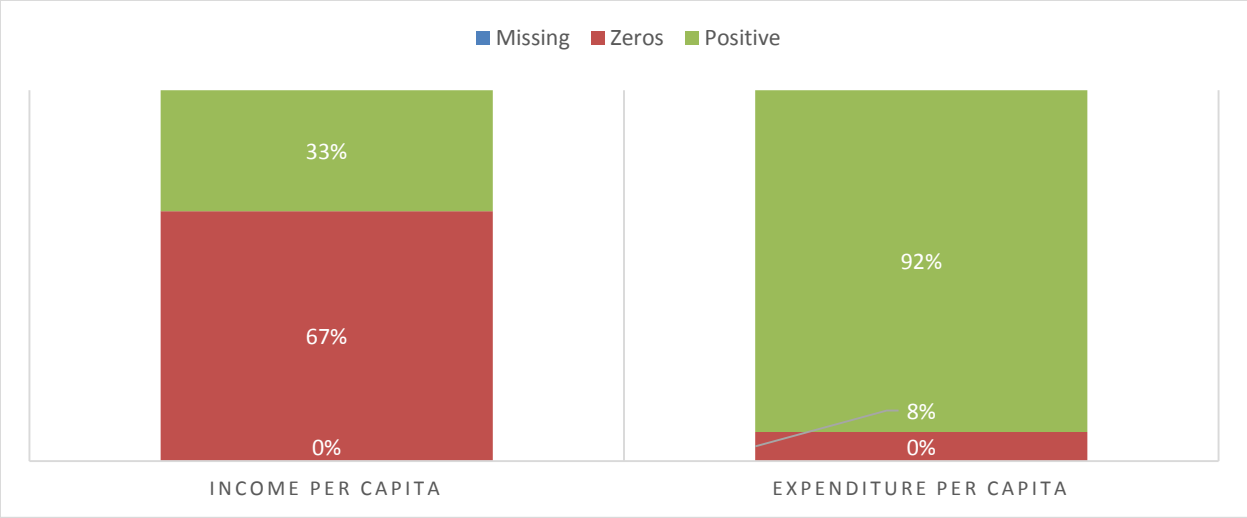
The second data set used in this study is the third round of the Home Visits database (henceforth "JD-HV3"), which was undertaken between July 1st and December 31st 2014. JD-HV3 data refer to a subset of the entire refugee population in Jordan as refugees subject to Home Visits include: i) the newly registered cases which receive a Home Visit post-registration; ii) cases that require a re-assessment; and iii) cases that require an urgent visit. Therefore, the cases and the data collected by the JD-HV3 are not random. Furthermore, and contrary to the ProGres data set, HV3 includes questions on income and expenditures, which were used to build the welfare aggregates presented in this chapter.

Welfare Aggregates

The creation of welfare aggregates for the purpose of poverty profiling and welfare modeling are similar to those undertaken in chapter 2 using the JD-HV2 data. The JD-HV3 questionnaire contains 11 questions on expenditures and 6 on income. The limited number of aggregated consumption items and income is not ideal. Data collected has a recall period of one month. This is a fairly long period, especially considering that questions refer to only 11 aggregated consumption items. As a consequence, one would expect the welfare figures to be under-reported. However, in a refugee context, long recall periods on limited consumption items are less of an issue than in a regular population. This is because refugees have smaller consumption diversity due to the limited resources available (see chapter 2). Under-reporting of expenditures can be a major issue for distributional analyses if different groups (i.e. richer and poorer cohorts) under-report expenses by different amounts.

Figure A.1 shows the structure of the two welfare aggregates—expenditure per capita and income per capita. We notice that missing data for income happened in only five instances and only in one for expenditure. However, 67 percent of respondents declared no income (zero value), whilst only 8 percent reported no expenditures. Figures do not include UNHCR and WFP assistance.

Figure A.1: Structure of Welfare Aggregates by Responses (%)



Source: Estimations based on JD-HV3 and JD- ProGres data.

This chapter uses per capita expenditure as the welfare aggregate given its better response rate and distribution. Table A.1 provides summary statistics for the two welfare aggregates.

Table A.1 Summary Statistics of the Main Welfare Aggregates

Variable	Obs.	Mean	Median	Std. Dev.	1st Q	3rd Q
Income per capita	26,286	18.91	0	96.41	0	20
Expenditure per capita	26,286	54.08	42.43	72.12	27.86	61
Income per capita with no zeros	8,574	58	33.33	77.17	20	60
Expenditure per capita with no	24,234	58.64	45.00	73.30	31.25	64.40

Source: Estimations based on JD-HV3 and JD-ProGres data.

Unit of Observation and Poverty Line

As UNCHR registers refugees as "cases" (see chapter 2 on JD-HV2), data are collected at a case-level. Each case is issued a unique identifier. The unit of observation of this study is therefore UNHCR's "case". Finally, in order to keep this study in line with chapter 2 on JD-HV2 the same poverty line of JD 50 per capita per month for each case is adopted.

Poverty Profiling

This section provides a poverty profiling of non-camp Syrian refugees living in Jordan based on JD-HV3 data. This exercise consists of analyzing the distribution of poverty through three-dimensional cross-tabulations. The first two dimensions include selected demographic or socioeconomic variables characterizing refugee families. The third dimension is the incidence of poverty.

Therefore, the percentage in each cell represents the poverty rate—which is set at JD 50 per person per month—among families characterized by the two specific variables. Empty cells indicate that the number of observed cases for the two variables is below 50. These observations are excluded from the tabulation, as they are insufficient to provide reliable findings. Poverty profiling allows us to form an opinion on the characteristics of poverty and its predictors without requiring econometric analyses.

The tables presented below reproduce the work of chapter 2; they however rely on more recent data, the JD-HV3, rather than the JD-HV2. In line with the analysis in chapter 2, this section is divided into three parts: migration patterns, characteristics of the Principal Applicant (PA), and characteristics of the case.

Migration patterns

The first cross-tabulation (table A.2) provides the distribution of poverty among the registered refugees by area of origin in Syria and Governorate of destination in Jordan. These figures reveal significant wealth differences among Syrian refugees. The lowest poverty rate was found in the Amman Governorate (47 percent) and the second lowest in the Southern Governorate of Aqaba (49 percent). On the other hand, the Governorates of Jarash and Ajloun host the highest prevalence of poor refugees (69 percent) followed by Tafilah (67 percent), Zarqa and Karak (66 percent).

Table A.2 also shows that the majority of the poor comes from Dar'a (66 percent) and Hama (63 percent), whereas Syrian refugees from Deir-ez-Zor, Al-Hasakeh, and Ar-Raqqa tend to be better off, with 37 percent, 38 percent and 39 percent poverty rates respectively. By observing the specific migration trajectories, it is possible to further describe the geography of poverty. The vast majority of refugees that fled Dar'a and went to Karak are poor (77 percent). Poverty is highly widespread also among refugees coming from Hama who settled in the Governorates of Mafraq and Balqa, 80 percent and 78 percent respectively, whereas half of those who settled in Amman are poor. Only one out of four refugee families from Al-Hasakeh and now living in Amman Governorate is poor.

The substantial wealth disparity across refugees living in the same Governorate (i.e. Balqa and Irbid), but coming from different areas in Syria suggests that a geographical targeting of humanitarian assistance would be largely prone to inclusion error. Similarly, targeting based on the refugees' place of origin would be susceptible to exclusion error. Geographical targeting would lead to high levels of exclusion or inclusion errors. The complexity of the situation and of their needs requires a more comprehensive analysis as several factors contribute to poverty. Refugees' background, area of origin and final destination are just some of them.

Table A.2: Case Level Poverty Rates by Governorate of Origin and Destination

Origin in Syria	Destination in Jordan											
	Ajloun	Amman	Aqabah	Balqa	Irbid	Jarash	Karak	Ma'an	Madaba	Mafraq	Tafilah	Zarqa	Total
Aleppo		43%		55%	38%		64%	41%		65%		78%	48%
Al-Hasakeh		26%											38%
Ar-Raqqa		37%											39%
As-Sweida													58%
Damascus		42%		51%	54%	71%				56%		55%	47%
Dar'a	71%	57%		64%	67%	74%	77%			70%		70%	66%
Deir-ez-Zor		37%		20%	22%								37%
Hama		51%		78%	64%					80%		54%	63%
Homs		50%		55%	63%	69%	57%	52%		59%		66%	57%
Idleb		42%								74%			61%
Lattakia													37%
Quneitra													60%
Rural Damascus		44%		62%	63%	48%		48%		68%		63%	54%
Tartous													40%
Total	69%	47%	49%	60%	65%	69%	66%	51%	62%	65%	67%	66%	59%

Source: Estimations based on JD-HV3 and JD-ProGres data.[1]

Table A.3 shows the prevalence of poverty in relation to the household's arrival year based on data collected during Home Visits in 2014. All Home Visits related to the JD-HV3 data collection were conducted between July and December 2014.

The refugees' influx into Jordan has not been constant. A relatively small number of Syrians arrived in Jordan before March 2011 (i.e. the beginning of the Syrian Civil War), and registered with UNHCR only at a later stage. After a relatively slow start in 2011, the influx rose in 2012 and peaked in 2013. The prevalence of poverty among Syrian households who fled the country and arrived in Jordan in 2013 and 2014 is significantly higher. This could be due to the intensification of the fighting in Syria, which made people less resilient and compelled to flee the country leaving behind their possessions.

Table A.3: Case Level Poverty Rates by Arrival Year (2014 Home Visits)

Arrival Year	Poverty Rate	Percentage of Respondents
2010	49%	1%
2011	49%	6%
2012	56%	41%
2013	64%	44%
2014	62%	6%
Total	59%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Finally, Table A.4 shows the distribution of poverty by point of entry and formality of entry. Not surprisingly, the incidence of poverty is much lower among refugees who entered Jordan formally compared to the informal arrivers. Poverty among the latter group is 68 percent, significantly higher than the 48 percent among the former group. Those who arrived in Jordan using commercial flights are generally better off than those who also entered formally but by land.

Table A.4: Case Level Poverty Rates by Point of Entry and Formality of Entry

Point of Entry	Poverty Rate (Percentage of Respondents)		Total Poverty
	Informal Entry	Formal	
C—Airport Queen Alia—from Aleppo		35%	
C—Airport Queen Alia—from Damascus		47%	47% (1%)
C—Airport Queen Alia—from Third countries		41%	41% (6%)
E—Al Karama			73% (1%)
E—Al Rogoban (T22)—Sub Rogoban	71% (1%)		70% (1%)
E—Matwie			
E—Ruwaished-Hadallat	71% (12%)		70% (12%)
No Data	70% (1%)	51%	57% (3%)
S—Al Omari		53%	
S—Aqaba			
W—Al Akaider—Dar'a	65% (2%)	51%	58% (4%)
W—Al Qaryatayn (Iretian)			
W—Al Thunaibah—Wadi Shallalah—Al Hayt	68% (3%)		68% (3%)
W—Altura—Tel Shehab (Tal Shihab)	67% (15%)		66% (15%)
W—Jaber (Nassib)—Official		48%	48% (11%)
W—Jaber (Nassib) Unofficial	66% (16%)	50%	58% (30%)
W—Qaraqush—Unity Dam—Al Hayt	66% (1%)		66% (1%)
W—Qlaid—(Yarmouk river) Alshajarah			
W—Ramtha—Dar'a	51% (2%)	51%	51% (2%)
W—Sama Al Sarhan (Post 58)—Tiba (Al Taebah)	72% (7%)		72% (7%)
W—Um Esrab—Tiba—(Al Taebah)	75% (3%)		75% (3%)
W—Umm Al qittayn—Khirbat Awwad—Al Mughayir			
Total Poverty	68% (63%)	47%	59% (100%)

Source: Estimations based on JD-HV3 and JD-ProGres data.

Characteristics of the PA

Table A.5 shows the incidence of poverty along with the average per-capita expenditures across different demographics and social features characterizing the Principal Applicant (PA).

Contrary to conventional wisdom, female-headed households are only marginally poorer (2 percent) than male-headed households. However, their per capita mean expenditure is 10 percent lower; JD 55 vs. JD 61. Non-Sunni refugees are characterized by the lowest poverty (33 percent) and by a much higher average per capita expenditure. It must be highlighted that they represent only 0.5 percent of the observations. Similarly, per capita expenditures among non-Arabs are 1.5-fold that of Arab refugees; but again they represent only 1 percent of the observations. Finally, PAs with university or post-university level of education form 7 percent of the observations. Fewer of them are poor compared to PAs with lower education levels and their per-capita expenditures are on average JD 28 higher.

Table A.5: Case Level Poverty Rates by Characteristics of the Principal Applicant

Characteristics of the PA		Poverty Rate	Mean Expenditure per Capita (JD)	% of Sample Observations
Gender	Female	60%	55	39%
	Male	58%	61	61%
Religion	Sunni	59%	58	99.5%
	Non-Sunni	33%	127	0.50%
Ethnicity	Arab	59%	58	99%
	Non-Arab	47%	89	1%
Education	Less than university level education	60%	57	93%
	At least university level education	45%	85	7%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.6 presents the distribution of poverty by age and marital status of the PAs. Poverty is predominant among PAs in the age group of 35 and 49 years, particularly if they are married. The second group with a very high prevalence of poverty are widows/widowers in the age group 19-34 years. These very high rates of poverty can be explained by the likely presence of children of young age and the absence of a second breadwinner. In fact, singles and engaged PAs in the same age group present the lowest poverty rates. Considering that it is customary for women and men of their age to be married, these PAs are likely to live in better-off households and can "afford" to remain single. The much higher prevalence of poverty among singles in the below-18-years age group seems to support this assumption. These PAs are teenagers with no skills and perhaps the sole support to their family. Poverty rates among widows/widowers decrease as the age groups increase, presumably because they no longer have financially dependent children.

Table A.6: Case Level Poverty Rates by Age of Principal Applicant and Marital Status

Age Group of Principal Applicant	Marital Status						
	Divorced	Engaged	Married	Single	Separated	Widowed	Total
	Poverty Rates						
Less than or equal to 18				57%			57%
19-34			61%	27%		72%	54%
35-49	35%		75%	36%		60%	72%
50+			50%			40%	46%
Total	40%		65%	32%		50%	59%
	Percentage of Respondents						
Less than or equal to 18				1%			1%
19-34	0%	0%	27%	3%		2%	32%
35-49	1%		47%	1%	0%	3%	51%
50+	0%		13%			3%	16%
Total	1%	0%	88%	4%	0%	7%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

The last poverty profile provided in this section is a cross-tabulation between the refugee's former occupation and his/her level of formal education (table A.7). Professionals and technicians, particularly those with a university degree and above, present the lowest poverty rates, which however remain high, as one in two PAs is poor despite the higher educational level. In a refugee setting, higher education and

number of years in school do not consistently prevent people from falling into poverty. The highest poverty incidence is found amongst skilled agricultural workers, particularly those with 12 to 14 years of education and among those who used to operate machines in industrial plants.

Table A.7: Case Level Poverty Rates by Former Occupation and Highest Education of the PA

Former Occupation	Highest Education of Principal Applicant					
	Below 6 years	6 to 8 years	9 to 11 years	12 to 14 years	At least university	Total
			Poverty Rates			
Craft and related	57%	57%	54%	54%		56%
Elementary	65%	66%	63%	68%		65%
Managers	59%	68%	63%	52%		62%
Plant and machine operators, and assemblers	64%	69%	73%	69%		69%
Professionals		50%	37%	53%	44%	48%
Service and sales	52%	64%	66%	60%	57%	61%
Skilled agricultural, forestry and	63%	66%	70%	77%		67%
Technicians and associate professionals	61%	57%	57%	51%	35%	54%
Total	56%	62%	62%	57%	45%	59%
			Percentage of Respondents			
Craft and related	4%	10%	4%	1%		19%
Elementary	3%	6%	2%	1%		13%
Managers	0%	1%	1%	1%		3%
Plant and machine operators, and assemblers	1%	4%	2%	1%		7%
Professionals		0%	0%	1%	2%	4%
Service and sales	8%	15%	10%	4%	1%	38%
Skilled agricultural, forestry and fishery workers	1%	2%	1%	0%		5%
Technicians and associate professionals	0%	1%	1%	1%	0%	5%
Total	20%	41%	21%	11%	4%	100

Source: Estimations based on JD-HV3 and JD-ProGres data.

Characteristics of the case

Table A.8 provides the prevalence of poverty across case size and number of children within the case. The cross-tabulation does not provide sufficient evidence to infer which of the two variables is more predictive of welfare. However, econometric modeling suggests that case size is the most important covariate in the welfare model. Notwithstanding, the number of children within the case remains a key determinant. The strong predictive power of both variables is not a surprise given the context and the characteristics of the Syrian population.

The data in table A.8 shows that poverty is pervasive among larger size cases. Almost all cases with 7 or more members are poor even when only one or two children are present. However, the presence of several children makes the case much more exposed to poverty. Almost all cases with five and more children are poor. Conversely, cases with no children are relatively less prone to poverty, in particular when the size of the case is small, i.e. below 3 members. Nonetheless, cases with only 1 or 2 members are more likely to be poor when those members are children. The least prevalence of poverty occurs among cases with a size of 3 and with only 1 child.

Table A.8: Case Level Poverty Rates by Case Size and Number of Children

Case Size	Number of Children								
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
				Poverty Rate					
1	26%								26%
2	38%	55%							43%
3	36%	27%	58%						41%
4	45%	45%	49%	69%					53%
5	59%	62%	63%	72%	83%				72%
6		69%	79%	83%	85%	90%			84%
7			84%	91%	92%	93%	94%		92%
8				94%	97%	98%	98%	98%	97%
9					98%	99%	100%	98%	99%
10							100%	100%	99%
Total	31%	44%	58%	76%	86%	94%	97%	98%	100%
				Percentage of Respondents					
1	5%	0%							5%
2	4%	1%	0%						5%
3	2%	3%	3%	0%					8%
4	1%	2%	6%	3%					13%
5	1%	1%	2%	8%	4%				16%
6		1%	2%	3%	8%	3%			16%
7		0%	1%	3%	3%	7%	1%		16%
8			0%	1%	2%	2%	4%	1%	11%
9					1%	1%	1%	1%	6%
10							1%	1%	2%
Total	13%	9%	15%	19%	18%	14%	8%	3%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Data in table A.9 provide a picture of poverty with regard to the number of school-aged children within a case and the number of those attending school. Not surprisingly, the pathways towards poverty are very similar to those presented in table A.8. Poverty is widespread among households with larger number of school-aged children. Almost all families with 5 or more children are poor irrespective of school attendance. Cases with 0 or 1 school-aged child are less prone to poverty. Households that are sending a number of children greater than those of school-age to school are more likely to be poor. However, the prevalence of poverty among cases with 3 or more children is largely the same whether children are sent to school or not. This finding reconfirms that it is the high number of children within a case that makes households more prone to poverty.

Table A.9: Case Level Poverty Rates by School Aged Children and School Attendance

Number of School Aged	Number of Children Attending School							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
	Poverty Rates							
0								30%
1	38%	38%						39%
2	57%	49%	51%					53%
3	78%	71%	69%	67%				70%
4	86%	83%	84%	84%				84%
5	96%	89%	91%	93%	91%			92%
6	98%		96%	95%	98%	94%		96%
7	99%			99%	97%	100%		98%
Total	70%	61%	74%	84%	91%	93%		59%
	Percentage of Respondents							
0	0%	0%						10%
1	2%	2%	0%	0%				7%
2	2%	3%	3%	0%	0%			13%
3	2%	4%	5%	3%	0%			17%
4	2%	2%	5%	5%	2%	0%		18%
5	2%	1%	3%	5%	4%	1%		16%
6	2%	0%	1%	3%	3%	1%	0%	10%
7	1%		0%	1%	1%	1%	0%	5%
Total	14%	12%	18%	16%	11%	5%	1%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Poverty Indicators (Econometric Estimation)

This fourth section provides an overview of the analysis undertaken to identify the best predictors of poverty and welfare. It is divided into two parts. The first is a description of the different models and their predictive power, as well as the process for variable generation and for variable selection. The second part presents the results of the models in the form of cross-tabulations between predicted and observed poor and non-poor cases. It also provides a thorough description of poverty and welfare indicators.

Welfare and poverty models

The first step of the analysis was to merge data from ProGres with data from JD-HV3. ProGres includes statistics on all registered refugee cases in Jordan, whereas HV includes multi-sectoral and socioeconomic information—including expenditures and incomes—for a subset of the total refugee population. Using UNHCR's unique identifier of registered refugees, it was possible to match the records (cases) of the two data sets and merge them creating a new database with indicators from both JD-HV3 and ProGres for 26,280 cases representing 108,456 individuals.

The second step was the generation of variables—an important component of the analysis. Characteristics specific to the PA i.e. gender, level of education, etc. were used alongside with other variables, such as number of children, which were transformed as proportional indicators (i.e. divided by the case size). Dummy variables were generated to regress categorical indicators. Continuous variables, such as case size, were transformed into binary form to more accurately capture poverty rate trends resulting from changes in the variable. Numerous composite indicators including: basic housing assets, luxury housing assets, non-

food item (NFI) needs, prevalence of chronic diseases and disability indicators, were also created. Finally, the welfare indicator was log-transformed and excludes UNHCR's and WFP's cash and food assistance.

The third step was to undertake the econometric estimation. The welfare and poverty models for each case *i* take the following form:

$$\ln(W_i) = \alpha + X_i\beta + e_i$$

$$\ln(P_i) = \alpha + X_i\beta + e_i$$

where W_i is the welfare indicator (per capita expenditure), P_i is the indicator for poor and takes the value $P_i = 1$ when a case falls beneath the poverty line and $P_i = 0$ when the case is on the poverty line or above; X_i represents a bundle of case characteristics such as education, case size, proportion of children. etc., β is a vector of parameters, i is the unique case identifier and e_i is the normally distributed mean-zero disturbance term.

The econometric estimation produced four different models. The first is the full welfare model. This is a 26-variable model, which uses data from both ProGres and JD-HV3 and has an adjusted R-squared of 56 percent. The welfare indicators identified in this estimation include: religion, ethnicity, gender, education, WASH, food, housing conditions, family composition, geography, formality of entry and cross-point into Jordan (annex A.1, table A.1.1).

The second model is a reduced version of the full welfare model. It includes only the 11 most important indicators of the full model, 4 of which are from ProGres and 7 from JD-HV3. Its adjusted R-squared is 55 percent, only 1-percent less than the full iteration. The most important predictors of this welfare model are: case size, proportion of children, marital status, Governorate of the Ministry of Interior (MOI) card registration, type of house occupancy, presence of working family members, enumerators' judgment of the vulnerability of the case, household size, formality of entry, gender of the PA and house crowding (annex A.1, table A.1.2).

The third estimation is the ProGres-only welfare model. This estimation uses 11 indicators, all from the ProGres registration questionnaire. Therefore, the prediction of welfare and poverty resulting from this model can be computed on the entire registered Syrian refugee population. However, the adjusted R-squared of this model was found to be at best 42 percent (annex A.1, table A.1.3) making it second to both the full and the reduced welfare models.

The fourth and final model is a *probit* poverty model. It is based on 20 variables and presents a McFadden R-squared of 45 percent. This estimation was carried out to test the explanatory power of all available indicators for poverty, which is set at less than JD 50 per person. It found the same 11 predictors of the reduced model as well as 9 from the full model (annex A.1, table A.1.4).

Table A.10 summarizes the key features of the four models. All have been tested for multicollinearity among regressors by performing a Variance Inflation Factor (VIF) test. Single collinearities among two regressors have also been tested. No significant collinearity was identified.

Table A.10: Summary of Models

	Welfare Model (full)	Welfare Model (reduced)	Welfare Model (ProGres)	Poverty Model (Probit)
Number of variables	26	11	11	20
Number of observations	22,593	24,163	22,469	23,555
Adjusted R-squared	56	55	42	45

Source: Estimations based on JD-HV3 and JD-ProGres data.

Model estimation results

This section provides the estimations resulting from each model and a thorough description of the poverty and welfare indicators. Predicted and observed values are cross-tabulated. By showing the discrepancy between fitted and true values, results allow gauging the potency of each model. A description of both the poverty and welfare predictors is also provided.

Table A.11 is a template showing how to read the results. Cases where both the Predicted and the Observed indicator are equal to 0 correctly predict non-poor families (i.e. expenditures greater or equal to JD 50 per capita). Conversely, cases where the Predicted and the Observed indicator are equal to 1 correctly predict poor families (i.e. less than JD 50 per capita).

Table A.11: Observed vs. Predicted Poverty (Case Level)

	Predicted = 0	Predicted = 1
Observed = 0	*Correct*	*Incorrect*
Observed = 1	*Incorrect*	*Correct*

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.12: Welfare Model (full)

	Predicted = 0	Predicted = 1	Total
Observed = 0	34%	11%	45%
Observed = 1	7%	48%	55%
Total	41%	59%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.13: Welfare Model (reduced)

	Predicted = 0	Predicted = 1	Total
Observed = 0	34%	11%	45%
Observed = 1	7%	48%	55%
Total	41%	59%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.14: Welfare Model (ProGres)

	Predicted = 0	Predicted = 1	Total
Observed = 0	18%	27%	45%
Observed = 1	22%	34%	55%
Total	39%	61%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.15: Poverty Model (Probit)

	Predicted = 0	Predicted = 1	Total
Observed = 0	30%	15%	45%
Observed = 1	4%	51%	55%
Total	34%	66%	100%

Source: Estimations based on JD-HV3 and JD-ProGres data.

The predictions discrepancy between the full and the reduced welfare model is negligible (about 0.2 percent difference). The overall prediction error in both models is 18 percent with an exclusion and inclusion errors of 7 percent and 11 percent respectively. Although humanitarian assistance programs are committed to cost-

efficiency and effectiveness, a model with a slightly greater inclusion error is preferable to a model with a bigger exclusion error as exclusion may result in loss of human lives.

The size of the case turned out to be the most important variable in the welfare model. In the bivariate stage of the analysis, case size was found to explain 33 percent of the variation in expenditures per capita. This is partially due to the fact that the size of the case is the denominator of the log-dependent variable. If the case and the household size are omitted from the analysis, the explanatory power of the models drops to 11 percent. As case size increases so does the coefficients on each binary indicator. The *t-values* are also very high and increasingly so. By removing the proportion of children, an important and significant indicator, the R-squared drops by only 0.2 percent once we control for case size.

With regard to the variables characterizing the PA, higher formal education is associated with higher spending. PAs with a university degree are predicted a per capita consumption rate 11 percent higher than PAs with less than 6 years of education. However, the inclusion of higher number of years of education carries a very small explanatory power (0.1 percent); *ipso facto* it has been excluded from the reduced model.

PAs of working age (18 to 59) are better-off than both younger PAs (below 18) and older (60 and above), with the youngest age cohort being the worst-off. The age of the PA contributes to the model by only 0.15 percent and is excluded from the reduced model. The gender of the PA is statistically significant. When dropped, the predictive power of the model declines by more than 0.6 percent. Male PAs are found to be slightly better-off than female-headed cases. Finally, married or engaged PAs are less prone to poverty than divorced/separated, widowed or single PAs (in this order) once we control for case size. Marital status contributes to the model by about 0.4 percent.

Location, formality of entry and border cross-point play a significant role in determining the predisposition to economic poverty. Refugees that arrived in Jordan informally have consumptions patterns 8 percent lower than formal entrants. The exclusion of formality of entry reduces the model's prediction by 0.1 percent. Border cross-point was also found to be statistically significant. Entrants by plane were found to have higher welfare than entrants by land. The exclusion of this variable reduces the explanatory power of the model by only 0.1 percent and its *t-value* is less than half of that of formality of entry *eo ipso* it has been excluded from the reduced iteration. Finally, the relationship between the Governorate of registration of the MOI card and welfare shows that refugees with a MOI card from Amman are better-off than anywhere else in the country. The governorates of Irbid, Zarqa, and Ajloun are estimated to have welfare levels that are respectively 22 percent, 20 percent and 18 percent lower than Amman.

House crowding measured as the number of household members divided by the number of rooms in the house (excluding WASH and kitchen facilities) has a high negative relation with welfare. For every extra person per room, expenditures are predicted to drop by about 6 percent *ceteris paribus*. When excluding house crowding from the welfare model the explanatory power reduces significantly (0.7 percent). Families with at least one working member are less poor than families with no working members. Similar to house crowding, by excluding this indicator the model's explanatory power drops by 0.7 percent. Type of occupancy can also predict welfare considerably. People in a rented accommodation are predicted to have expenses 60 percent higher than rent-free tenants. This indicator increases the models explanatory power by 0.3 percent. Finally, the enumerator's judgment of a case as "not vulnerable" is associated with approximately 20 percent higher predicted welfare. Its importance accounts for 0.25 percent.

The loss in explanatory power resulting from the exclusion of the analyzed indicators refers to the omission of each variable from the full model. If we exclude these variables from the reduced model, the loss in explanatory power will be greater. Other less important variables included in the full model are: wastewater facilities, regularity of wastewater removal, food consumption, school attendance, access to kitchen facilities, vaccinations, religious status, birthplace and entries into Jordan.

The ProGres Model is similar to the reduced welfare model. In fact, case size, proportion of children, marital status, formality of entry and gender of the PA, are included in both formulae. The ProGres model uses additional variables: the age group of the PA (underage, working-age, elder), the level of formal education of the PA, border crossing point, destination in Jordan, religious status and birthplace, as predictors of welfare.

Table A.14 shows that the predictive power of the ProGres model is inferior to that of the ProGres + JD-HV3 model. The exclusion and inclusion errors are higher, 22 percent and 27 percent, respectively.

In terms of variable construction and model specification the *probit* poverty model is very similar to the reduced and full Welfare iteration. All variables available in the data set are re-examined for explanatory power. The 11 variables of the reduced welfare model and 9 more from the full model are found to be the best poverty predictors. The cross-tabulations provided above show that the poverty model is more accurate. The exclusion error of the *probit* is only 4 percent (table A.15), whereas it is 7 percent in the ProGres ProGres/HV models (table A.12 and table A.13). However, the *probit* poverty model has a higher inclusion error than the welfare model, i.e. 15 percent versus 11 percent. Its overall prediction error is therefore 19 percent versus 18 percent of the welfare model.

Conclusions

The Syrian Civil War that began in the spring of 2011 unfolded a major humanitarian crisis. As the conflict enters its fifth year, 4.4 million Syrians have fled their homes to seek asylum in neighboring countries: Turkey, Lebanon, Jordan, Iraq and Egypt. As of November 2015 more than six-hundred-thousand have sought refuge in Jordan.

Poverty and welfare of refugee communities have seldom been the topic of studies in major literature. This study, in conjunction with chapter 2, provides a primer on poverty and welfare analysis of Syrian refugees living in host (non-camp) communities in Jordan. The analysis relies on two components. The first is a poverty profile—an overview of poverty distribution by family-specific characteristics. The second is a welfare and poverty assessment—an econometric estimation to identify predictors and predictors of poverty.

Contrary to conventional wisdom, female-headed households are only marginally poorer (2 percent) than male-headed households. However, their per capita mean expenditure is 10 percent lower; JD 55 vs. JD 61. Principal Applicants (PAs) with a university or post-university degree are less likely to be poor than PAs with lower education levels. However, 45 percent of university graduate refugees live in poverty compared to 60 percent among the rest of the refugees. Although those with higher levels of education are marginally less affected by poverty, their former occupation is also an important factor in the poverty assessment.

PAs of working age (18 to 59) tend to be better-off than both younger (below 18) and older (60 or older) PAs, with the youngest age cohort being the worst-off. Nonetheless, poverty is 20 percent higher among PAs in the age group 35-49 than among PAs between 18 and 34 and 50 or more. This seems to be due to the higher number of children and adolescents present in these families.

Formality of entry and border crossing-point are informative in predicting the likelihood of being poor among refugees. Not surprisingly, the incidence of poverty is much lower among refugees who entered Jordan formally compared to the informal arrivers. Poverty among the latter group is significantly higher, 68 percent, than the 48 percent among the former group. Those who formally entered Jordan by plane are characterized by lower poverty rates than those who formally crossed the border by land.

In analyzing the areas of origin in Syria and those of destination in Jordan, the lowest poverty rate among Syrian refugees was found in the Amman Governorate (47 percent) followed by the Southern Governorate of Aqaba (49 percent). On the other hand, Jarash and Ajloun Governorates host the highest prevalence of poor refugees. Most of the poor come from Dar'a (66 percent) and Hama (63 percent), whereas Syrian

refugees from Deir-ez-Zor (37 percent), Al-Hasakeh (38 percent), and Ar-Raqqa (39 percent) tend to be better off. Those who came from Hama and settled in the Northeastern Governorate of Mafraq and in Balqa are among the poorest; 80 percent and 78 percent respectively. These figures show that geographical targeting of Syrian refugees is not suitable and would lead to high levels of exclusion or inclusion errors. The complexity of the situation and of the refugees' needs require a more comprehensive analysis as several factors contribute to poverty. Refugees' background, area of origin and final destination are just some of them.

This chapter identifies the characteristics associated with economic resilience and economic poverty. The econometric estimation has produced four different models:

1. The full welfare model—including 26 variables from both ProGres and JD-HV3—with an adjusted R-squared of 56 percent (table A.1.1);
2. The reduced version of the full welfare model—including only the 11 most important indicators of the full model, 4 of which from ProGres and 7 from JD-HV3—with an adjusted R-squared of 55 percent, i.e. only 1-percent less than the full iteration (table A.1.2);
3. The ProGres-only welfare model—including 11 indicators, all from the ProGres database—with an adjusted R-squared of 42 percent (table A.1.3);
4. The *probit* poverty model—including 20 variables from both ProGres and JD-HV3—with a McFadden R-squared of 45 percent (table A.1.4).

The most important predictors of welfare are: case size, proportion of children, marital status, Governorate of MOI card registration, type of house occupancy, presence of working family members, enumerators' judgment of the vulnerability of the case, household size, formality of entry, gender of the PA and house crowding.

Case size is the strongest predictor. Alone it explains 33 percent of the variation in expenditures. The exclusion of case size from the welfare model reduces its explanatory power significantly. Proportion of children is another important indicator (25 percent explanatory power). However, once controlling for case size its explanatory capacity is considerably lower. Poverty is pervasive among cases with 3 or more children, irrespective of whether children are sent to school or not. This finding confirms that it is the high number of children within a case that makes households more prone to poverty not school attendance.

The enumerators' judgment of the vulnerability of the case is found to provide valuable information on the poverty level of a family. A judgment as "not vulnerable" is statistically associated with lower poverty rates. Furthermore, families in a rent type of occupancy, as opposed to illegal squatting, shelter provided through humanitarian assistance, hosted, or provided in return for work, are less poor. Single PAs are predicted to be the poorest, with widowed PAs being the second worst. Married and divorced PAs are among the least poor, with respect to the other two groups, *ceteris paribus*.

Families in densely crowded dwelling present higher levels of poverty. Household size provides an estimate of the effect of larger house residents versus the effect of case size which we control for; the effect is lower predicted welfare. Finally, presence of working family members who are able to procure economic resources are not surprisingly related to lower poverty among households.

The complexity of the situation of Syrian refugees living in host (non-camp) communities in Jordan shows that poverty and welfare are multi-faceted and require a comprehensive analysis. This chapter attempts to provide that by presenting a poverty profile and identifying throughout the analytical work the predictors and predictors of poverty. Finally, although the main purpose of this cross-sectional study was to assess poverty, it facilitates informed judgments on the vicissitude of welfare.

Annex

Table A.1.1: Welfare Model (Full): ProGres and JD-HV3 Variables

Variables		Coefficient	t-value
Case Size	2	-0.34	-27.76
(Ref. case size = 1)	3	-0.4	-28.1
	4	-0.55	-36.14
	5	-0.64	-40.29
	6	-0.71	-41.84
	7	-0.79	-43.17
	>= 8	-0.85	-43.37
	0–50%	-0.07	-4.98
Proportion of Children (Ref. 0%)	50–75%	-0.12	-9.24
	> 75%	-0.11	-6.66
Highest Education of PA	6–8 years	0.02	2.57
(Ref. Less than 6 years)	9–11 years	0.02	2.62
	12–14 years	0.04	3.74
	At least university	0.11	7.51
Type of House Occupancy	Provided through humanitarian assistance	-0.67	-40.88
(Ref. Rent)	Hosted (for free)	-0.57	-12.91
	Provided in return for work	-0.62	-19.8
	Squatter/Illegal occupation	-0.53	-20.38
Marital Status of PA	Single	-0.1	-6.74
(Ref. Widow)	Married or Engaged	0.05	4.38
	Divorced or Separated	0.02	1.06
Age of PA	0–17 years old	-0.14	-3.49
(Ref. 60 years old or older)	18–59 years old	0.07	6.48
MOI Registration	Ajloun	-0.14	-5.03
(Ref. Amman)	Aqabah	-0.1	-2.47
	Balqa	-0.1	-5.11
	Irbid	-0.09	-11.39
	Jarash	-0.11	-6.15
	Karak	-0.18	-8.53
	Maan	-0.07	-2.94
	Madaba	-0.06	-2.25
	Mafraq	0.01	1.2
	Tafilah	-0.04	-0.81
	Zarqa	-0.18	-18.17
	Ruwaished-Hadallat	-0.05	-3.14
Border Crossing Point (Ref. Airport)	Tal Shibab	-0.07	-4.85
	Nassib official or unofficial	-0.06	-5.9
	Other or no other data	-0.07	-5.68
Enumerator's Judgment: Not Vulnerable		0.17	11.7
Household Size		-0.05	-41.01
Household Size Squared		0.0009	26.96
Working Family Member Present		0.13	19.7
Informal Arrival		-0.06	-7.34
WASH: Wastewater Sewage Facility		0.03	4.06
WASH: Wastewater Regularly Removed		0.04	6.15
Food: Meat Consumed Through WFP Assistance		-0.02	-2.91
Food: Dairy Consumed Through WFP Assistance		-0.04	-4.94

Variables	Coefficient	t-value
Food: Spices and Condiments Bought With Cash	0.05	4.36
Education: Number of Children Attending School	0.03	3.18
Education: Public School	-0.02	-2.64
Vaccination Measles Children Under 5: Not Applicable	0.03	3.07
Multiple Entries into Jordan	0.1	7.64
Gender of PA: Male	0.13	17.96
Access to Kitchen Facilities	0.09	5.1
Religion Sunni	-0.13	-3.01
Birthplace Syria	-0.07	-3.09
House Crowding	-0.05	-19.9
Constant	4.86	86.96
Number of Observations	22593	
F-statistic	518.7	
Adjusted R-squared	0.56	

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.1.2: Welfare Model (Reduced): ProGres and JD-HV3 Most Important Variables

Variables		Coefficient	t-value
Case Size	2	-0.35	-28.9
(Ref. case size = 1)	3	-0.41	-28.92
	4	-0.55	-36.81
	5	-0.64	-41.61
	6	-0.71	-44.11
	7	-0.79	-46.88
	>= 8	-0.84	-47.78
	0—50 %	-0.05	-3.83
Proportion of Children (Ref. 0%)	50—75 %	-0.11	-10.09
	> 75 %	-0.1	-7.03
Marital Status	Single	-0.05	-3.61
(Ref. widow)	Married or Engaged	0.07	6.28
	Divorced or Separated	0.05	2.79
MOI Registration	Ajloun	-0.18	-6.55
(Ref. Amman)	Aqabah	-0.13	-3.36
	Balqa	-0.12	-6.28
	Irbid	-0.22	-10.99
	Jarash	-0.12	-15.94
	Karak	-0.13	-7.26
	Maan	-0.1	-4.05
	Madaba	-0.06	-2.47
	Mafraq	-0.03	-2.98
	Tafilah	-0.06	-1.32
	Zarqa	-0.2	-20.28
Type of House Occupancy	Provided through humanitarian assistance	-0.69	-43.87
(Ref. Rent)	Hosted (for free)	-0.53	-12.37
	Provided in return for work	-0.66	-21.58
	Squatter/Illegal occupation	-0.63	-27.05
Working Family Member Present		0.14	21.07
Enumerator's Judgment of Case: Not Vulnerable		0.2	13.7
Household Size		-0.05	-42.13
Household Size Squared		0	28.66
Informal arrival		-0.08	-12.9
Gender of PA: Male		0.13	18.2
House Crowding		-0.06	-23.53
Constant		4.83	365.5
Number of Observations		24163	
Adjusted R-squared		0.55	
F-statistic		839.7	

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.1.3: Welfare Model: ProGres Variables Only

Variables		Coefficient	t-value
Case Size	2	-0.35	-24.57
(Ref. case size = 1)	3	-0.42	-25.06
	4	-0.57	-31.59
	5	-0.7	-37.82
	6	-0.81	-42.33
	7	-0.95	-48.24
	>= 8	-1.12	-54.81
Proportion of Children (Ref. 0%)	0—50 %	-0.1	-6.1
	50—75 %	-0.2	-13.61
	> 75 %	-0.21	-11.96
Age of PA	18—59 years old	0.17	3.83
(Ref. < 18 years old)	>= 60 years old	0.02	0.41
Marital Status	Single	-0.12	-6.83
(Ref. widow)	Married or Engaged	0.06	4.62
	Divorced or Separated	0.04	1.84
Highest Education of PA	6—8 years	0.05	5.97
(Ref. Below 6 years)	9—11 years	0.06	6
	12—14 years	0.08	6.43
	At least university	0.18	10.45
Border Crossing Point (Ref. Airports)	Ruwaished-Hadallat	-0.1	-5.79
	Nassib-official or unofficial	-0.08	-6.52
	Tal Shibab	-0.08	-5.18
	Other or no data	-0.1	-6.91
Destination in Jordan (Ref. Madaba)	Ajloun	0.04	1.47
	Amman	0.17	19.41
	Aqabah	0.08	1.75
	Balqa	0.05	2.75
	Jarash	0.06	3.15
	Karak	0.01	0.39
	Irbid	(omitted)	(omitted)
	Maan	0.15	5.71
	Mafraq	0.04	3.71
	Tafilah	0.13	2.53
	Zarqa	-0.03	-2.94
Informal arrival		-0.08	-9.65
Religion Sunni		-0.15	-3.03
Birthplace Syria		-0.11	-4.41
Gender of PA: Male		0.18	22.6
Constant		4.5	61
Number of Observations		22469	
Adjusted R-squared		0.42	
F-statistic		450.4	

Source: Estimations based on JD-HV3 and JD-ProGres data.

Table A.1.4: Poverty Model (Probit): ProGres and JD-HV3 Variables

Variables		Coefficient	z-value
Case Size	2	1.15	23.72
(Ref. case size = 1)	3	1.19	21.86
	4	1.5	25.93
	5	1.97	33.2
	6	2.31	36.76
	7	2.67	38.7
	>= 8	3.09	35.94
	0—50 %	0.01	0.16
Proportion of Children (Ref. 0%)	50—75 %	0.33	8.04
	> 75 %	0.39	7.1
Marital Status	Single	0.19	3.15
(Ref. widow)	Married or Engaged	-0.04	-1.04
	Divorced or Separated	0.07	1.01
Highest Education of PA	6—8 years	-0.04	-3.85
(Ref. Below 6 years)	9—11 years	-0.04	-2.39
	12—14 years	-0.1	-1.21
	At least university	-0.22	-1.24
MOI Registration	Ajloun	0.43	4.01
(Ref. Amman)	Aqabah	0.2	1.36
	Balqa	0.24	3.31
	Irbid	0.25	8.88
	Jarash	0.42	6.14
	Karak	0.6	7.64
	Maan	0.33	3.68
	Madaba	0.1	1.05
	Mafraq	-0.02	-0.54
	Tafilah	0.22	1.27
	Zarqa	0.58	15.25
Age of PA	< 18 years old	0.48	2.95
(Ref. >= 60 years old)	18—59 years old	-0.05	-1.16
Type of House Occupancy	Provided through humanitarian	1.52	18.56
(Ref. Rent)	Hosted (for free)	1.44	8.5
	Provided in return for work	1.51	10.14
	Squatter/Illegal occupation	1.49	10.87
	Ruwaished-Hadallat	0.11	2.02
Border Crossing Point (Ref. Airports)	Nassib-official or unofficial	0.12	3
	Tal Shibab	0.14	2.63
	Other or no data	0.13	2.86
Food: Dairy Consumed Through WFP Assistance		0.06	2.11
Food: Spices and Condiments Bought With Cash		-0.18	-4.06
WASH: Wastewater Sewage Facility		-0.11	-4.22
WASH: Wastewater Regularly Removed		-0.07	-2.59
Multiple Entries into Jordan		-0.22	-4.43
Access to Kitchen Facilities		-0.28	-3.72
Working Family Member Present		-0.31	-12.23
Enumerator's Judgment of Case: Not Vulnerable		-0.37	-6.21
Household Size		0.14	18.96
Household Size Squared		-0.004	-13.67
Informal arrival		0.17	6.03
Gender of PA: Male		-0.13	-4.73

Variables	Coefficient	z-value
House Crowding	0.19	15.95
Constant	-2.53	-22.94
Number of Observations	22945	
R-squared (McFadden)	0.45	
AIC	18384	

Source: Estimations based on JD-HV3 and JD-ProGres data.

Appendix B: A Welfare Assessment Using LB-VASyR Data

Introduction

This chapter provides a poverty profile of Syrian refugees living in Lebanon and an analysis of the main predictors of welfare and poverty using the Vulnerability Assessment of Syrian Refugees (VASyR) data of 2014. We show that the Syrian refugee population in Lebanon has clear predictors of welfare and poverty including migration patterns, characteristic of the household heads, housing, WASH, coping strategies and indicators on humanitarian assistance. These predictors can change if we focus on the entire distribution of cases or on the poor only and they can change according to the poverty line set but, overall, there is a set of indicators that is robust to any modeling.

The purpose of the poverty profile is three-fold. First, it provides an indication of the socioeconomic characteristics of the poor which help detect poverty pockets of the refugee population that aggregate analyses or welfare modeling may not be able to identify. Second, it helps to provide some useful indications of the important variables that one should consider in a welfare model tailored to a refugee population and third, it contributes to highlight the dimensions that could matter more from a policy perspective.

The chapter is organized as follows: the second section provides an overview of the two data sources used for this study. The third section provides a poverty profile focusing on those variables that may be more of interest to a population of refugees with the objective to selectively highlight important aspects related to the refugee status of the population of interest. The fourth section summarizes the results of the welfare and poverty models by providing an overview of the careful screening of all available variables and a final selection of the most relevant variables. The fifth section concludes.

Data

The chapter uses two data sets: the profile Global registration system (ProGres) and the Vulnerability Assessment of Syrian Refugees (LB-VASyR) 2014 data. Below, we describe each of the data sets in turn.

ProGres data

The first data set is the **Profile Global registration system (ProGres)**, the main global database used by the UNHCR as of December 2014, details of which are described in chapter 2 of the full report. The ProGres data include information on select key variables, such as demographic information, socioeconomic information, 'specific needs' such as disability or chronic illness, unaccompanied children. , etc., on all registered refugees in Lebanon, over 1 million at the end of 2014. Registration of new arrivals takes place in four urban UNHCR registration centers in Tripoli, Bekaa, Tyre and Beirut.[2]

Vulnerability Assessment of Syrian Refugees data

The second data set is the **Vulnerability Assessment of Syrian Refugees (LB-VASyR)**. The LB-VASyR 2014 is a household survey administered for the second time in Lebanon to monitor and evaluate the vulnerability situation of Syrian refugees in Lebanon. The first round (LB-VASyR 2013) was carried out in 2013 exactly one year prior to LB-VASyR 2014. The LB-VASyR 2014 was implemented between May 26th and June 13th, 2014.

The LB-VASyR data collection aimed at providing knowledge on the living conditions of Syrian refugees in Lebanon; informing policy-makers; and re-designing programmatic activities. This multi-sectorial household survey of registered and pre-registered Syrian refugees was a joint exercise by the UNHCR, UNICEF and WFP. The LB-VASyR 2014 covered only a very small fraction of all refugee households in Lebanon which were selected at random among the refugee population in i) a two-stage cluster of random selection proportional to population size and ii) a stratified sample according to date of registration date (awaiting registration; registered between zero and three months; registered from three to six months; and

registered for more than six months). The household survey was administered to 350 households per strata in 35 clusters per strata with a random selection of 10 households per cluster resulting in a total sample of 1,750 randomly selected households. The LB-VASyR 2014 questionnaire was a household questionnaire based on the LB-VASyR 2013 but with significant improvements, such as the redefinition of household. Therefore, LB-VASyR 2013 and LB-VASyR 2014 are not necessarily comparable across all variables. The LB-VASyR questionnaire was extensive and resulted in the opportunity to analyze data in eight sector-specific criteria including shelter, health, non-food items (NFIs), WASH, education, food security, protection, and economy. The LB-VASyR also included questions on expenditure which we used to construct our welfare aggregate.

The data set used for the analysis in this chapter joins both data sets, the ProGres data and the LB-VASyR data, using the household (case) identification number which is provided in both data sources. Since LB-VASyR collected information at the household level and includes information on only some of the cases within a household, the analysis in this study focuses on the household as the unit of observation rather than the case. The LB-VASyR data are a small sub-sample of the ProGres data. Therefore, the final data set used in this chapter includes all variables coming from both data sets but is limited to the size of the LB-VASyR data by dropping all those observations for which we either did not have information in the LB-VASyR or the ProGres case identification number could not be matched.

There are no (official) refugee camps in Lebanon and therefore only households living in host communities are included in our sample. All refugees living outside camps are considered to be urban residents and consequently there is no need to split the analysis by urban and rural areas.

Comparison of ProGres and LB-VASyR data

Out of the 1,747 households in the LB-VASyR, we could retain 1,605 observations when merging ProGres and LB-VASyR data. Some variables had observations in the LB-VASyR as well as the ProGres data set while others were only available in one of the data sources. LB-VASyR was more extensive and preference was given to the source that seemed most reliable which in most cases was the LB-VASyR data set as the unit of observation was the household while the unit of observation for the ProGres data is the case. The concepts of Principal Applicants (a term used for a case) and the household head are not necessarily equivalent. The PA is the person who registered the case and not necessarily the head of household as there are often several cases in one household. Furthermore, the LB-VASyR collected household (and not individual) level information but the respondent was not necessarily the household head. Hence, information on the household head, such as employment, is often not available in the LB-VASyR data. On the other hand, the ProGres data have a very high percentage of missing values for some variables which creates issues in welfare modeling. For example, variables that were only available in the ProGres data set included employment by occupation; however, we had about 38 percent of missing values.

The variable of education for the household head was available in the LB-VASyR and the ProGres data, however, the ProGres data contained missing values for 1,313 observations and could therefore not be retained. Consequently, the educational variable is taken from the LB-VASyR data with the drawback that someone besides the household head had to answer the question on the highest attained level of education of the household head. The respondent may not have been able to provide this information as accurately as the household head him/herself.

Another variable for which we have available data in the LB-VASyR and the ProGres was the sex of the household head. There were significant differences in the two data sets. The ProGres data show that 30.5 percent of all PAs are female while the LB-VASyR data only show 17 percent of female-headed households. This difference could stem from the fact that PAs are not equivalent to household heads and therefore females may be more likely to be PAs but they would actually not be considered a head of the household. We assumed that the LB-VASyR data are more accurate as many female-headed households in the ProGres data are living in multi-case households.

The variable on marital status is used from the ProGres data as LB-VASyR does not collect information on the marital status of the household head but rather only of the respondent to the LB-VASyR questionnaire.

Unit of observation

The unit of observation used in this study is the household which in the LB-VASyR is defined as *a group of people who routinely eat out of same pot, live in the same compound (or physical location), and share the same budget that is managed by the head of the household. It is possible that they may live in different structures.* The case identifier is present in both ProGres and LB-VASyR data, however, interviews for LB-VASyR are conducted at the household level. The ProGres data also collect information on individuals who are part of a case. Consequently, the more detailed information on cases is lost in the subsequent data set as households often contain more than one case. Households are on average larger than cases with a mean size of 6.7 members while the average case size is 4.6.

Welfare aggregates

In order to conduct welfare analyses and construct poverty profiles of Syrian refugees, it is essential to construct a main welfare aggregate. The LB-VASyR's main welfare aggregate is based on expenditure data which is structured into several components, the first major component—food—is reported in several sub-components indicating the amount spent on each of the items (i.e. bread, cereals, tubers, milk, etc.). In addition, expenditures are structured into 14 broad expenditure items:

- Food
- Health
- Education
- House rent
- Water
- Soap and other household hygiene items (including diapers/nappies)
- Fuel (gas, petrol, etc.)
- Transport
- Electricity
- Clothing
- Telecommunication (mobile, satellite, etc.)
- Household utilities or assets
- Alcohol, wine, tobacco
- All the rest of expenditures (milling, labor ceremonies, firewood, waste collection, desludging (emptying) of toilets / septic tanks, agricultural and livestock inputs, purchase of income generating equipment, savings, gave money to other family or relatives, shelter material, debt repayment, etc.)

Questions on expenditure refer to a recall period of one month prior to the interview. Even though the LB-VASyR contains 14 expenditure items, this is not very detailed in welfare analysis as the values reported for expenditures decrease as i) the number of items listed in the questions decreases; and ii) the recall period increases. A recall period of 30 days is fairly long and 14 items for expenditure questions is fairly short. We therefore expect expenditure data to be under reported of their true values.

Great care was taken by the WFP to clean the data and ensure consistency across expenditure measures. Therefore, we used the total household expenditure per month in U.S. dollars provided by the WFP, which adds up the 14 broad items specified above. To reflect the true purchasing power of refugee households, we subtracted the amount of food aid for those households which received food vouchers (e-cards) by the WFP at the time of the survey under the assumption that expenditure includes expenditures made with the WFP food vouchers. The food vouchers provided by the WFP are valued at US$30 per family member per month. To ensure that no household has a negative expenditure level (due to the subtraction of food aid), we based all expenditure levels at a minimum of zero. In addition, we created a total expenditures per capita

welfare aggregate, by dividing total expenditures of the household by the number of household members. This last expenditure aggregate was then selected as the main welfare aggregate for the analysis.

Expenditure per capita including zero values was reported for 1,597 households and on average is US$111.1 per month per family member (table B.1).

Table B.1: Summary Statistics for Expenditures Per Capita

Variable	Obs.	Mean	Std. Dev.	Min	Max
Total expenditures per capita net of WFP food vouchers	1,597	111.1	91.4	0	1,157.16
Total expenditures per capita	1,597	132.5	87.8	0	1,187.17

Source: Estimations based on LB-VASyR data.

The expenditure aggregate may also include expenditure financed by donations not provided by the WFP. In addition to WFP food vouchers, refugees receive UNHCR cash assistance (UNHCR cash assistance is based on seasonal and specific cash assistance programs), and occasional assistance in-kind or in cash by many different local and international organizations. While the UNHCR tries to keep track of these donations, it does not have a full record for each case/household. This means that, for some households, the expenditure measure could include other donations in cash. The LB-VASyR questionnaire contains questions on financial and non-financial assistance but does not indicate specific amounts each household receives. We will however in the course of our analysis use these questions to control for various types of donations.

Poverty lines

For the purpose of the poverty profile and poverty models, we adopt a poverty line of US$92 per capita per month. This is equivalent to the poverty line of JD 50 per capita per month adopted by the UNHCR for providing cash assistance in Jordan. This line corresponds to LBP 139,054 and US$196 at Purchasing Power Parity (PPP) per capita per month (2013 prices). In per day equivalent, the PPP value is US$6.45, significantly higher than the international poverty line of US$1.25 (table B.2). As Lebanon is a middle-income country, this poverty line is not unreasonable although it may be considered on the high end, especially if we consider that the population we consider are refugees. The advantage of using a relatively high poverty line for poverty profiling is that the number of individuals or households that will be found below the poverty line will also be high and this will allow us to increase on the details of the analysis and explore smaller cells of poverty.

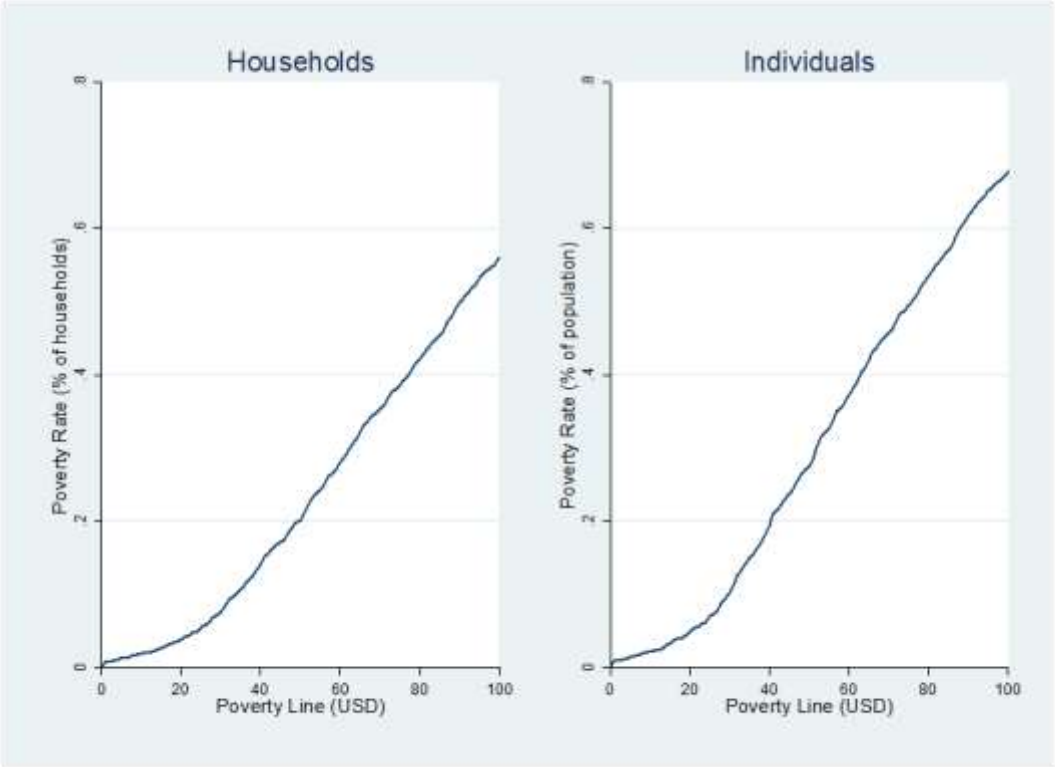
Table B.2: Per Capita Poverty Lines Used in This Study

	Per month	Per day
UNHCR Poverty Line (LCU)	139,054	5621.9
UNHCR Poverty Line (US$)	92.0	3.02
UNHCR Poverty Line (US$ PPP)	196.2	6.45

Source: Estimations based on LB-VASyR data.

A poverty line of US$92 per capita per month results in a poverty rate of 51.2 percent for households and 63.2 percent for individuals (the refugee population). To test the sensitivity of the poverty rate to different poverty lines, we plot poverty rates by different poverty lines between 0 and 100 (figure B.1). We observe that poverty rates are very sensitive to changes in poverty lines. For example, applying an arbitrary poverty rate of US$2.4 per day (US$72 per month) reduces the poverty rate to 36.8 percent for households and 47.6 percent for individuals. This sensitivity of poverty rates to the choice in poverty line may have large impacts in terms of inclusion and exclusion of certain UNHCR assistance programs.

Figure B.1: Poverty Rate Curves



Source: Estimations based on LB-VASyR data.

Poverty Profile

This section provides poverty profiles of Syrian refugees by showing cross-tabulations of poverty rates by various socioeconomic characteristics of the Syrian refugee population in Lebanon. As such, we can derive poverty rates for hundreds of population groups; however, we focus on those characteristics that may matter more from the welfare model and policy perspective than others following the approach taken in chapter 2. We divide this analysis in three parts: i) migration patterns; ii) characteristics of the household head; and iii) characteristics of the household.

Migration patterns

Syrian refugees follow particular trajectories which largely depend on location in their home country and proximity to the host country. The largest proportion of Syrian refugees included in the LB-VASyR survey, almost 40 percent, settled in the Northern governorate of Lebanon while the smallest proportion, not even 2 percent, settled in Beirut. Approximately 29 and 18 percent of all Syrian refugees settling in Lebanon originate from the Syrian governorates of Homs and Aleppo. The most common trajectory of Syrian refugees was to originate in Homs and to settle in the Northern governorate of Lebanon. The trajectories Syrian refugees take often reveal differences in poverty rates. Table B.3 provides poverty rates by governorates of origin in Syria and governorates of destination in Lebanon[3]. It is visible, for example, that Mount Lebanon is the governorate at destination with the lowest poverty rate of 39.3 percent, followed by Beirut with 56.2 percent. Refugees settling in the governorates of Bekaa and the North are poorest with poverty rates of 74.7 and 66.9 percent respectively but also those Lebanese governorates that host the largest proportions of refugees. In terms of origin, the governorates of Al-hasakeh and Idleb show the lowest poverty rates of 31.8 and 52.2 percent respectively while Quneitra and Ar-raqqa have the highest poverty rates of 89.1 and 76.1 percent.

Table B.3 also allows for the identification of trajectories that are very likely to lead to high poverty rates and those that lead to low poverty rates. For example, refugees coming from Idleb and Damascus who settle in Mount Lebanon have the lowest poverty rates of 14.1 and 22.6 respectively. On the other hand, those departing from Dar'a and Idleb who settle in Bekaa are among the poorest with poverty rates of 89.3 and 86.3 percent respectively.

Table B.3: Individual Level Poverty Rates of Syrian Refugees by Governorates of Origin and Destination

		Destination in Lebanon (Governorate)					
		Beirut	Bekaa	Mount	North	South	Total
Origin in Syria (Governorate)	Al-hasakeh			23.0			31.8
	Aleppo		80.3	47.2	74.2	68.3	66.8
	Ar-raqqa		80.0		74.5		76.1
	As-sweida						
	Damascus		62.2	22.6	71.6	72.6	61.8
	Dar'a	60.3	89.3	51.2		71.4	69.5
	Deir-ez-zor		69.5				67.7
	Hama		31.7	23.0	63.5	55.2	55.7
	Homs		76.2	44.1	66.8	61.9	66.7
	Idleb		86.3	14.1	63.2	47.0	52.2
	Lattakia						
	Quneitra						89.1
	Rural Damascus		69.7	50.9	62.2	60.0	64.7
	Tartous						
	Total	56.2	74.7	39.3	66.9	60.8	63.1

Source: Estimations based on LB-VASyR and LB-ProGres data.

Another useful approach is to explore the arrival of refugees in Lebanon and therefore the duration of Syrians' refugee status. The refugee influx has undergone various phases, indicated by the middle column of table B.4, and started slowly in 2011 with about 4.5 percent of all Syrian refugees arriving in Lebanon in 2011. In 2012 the influx increased and about 36.5 percent of all Syrian refugees registered in Lebanon arrived in 2012. An additional 44.4 percent entered Lebanon from January 1st, 2013 through November 1st, 2013 while the refugee arrival slowed down after November 1st, 2013.

The poverty rates of refugees arriving in Lebanon during the different phases show clear patterns. Refugees who entered Lebanon at the beginning of the crisis have the lowest poverty rates while the peak of poverty is associated with those refugees who arrived in 2013. Refugees entering before March 15th, 2011 have poverty rates of 35.5 percent and those entering during 2011 have poverty rates of 54.3 percent. We observe that refugees living in households that have been in Lebanon the shortest, (under 1 year) are poorer than those refugees who have been in Lebanon for more than one year. Since the peak of the crisis, poverty rates for individuals stayed consistently above 60 percent. Refugees who entered Lebanon between January 1st, 2013 and November 1st, 2013 are among the poorest with poverty rates of 67.2 percent while poverty rates for those who entered Lebanon after November 2013 declined again. This may be explained by the fact that WFP's food voucher program and UNHCR cash assistance program were at their peak and these programs effectively contributed to the reduction in poverty. Furthermore, refugee who fled the conflict later on, presumably had more resources and opportunities to stay in Syria and therefore poverty rates are presumed to have been lower.

Table B.4: Individual Level Poverty Rates by Date of First Arrival in Lebanon

First arrival in Lebanon	Percentage of refugee	Poverty rates
Before 15 Mar. 2011	0.3	35.5%
15 Mar. 2011—31 Dec. 2011	4.2	54.3%

1 Jan. 2012—31. Dec. 2012	36.5	60.9%
1 Jan. 2013—1. Nov. 2013	44.4	67.2%
After 1 Nov. 2013	14.6	60.3%
Total	100	63.2%

Source: Estimations based on LB-VASyR and LB-ProGres data.

Further insight can be drawn by looking at the border crossing points of refugees (table B.5). The majority of refugees entered the country at formal border crossing points (86.5 percent). As one would expect, refugees who entered Lebanon informally suffer from higher poverty, about 10 percentage points higher, than refugees entering officially.

Table B.5: Individual Level Poverty Rates by Official and Unofficial Border Crossing Point

	Percentage of	Poverty
Informal entry	13.5	72.2
Formal entry	86.5	62.2
Total	100.0	63.5

Source: Estimations based on LB-VASyR and LB-ProGres data.

Characteristics of the household head

Figure B.2 provides a first snapshot of the impact of the characteristics of the household head on poverty rates. We plot poverty rates for different population groups according to the characteristics of the household head. Results are largely as expected with some peculiarities to be attributed to the fact that we are looking at a refugee population of mostly unemployed or informally employed people.

Highly skilled people have a lower poverty rate than low skilled people but the difference is small as we would expect in regular populations. Refugees living in households with a high-skilled household head have lower poverty rates than those living in households with low-skilled household heads, with an average poverty rate of 61.9 and 64 percent respectively. Similarly, so-called white collar professionals have lower poverty rates than blue collar professionals; however, the differences are not very large particularly for white collar professionals. This is counter-intuitive to what we know from poverty analysis in so-called "regular" populations. However, it demonstrates the fact that refugees have small returns in terms of occupations they held prior to their displacement. Syrian refugees in Lebanon have great difficulty in obtaining work permits and are forced to either not work or work informally for low wages.

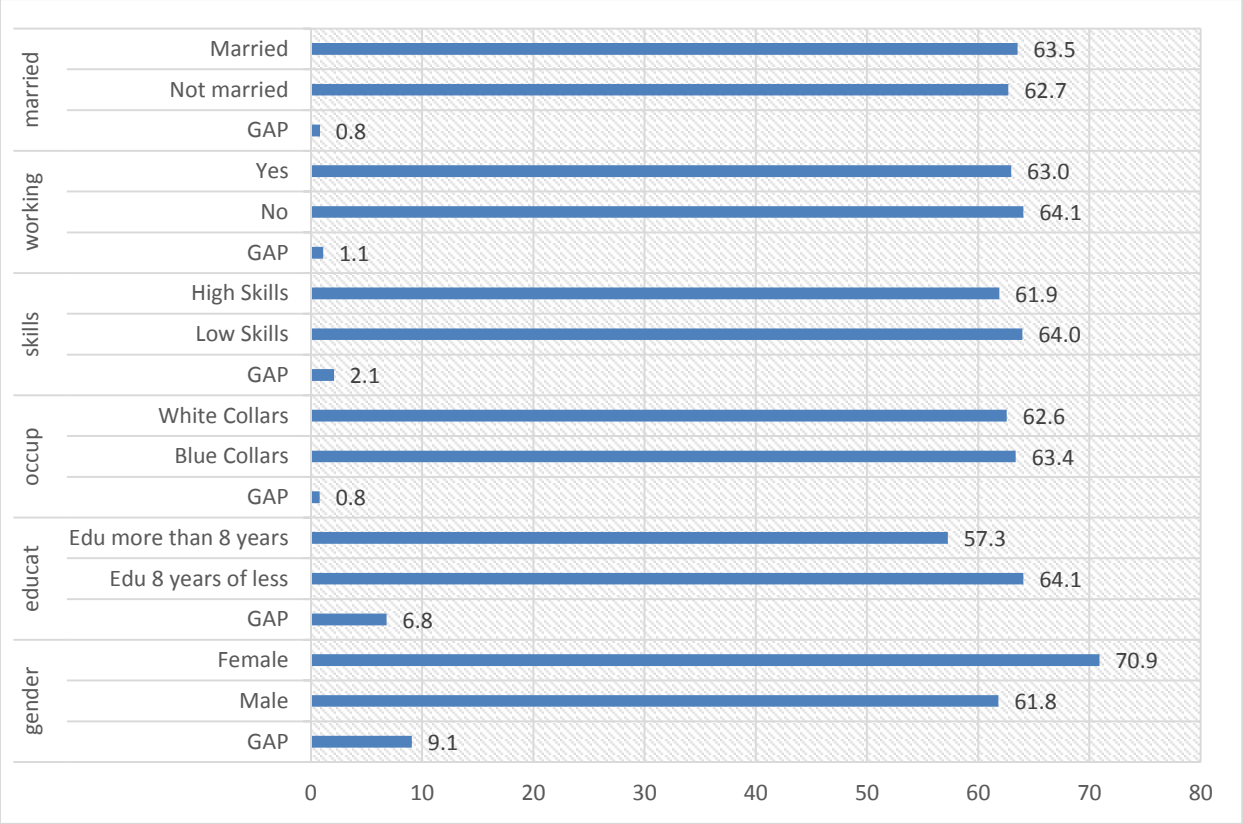
The returns to education for Syrian refugees in Lebanon are higher for those with 8 or more years of education. The poverty rate for refugees living in households where the household head has 8 or more years of education stands at 57.3 percent on average compared to 64.1 percent of those with less than 8 years of education. However, less than 13 percent of Syrian refugees live in households where the household head has 8 or more years of education.

Female-headed households have higher poverty than male-headed households with quite a large difference of 9.1 percent even though the WFP privileges female-headed households in the provision of food assistance. Therefore, if there were any weaknesses in adjusting expenditure for the WFP food voucher, we would be able to observe it among female-headed households. Furthermore, when looking at a population that did not receive WFP food assistance is studied (LB-Verif data), we observe much smaller differences between male- and female-headed households.

Poverty rates are similar for refugees living in households with married or unmarried household heads with slightly higher poverty rates for married household heads. Surprisingly, whether any member in the family has worked in the past 30 days or not does not seem to make a difference in poverty rates. Refugees living in households where any of the household members have worked in the past 30 days have an only 1.1 percentage point lower poverty rate. This could be attributed to the fact that most refugees live in households where any one member of the household worked (77 percent). As we see later on in the analysis, the ability

to generate income through i) a grouped variable indicating households' main source of cash/income to sustain the household as irregular and ii) households who generate income through skilled work, does impact welfare positively.

Figure B.2: Individual Level Poverty Rates by Characteristics of the Household Head



Source: Estimations based on LB-VASyR and LB-ProGres data.

With the aim of identifying poverty pockets otherwise little visible in statistical and econometric analyses, we look at age and marital status groups of the household head (table B.6). The top panel on population shares shows that the largest shares of the Syrian refugees live in households where the household head is married or single. About 0.7 percent of Syrian refugees live in households where the household head is married and under the age of 19 with the highest poverty rate of all groups of about 81.7 percent. The largest share of the refugee population lives in households where the household head is married or engaged at the age of 35 to 49 years (35.9 percent). Other groups by marital status are small and make up only about 12 percent of the refugee population. Poverty (bottom panel) is the highest for the age group of under 19 year olds (78.9 percent) which only makes up about 1.3 percent of the population. The group with the second highest poverty rate are widowed 35 to 49 year olds (80.7 percent); however, this group is small by comparison and only accounts for 1.8 percent of the population. Refugees with the lowest poverty rates live in households where the household head is single; and married or divorced aged 19 to 34 years with poverty rates of 43.0 and 58.7 percent respectively. Married and widowed household heads have the highest poverty presumably because this is the group with the largest number of children at a young age. Refugees living in households with single household heads have the lowest poverty rate.

Table B.6: Population and Individual Level Poverty by Age and Marital Status of household Head

	Marital status of household head				
Age grouping	Married or	Divorced or separated	Single	Widowed	Total

		Percentage of refugee population			
<19 years	0.7	0.0	0.5	0.1	1.3
19-34 years	32.6	0.3	3.4	1.2	37.5
35-49 years	35.9	0.1	1.4	1.8	39.2
50+ years	19.2	0.2	0.4	2.3	22.1
Total	88.3	0.6	5.7	5.4	100.0
		Poverty rates			
<19 years	81.7		78.8		78.9
19-34 years	58.2		43.0	65.1	57.1
35-49 years	69.0		72.9	80.7	69.6
50+ years	61.7			71.1	62.3
Total	63.5	58.5	53.7	72.7	63.4

Source: Estimations based on LB-VASyR and LB-ProGres data.

Table B.7 provides population and poverty statistics by the former occupation of refugees and the current level of education. The largest share of refugees live in households where the household head used to work in elementary occupations (26.1 percent), and service and sales jobs (14.5 percent). In general, poverty increases with lower skill levels required for occupations. The highest poverty rate is found among skilled agricultural, forestry and fishery workers (75.2 percent) followed by service and sales workers (65.2 percent) and elementary occupations (62.6 percent). Professionals and craft and related trades workers have the lowest poverty rates (25.4 and 54.5 percent respectively) but the lowest shares of the population employed in these occupations (0.6 and 9 percent respectively).

The largest group by highest educational level, over half of the population, attained below 6 years of education, and not surprisingly we observe the highest poverty rate of almost 65.7 percent, while only 46.5 percent of those with 12 years or more education are poor. The highest poverty rates can be found in refugees living in households with a household head working as skilled agricultural, forestry and fishery worker with less than 6 years of education (88.3 percent). Hence, agricultural workers who were particularly affected by the drought in Syria prior to the crisis remain the poorest population group in refugees. An anomaly in terms of occupation and education are technicians and associate professionals with 12 or more years of education who are among the poorest with a poverty rate of 68.8 percent. Service and sales workers with 12 years of education or more are the least poor; however, only 1.2 percent of refugees fall within this group.

Table B.7: Population and Individual Level Poverty by Former Occupation and Education of Household Head

ISCO Employment Category	**Highest educational attainment of household head**				
	Below 6 years	6-8 years	9-11 years	12+ years	Total
	Percentage of refugee population				
Managers	0.4	0.4	0.1	0.1	0.9
Professionals	0.0	0.0	0.2	0.4	0.6
Technicians and associate professionals	0.7	0.3	0.3	1.2	2.6
Clerical support workers	0.0	0.0	0.0	0.0	0.0
Service and sales workers	8.8	4.0	1.1	0.5	14.5
Skilled agricultural, forestry and fishery	2.6	1.3	0.4	0.1	4.4
Craft and related trades workers	4.5	3.1	1.1	0.2	9.0
Plant and machine operators, and	2.1	1.0	0.5	0.1	3.7
Elementary occupations	16.4	8.2	1.0	0.4	26.1
Total	56.5	31.1	7.7	4.7	100.0
	Poverty rates				
Managers					59.0

Professionals					25.4
Technicians and associate professionals	43.8			68.8	56.8
Clerical support workers					
Service and sales workers	66.5	65.7	66.1	36.5	65.2
Skilled agricultural, forestry and fishery	88.3	59.7			75.2
Craft and related trades workers	55.1	50.4	71.6		54.5
Plant and machine operators, and	61.9	63.0			60.7
Elementary occupations	66.0	57.3	64.0		62.6
Total	65.7	61.2	63.8	46.5	63.2

Source: Estimations based on LB-VASyR and LB-ProGres data.

Characteristics of the household

As in most welfare analysis, household size and share of children in a household are important predictors of welfare and poverty rates are higher the larger either of these indicators. Table B.8 plots the household size against the number of children in the household. It is interesting to note that while the average household size is 6.7 persons per household, the largest share of refugees (42.6 percent) lives in households with 9 or more people. That is due to the fact that one 9-person household weighs as much as nine one person households in the population. We observe that the larger the household size, the higher the poverty rates. Refugees living in households of 8, and 9 or more members have poverty rates of 68.6 and 83.2 percent respectively. The largest share of refugees lives in households with 9 or more household members (42.6 percent). Poverty rates of households with 1 or 2 household members are much lower at 23.3 and 19.9 percent respectively and only 0.4 and 1.4 percent of refugees live in these households. Similarly, refugees living in households with a larger number of children are poorer than households with a smaller number of children. Just as with the number of household members, the poverty rate jumps for each additional child. For example, from three to four members, the poverty rate jumps from 31.8 to 40.3 percent and it jumps from 33.6 to 53.1 percent from three to four children. Overall, both household size and number of children are important and it is not possible to say with certainty the more important of the two factors. This question will be addressed in the multivariate welfare models in the next section.

Table B.8: Population and Individual Level Poverty by Household Size and Number of Children

	Number of children								
Number of household	0	1	2	3	4	5	6	7+	Total
	Percentage of refugee population								
1	0.4								0.4
2	1.1	0.3							1.4
3	1.1	2.6	0.6						4.4
4	1.0	1.0	4.4	0.7	0.1				7.2
5	0.5	0.8	2.3	7.9	0.6				12.1
6	0.2	0.6	1.9	3.2	6.2	1.0	0.1		13.1
7	0.2	0.4	0.9	1.3	2.2	4.3	0.5		9.7
8	0.0	0.3	0.3	1.6	1.9	2.0	2.6	0.2	9.0
9+	0.0	0.3	0.4	2.2	4.2	6.2	6.3	22.9	42.6
Total	4.6	6.3	10.9	17.0	15.2	13.5	9.4	23.2	100.0
	Poverty rates								
1	10.6								10.6
2	19.3								23.3
3	17.1	15.4	43.5						19.9
4	29.6	25.9	26.5	73.7					31.8
5		38.9	26.0	42.5	84.6				40.3
6		36.4	41.2	59.6	60.6	64.7			56.7
7			46.2	45.0	63.6	63.6			59.5
8				59.1	76.9	66.7	74.3		68.6

9+				75.5	58.7	72.5	72.6	94.6	83.2
Total	22.4	29.7	33.6	53.1	63.5	68.2	74.6	94.4	63.2

Source: Estimations based on LB-VASyR and LB-ProGres data.

Refugee children at school age face many challenges in enrolling in educational institutions in Lebanon due to scarce supply, financial constraints, crowding, psychological distress and other issues that would not normally be an issue for children in regular populations. It is therefore instructive to look at the proportion of children in school compared to the number of children of school age and their relative poverty rates. Table B.9 shows the results.

About 11 percent of the refugee population lives in households with no children of school age and over half of all refugees live in households where no children attend school. The numbers on the diagonal of the top panel indicate the population shares of people living in households where all children attend school; only about a quarter of the total refugee population lives in these types of households. Approximately 32 percent of all refugees live in households with 5 or more children. Not surprisingly, poverty rates increase continuously for every additional child of school age and the number of children attending school. Those households where none of the children attend school, have a poverty rate of about 31.6 percent whereas over 90 percent of refugees living in households with 5 or more children attending school are poor.

In addition, those refugees that live in households where all children who are of school age attend school are poorer, the higher the number of children. The highest poverty rates are found for refugees living in households where there are 5 or more children but none of them attend school (91.0 percent). In general those households where fewer children attend school than are of school age, poverty rates tend to be higher while the lowest poverty rates are found in households with fewer children. The highest poverty rates are found among households with 5 or more children and almost the entire population living in this type of households is poor (91.0 percent). The highest poverty rates are indeed found for the population living in households with many children and where several children do not attend school (bottom panel, bottom-left of the table).

Table B.9: Population and Individual Level Poverty by Children in School Age and School Attendance

Number of children of school age	**Number of children attending school**						
	0	1	2	3	4	5+	Total
	Percentage of refugee population						
0	11.3						11.3
1	7.4	1.7					9.1
2	7.4	4.1	3.2				14.7
3	7.3	2.2	4.6	2.6			16.7
4	6.1	1.2	3.8	2.7	2.1		15.8
5+	12.4	2.1	3.3	4.8	4.8	4.7	32.2
Total	52.0	11.4	14.9	10.1	6.8	4.7	100.0
	Poverty rates						
0	31.6						31.6
1	44.7	31.6					42.1
2	54.4	48.6	39.5				49.6
3	57.7	73.2	55.0	44.1			56.9
4	71.9	90.6	56.7	71.1	75.6		70.1
5+	91.0	92.6	76.7	78.2	85.1	90.7	86.7
Total	59.1	63.6	56.9	67.5	82.2	90.7	63.2

Source: Estimations based on LB-VASyR and LB-ProGres data.

Children who do not attend school are at risk of working to support the family income. Table B.10 shows poverty by the number of children attending school and child labor. About 3.6 percent of refugees live in

households where at least one child is working to support the family. The largest share of the population lives in households where there are no children who do not attend school (all children go to school) (46.2 percent). The poverty rate increases continuously with the increase in children not attending school and is the highest for refugees living in households with 4 or more children who do not attend school (90.1 percent). These are evidently households that cannot afford to send any children to school, as they need them for work. Poverty rates are similar for refugees living in households where 4 or more children do not go to school and children do not work compared to those who work (90.1 compared to 89.7 percent). Not surprisingly, children who have to work in order to support the family income are therefore a clear sign of poverty.

Table B.10: Population and Individual Level Poverty by Child School Attendance and Child Labor

Number of children not attending school	**Children are working to support the family**		
	No	Yes	Total
	Percentage of refugee population		
0	46.2	0.9	47.1
1	14.7	0.7	15.4
2	11.7	0.4	12.2
3	8.3	0.8	9.1
4+	15.4	0.8	16.2
Total	96.4	3.6	100.0
		Poverty rates	
0	53.6	70.1	53.9
1	55.0	66.7	55.5
2	70.9		70.9
3	68.0	64.0	67.6
4+	90.1	89.7	90.1
Total	62.9	72.6	63.2

Source: Estimations based on LB-VASyR and LB-ProGres data.

Finally, we look at the type of accommodation and number of rooms as these may be good indicators of poverty. Table B.11 shows that the largest share of the refugee population lives in cement houses (64.5 percent), 11.6 percent live in apartments and about a quarter of all refugees live in bad quality or make shift housing. As expected, the poverty rate for refugees living in make shift housing is the highest with 77.1 percent while poverty rates for apartments and houses do not differ substantially (59.5 and 58.7 percent respectively). The results for number of rooms are somewhat counter-intuitive as refugees living in housing with 4 or more rooms have the highest poverty rates while refugees living in smaller houses have lower poverty rates. However, this seems to reflect the fact that refugees living in households with a larger size have a higher number of household members than those living in smaller households and the presumably need a larger number of rooms; a higher number of rooms is not a sign of wealth but rather one of poverty. We therefore conclude that crowding or square meters per person are more appropriate indicators than the number of rooms.

Table B.11: Percentage of Refugee Population and Individual Level Poverty Rates by Kind of Housing and Number of Rooms

Number of rooms	**Kind of housing**			
	Bad quality housing	Apartment	Cement house	Total
	Percentage of refugee population			
0	9.5	7.5	7.4	24.4
2	9.8	2.2	16.9	28.9
3	3.2	1.2	19.3	23.7
4+	1.4	0.8	20.9	23.0
Total	23.9	11.6	64.5	100.0

	Poverty rates			
0	71.6	52.6	45.1	57.7
2	81.5	63.9	48.1	60.6
3	82.7	71.2	59.5	63.2
4+	71.9	95.1	71.6	72.4
Total	77.1	59.5	58.7	63.2

Source: Estimations based on LB-VASyR and LB-ProGres data.

Poverty Predictors

This section examines the likely predictors of welfare and poverty. We first describe the models, the estimators and the process of variables' selection followed to optimize the final models. Next, we present the results for the welfare model providing details on each key predictor and their explanatory power. In the last part, we present the results of the poverty models comparing different estimations and sets of predictors.

Models

The LB-VASyR and ProGres data can be merged into one data file using the UNHCR case identification code. We kept only those observations for which we have information from the LB-VASyR and information is provided for a household as the unit of observation. Each observation has a set of variables from the LB-VASyR data set and a set of variables from the ProGres data.

Central to the various objectives set in this paper is the estimation of the welfare and poverty models that exploit at best the LB-VASyR and ProGres data available. The general models are described as follows:

$$W_i = \alpha + \beta_1 PGVS_i + \beta_2 PG_i + \beta_3 VS_i + \varepsilon_i \quad (1)$$

$$P_i = \alpha + \gamma_1 PGVS_i + \gamma_2 PG_i + \gamma_3 VS_i + \varepsilon_i \quad (2)$$

where *W*=welfare measure (income or expenditure) and *P*=poor where *P*=1 if the household is under the poverty line and *P*=0 if the household is on the poverty line or above; *PGVS*=vector of household characteristics present in both the ProGres and LB-VASyR (VS) databases; *PG*=vector of case characteristics present in the ProGres data but not in the LB-VASyR data; *VS*=vector of household characteristics present in the LB-VASyR (VS) data but not in the ProGres data; ε_i= normally distributed error term with zero mean; *i*=household. As *W* is only available in LB-VASyR data, the total number of observations on which the model can be run is equal to the total number of observations in the LB-VASyR data.

We aggregated individual-level variables such as the level of education, age, sex, etc. to the household-level by using the values of the household head. Variables representing counts per household like number of children in school were transformed into household variables by dividing for the household size and for the remainder of the categorical variables, dummy variables were created. We only used binary (dummy) variables in the model to avoid the problem of finding the right non-linear transformation for continuous variables.

To maximize the explanatory power of the models and to select the final welfare model, we followed the approach laid out in chapter 2 including tests for collinearity[4].

Welfare results

Table B.1.1 shows the results of the welfare models. The dependent variable is the logarithm of expenditure net of WFP food assistance. The independent variables are organized by groups of variables with the first group from the ProGres data set and the other groups of variables following the order of the LB-VASyR questionnaire (demographics, housing, WASH, coping strategies, and humanitarian assistance). All

variables are either used as dummies (i.e. yes or no; 1 or 0) or their categorical answer choices are transformed into dummy variables. Only those variables retained by the best available model including all variables were retained in table B.1.1. Therefore, not all groups of variables are presented as we followed the methodology described in the section on models to reach the final model. The final model includes 17 variables and all variables combined have an explanatory power of 47 percent which may not seem much but is a fairly good result in econometric welfare modeling.

The place of destination relates to migration patterns as initially explored in the section on poverty profiles. The place of destination in Lebanon is generally important, if this variable were removed from the welfare model, the explanatory power of the model would be reduced by 2.7 percent. However, only the governorate of Mount Lebanon is significant; those settling in Mount Lebanon are usually better off than those settling in other governorates. The place of destination is the only variable from the ProGres data that is included in the model. This is mainly caused by the fact that most variables are taken from the LB-VASyR rather than the ProGres data (as discussed in the section on data).

Another variable that relates to migration patterns of refugees is the time of first arrival in Lebanon. Those refugees who arrived in Lebanon 4 to 6 months prior to the LB-VASyR data collection (hence, approximately from January through March of 2014) are poorer than those arriving at other times. The arrival of refugees contributes to the model by 1.7 percent.

The most important variable of the model is household size. This is somewhat by construction as the dependent variable is expenditure in per capita terms calculated by using household size in the denominator. However, household size can potentially take any sign and is used in combination with all other variables in the model, indicating that the coefficient is not predictable by construction. Removing this variable would reduce the explanatory power of the model by approximately 10 percent. All categories of household size are significant with a negative sign indicating that the larger the household, the smaller the expenditure, creating poorer households.

The proportion of children in the household is another significant and important variable which decreases expenditures as the proportion of children increases. The negative relationship increases in magnitude as (larger negative coefficients) the proportion of children in a household increases. The removal of this variable would reduce the adjusted R squared by 2.2 percent. Hence household size predicts welfare better than the share of children in a household but both matter.

The next set of variables relates to the demographic and socioeconomic characteristics of the household head. Educational attainment of the household head contributes to the model by 1.6 percent and shows that higher educational attainment is associated with higher welfare measured through expenditures. The coefficients increase linearly as the years of education increase and is highest (and significant) for university degrees or higher. The number of children not attending school is also significant but only for two children, which decreases welfare. Whether children who do not attend school are a sign of wealth or poverty is not clear as coefficients switch signs depending on the number of children and it will also depend on the total number of children in a household. This variable modestly contributes to the overall model (1.6 percent).

We found several variables relating to housing conditions and assets to be significant in the model, all of which increase welfare. Among the most important of these is the availability of cooking fuel in a household. As expected, a household with access to cooking fuel has a higher welfare than those without cooking fuel. If this variable were to be removed from the model, the explanatory power would decrease by 1.6 percent. Another relevant variable is the area of house per household members which is often referred to as an indicator of crowding. This variable was created by dividing the total area of each refugee household by the household size and creating three quantiles equal in size. Not surprisingly, the larger the area per household member, the better off the household indicating that less crowding is a sign of increased welfare. Living space reduces the explanatory power of the model by 1.6 percent. Whether a household rents or owns[5] their accommodation (compared to free or other types of accommodation) is a clear predictor

of welfare and is the second most important variable in the model. If this variable were removed from the model, we would lose 7.1 percent of explanatory power. We should also take into consideration that the large majority of households (over 80 percent) rents their accommodation, indicating that the group worse off is rather small.

Variables relating to assets, namely whether the household has access to a fridge and water heater in usable condition, also increases welfare. These variables contribute to the overall model by 1.6 and 1.5 percent respectively. The last housing variable of significance in the model is the type of latrine facility the household uses. Several options are available, most of which reduce welfare, the only significant category of which is the traditional pit latrine (without slab/open pit) whether inside or outside the dwelling.

A grouped variable indicating households' main source of cash/income to sustain the household includes: i) Non-agricultural casual labor (casual labor, provision of services); ii) Informal commerce; iii) Sale of crops; or iv) sale of livestock and animal produce. Refugee households with this type of irregular income have an increased welfare with a contribution of 1.4 percent to the explanatory power of the overall model. Another variable related to income, indicates whether household members had cash or income to sustain a household through skilled work, which indicates an increase in welfare with a contribution of 1.5 percent to the model. Another variable indicating the main source of income of households is a grouped variable including food assistance (e-card/voucher); food assistance in-kind; health care or drugs; psychosocial support; fuel subsidy; rent subsidy; hygiene kits; other non-food items; unconditional cash; or any others. Households receiving any of these types of assistance are in fact poorer with a negative coefficient. Removing this variable from the model would reduce the adjusted R squared by 1.7 percent. Just over 80 percent of all refugees in Lebanon receive these types of assistance.

The last set of variables relates to humanitarian assistance and coping strategies. Among coping strategies that indicate reduced levels of households' welfare are the reduced number of meals eaten per day by a household to cope with a lack of food or money. This variable contributes 1.5 percent to the overall model. Variables on humanitarian assistance indicate whether the household was considered eligible for food and non-food assistance provided by the WFP and the UNHCR with a negative coefficient indicating that households who receive this type of assistance have lower levels of welfare. This variable is negative and contributes to the overall model by 1.7 percent. Recall that our dependent variable does not include WFP food vouchers for reasons already described in the section on welfare measures. We can observe that households who receive assistance are in fact poorer which confirms that assistance is provided to households in need.

Poverty results

In this section, we turn to model poverty. The difference between welfare modeling and poverty modeling is that welfare modeling provides results for the whole distribution of households while poverty modeling focuses on the factors that matter for the households below the poverty line. Hence, it is important to understand that the results of poverty modeling largely depend on the level of the poverty line. If this level is very high and all households fall under the poverty line, then the poverty model will be equal to the welfare model in terms of the factors that matter (coefficients are different because in poverty modeling we use logit or probit estimators while in welfare models we use OLS estimators). If, vice-versa, the poverty line is very low, the households that fall under the poverty line are few and the model will focus on these households and will result in a model that looks quite different from the welfare model in terms of predictors. Therefore, if one wants to have general rules for predicting welfare irrespective of the poverty line, the welfare model is more appropriate. If one, instead, is confident of the poverty line and wishes to focus only on those households below the poverty line, then the poverty model is more appropriate.

In the poverty model (Table B.1.2), we use the same poverty line used for the poverty profile and discussed in the section on poverty lines of US$92 per capita per person. Results are similar to the welfare model. This is not particularly surprising because, as already explained, the poverty line is fairly high and includes

over half of the households considered. However, some changes are visible. For example, the number of children not attending school is not only significant for two children but also for four or more children with a clear indication of increased welfare for those households that can send more children to school. The type of latrine is also different from the welfare model. The welfare model identified significance for the traditional pit latrine. The poverty model however shows that the traditional pit latrine is not significant; however, improved latrines and flush toilets become significant, both of which counter-intuitively decrease households' welfare.

There are also variables that are excluded as compared to the welfare model and new variables that are added to the model. For example, the proportion of children in the household; first arrival in Lebanon; highest education of the household head; availability of cooking fuel; access to water heater in usable condition; the two variables for main sources of income (irregular and skilled work); as well as the coping strategy of reducing the portion size of meals are dropped from the model. However, the origin of refugees in Syria is a new variable that appears in the poverty model but was not significant in the welfare model.

The importance of variables that are retained by both the welfare and poverty models also change in the poverty model even though the most important variables of household size and rent remain the same. Overall, the welfare and the poverty model are similar but the importance of several variables decreases in the poverty model, such as for household demographics and housing conditions become less important overall

While some variables come and go, those that remain in both the welfare and poverty models seem to be more solid foundations, while others, i.e. origin, first arrival, highest education, availability of cooking fuel, etc. require a more attentive scrutiny and depend on the poverty line set for the poverty models.

Predictions tests

We now test the capacity of the poverty models used in the previous section to predict poverty correctly. In essence, the exercise consists in using the parameters estimated by the models to predict the dependent variable of the model—whether households are poor or non-poor—as if we did not have information on this variable. Table B.12 shows the results using different poverty lines and different probability thresholds. The models estimate probabilities of poverty for each household. These probabilities vary between 0 and 1, for example, household X has a probability of being poor of 60 percent. To test the goodness of the model, we need to determine the probability threshold that we wish to use to decide whether the model assigns a value of poor or non-poor to the household. This threshold is usually 50 percent. If a household is more than 50 percent likely to be poor, then we can say that the model predicts this household to be poor. Sometimes, we may want to change this threshold. That is because each threshold corresponds to a specific coverage rate and leakage rate. Changing the threshold may improve on one of the two rates such as the leakage rate, while making the coverage rate worse. Depending on which rate we are most interested in, we may adapt the threshold to optimize that particular rate. As a result, it is essential to comprehend how inclusion and exclusion errors vary as the probability threshold change.

The top panel of table B.12 shows that, using a US$92 poverty line and a 50 percent threshold, the model correctly predicts if a household is poor 85 percent of the time, which implies that 15 percent of times the model predicts poor households to be non-poor (under-coverage rate or exclusion error). The model also correctly predicts if a household is non-poor 67.7 percent of the time, which indicates that 32.3 percent of the time the model predicts non-poor households as poor (leakage rate or inclusion error). Evidently, the first type of error (under-coverage) is more problematic from a policy and welfare perspective while the second type of error (leakage) is more problematic from a budget perspective.

The middle panel repeats the exercise using a poverty line of 72 JD and a 50 percent threshold. We can see that the exclusion error becomes larger (25.2 percent) while the leakage rate becomes lower (23.6 percent). Hence, as we lower the poverty line, the prediction capacity of the model worsens from the perspective of

under-coverage but improves from the perspective of leakage. The bottom panel repeats the exercise with a poverty line of 72 JD and a probability threshold of 30 percent. This time, the under-coverage rate improves (9.2 percent) while the leakage rate worsens (43.2 percent). Clearly, changing the poverty line and the probability threshold affects targeting results. Hence, it is important to fine tune both parameters to obtain results as close as possible to the error that should be minimized (under-coverage or leakage).

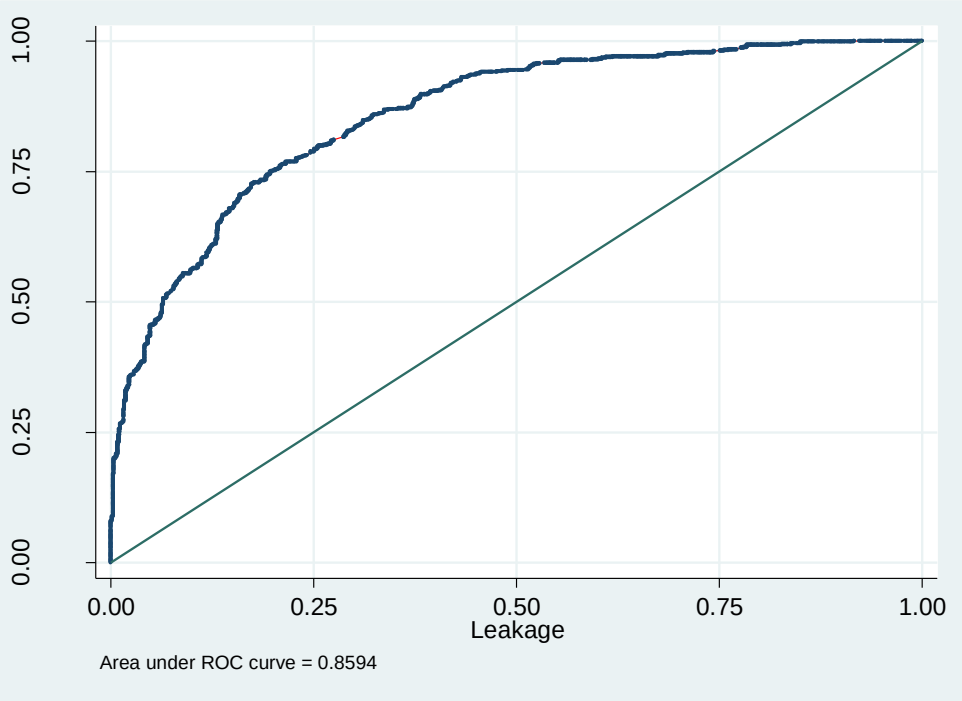
Table B.12: Coverage and Leakage Rates

		Observed poverty	
		Non-poor	Poor
		PL= US$92; threshold 50%	
Predicted poverty	Non-poor	67.7	15.0
	Poor	32.3	85.0
		PL = US$72; threshold 50%	
	Non-poor	76.4	25.2
	Poor	23.6	74.8
		PL= US$72; threshold 30%	
	Non-poor	56.8	9.2
	Poor	43.2	90.8

Source: Estimations based on LB-VASyR and LB-ProGres data.

As a final exercise, we test more precisely the performance of our model in terms of the trade-off between coverage and leakage. Figure B.3 plots the coverage rate (y-axis) against the leakage rate (x-axis) and draws the curve that derives from using different probability thresholds. The interpretation of the curve is the following. The diagonal represents an equal probability of coverage and leakage, which is what one would obtain if we were targeting refugees randomly (blindly) with no model. Points on the left of the diagonal show the performance of models that do better than random draws. Clearly, our model does better than random targeting as all points of the curve are on the left of the diagonal. The points further away from the diagonal are those that indicate the best performance and there is clearly one point on the curve where the distance between the curve and the diagonal is maximized. This is the point that offers the best coverage while minimizing leakage. A point corresponds to a particular probability threshold, which can be used to maximize the targeting performance of the model.

Figure B.3: Coverage and Leakage With Different Probability Thresholds (US$92 Poverty Line)



Source: Estimations based on LB-VASyR and LB-ProGres data.

Conclusions

This paper provides a poverty profile and welfare assessment of Syrian refugees in Lebanon. The purpose of the poverty profile is three-fold: i) it provides a first indication of the poverty pockets; ii) it helps to provide some useful indications of the important variables to be used in the welfare model; and iii) it helps to start highlighting the dimensions that could matter from a policy perspective. In the second part of the paper, we study possible predictors of welfare and poverty.

The chapter provides a detailed scrutiny of the data and explains in detail the measures used. We focus on refugees outside camps living in urban areas and used LB-VASyR data which we considered the most representative data set of refugees living in Lebanon currently available. As welfare measure, we use an expenditure aggregate net of WFP food vouchers. A poverty line of US$92 per person per month is applied as our threshold to separate the poor from the non-poor.

The poverty profile shows that Syrian refugees follow particular trajectories depending where they flee from and where they settle in Lebanon. These trajectories reveal different paths of poverty. It is visible, for example that almost 40 percent of refugees settled in the Northern governorate of Lebanon while the smallest proportion, not even 2 percent, settled in Beirut. Approximately 29 and 18 percent of all Syrian refugees settling in Lebanon originate from the Syrian governorates of Homs and Aleppo, respectively. The most common trajectory of Syrian refugees was to originate in Homs and to settle in the Northern governorate of Lebanon. Mount Lebanon is the governorate at destination with the lowest poverty rate of 39.3 percent, followed by Beirut with 56.2 percent. Refugees settling in the governorates of Bekaa and the North are poorest with poverty rates of 74.7 and 66.9 percent respectively but also those Lebanese governorates that host the largest proportions of refugees. In terms of origin, the governorates of Al-hasakeh and Idleb show the lowest poverty rates of 31.8 and 52.2 percent respectively while Quneitra and Ar-raqqa have the highest poverty rates of 89.1 and 76.1 percent.

Another useful angle is to look at the time of entry into the country. Refugees who entered Lebanon at the beginning of the crisis have the lowest poverty rates while the peak of poverty is associated with those refugees who arrived in 2013. Refugees entering before March 15, 2011 have poverty rates of 35.5 percent and those entering during 2011 have poverty rates of 54.3 percent. We observe that refugees living in households that have been in Lebanon the shortest, (under 1 year) are poorer than those refugees who have been in Lebanon for more than one year. Further insight can be drawn by looking at the border crossing points of refugees. Refugees who entered Lebanon informally suffer from higher poverty, about 10 percentage points higher, than refugees entering formally.

Socioeconomic characteristics of the household head provide some clues about the poverty status of a household. Highly skilled people have a lower poverty rate than low skilled people but the difference is small as we would expect in regular populations which demonstrates the fact that refugees have a small return in terms of occupations they held previous to their displacement. The returns to education for Syrian refugees in Lebanon are higher for those with 8 or more years of education. Female-headed households have higher poverty than male-headed households with quite a large difference of 9.1 percent. Poverty rates are similar for refugees living in households with married or unmarried household heads with slightly higher poverty rates for married household heads. Poverty is highest for the age group of under 19 year olds irrespective of marital status followed by widowed 35 to 49 year olds. Married and widowed household heads have the highest poverty presumably because this is the group with the largest number of children at a young age. Refugees living in households with single household heads have the lowest poverty rate. In general, poverty increases with lower skill levels required for occupations. The highest poverty rate is found among skilled agricultural, forestry and fishery workers followed by service and sales workers and elementary occupations.

Household characteristics provide additional insights. Household size and the share of children in the household are very important for poverty as it is common among poor populations but this phenomenon seems to be more clearly defined in the Syrian refugee population in Lebanon. We observe that the larger the household size, the higher the poverty rates. Similarly, refugees living in households with a larger number of children are poorer than households with a smaller number of children. Just as with the number of household members, the poverty rate jumps for each additional child.

Refugee children of school age face many challenges in enrolling in educational institutions in Lebanon due to scarce supply, financial constraints, crowding, psychological distress and other issues that would not normally be an issue for children in regular populations. Only about a quarter of the total refugee population in Lebanon lives in households where all children of school age go to school. Approximately 32 percent of all refugees live in households with 5 or more children. Not surprisingly, poverty rates increase continuously for every additional child of school age and the number of children not attending school. In general those households where fewer children attend school than are of school age, poverty rates tend to be higher while the lowest poverty rates are found in households with fewer children. Children who do not attend school are at risk of working to support the family income. About 3.6 percent of refugees live in households where at least one child is working to support the family.

Through welfare modeling, we were able to identify key predictors of poverty. Following a systematic process of variable selection, we reached a final welfare model including a total of 17 variables, most of which are from the ProGres data. The first and most important variable of the model is household size. The proportion of children in the household is a significant variable for which the negative relationship increases in magnitude as the proportion of children in a household increases. Higher educational attainment is associated with higher welfare with values that increase rather linearly as education increases. The number of children attending school is also significant but only for two children, which decreases welfare.

As for the poverty profile, migration patterns offer some insights into the predictors of welfare. The place of destination is generally important, those settling in Mount Lebanon are usually better off than those settling in other governorates. Those refugees who arrived in Lebanon 4 to 6 months prior to the LB-VASyR

data collection (hence, approximately from January through March of 2014) are poorer than those arriving at other times.

We found several variables relating to housing conditions and assets to be significant in the model, all of which increase welfare. Among the most important of these is the availability of cooking fuel in a household. The crowding variable measured in terms of squared meters per capita is also important and associated with increased welfare. Whether a household rents or owns their accommodation (compared to free or other types of accommodation) is a clear predictor of welfare and is the second most important variable in the model. Having access to a fridge and water heater in usable condition also increases welfare. Households with a traditional pit latrine (without slab/open pit), whether inside or outside the dwelling, have a decreased welfare.

Households that generate income through i) a grouped variable indicating households' main source of cash/income to sustain the household as irregular and ii) households who generate income through skilled work, have a higher level of welfare. Furthermore, seeking humanitarian assistance or engaging in coping strategies is a clear sign of reduced welfare. Reducing the number of meals eaten per day reduces expenditures. Variables on humanitarian assistance indicating whether the household was considered eligible for food and non-food assistance provided by the WFP and the UNHCR shows that households who receive this type of assistance have lower levels of welfare.

With a poverty model that uses a poverty line of US$92 per capita per month, results are similar to the welfare model. This is not particularly surprising because the poverty line is fairly high and includes over half of the households considered and over 60 percent of the population. However, some changes are visible. For example, some variables are excluded as compared to the welfare model and new variables enter the model. For example, the proportion of children in the household; first arrival in Lebanon; highest education of the household head; availability of cooking fuel; access to water heater in usable condition; the two variables for main sources of income (irregular and skilled work); as well as the coping strategy of reducing the portion size of meals are dropped from the model. Comparing the welfare model with poverty models with different poverty lines shows that some variables seem to be solid foundations for any welfare or poverty model while other variables require a more attentive scrutiny and depend on the poverty line set for the poverty models. Variables that are consistent across the welfare and poverty models include the destination, household size, the number of children attending school, crowding variable, rent, access to a fridge, the type of latrine and whether the household has access to humanitarian assistance.

Annex B.1: Data

Table B.1.1: Welfare Model (Poverty Line of US$92)

		ProGres variables	ProGres + demographic + house + wash	All variables	Variable importance
Destination (Ref. Beirut)	Bekaa	-0.28	-0.00	0.03	2.7%
		(1.96)*	(0.04)	(0.24)	
	Mount Lebanon	0.29614	0.35970	0.29585	
		(2.06)*	(3.20)**	(2.68)**	
	North	-0.15	0.01	0.04	
		(1.10)	(0.11)	(0.40)	
	South	-0.03	0.16	0.19	
		(0.21)	(1.46)	(1.76)+	
Household size (Ref. 1)	2-3		-0.38	-0.33	10.0%
			(3.87)**	(3.37)**	
	4-5		-0.69	-0.60	
			(6.55)**	(5.87)**	
	6-8		-0.94	-0.82	
			(8.74)**	(7.73)**	
	9-11		-1.17	-1.05	
			(10.41)**	(9.42)**	
	12+		-1.43	-1.29	
			(12.29)**	(11.13)**	
Proportion of children in household (Ref. 0)	1-50%		-0.15	-0.17	2.2%
			(2.48)*	(2.76)**	
	51-67%		-0.23	-0.19	
			(3.72)**	(3.10)**	
	>67%		-0.42	-0.36	
			(5.71)**	(5.00)**	
First arrival in Lebanon (Ref. before conflict in	< 1 month		0.19	0.24	1.7%
			(0.48)	(0.59)	
	1-3 months		-0.20	-0.21	
			(1.89)+	(2.03)*	
	4-6 months		-0.26	-0.27	
			(3.02)**	(3.12)**	
	7 months-1 year		-0.12	-0.10	
			(1.55)	(1.31)	
	1-2 years		-0.15	-0.13	
			(2.22)*	(1.92)+	
	2-3 years		-0.08	-0.05	
			(1.04)	(0.77)	
Highest education of household head (Ref.	6-8 years		0.04	0.04	1.6%
			(1.18)	(1.31)	
	9-11 years		0.05	0.06	
			(0.96)	(1.04)	
	12+ years		0.22	0.20	
			(3.36)**	(3.05)**	
Number of children not attending school (Ref. 0)	1		0.03	0.03	1.6%
			(0.69)	(0.61)	
	2		-0.14	-0.14	
			(2.75)**	(2.77)**	

		3	0.04	0.05	
			(0.65)	(0.82)	
		4+	-0.04	-0.04	
			(0.65)	(0.62)	
Cooking fuel available			0.11	0.11	1.7%
			(3.33)**	(3.37)**	
House area per person (Ref. lowest quantile)	Quantile 2		0.02	0.03	1.6%
			(0.65)	(0.88)	
	Quantile 3		0.09	0.12	
			(2.08)*	(2.90)**	
Access to fridge in usable condition			0.11	0.09	1.6%
			(3.31)**	(2.91)**	
Access to water heater in usable condition			0.10	0.09	1.5%
			(3.01)**	(2.56)*	
House is rented			0.50	0.49	7.1%
			(13.13)**	(13.00)**	
Type of latrine (Ref. open air)	Flush toilet		-0.03	-0.02	2.1%
			(0.33)	(0.23)	
	Improved latrine		-0.01	0.01	
			(0.08)	(0.10)	
	Traditional pit		-0.18	-0.16	
			(1.90)+	(1.76)+	
Main source of income:	Irregular work/income			0.07	1.4%
				(2.18)*	
Main source of income:	Skilled work			0.12	1.5%
				(2.44)*	
Main source of income:	Humanitarian aid			-0.15	1.7%
				(3.36)**	
Coping strategy:	Limit portion size of meals			-0.07	1.5%
				(2.37)*	
Humanitarian assistance:	Food and non-food by UNHCR&WFP			-0.15	1.7%
				(3.61)**	
_cons		4.54	4.95	5.04	
		(33.35)**	(27.87)**	(28.35)**	
F statistic		24.9	37.9	36.4	
Adjusted R-squared		0.06	0.44	0.47	
N		1,585.00	1,584.00	1,584.00	

+ $p<0.1$; * $p<0.05$; ** $p<0.01$

Source: Estimations based on LB-VASyR and LB-ProGres data.

Table B.1.2: Poverty Model (Poverty Line of US$92)

		ProGres variables	ProGres + demographic + house + wash	All variables	Variable importance
Destination (Ref. Beirut)	Bekaa	0.49	0.25	0.20	2.4%
		(1.98)*	(0.92)	(0.70)	
	Mount Lebanon	-0.46121	-0.55815	-0.55113	
		(1.85)+	(2.00)*	(1.97)*	
	North	0.25	0.28	0.28	
		(1.02)	(1.02)	(1.02)	
	South	0.05	-0.19	-0.22	
		(0.19)	(0.69)	(0.81)	
Origin (Ref. Damascus)	Al-hasakeh	-0.17	-0.08	-0.06	1.5%
		(0.61)	(0.26)	(0.18)	
	Aleppo	0.15	-0.10	-0.06	
		(0.91)	(0.51)	(0.32)	
	Ar-raqqa	0.40	-0.10	-0.02	
		(1.67)+	(0.36)	(0.06)	
	As-sweida	0.22	0.72	0.63	
		(0.25)	(0.80)	(0.69)	
	Dar'a	0.25	-0.18	-0.15	
		(1.22)	(0.74)	(0.65)	
	Deir-ez-zor	0.24	-0.21	-0.21	
		(0.83)	(0.64)	(0.66)	
	Hama	-0.22	-0.61	-0.59	
		(1.19)	(2.86)**	(2.76)**	
	Homs	-0.04	-0.36	-0.35	
		(0.25)	(1.90)+	(1.85)+	
	Idleb	-0.27	-0.66	-0.65	
		(1.56)	(3.34)**	(3.28)**	
	Lattakia	-0.52	-0.17	-0.14	
		(0.92)	(0.30)	(0.23)	
	Quneitra	0.67	-0.28	-0.27	
		(0.94)	(0.36)	(0.36)	
	Rural Damascus	-0.18	-0.37	-0.35	
		(0.99)	(1.79)+	(1.71)+	
Humanitarian assistance:	Food and non-food by UNHCR&WFP	0.77	0.66	0.48	0.9%
		(9.85)**	(7.13)**	(4.49)**	
Household size (Ref. 1)	2-3		0.22	0.20	9.7%
			(0.72)	(0.64)	
	4-5		0.81	0.78	
			(2.73)**	(2.60)**	
	6-8		1.49	1.44	
			(5.00)**	(4.75)**	
	9-11		1.85	1.80	
			(5.96)**	(5.68)**	
	12+		2.55	2.49	
			(7.62)**	(7.32)**	
Number of children not attending school (Ref. 0)	1		0.10	0.11	0.9%
			(0.95)	(0.97)	
	2		0.40	0.39	

			(3.09)**	(2.94)**	
	3		0.06	0.05	
			(0.41)	(0.34)	
	4+		0.62	0.60	
			(3.65)**	(3.55)**	
House area per person (Ref. lowest quantile)	Quantile 2		0.00	0.00	0.3%
			(0.04)	(0.03)	
	Quantile 3		-0.22	-0.23	
			(2.08)*	(2.18)*	
Household is renting			-1.04	-1.03	4.6%
			(9.80)**	(9.65)**	
Access to fridge in usable condition			-0.38	-0.39	1.0%
			(4.63)**	(4.73)**	
Type of latrine (Ref. open air)	Flush toilet		-0.49	-0.51	1.4%
			(1.92)+	(1.99)*	
	Improved latrine		-0.40	-0.42	
			(1.59)	(1.70)+	
	Traditional pit		0.04	0.01	
			(0.17)	(0.06)	
Main source of income:	Other humanitarian aid			0.39	0.5%
				(3.20)**	
_cons		-0.64	-0.50	-0.61	
		(2.69)**	(1.01)	(1.21)	
chi2		177.5	724.6	740.9	
Pseudo R-squared		0.08	0.33	0.34	
N		1,597.00	1,594.00	1,594.00	

+ $p<0.1$; * $p<0.05$; ** $p<0.01$

Source: Estimations based on LB-VASyR and LB-ProGres data.

Appendix C: A Welfare Assessment using LB-Verification Data

This appendix focuses on Syrian refugees living in Lebanon. Its aim is to provide a poverty profile of Syrian refugees in Lebanon and to determine if poverty and welfare modeling is feasible. It further tests to what extent data available in the Profile Global Registration System (ProGres) can be used to screen vulnerable refugees for economic assistance, either by using ProGres profiles to target household visits or by using ProGres data only to determine eligibility.[6] The aim of this chapter is also to determine to what extent the variables relevant for modeling are similar to Jordan, and by inference other Syrian refugees living in similar circumstances, i.e. Egypt. Finally this chapter is a complement to the previous chapter performing analysis using LB-VASyR 2014 data. This was deemed useful because the LB-VASyR 2014 data set is less than 2,000 observations while the so-called verification data set collected at the end of 2013 has nearly 30,000 observations.

The results demonstrate that indeed, reliable indicators of poverty and welfare can be used for describing poverty and welfare and that these indicators are very similar to Jordan and between data sets in Lebanon, specifically household demographics, migration patterns and living conditions (shelter, sanitation, asset holdings). The results also demonstrate that similar degrees of predictive capacity can be found with a ProGres-only model as with a full household interview, if living conditions are included. However as the latter analysis required merging existing household survey data with ProGres data, and this merge resulted in very small data sets (less than 2,000 observations), further analysis should be done to determine if it is advisable to use ProGres data only. The on-going household data collection being done by UNHCR and partners (presently at 38,000 households as of 15 May 2015) with careful attention to collecting accurate ProGres identification numbers will provide the necessary data to test if ProGres data only can be used to target assistance.

Data

The chapter uses two data sets: the ProGres and the verification data set (LB-Verif). For this analysis, the verification data set is used stand-alone (original sample size of 28,215). A smaller merged data set was also created, to test whether or not ProGres variables could be used stand-alone (n=2,979). Descriptions of the two data sets follow.

ProGres

Prior to spring of 2011, the UNHCR operation in Lebanon was a relatively small one, responding to around 10,000 mostly Iraqi refugees. Since that time the registered refugee population has grown exponentially, with more than 1.1 million refugees registered at the end of 2014. UNHCR registers those in need of international protection who fled persecution or violence in Syria. Registration teams captured the bio-data of every individual, special needs, preliminary vulnerabilities, as well as any protection concerns and risk. Registration capacity has been enhanced over the course of the response, and waiting times have generally remained with the UNHCR standard of 30 days. There are four registration centers, in Tripoli, Bekaa, Tyre and Beirut.

In 2013, UNHCR introduced iris scanning to improve reliability of information, and to limit fraud and child trafficking. In 2014, UNHCR Lebanon registration teams registered 2,350 individuals on average per day, verified and renewed the documents of 2,000 and issued a registration appointment to 3,100 Syrians for a total of 7,450 Syrians assisted per day country-wide. Work continues to verify and maintain updated details for the over 1.1 million registered refugees in Lebanon, at the same time ensuring that data are both up to date and accurate.

Verification Data

The second data set is the verification database (LB-Verif). The verification data set was derived from verification visits to households after an exercise that excluded those refugees believed to be less in need

of food and certain non-food assistance.[7] Their exclusion was on the basis of a "burden index" or demographic profile (WFP 2014). Households were given the opportunity to appeal the decision. Subsequent household visits took place between November 2013 and April 2014.

WFP, UNHCR and partners administered a short version of the questionnaire used in the Vulnerability Assessment of Syrian Refugees in Lebanon (LB-VASyR). The verification data set covers approximately 15 percent of the households in the ProGres data set, the latter presently numbering over 200,000 cases. The verification database includes over 200 variables. These variables include the demographic profile of households, whether or not the household is registered and unregistered, specific needs, housing conditions, asset holdings, expenditure, food consumption patterns, and coping mechanisms which we used to construct the welfare aggregate. Unlike the Jordan HV data which collected both income and expenditure, in Lebanon only expenditure data were collected. The expenditure aggregated was based on 10 categories of expenditures. Furthermore, households included in the verification data set were receiving no cash or food assistance at the time of the exercise.

In the verification data set, households were defined as *those members eating around the same pot* or sharing expenditures. All data collected used the household as a unit; unlike the Jordan data where the case was the unit. In Lebanon, a significant percentage of households were multiple cases (estimated 21 percent). Furthermore the ProGres identifier (PGID) was not systematically collected by enumerators. This presented a challenge as only 2,039 records from ProGres could be merged with the 28,215 records of the verification data set. Furthermore, the several key variables in ProGres, i.e. case size, percent of dependents, had no observable relationship with household size and percent of dependents in the verification data set. Therefore data analysis was done on two data sets, the verification data set without merged ProGres variables (LB-Verif) and a smaller merged file (LB-Verif and LB-ProGres), where only additional data not found in the verification data set, specifically marital status, religion, ethnicity, entry status (formal/informal), entry date, and occupation were analyzed. However, with the exception of entry status, these additional variables were not included in the welfare or vulnerability model. There are no camps in Lebanon therefore all refugees are out-of-camp.

The LB-Verif data are not necessarily representative of ProGres data as the LB-Verif data were not a randomly selected sample of ProGres data. It is instructive therefore to test the differences between the two data sets. This is normally done by testing the means of the variables that are common to both ProGres and LB-Verif data sets are significantly different. The table below reports the results for key variables that are common in the ProGres and LB-Verif data.

Table C.1: Demographic Profile of ProGres and LB-Verif Data Sets (1.4 Million and 28,215 Records, Respectively)

Variable	ProGres	Verification
Case size/Household size	4.1	4.3
Percentage of female HH	22.2%	14.0%
Percent of elderly HH	5.1%	4.0%
% of households $\geq$3 U5yr	4.2%	2.5%
% of households $\geq$3 6-15yr	19.2%	20.6%
% of households $\geq$1 disabled	5.7%	5.8%
Percentage of HH living in Bekaa	35.5%	39.2%
Percentage of HH living in Beirut	2.7%	1.4%
Percentage of HH living in rented accommodation	71.6%	79.0%

Source: Estimations based on LB-Verif and LB-ProGres data.

The above comparison demonstrates the two data sets are very similar. Only the percentage of female-headed households is notably different. It is possible women registering as female-headed *cases* in ProGres are in fact living with other refugee families in a *household.*

It is possible to correct the LB-Verif data set through weighting, however as in the Jordan analysis, there is good justification to not do this and use the LB-Verif data. The first reason those factors that show the highest differences between LB-Verif and ProGres data such as percentage of female-headed households or household size are expected to be more accurate in LB-Verif data. Not only because the ProGres interview is the first for refugees when they enter the country; it is short and conducted under great pressure, especially during the periods of high refugees' inflows (see ProGres data above). And the LB-Verif data, instead, were collected during lengthy interviews in a more relaxed environment when refugees had already settled. Moreover, the date of registration of this information is different for ProGres and LB-Verif data with LB-Verif data being subsequent to ProGres data. During the period between the two interviews, cases' conditions may have changed, for example with the reunion of an additional child. And finally the issue of multiple cases living in one household may slightly change the means/percentage. This may explain some of the differences that we observe between ProGres and LB-Verif means. A second reason for using LB-Verif data is that the variables that are collected only with LB-Verif interviews relate better to LB-Verif than ProGres data as they are evidently collected at the same time. Therefore, our final decision was to keep the LB-Verif data intact on the assumption that they are better representative than ProGres data of the population of refugees.

Based on the analysis above, it was deemed reliable to use the LB-Verif data set for profiling and modeling. That said, there are missing values in the LB-Verif data set. Therefore in the following tables, the reader will observe that the sample size (n) ranges from 22,291 to 28,215. The difference is due to missing values that are largely non-demographic, i.e. living conditions, asset holdings, etc. The tables site the sample size used (n) and uses the largest sample available to make the most of existing observations.

Unfortunately the verification data set inconsistently collected refugee ID numbers. Furthermore as the unit of observation was the household, often there was more than one refugee case number included in the record. Using the first refugee ID number (PGID) as a default, the ProGres and LB-Verif data sets where merged. The result was 2,031 records. However frequently the data within a combined record that should have been comparable was not—specifically case size<>household size, age of Principle Applicant (PA) <> age of head of household, if the household was female-headed or not was not the same between ProGres and LB-Verif data sets. Furthermore there many missing values in the ProGres data set, i.e. occupation. Therefore the data set including LB-Verif and LB-ProGres data was used sparingly, largely for descriptive statistics in poverty profiling, and only when there were at least 50 records.

While there are weaknesses with the LB-ProGres data set mentioned above, it is nonetheless important to test ProGres-like demographic variables. Thus special attention during analysis was paid to the demographic variables available in both data sets, specifically household size, number of children, percentage of dependents, marital status, destination (location), etc. These are referred in the models as "variables available in ProGres" and are identified by a _V at the end of the variable name.

Unit of observation

As explained above, the unit of observation in the ProGres data is the "case" while the unit in the LB-Verif data was the "household". The definition of household was similar in Lebanon as in Jordan.[8] As the welfare data collected in the LB-Verif data set cannot be disaggregated by case, throughout this paper, we exclusively focus on households, with one small exception where case-specific data has demonstrated a relationship with the welfare aggregate (entry status).

Welfare aggregates

Unlike the Jordan HV data, only one welfare aggregate was collected in the LB-Verif data set—expenditures. This was asked twice: once as an aggregate of two consumption items (total of food and shelter expenditure) and once as an aggregate of 10 consumption items. The aggregate based on 10 expenditures was used as it is known that the values reported for expenditure decrease as the number of

items listed decrease, and therefore the latter was likely to be more accurate. All values were reported in either Lebanese pounds or U.S. dollars and converted to a single currency.

Table C.2 demonstrates the mean expenditure for the LB-Verif data set. Expenditure per capita excluding zero values was on average LBP 140,000 or US$125 per capita per month.

Table C.2: Summary Statistics of the Main Welfare Aggregate in LBP

Variable	Obs	Mean	StdDev	Min	Max
Expenditure per capita (LB-Verif)	28,215	189,840.6	140,287.6	1,764	2,111,200

Source: Estimations based on LB-Verif data.

For the purpose of the poverty profile, a poverty line of LBP 139,054 per month was used. This poverty line is equivalent to US$92.1 at Purchasing Power Parity (PPP) of the 50 Jordanian Dollar (JD) poverty line adopted by the UNHCR for refugees in Jordan for providing cash assistance. This figure falls in between the Lebanon humanitarian communities' estimate of a "Survival Minimum Expenditure Basket" of US$87 per capita and "Minimum Expenditure Basket" of US$125 for refugees (table C.3).

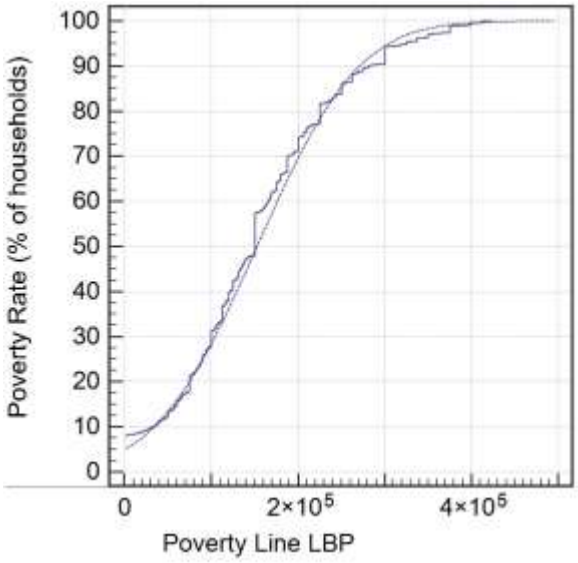
Table C.3: Poverty Lines

	Per month (LBP/US$)	Per day (US$)
Survival Minimum Expenditure Basket	131,196 (87)	2.90
Purchasing Power Parity with Jordan (PPP)	139,054 (92)	3.07
Minimum Expenditure Basket (MEB)	168,896 (112)	3.73

Source: Estimations based on LB-Verif data.

In per day equivalent, the poverty line is US$3.07 per day which is significantly higher than the international poverty line of US$1.25 per day. The poverty line of LBP 139,054 per month equates to a poverty rate of 39.8 percent for households. To test the sensitivity of the poverty rate to different poverty lines, we plot poverty rates by different poverty lines between 0 and LBP 170,000 (figure C.1). For example, applying the poverty rate of US$3.7 per day (US$112 per month) which is used by the UNHCR and partners in the context of Syrian refugees in Lebanon, the poverty rate increases to 54.2 percent for households. Note that using this poverty line (instead of the PPP-derived value of LBP 139,054), the poverty rates are more similar to Jordan (which are 60 percent). The sensitivity of poverty rates to the choices in poverty lines or thresholds may have large impacts in terms of inclusion and exclusion in the UNHCR cash assistance program. This is further discussed in the section on Predictions Tests.

Figure C.1: Poverty Rate Curves



Source: Estimations based on LB-Verif data.

Poverty Profile

This section shows the profile of Syrian refugees and cross-tabulations of poverty rates by various socioeconomic characteristics of the Syrian refugee population in Lebanon. The poverty rates are estimated on households not individuals. For comparability to Jordan, the poverty line used is the PPP poverty line of LBP 139,054.

Migration patterns

Syrian refugees settled largely in Bekaa and North Lebanon where the cost of living was likely to be lower. As North Lebanon and Bekaa are among Lebanon's most depressed regions, it comes as no surprise that Syrian refugees are also more likely to be poor (49 to 55 percent)—most likely given limited income earning opportunities. Mount Lebanon is the governorate with the lowest poverty rates, both among refugees and host population, 28 percent and 20 percent respectively (table C.4). Note the poverty profiles are similar between the LB-Verif and the LB-VASyR data sets.

Table C.4: Case Level Poverty Rates of Destination of Syrian Refugees (n = 22,291)

Destination	N	Refugee Poverty Rates
Beirut	384	45.1%
Bekaa	11,617	54.9%
S Lebanon	3,739	38.6%
N Lebanon	9,131	49.1%
Mt Lebanon	3,580	28.3%
Total	22,291	39.8%

Source: Estimations based on LB-Verif data.

Poverty appears to be concentrated among those families that crossed the border informally. These persons largely settled in Bekaa (tables C.5 and C.6).

Table C.5: Case Level Poverty Rates of Entry status and Destination (n=1,881)

Entry Status	Poverty	N
Formal	38.6%	1773

Informal	55.6%	108
Destination-Bekaa	56.7%	97

Source: Estimations based on LB-Verif and LB-ProGres data.

Table C.6: Case Level Poverty Rates of Date of arrival and Destination (n=1,918)

	Poverty Rates			
Destination	**2011**	**2012**	**2013**	**2014**
Mt Lebanon	11.1%	24.3%	18.4%	
S Lebanon		24.1%	17.6%	19.0%
Beirut		27.0%	16.7%	
N Lebanon			54.6%	
Bekaa	50.0%	53.4%	54.1%	47.5%

Source: Estimations based on LB-Verif and LB-ProGres data. Note: All values for which there are not at least 20 records (10 percent of sample) are removed.

The poor are disproportionately homeless or inhabit unfinished or tented shelters when compared to those who are less poor and or residing in independent and or shared accommodation. This is particularly true in Beirut and Bekaa where more than 70-75 percent of those in these types of housing arrangements are poor. Whereas those in independent accommodation in Beirut, S Lebanon and Mt Lebanon are less poor (21 to 25 percent) (table C.7).

Table C.7: Case Level Poverty Rates of Type of Living Accommodation, Destination and Poverty Rates (n=28,318)

	Poverty Rates						
	Beirut	**Bekaa**	**S Lebanon**	**N Lebanon**	**Mt Lebanon**	**Total**	**n**
Independent	25.8%	42.4%	21.7%	41.4%	23.1%	36.8%	14302
Shared/Collective	43.6%	54.5%	35.4%	53.1%	32.2%	46.2%	7639
Tented/Warehouse	75.0%	71.0%	50.5%	58.9%	46.3%	62.7%	6255
Homeless		60.6%		68.6%			122
Total	62.2%	63.2%	51.6%	58.1%	48.3%		28318

Source: Estimations based on LB-Verif and LB-ProGres data.

Characteristics of the head of household (principal applicant)

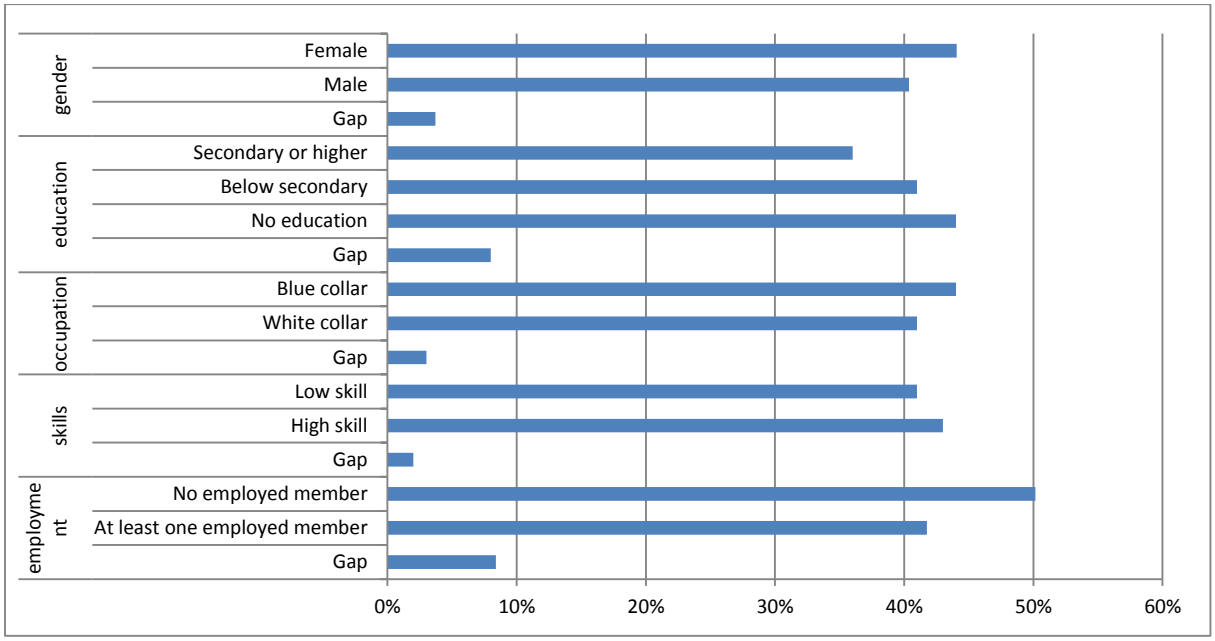
The LB-Verif data set uses the household as its unit of analysis and data collection, while ProGres uses the term Principal Applicant. Principal Applicant (PA), at its most basic, means that once one member of the family—*the principal applicant*—is recognized as a refugee, the rest of the accompanying family members should also benefit from the same status (UNHCR 2001). For the purpose of analysis it is assumed that the Head of Household and the PA are the same.

Similar to the smaller LB-VASyR database, the poverty rates among so-called blue and white collared workers and unskilled and skilled workers are not significantly different. This is different from what we normally see in poverty analysis in stable non-refugee populations. It demonstrates that refugees have little change of resuming the occupations they held previous to their displacement. Refugees struggle to find work as they are not allowed to work legally and are therefore forced to work in informal employment. In fact, simply having a job (having worked in the last 30 days regardless of type of work) appears to make a difference to a family's poverty status.

However, the returns on education for Syrian refugees in Lebanon are higher for those with at least a secondary education. The poverty rate for refugees living in households where the household head has no education stands at 44 percent on average (figure C.2). While the poverty rates of those with at least a secondary education is 36 percent. However, less than 12 percent of Syrian refugees live in households where the household head has at least a secondary education. Considering traditional assumptions that poverty is significantly higher among female- than among male-headed households, the difference is

relatively small in Lebanon (4 percent). This is consistent with the hypothesis that female-headed households are in fact members of larger households and share resources and/or live with husbands who have not registered with the UNHCR.

Figure C.2: Case Level Poverty Rates by Characteristics of the Household Head (n=29,221)



Source: Estimations based on LB-Verif and LB-ProGres data. Note: Information on white/blue collar and high/low skill is from combined LB-ProGres and LB-Verif data set, n=2,976.

More detailed analysis of poverty, education and occupation is not possible with the combination of the LB-Verif and the LB-ProGres data sets as there are significant inconsistencies between the head of household's education level in the two data sets.

Characteristics of the household

Household demographics continue to be a significant predictor of poverty among refugee households. The number of dependents (including disabled members, elderly and children under 18) was compared to family size. This is a proxy for dependency ratios but avoids the problem of zero-denominators when the adult is categorized as a "dependent" because he/she fits into one of the above categories (table C.8).

What is notable about the descriptive statistics below is that poverty rates are high for large families (above 60 percent) independent of the number of dependents, i.e. even for a family of 6 adults. This figure goes to nearly 90 percent when there are no "able adult" members, i.e. all adults are either elderly or disabled. However, this group is only 2 percent of the refugee population. This implies that large families with adults have a clear potential to become less poor *if* they are able to work.

Table C.8: Percent of Population and Case Level Poverty Rates by Family demographics and Poverty Rates (n=28,057)

	Number of dependents							
Household	**0**	**1**	**2**	**3**	**4**	**5**	**>5**	**Total**
	Percentage of refugee population							
1	4.9%	0.4%						5.4%
2	8.7%	2.4%	0.5%					11.6%
3	1.9%	17.3%	1.3%	0.4%				20.9%

4	1.4%	3.7%	22.6%	0.6%	0.4%			28.6%
5	0.7%	2.2%	4.0%	8.7%	0.2%	0.3%		16.0%
>5	0.4%	1.5%	3.4%	4.4%	3.9%	1.7%	2.2%	17.5%
				Poverty rates				
1	8.6%	2.4%						7.9%
2	15.4%	17.1%	10.9%					15.2%
3	28.8%	29.2%	27.2%	31.4%				28.9%
4	38.1%	39.1%	41.0%	32.9%	42.7%			40.4%
5	48.7%	44.3%	49.4%	50.6%	59.1%	55.4%		49.4%
>5	60.9%	60.7%	63.0%	66.5%	69.6%	77.4%	89.5%	69.8%
	18.9%	32.0%	43.4%	54.4%	66.7%	74.4%	89.5%	

Source: Estimations based on LB-Verif data.

This again raises employment as a key factor. The four tables below (tables C.9 to C.12) explore this issue further looking at the relationship between source of income, education, location and gender of head of household.

The majority of refugees report having at least one member working in the previous 30 days in temporary, permanent or seasonal employment (72 percent). This is consistent with the finding that the primary source of income for Syrian refugees in Lebanon is labor (59 percent) (table C.9). Nearly a quarter of refugees (24.3 percent) rely on debts and loans as their primary source of income to meet their minimum consumption requirements, 12.5 percent rely on assistance, and small number rely on remittances or the sale of assets/savings (4.4 percent).

Table C.9: Case Level Poverty Rates of Relationship between Source of Income, Employment and Poverty

	Remittances	**Savings/Sales of assets**	**Labor**	**Assistance**	**Debts/ Loans**	**Total**
		Percentage of Refugee Population				
No member working	0.8%	2.1%	2.2%	5.7%	17.1%	27.9%
At least one member working	0.5%	1.0%	56.7%	6.8%	7.1%	72.1%
Total	1.3%	3.1%	58.9%	12.5%	24.2%	
		Poverty Rates				
No member working	38.0%	36.7%	30.5%	46.6%	48.2%	40.0%
At least one member working	24.8%	38.4%	36.3%	40.3%	45.6%	37.1%
Total	31.4%	37.5%	33.4%	43.4%	46.9%	

Source: Estimations based on LB-Verif data.

Note that poverty rates are higher for those households relying on assistance and debt, and marginally higher for those among them that do not have at least one member working.

Table C.10: Case Level Poverty Rates of Relationship between Education, Employment, and Poverty Rates (n=27,646)

	No education	**Primary education**	**Secondary or more**	**Total**
		Percent of refugee population		
No member working	6.8%	18.1%	3.9%	28.8%
At least one member working	12.6%	51.4%	7.2%	71.2%
Total	19.3%	69.5%	11.2%	
		Poverty rates		
No member working	50.8%	44.3%	34.7%	43.2%
At least one member working	48.0%	36.3%	28.1%	37.4%
Total	49.4%	40.3%	31.4%	

Source: Estimations based on LB-Verif data.

It appears that having at least a primary education increases the likelihood of having worked within the last 30 days (5 out 7 persons primary education working). Poverty rates decline with increases in education and access to employment.

Table C.11: Case Level Poverty Rates of Relationship between Location, Employment, and Poverty (n=27,755)

	Beirut	Bekaa	S Lebanon	N Lebanon	Mt Lebanon	(6) 9	Total
			Percentage of Refugee Population				
No member working	0.3%	10.3%	1.6%	14.4%	1.7%	0.5%	28.8%
At least one member working	1.2%	29.3%	12.4%	16.0%	10.9%	1.5%	71.2%
Total	1.4%	39.6%	14.0%	30.4%	12.6%	1.9%	
				Poverty Rates			
No member working	36.1%	55.7%	28.8%	39.7%	34.2%	51.5%	41.0%
At least one member working	30.8%	49.5%	22.9%	37.7%	21.8%	45.9%	34.8%
Total	33.4%	52.6%	25.8%	38.7%	28.1%	48.7%	

Source: Estimations based on LB-Verif data.

Table C.12 demonstrates that refugees are more likely to find work in Beirut, South Lebanon and Mt Lebanon. North Lebanon with higher rates of refugees not working (47 percent) and has correspondingly high rates of poverty (40 percent). Whereas in Bekaa, despite high rates of refugees not working being comparably low (26 percent), poverty remains high (53 percent).

Table C.12: Case Level Poverty Rates of Relationship between Gender, Employment and Poverty (Data Set LB-Verif, n=27,092)

	Male HH	Female HH	Total
	Percentage of Refugee Population		
No member working	23.7%	4.2%	28.0%
At least one member working	60.0%	9.2%	69.1%
Total	83.7%	13.4%	
	Poverty Rates		
No member working	38.0%	50.2%	46.8%
At least one member working	37.4%	43.4%	37.7%
Total	40.4%	44.1%	

Source: Estimations based on LB-Verif data.

It also appears that female-headed households are less likely to have a working member which may contribute to slightly higher rates of poverty.

Another key factor in relation to poverty is the quality of housing. The relationship between adequate housing and livelihoods is well known. Housing is captured in several indicators in the LB-Verif data: type of housing, type of occupancy contract and crowding (number of persons per square meter).[9] Tables C.13 to C.15 demonstrate the potential relationship between poverty, employment and adequate housing.

Table C.13: Case Level Poverty Rates of Relationship between Housing Type, Employment and Poverty (n=27,344)

	Independent	Sharing/ Collective	Tented/ Unfinished	Homeless	Total
		Percentage of Refugee Population			
No member working	13.6%	8.3%	6.7%	0.2%	28.8
At least one member working	38.6%	17.9%	14.6%	0.2%	71.2
Total	52.1%	26.2%	21.3%	0.4%	
		Poverty Rates			
No member working	35.4%	46.8%	59.8%		48.1

At least one member working	27.7%	39.0%	60.5%	45.4
Total	31.5%	42.9%	60.1%	

Source: Estimations based on LB-Verif data. Note: The sample size of homeless is too small to reliably report poverty rates.

The above Table appears to demonstrate a relationship between the likelihood of working (74 percent) and adequate housing (independent). Households living in tented/unfinished accommodation, while likely to work (68 percent), are still noticeably poorer than their compatriots living in independent, shared or collective housing. Focus group discussions with refugees also indicated that living in collective housing may not necessarily be an economic decision. Rather the decision to live in collective shelters is motivated by the desire to remain close to other refugees who provide in effect social capital (UNHCR 2014).

Table C.14: Case Level Poverty Rates of Relationship between Occupancy Status, Employment and Poverty (n=27,128)

	Owned/furnished rental	**Unfurnished rental/work for rent**	**Assistance**	**Squatting**	**Total**
		Percentage of Refugee Population			
No member working	4.6%	18.0%	5.6%	0.4%	28.6%
At least one member working	13.7%	49.0%	7.8%	0.8%	71.4%
Total	18.3%	67.0%	13.5%	1.2%	
		Poverty Rates			
No member working	39.5%	38.6%	65.2%	70.5%	53.5%
At least one member working	30.5%	34.6%	63.7%	68.3%	49.2%
Total	35.0%	36.6%	64.5%	69.40%	

Source: Estimations based on LB-Verif data.

The above table demonstrates that there is strong correlation between poverty and housing conditions, both source of housing and crowding. Poverty rates among households that report relying on "assistance" for housing are relatively high (65 percent).[10] These same households are possibly the "unproductive" poor, as the rates of employment are also much lower (59 percent compared to 71 percent overall).

Poverty rates are also higher (55 percent) among households living in crowded conditions compared to those living in less crowded accommodation (38 percent). The relationship appears to be linear (see annex C.1, table C.1.1) implying that those households that have at least one working member and renting less crowded accommodation are likely to have higher expenditures and by proxy, income.

Table C.15: Case Level Poverty Rates of Relationship between Crowding, Employment and Poverty (n=26001)

	>3.5 sq. m/pp	**≤3.5 sq. m/pp**	**Total**
		Percentage of Refugee Population	
No member working	16.4%	5.4%	26.8%
At least one member working	55.2%	11.3%	66.4%
Total	76.6%	16.6%	
		Poverty Rates	
No member working	41.4%	57.7%	49.6%
At least one member working	34.3%	52.6%	43.5%
Total	37.8%	55.2%	

Source: Estimations based on LB-Verif data.

Family size, children's schooling and labor

With regards to poverty trends among families with many children, who withdraw children from school for economic reasons, and whose children work to support the family, there is—unsurprisingly—higher poverty among larger families with more children (68 and 81percent for families with 4 and 5 or more children, respectively) (table C.16). However, the number of families with four or more children is less than 7 percent of the total population. School age children are less likely to go to school when there are more children in the household (25 to 27 percent of households with 4 or more children have withdrawn at least one child from school). Poverty rates decline among households that withdraw their children from school which could imply that child labor is an effective strategy to increase income/expenditure however detrimental to the child. Note the percentage of households reporting child labor is very low—less than 2 percent (table C.17).

Table C.16: Case Level Poverty Rates of Relationship between Number of Children, School Attendance and Poverty (n=27,497)

	Number of children					
Withdrew children from school	**1**	**2**	**3**	**4**	**5 or more**	**Tota**
	Percentage of Refugee Population					
No	24.6%	25.6%	10.1%	2.8%	2.5%	87.6
Yes	1.9%	4.6%	2.7%	0.9%	0.9%	11.5
Total	26.3%	30.2%	12.8%	3.7%	3.4%	
	Poverty Rates					
No	32.8%	44.4%	56.6%	71.0%	86.3%	52.2
Yes	35.7%	39.9%	52.1%	64.8%	76.2%	49.8
Total	34.3%	42.2%	54.3%	67.9%	81.2%	

Source: Estimations based on LB-Verif data.

While the reported rates of children working are very low, children who come from families that have withdrawn at least 1 child from school are 11 times more likely to be working to support their families (table C.17).

Table C.17 Case Level Poverty Rates of Relationship between Working Children, Children Not in School, and Poverty

	At least one child is working in order to support the family		
Family withdrew children from school for economic reasons	**No**	**Yes**	**Total**
	Percentage of refugee population		
No	86.1%	0.8%	86.9%
Yes	10.2%	1.1%	11.3%
Total	96.3%	1.9%	
	Poverty Rates		
No	38.7%	56.7%	47.7%
Yes	45.2%	57.9%	51.6%
Total	42.0%	57.3%	

Source: Estimations based on LB-Verif data.

Poverty Predictors

In this section, we look at the possible predictors of welfare and poverty. We first describe the models, estimators and process of selection variables that we follow to optimize the final models. Next we present the results for the welfare providing details on each key predictor and their explanatory power. In the last part, we present the results of the poverty models comparing different estimations under different poverty lines and sets of predictors.

Models

Central to the various objectives set in this chapter is the estimation of the welfare and poverty models that exploit at best the LB-Verif and LB-ProGres data available. The general models are described as follows:

$$W_i = \alpha + \beta_1 PGV_i + \beta_3 PG_i + \beta_2 V_i + \varepsilon_i \qquad (1)$$

$$P_i = \alpha + \gamma_1 PGV_i + \gamma_1 PG_i + \beta_2 V_i + \varepsilon_i \qquad (2)$$

where W=welfare measure (income or expenditure) and P=poor where P=1 if the case is under the poverty line and P=0 if the case is on the poverty line or above; PGV=vector of case characteristics present in both the ProGres and LB-Verif databases; PG=vector of case characteristics present in the ProGres data but not in the Verif data; V=vector of case characteristics present in the LB-Verif data but not in the ProGres data; ε_i= normally distributed error term with zero mean; $_i$=case. As W is only available in LB-Verif data, the total number of observations on which the model can be run is equal to the total number of observations in the LB-Verif data. In an attempt to make the most of existing observations for each model, the number of observations is higher in the first model and declines with the addition of variables with a larger percent of missing values.

Analyses were done using the systemic approach described in chapter 2 with the exception of retaining some continuous values as continuous (not categorical) such household size, percent of dependents and crowding index.

Welfare results

Table C.1.1 shows the results of the welfare models using the LB-Verif data. The dependent variable is expenditure per capita as described in the section on welfare measures. The independent variables are organized by groups, with the first group of variables being those available in ProGres and the other groups following the order of the verification questionnaire (housing, WASH, assets, employment, source of income, expenditures, food consumption, food and non-food based coping mechanisms, and debt (table C.1.1).

Similar to Jordan, the first and most important variable is household size. This is partly by construction as expenditure is in per capita terms which is calculated as total expenditures divided by household size. However, what is relevant is while the coefficient can potentially take any sign (positive or negative), i.e. expenditure could go up with numbers of person per household or could go down with numbers of persons per household, it is clearly negatively associated with welfare. Removing this variable alone would reduce the explanatory power of the model by 21 percent (compared to 18.1 percent in the Jordan model). Similar to Jordan, a variation on dependency ratio is also an important variable (albeit less important than household size), however in Lebanon this is not percentage of children but percentage of dependents (see discussion on table C.8).

The next set of variables relates to the socioeconomic characteristics of the head of household. Only education is significant. Higher levels of education increase welfare as expected. Occupation does not increase welfare (white collar or skilled) as expected, presumably because of a shortage of skilled jobs and Lebanon's policy that refugees are not officially allowed to work. While refugees are working (labor being most often cited as their first source of income), the work they do is unlikely to reflect their skills. This is clearly a significant loss in human capital and productivity, benefits which could accrue to the host country.

Neither age nor sex is significant in the model. Older age (>35 years) does correlate with lower income however it is not significant when other variables are added to the model. Marital status is significant to the extent that widowed or divorced households are more likely to have higher expenditures per capita and single men and women lower expenditures per capita. But the predictive contribution is less than 0.5 percent. Female-headed household status does not appear to be significant in the models.

Informal border crossing/entry status is significant, correlating with lower expenditures per capita (Table C.5). However given the number of data points it is not retained in the model. Those settling in Bekaa and North Lebanon are worse off, while those settling in Mt Lebanon are better off. The destination variable contributes significantly to the models predictive capacity—8 percent in the optimal model.

The variables illustrated so far are variables (even though taken from the LB-Verif data) that are also available in ProGres and could potentially be used from the ProGres data if data collection were improved to have less missing values. Together these variables have an explanatory power of 30 percent when using the LB-Verif data set. For the LB-Verif data set, it is the additional variables such as housing, WASH, assets, and employment that make a considerable improvement on the model as discussed in what follows adding another 12 percent predictive capacity.

Among housing variables, we have found crowding, type of housing, type of occupancy contract, and type of toilet to predict welfare; less crowding, preferably owned or rented, furnished housing with an improved toilet predict increased welfare (contributing a total of 7 percent to the model). Conversely, homelessness, squatting, crowding, unfinished housing, with an open or traditional toilet predicts decreased welfare. Persons living in these conditions are approximately 25 percent (table C.13). Owning or having access to assets such as refrigerators, water heaters and beds contributes to the predictive capacity of the model modestly (0.1 percent). Or conversely *not* owning basic assets such as blankets, mattresses and winter clothes.

Finally variables indicative of income and employment contribute to the model. These variables are not found in the Jordan HV data set. The majority of households report at least one member having worked in the previous 30 days (71.2 percent). Those reporting relying on sales of assets or savings, assistance or debt/credit as a primary source of income are less likely to be working. The phenomenon of debt should be examined carefully as those with high levels of debt (above US$600) have higher expenditure, but obviously at a cost. The addition of these variables increases the predictive capacity of the model by 3 percent.

Poverty results

In this section, we turn to model poverty. The difference between welfare modeling and poverty modeling is that welfare modeling provides results for the whole distribution of cases while poverty modeling focuses on the factors that matter most for the cases below the poverty line. Hence it is important to understand that the results of poverty modeling is largely dependent on the level of the poverty line. At the higher level. LBP 167,000 (US$112), the present Minimum Expenditure Basket used by humanitarian agencies in Lebanon, the poverty model will be equal to the welfare model. If the poverty line is low (LBP 132,000 or US$87) the cases that fall under the poverty line are fewer and the model will focus on these cases and will result in a model that looks quite different. In the first poverty model (table A.1.2), we use the same poverty line used for the poverty profile (LBP 139,000/capita). Results are very similar to the welfare model, with some significant differences. Household demographics become less important overall (from 21 to 15 percent). While percent of dependents becomes more important (from 0.5 to 1.2 percent).

Housing conditions decline in importance from 12 to 6.5 percent. While assets and food consumption also decline in importance. Notably, housing that is provided through assistance remains important in both models, implying the accurate targeting of housing assistance to the poor. Poverty rates are 65 percent among those reporting to rely on assistance for shelter, compared to 35 percent among those that rent using their own means.

Variables that remain in both the welfare and poverty models are more reliable, while others such as single (never been married) households or having luxury assets other than fridges, require a more scrutiny. Their predictive power may depend on the poverty line set for the poverty models.

Predictions tests

We now test the capacity of the poverty models used in the previous section to predict poverty correctly. The exercise consists of using the parameters estimated by the models to predict the dependent variable of the model (poor/non-poor) as if we did not have the expenditure variable. In practice, the reliable estimation of expenditures is itself a good targeting criteria (below and above a certain threshold). However, where it is difficult to obtain and/or there are concerns about its validity, the predictive model may be used as a substitute.

Table C.18 shows the results using different poverty lines and different probability thresholds. The models estimate probabilities of poverty for each household and these probabilities vary between 0 and 1. For example, household X has a probability of being poor of 60 percent. To test the goodness of fit[11] of the model, we use the same probability threshold that we applied in other chapters, a threshold of 50 percent.

The top panel of table C.18 shows that using a LBP 139,000 poverty line (US$92) poverty line and a 50 percent threshold, the model is able to predict correctly if a case is poor 92.6 percent of the time. This implies that 7.4 percent of the time the model predicts poor cases as non-poor (under-coverage rate or exclusion error). The model also predicts correctly if a case is non-poor 63.6 percent of the time, which means that 36.4 percent of the time the model predicts the non-poor as poor (leakage rate or inclusion error). Evidently the first type of error (under-coverage) is more problematic from a policy and welfare perspective while the second type of error (leakage) is more problematic from a budget perspective.

The next panel repeats the exercise raising the threshold to 70 percent or LBP 105,000. This demonstrates that while exclusion error goes up by 6 percent, inclusion error does not come down to the same degree (4 percent). The third panel repeats the exercise using a lower poverty line (LBP 70,000) and the first threshold (50 percent). We can see now that the exclusion error becomes larger 46.1 percent while the leakage rate is much lower (7.5 percent).

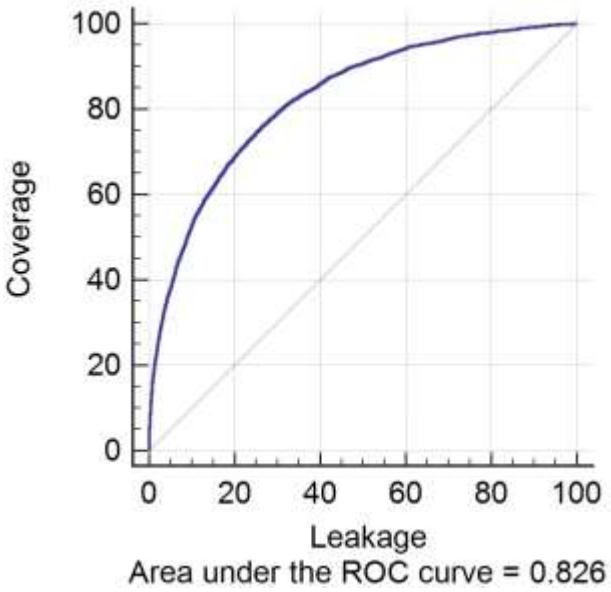
Table C.18: Coverage and Leakage Rates (Threshold 50-70 Percent)

		Observed Poor	
		No	Yes
		PL=139,000; cutoff 50%	
Predicted poor	No	**63.6**	7.4
	Yes	36.4	**92.6**
		PL=139,000; cutoff 70%	
	No	**67.6**	13.0
	Yes	32.4	**87.0**
		PL=70,000; cutoff 50%	
	No	**92.5**	46.1
	Yes	7.5	**53.9**

Source: Estimations based on LB-Verif data.

As a final exercise, we test more precisely the performance of our model in terms of the trade-off between coverage and leakage. Figure C.3 plots the coverage rate (y-axis) against the leakage rate (x-axis) and draws the curve that derives from using different probability thresholds. As with the LB-VASyR data, we observant that our model does better than random targeting as all points of the curve are on the left of the diagonal.

Figure C.3: Coverage and Leakage with different Probability Thresholds (LBP 139,000 Poverty Line)



Source: Estimations based on LB-Verif data.

Conclusions

This chapter provided a poverty profile and welfare assessment of the Syrian refugees in Lebanon using LB-Verif data by providing detailed scrutiny of the data and explaining in detail the measures used. In Lebanon, this concerns refugees living among the host population in both rural and urban settings, using a large database available (30,000 records) from late 2013/early 2014.[12] This analysis can be compared to a similar undertaking on the LB-VASyR 2014 data which is a two-stage cluster-sample of 1,700 records (see previous chapter).

As a welfare measure, we used an expenditure aggregate. A poverty line that represents purchasing power parity for refugees in Jordan was used (LBP 139,000). Using this cut-off, the household poverty rate is 40 percent among Syrian refugees in Lebanon. The poverty profile demonstrated that Syrian refugees follow different trajectories and these trajectories reveal different paths of poverty as demonstrated by poverty rates. Specifically those refugees crossing the border informally and settling in Bekaa and North Lebanon are more likely to be poor with a difference of 18 percentage points. However, this group is relatively small compared to the overall influx of refugees and only about 13 percent of the refugee population crossed informally into Lebanon. Indeed refugees living in Bekaa and North Lebanon are significantly more likely to be poor than their counterparts in Mount Lebanon, with a difference of 26 and 21 percentage points. Unlike in Jordan, the origin of refugees in Syria or their date of arrival in Lebanon are less predictive of their poverty status.

Socioeconomic characteristics of the head of household and household provide some clues about the poverty status. Poverty rates are highest among families with a large number of dependents (elderly, disabled and children). The deepest pockets of poverty are among families with more than 5 dependents (90 percent poverty rates). Fortunately, these are approximately only 2 percent of the population. Correspondingly single persons, who are less likely to have dependents, are least likely to be poor (20 percent poverty rate). Poverty is higher among those who have not completed their primary education when compared to those with at least a secondary education (gap of 9 percentage points). Previous occupation has very little impact on present welfare, with the exception of professionals (similar to Jordan) with poverty rates of 31 percent among this group. Not surprisingly, those with at least a secondary education, including

professionals, are more likely to have worked in the last 30 days. Those with no education and not working present a significant pocket of poverty (51 percent).

Access to employment, even if it is informal and engaged only one family member in the last 30 days, contributes to lower poverty rates by 9 percent. This is truer for female-headed households than for male-headed households. However while the impact is high, the incidence is low, with only 2 in 3 female-headed households likely to have worked in the last 30 days. For male-headed households it is higher (3 in 4).

The overall percentage of refugees accessing some kind of work in the last 30 days is relatively high (72 percent). Refugees living in Mount Lebanon, South Lebanon, Beirut and Bekaa are more likely to have access to informal employment. Returns on informal employment in Bekaa are considerable less than in other regions. North Lebanon has the highest rates of refugees not working (47 percent) while Mount Lebanon has the lowest rate (14 percent).

Whether formal or informal employment, 60 percent of refugees rely on their labor as a primary source of income. The second most common source of income is debt/credit (24 percent of the population). Poverty rates are higher among those that rely on debt/credit for income (47 percent), with difference of 16 percentage points when compared to those that rely on remittances (31 percent). Notably very few rely on remittances (only 1.3 percent). Assistance is the third most common source of income, provided to those with equally high rates of poverty (43 percent); this is despite the fact that the LB-Verif data set by design included only those who had been excluded from food and non-food assistance at the time the data were collected so the assistance these households are receiving should be limited. In fact, only 12.5 percent of the sample report receiving assistance. Poverty rates are slightly lower for those living from remittances and savings when compared to the average (31 and 37 percent respectively). Whereas poverty rates for those relying on debt (regardless of the amount) are higher (47 percent).

Assistance does not appear to discourage seeking work. Those relying on assistance are more likely to have worked in the last 30 days compared to households relying on remittances, savings or debt (54 percent). Those depending on remittances, savings and debt appear less likely (or able) to work (refugees not working is 59, 69 and 71 percent, respectively).

Those with higher expenditures and by proxy income are more likely to have adequate and stable housing. It is also true that there is a mutually reinforcing relationship between housing and livelihoods, i.e. adequate and stable housing facilitates seeking and maintaining employment or is even a place of employment itself (home industries, shops, etc.) (Burnell and Sanderson 2013; UNDP 2007a; UNDP 2007b).

Those living in adequate shelter with stable contracts have nearly half the poverty rates of those living in inadequate shelter, and dependent on assistance or squatting. Those living in independent housing are more likely to work (4 out of 5) and have lower poverty rates (27 percent). While those living in tented or unfinished shelters (21 percent of the refugee population) experience some of the deepest poverty (61 percent). Occupancy contracts also make a difference with renting correlating with lower poverty (35 percent), while those relying on assistance for shelter and squatting have high poverty rates (65 and 70 percent, respectively). The trends are similar compared to the Sphere standard for crowding, with those living with less than 3.5 sq/m per person having poverty rates of 55 percent compared to 38 percent for those living in less crowded situations.

To complete the poverty profile, the impact of poverty on family size, children's school attendance and child labor was examined. Very few children in Lebanon attend school, approximately 30 percent (CARE 2014). Among the sample, 11 percent of households report taking children out of school as a coping strategy.[13] The poverty profile clearly demonstrates that as the number of children increases, and school expenses increase, the likelihood of withdrawing a child from school also increases (from 7 percent among families with 1 child to 27 percent with families with 5 or more children). Poverty rates are very high among families with 5 or more children (81 percent) while these families remain a small portion of the overall

population (3.4 percent). Perhaps not surprisingly, poverty rates drop slightly (by 10 percentage points) for large families who take their children out of school, implying that by leaving school they at a minimum reduce total expenditures and potentially, through work actually increase income. Child labor is reported very rarely (less than 2 percent). However those who do report that their child is working to support the family have higher poverty rates (57 percent compared to 42 percent). It is clear that families who report children out of school are also more likely to admit their children supporting their families (11 times more likely).

Through welfare and poverty modeling, we were able to identify the key predictors of poverty. Following a systematic process of variable selections, we reached a final welfare model including a total of 13 variables, 6 of which can also be found in the ProGres data. The first and foremost important variable is household size. The percentage of dependents in the household is also a significant variable, with poverty increasing with percentage of dependents, but it is less important than household size. As such, single headed households without children are less likely to be poor, for both males and females (low family size, low percentage of dependents).

For the welfare profile using the LB-Verif data, the explanatory power in the model is 30 percent when using variables from LB-Verif that can also be found in the ProGres data. This is an important indication that ProGres data can potentially be used for estimating welfare in the absence of welfare measures such as income or expenditure, particularly if some of the variables originating in the LB-VASyR and verification questionnaires can be included into the ProGres.

The household interview used in the verification and LB-VASyR data collection exercises include variables related to housing and assets, WASH, food security, coping mechanisms both food and non-food including employment and debt, and to a certain extent education and health. Among these housing and employment variables are the most important. The variables are similar but different between Jordan and Lebanon but some conclusions can be drawn. Independent housing, that is rented, preferably furnished, with a refrigerator, water heater and beds, and an "improved toilet" are reliable indicators of improved welfare. Not having basic assets such as mattresses, blankets and winter clothes is an indicator of refugee poverty. Relying on assistance or even squatting is similarly an indicator of poverty.

Income and employment indicators are also important, but to a lesser extent, contributing less than 3 percent to the predictability of the welfare model. Nonetheless, relying on assistance or credit/debt as a primary source of income, having no members working in the last 30 days are predictors of welfare. With a poverty model that uses a poverty line of LBP 139,000 (US$91.2) per capita, results are very similar to the welfare model. This is not surprising because the poverty line is fairly high and includes nearly half the population (39.8 percent). However some changes are visible. Household demographics become less important overall (from 22 to 17 percent). Housing conditions decline as predictors falling from 12 to 6.5 percent. Food consumption disappears from the model. The most important and reliable variables appear in both models.

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World Food Programme (WFP). 2014. Verification Exercise, Preliminary Result March 2014, WFP Lebanon.

Annex C.1: Data

Table C.1.1: Welfare Model (Per Cap Expenditure in US$, US$1= LBP 1,508) (LB-Verif Data)

		ProGres-only		*ProGres+housing*		All variables		Variable
		Coef.	t	Coef.	t	Coef.	t	Importan
Household size	*2-3*	-0.31	-13.73	-0.37	-16.02	-0.17	-18.41	21%
	4-5	-0.43	-18.92	-0.52	-22.75	-0.32	-28.67	
	6-8	-0.54	-23.39	-0.63	-27.18	-0.43	-37.70	
	9-11	-0.67	-27.60	-0.75	-31.03	-0.55	-40.16	
	12+	-0.92	-33.22	-0.94	-34.14	-0.75	-38.53	
Proportion of dependents (children <18 years, disabled	*0–50%*	-0.08	-17.60	-0.09	-19.62	-0.09	-20.07	0.04%
	50%–75%	-0.08	-14.28	-0.07	-14.22	-0.07	-13.85	
	>75%	-0.14	-11.44	-0.12	-9.96	-0.08	-7.44	
Marital status of PA (Ref. Married)	*Divorced or widowed*	0.06	7.52	0.04	5.37	0.10	0.10	0.05%
	Single	-0.13	-5.41	-0.11	-4.48	0.17	0.16	
Highest education of PA (Ref. Below 6	*Primary education*			omitted		omitted		1.20%
	Secondary or more	0.04	8.40	0.01	3.14	0.01	3.44	
Destination (MOI registration) (Lebanon: Ref. Mt Lebanon)	*Bekaa*	-0.16	-37.25	-0.13	-35.95	-0.12	-31.68	8%
	North Lebanon	-0.20	-47.69	-0.15	-45.41	-0.15	-44.15	
	South Lebanon	-0.02	-3.96			omitted		
Occupancy (Ref. rented furnished or owned)	*Rent unfurnished*			0.03	9.80	0.04	10.15	12%
	rent assistance			-0.15	-29.08	-0.13	-25.38	
	Rent squatting			-0.10	-7.59	-0.10	-6.60	
Housing (ref=independent)	*housing_shared*			-0.06	-16.25	-0.05	-13.98	
	housing_makeshift			-0.10	-24.72	-0.10	-23.59	
	housing_homeless			-0.12	-3.96	-0.09	-3.46	
House area: sq m per capita (Ref. <10 sq	*10-15 sq meters*			0.02	6.55	0.02	6.12	
	>15 sq meters			0.05	11.76	0.05	11.03	
Type of latrine (Ref=improved	*Traditional pit*			-0.05	-17.76	-0.04	-12.60	
	Open air			-0.04	-6.69	-0.04	-5.75	
Assets	*Luxury*			0.03	7.57	0.01	2.87	
	Basic			-0.03	-8.89	-0.03	-10.09	
source of income (ref. remittances	*income_salessavings*					omitted		3%
	income_assistance					omitted		
	income_creditdebt					-0.03	-7.95	
Debt amount (ref =	*debt_less US$200*					-0.01	-2.79	
	debt200_600					0.03	8.37	
	debt_more600					0.08	18.95	
pov_inc: worked in						0.02	8.57	
fsec_eatingmeat						0.02	7.93	0.01%
	_cons	2.82		2.66		2.40		
	F statistic	852.25		847.16		834.45		
	Adjusted R-squared	0.30		0.42		0.45		
	N	27798		24347		22643		

Source: Estimations based on LB-ProGres and LB-Verif data.

Table C.1.2: Poverty Model (LBP 139,000/per capita)

		verification Coef.	z	Variable importanc
Household size (Ref. HH size =1)	*2-3*	0.21	16.16	15%
	4-5	0.45	34.34	
	6-8	0.68	47.06	
	9-11	0.89	42.24	
	12+	1.03	32.22	
Proportion of dependents (children <18yrs, disabled adults and elderly)	*0–50%*	0.09	10.64	1.0%
(Ref. =0)	*50%–75%*	0.07	7.72	
	>75%	0.07	3.97	
Marital status of PA (Ref. Married or engaged)	*Divorced or widowed*	-0.07	4.767	0.2%
	Single	omitted		
Highest education of PA (Ref. Below 6 years)	*Primary only*	omitted		0.9%
	Secondary or more	-0.02	-2.68	
Destination/MOI registration (Lebanon: Ref. Mt Lebanon)	*Bekaa*	0.15	20.15	6.0%
	North	0.22	29.73	
	South	omitted		
Occupancy (Ref. rented furnished or owned)	rent unfurnished	-0.05	-6.53	6.5%
	rent assistance	0.20	19.66	
	rent squatting	0.13	4.72	
Housing (ref=independent)	housing_shared	0.08	11.05	
	housing_makeshift	0.18	21.91	
	housing_homeless	0.15	2.62	
House area: sq. meters per capita (Ref. <10 sq. m)	*10-15 sq. meters*	-0.05	-7.73	
	>15 sq. meters	-0.09	-	
Type of latrine (Ref=improved toilet)	*Traditional pit*	0.08	13.79	
	Open air	0.08	6.37	
asset_hh_fridge		-0.02	-4.15	
asset_lack_basic (blankets, mattresses, winter_clothes)		0.03	5.21	
Household members worked in last 30 days		-0.03	-5.34	1.7%
Source of income (Ref. Remittances)	*savings*	omitted		
	assistance	0.04	4.91	
	Credit/debt	0.08	11.53	
Debt amount (ref. None)	*less US$200*	0.03	3.38	
	US$200-600	-0.03	-4.20	
	more US$600	-0.11	-	
	_cons	-0.21		
	N	24074		
	Pseudo R2	0.31		

Source: Estimations based on LB-ProGres and LB-Verif data.
Note: Those variables that do not exist in the verification data set are denoted with n/a.

Notes

[1] Empty cells are those that had either no observation or the number of observation was too small to report.
[2] For more detailed information on the ProGres data in Lebanon, please refer to Appendix C, section on data.
[3] Empty cells are those that had either no observation or the number of observation was too small (chosen at less than one percent of the population or 50 observations whichever one applies).
[4] We checked for the collinearity of the variables selected using the variance inflation factor VIF.
[5] The number of household owning their accommodation is negligible and therefore this variable is described as renting in the remainder of the document.
[6] Note that refugees receive various types of assistance, i.e. education assistance, for which other indicators may be more appropriate. For economic assistance of certain types, additional criteria may be added, i.e. winterization support is provided to those who are financially vulnerable AND living at high altitude.
[7]The total number of persons discontinued from monthly WFP Food and UNHCR hygiene assistance was 61,000 households. An information campaign on targeting of food and hygiene/baby kit assistance was undertaken two months in advance of implementation. The concerned individuals were informed again one month in advance individually at distribution sites. After exclusion, they were invited to appeal the result if they believed they should be eligible.
[8] With the exception of the LB-VASyR 2013 data which used "all those members living under the same roof". It was later determined that not all cases and households "living under the same roof" were sharing resources, as many families were sharing rooms or living in collective shelters to reduce rental costs. This was corrected in the LB-Verif data and later LB-VASyR exercises (2014).
[9] Living conditions are also captured in ProGres data set (renting or hosted) however there significant inconsistencies between the LB-Verif and ProGres data set. This is possible because the ProGres data is captured on arrival and the verification data reflect up to date living conditions after families have been in country for a longer period.
[10] In the Verification questionnaire, households could report a) Owning an apartment/house, renting a furnished apartment or being hosted for free, b) renting an unfurnished apartment or working for rent, c) relying on 'assistance' to access housing or c) squatting (WFP 2013, Verification Questionnaire).
[11] The goodness of fit of a statistical model describes how well it fits a set of observations. Measures of goodness of fit typically summarize the discrepancy between observed values and the values expected under the model in question.
[12] Since the writing of this paper, another data set of 40,000 households has been collated, on which the model developed here can be tested.
[13] Among targeted households interviewed between January and May 2015 to determine their eligibility for cash, the use of withdrawing children from school as a coping mechanism was 16 percent (UNHCR, presentation to donors 22 May 2015).