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Supplementary of the IAB-BAMF-SOEP Survey of Refugees in Germany (M5) 2017

Jannes Jacobsen, Martin Kroh, Simon Kühne, Jana A. Scheible, Rainer Siegers, and Manuel Siegert

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The Institute for Employment Research (Institut für Arbeitsmarkt- und Berufsforschung, IAB) is an independent institute of the Federal Employment Agency in Nuremberg, Germany. The IAB conducts labor market and occupational research in Germany on topics such as labor market policy and social inequality, and also does research in the fields of statistical methods and survey methodology (IAB 2017).

The Migration, Integration and Asylum Research Centre of the Federal Office for Migration and Refugees (BAMF-FZ) conducts research on migration to and from Germany as well as research on integration processes in Germany. The results are used for migration management and political consultancy. The Federal Office for Migration and Refugees (BAMF) is a federal authority within the remit of the Ministry of the Interior (BMI) and the Centre of Excellence for Asylum, Migration and Integration in Germany (BAMF 2017).

The Socio-Economic Panel (SOEP) is a longitudinal survey of private households in Germany based at the German Institute for Economic Research (DIW Berlin). It has been conducted annually since 1984. The SOEP has been receiving ongoing funding since 2002 from the federal government and the state of Berlin through the Joint Science Conference. The survey provides information on various topics such as household composition, employment, health, and social attitudes. In 2017, a total of around 38,000 individual respondents in 23,000 households were interviewed (Göbel et al. 2018).

1 Introduction

The first wave of the IAB-BAMF-SOEP Survey of Refugees in Germany was conducted in 2016. The data were made available to the scientific community in 2017 (Sample M3 & M4 of the Socio-Economic Panel (SOEP) (Kroh et al. 2017)). It is a random sample of German households that include adult asylum seekers, refugees, and people with subsidiary protection or protection on humanitarian grounds who arrived in Germany between 2013 and January 2016 and were entered into the central register of foreigners (AZR) by April 2016 (minors were additionally sampled in in June 2016). The survey has been used extensively in policy and academic research on the recent influx of refugees to Germany (Brücker et al. 2017, Brücker et al. 2016, Baier/Siegert 2018, Bürmann et al. 2018, Brücker et al. 2019).

To compensate for changes in the underlying population of refugees in Germany in a longitudinal survey, the IAB-BAMF-SOEP Survey needed to integrate individuals who were not part of the sampling frame in the initial wave of samples M3 & M4. In wave 2, 2017, this applied to two groups in particular: first, refugees who arrived in Germany between January and December 2016 (new arrivals) and, second, refugees who arrived between January 2013 and January 2016 but who registered in Germany later (late registration). Sample M5, as the 2017 supplementary sample of the IAB-BAMF-SOEP Survey, covers these two groups.

As Table 1 shows, these two groups of new arrivals and late registrations cover around 435,000 persons (minors included), 290,000 of whom are adults[1]. With this enlargement, we are able to extend the target population of the IAB-BAMF-SOEP survey to persons who arrived in Germany through the year 2016 and also include late asylum applicants.

[1]Please note that in the following tables, we do not rely on totals as estimated from the sampling frame but on an AZR version that was compiled in December 2017, as the integrated weight of all sub-samples M3-M5 should be calculated based on the same AZR version. The first wave of IAB-BAMF-SOEP used an AZR version from January 2017. Hence, the second wave uses totals that rely on the AZR one year later. Therefore, there is a slight deviation in M5 between the totals for the sampling frame and the totals used in the raking process. Therefore, as table 1 indicates, we also acknowledge persons who do not have refugee status. These are particularly persons who had applied for a prolongation of their legal status and therefore possessed temporarily no legal status we considered in the sampling. This also holds for individuals who had changed track under migration law but had initially immigrated as refugees. These special cases result from the fact that some individuals in the target population have lived in Germany for some time but changed status at some point.

Due to the design and scope of the IAB-BAMF-SOEP Survey of Refugees (M3-M5), we recommend using and analyzing all sub-samples together.

Table 1: Late Registration and New Arrivals in the Sampling Frame - Adults and Minors

Legal Status	**Late Registration** (%)	**New Arrivals** (%)	**Total** (%)
Asylum Seeker	74,627 (26.3)	49,506 (32.7)	124,133 (28.5)
Protection Granted	162,338 (57.3)	72,872 (48.2)	235,210 (54.1)
Postponement of Removal & Other	15,006 (5.3)	11,177 (7.4)	26,183 (6.0)
No Refugee Status	31,610 (11.1)	17,760 (11.7)	49,370 (11.4)
Total	283,581 (100)	151,315 (100)	434,896 (100)

Source: AZR, special count on behalf of research group in December 2017

This documentation provides information about the sampling, weighting, response, and integration of M5 into the SOEP-Core household panel (Göbel et al. 2018). Due to the fact that sample M5 is an addition to existing samples, we focus here on aspects that are unique to its sampling process. The sampling and weighting procedure in M5 is similar in many respects to samples M3 & M4. To work with the IAB-BAMF-SOEP Survey of Refugees data, we therefore recommend first taking a look at the documentation on M3 and M4 (see Kroh et al. 2017).

2 Target Population and Sampling Frame

As with sub-samples M3 & M4, the sampling frame for M5 is the Central Register of Foreigners ("Ausländerzentralregister", AZR) (von Gostomski/Pupeter 2008). The sample M5 consists of two distinct target populations (see Table 1). The first are adult refugees who arrived in Germany between January 2013 and January 2016 but were entered into the AZR after April 2016 (late registrations). These respondents are not part of the target population of M3 or M4. They could not have been identified in the Central Register because they had not applied for asylum at the time of sampling M3 & M4. The second target population of M5 consists of adults who arrived in Germany between February 1, 2016, and December 31, 2016, and applied for asylum by January 2017 (new arrivals).

Table 2: Anchor Persons Across Tranches/Subsamples

Sample Population	**Tranche/Subsample**					
	M3-1	M3-2	M4-1	M4-2	M5-1	M5-2
1) Adult, in AZR by January 2016	✓	×	✓	×	×	×
2) Adult, in AZR betw. February and April 2016	×	✓	✓	×	×	×
3) Adult, in AZR by April 2016	×	×	✓	×	×	×
4) Minor, in AZR by June 2016	×	×	×	✓	×	×
5) Adult, in AZR betw. May 2016 and January 2017	×	×	×	×	✓	×
6) Adult, in AZR betw. February 2016 and January 2017	×	×	×	×	×	✓

Table 2 displays the definition of sub-samples of M5 in combination with the initially separate samples M3 & M4.

3 Sampling Design

The sampling followed a two-step sampling procedure. The primary sampling units (PSU) were regional clusters of immigration offices. We sampled with replacement, which means that some sample points were sampled more than once. Initially we sampled 130 sample points in total, 99 of which were distinct. The sampled points represent 158 distinct immigration offices.

Next, for each point, we sampled 45 anchor respondents (secondary sampling unit, SSUs), resulting in a total of 5,850 individuals as our gross sample (130 × 45). Due both to some immigration offices not being able to provide addresses as well as to faulty addresses, we ended up with 5,390 addresses that were provided to the field institute.

Finally, the field institute Kantar Public sampled 23 addresses randomly per PSU for the initial fieldwork, resulting in 2,984 households as the working sample (see Britzke/Schupp 2018).

3.1 Clustering of Addresses

In a first step, individuals in the Central Register of Foreigners were compiled into regional clusters in order to allow for a multi-stage clustered sample design. We made use of the fact that each individual is assigned to the local immigration office that has that individual's address.

As some offices only had a small number of target population members, they were combined with other nearby offices to create sample points of sufficient size. The 594 immigration offices were thus merged into 369 clusters consisting of one to seven offices each (see Kroh et al. 2017). The clustering process followed a set of rules. First, merging was only allowed within a given state, not across states. Second, offices were merged only with other offices that were located nearby. And third, whenever possible, we merged offices within a given municipality or county.

3.2 Sampling of Primary Sampling Units

We used stratified sampling of sample points to assure minimum sample sizes for different regions of Germany. For this, 16 strata were constructed based on the states and county types (rural vs. urban) of sample points. Within each of the 16 strata, the number of points to be sampled was proportional to the size of the stratum. Thus, a higher number of sample points were sampled in a stratum that comprised a large number of target population members (such as North Rhine-Westphalia) compared to a smaller stratum (such as Eastern Germany (without Berlin)). Finally, clusters themselves were sampled proportionally to their size. Thus, larger clusters had a higher probability of being sampled than smaller clusters.

3.3 Sampling of Secondary Sampling Units

The sampling of individuals (SSUs) was based on a disproportional sampling design to ensure minimum sample sizes and thus allow for meaningful comparisons between subgroups of refugees. For this purpose, we made use of individual information on a number of characteristics available from the central register of foreigners. More precisely, we assigned varying sample probabilities dependent upon an individual's country of origin, current legal status, gender, and whether the respondent was part of the new arrivals or late registrations.

Table 3: Sample Factors Across Countries of Origin and Legal Status

Country	**Legal Status**		
	Ongoing Procedure	Granted Protection	Toleration & other
Syria	0.8	1.0	0.8
Albania	0.3	1.0	0.8
Afghanistan	0.4	1.0	0.8
Eritrea	0.7	1.0	0.8
Serbia	0.3	1.0	0.8
Kosovo	0.3	1.0	0.8
Iraq	0.6	1.0	0.8
Russia	0.6	1.0	0.8
Somalia	0.7	1.0	0.8
Pakistan	0.6	1.0	0.8
Other	0.3	1.0	0.8

Table 3 displays the sample probabilities assigned to combinations of country of origin and legal (asylum) status. As can be seen, refugees who had already been granted protection were assigned a higher probability than refugees whose asylum decisions were still pending or those who were in an appeal process and individuals whose asylum claims had been rejected but who were allowed to remain in the country temporarily with postponement of removal or another status. Because the study is designed as a longitudinal survey, we increased the number of individuals in our sample who are more likely to remain in Germany for an extended period of time. For instance, respondents from Syria were assigned a higher probability than respondents from Albania. Furthermore, those who already had some sort of protection were always assigned a higher probability than those whose decisions were still pending or who were in an appeal process. Besides status

and country of origin, higher probabilities were assigned to women (factor of 1.3) and to respondents who are part of the new arrivals (factor of 1.7).

Table 4 shows the distribution of respondents in the sampling frame as well as the net sample across age groups and country of origin. Similar to M3 & M4, most people in the sampling frame come from Afghanistan and Syria whereas the numbers of asylum seekers and refugees from the Balkans declined dramatically compared to M3 & M4.

Table 4: Minors and Adults in Sampling Frame by Country of Origin

	Minors **Numbers in Net Sample in Parentheses**					
	Boys		Girls			
	Up to 9 Years	Over 9 Years	Up to 9 Years	Over 9 Years	Total	Target Population in %
Country of Origin						
Syria	19.521 (293)	13,827 (203)	17,401 (278)	8,264 (159)	59,013 (933)	39.6
Afghanistan	9,445 (87)	10,660 (55)	8,449 (100)	5,161 (55)	33,715 (297)	22.6
Iraq	7,133 (104)	5,273 (96)	6,407 (105)	3,815 (87)	22,628 (392)	15.2
Albania, Serbia, Kosovo	1,179 (7)	510 (5)	1,098 (15)	479 (14)	3,266 (41)	2.2
Eritrea, Somalia	1,592 (15)	920 (1)	1,439 (16)	368 (1)	4,319 (33)	2.9
Iran, Pakistan	1,198 (18)	921 (5)	1,089 (19)	608 (13)	3,816 (55)	2.6
Other	8,446 (75)	3,741 (16)	7,591 (64)	2,438 (11)	22,216 (166)	14.9
Total	48,514 (599)	35,852 (381)	43,474 (597)	21,133 (340)	148,973 (1917)	100

	Adults **Numbers in Net-Sample in Parentheses**					
	Men		Women			
	Up to 29 Years	Over 29 Years	Up to 29 Years	Over 29 Years	Total	Target Population in %
Country of Origin						
Syria	34,632 (340)	27,364 (305)	15,092 (239)	18,318 (222)	95,406 (1,106)	33.4
Afghanistan	29,133 (135)	11,339 (75)	8,109 (75)	7,539 (50)	56,120 (335)	19.6
Iraq	12,665 (106)	9,297 (99)	6,078 (77)	6,998 (75)	35,038 (357)	12.2
Albania, Serbia, Kosovo	685 (7)	993 (7)	555 (2)	865 (3)	3.098 (19)	1.1
Eritrea, Somalia	10,158 (68)	2,321 (18)	4,460 (36)	1,304 (6)	18,243 (128)	6.4
Iran, Pakistan	8,995 (49)	9,168 (50)	1,504 (12)	3,376 (18)	23,043 (129)	8.1
Other	22,825 (66)	15,986 (42)	6,792 (39)	9,364 (31)	54,967 (178)	19.2
Total	119,093 (771)	76,468 (596)	42,590 (480)	47,764 (405)	285,915 (2,252)	100

Source: AZR, special count on behalf of research group in December 2017, and IAB-BAMF-SOEP Survey of Refugees - sample M5

4 Fieldwork Results and Response Rates

To assess the quality of a random sample, it is crucial to take into account details of the fieldwork such as response behavior. In this section, we aim to identify whether there was systematic self-selection from the gross into the net sample.

4.1 Address Availability and Quality

At the time of the sampling, individual addresses of refugees were not kept in the Central Register of Foreigners but by the regional immigration offices. As a consequence, offices in the sample had to provide addresses to our fieldwork agency, Kantar Public. Immigration offices are not legally obligated to provide these addresses to fieldwork agencies. The team at BAMF-FZ therefore had to contact each individual office and ask them to provide addresses. Although a large majority of offices did provide all requested addresses, some did not. Thus, out of the 5,850 sampled addresses in all four tranches, a total of 5,390 addresses were available and forwarded to the fieldwork institute.

4.2 Fieldwork

Interviews were conducted by the survey institute Kantar Public from June to October 2017. Sampled households were provided with information that was sent out by mail prior to the actual interview. In these letters, it was emphasized that participation is voluntary and information respondents provided would have no impact on any legal proceedings any members of the household might be part of.

Table 5 displays the results of the fieldwork (we use a similar classification as suggested by AAPOR 2016). Interviews were attempted with 2,915 anchor respondents, 140 of whom did not respond for reasons that can be described as quality-neutral drop-outs. These include non-existent or invalid addresses, and individuals who, for instance, moved abroad and thus are no longer part of our target population. We assume that invalid addresses resulted from spelling mistakes or misunderstandings in the registration process. Of the remaining 2,775 households, 1,519 took part in our survey, meaning a response

rate of around 52.1%. Looking at the two different focus groups, we see that the response rate in the late registration sample (56.1%) was slightly higher than for the new arrivals (47.1%). The 2,915 households were contacted by 30 different interviewers, each of whom finished 51 household interviews successfully on average (min = 12 & max = 149).

1,256 of the sampled anchor persons either declined or were not able to participate. It is striking that in total, only around 11% did not participate due to a "hard refusal" or due to time constraints. The overall response rate for the IAB-BAMF-SOEP Survey of Refugees was 54.7% if the quality-neutral drop-outs are ignored. This is an outstanding response rate compared to other sub-samples in the SOEP.

Figure 1 shows the response rates at the state (*Länder*) and county levels. Generally speaking, we found lower response rates in northeastern Germany. The response rates on the state level varied from around 30% (Mecklenburg-Western Pomerania) to 65% percent (Bavaria)[2].

Table 5: Fieldwork Results With and Without QNA

	Household Response Rate M5					
	Overal (With and without QNA)		Late Registration (With and without QNA)		New Arrivals (With and without QNA)	
Quality-Neutral Drop-Out						
Deceased	0.0 (1)	-	0.1 (1)	-	-	-
Nonexistent/invalid address	4.8 (139)	-	4.5 (74)	-	5.1 (65)	-
Subtotal	4.8 (140)	-	4.6 (75)	-	5.1 (65)	-
Response						
Full/Partial Response	52.1 (1519)	54.7 (1519)	56.1 (914)	58.8 (914)	605 (47.1)	49.6 (605)
Subtotal	52.1 (1519)	54.7 (1519)	56.1 (914)	58.8 (914)	605 (47.1)	49.6 (605)
Non-Response						
Not Locatable/Accessible	27.7 (808)	29.1 (808)	25.5 (415)	26.7 (415)	30.6 (393)	32.2 (393)
Illness or Nursing Care	1.0 (28)	1.0 (28)	0.8 (13)	0.8 (13)	1.2 (15)	1.2 (15)
Language Problems	3.5 (102)	3.7 (102)	2.5 (41)	2.6 (41)	4.8 (61)	5.0 (61)
No time/Refusal	10.7 (313)	11.3 (313)	10.4 (169)	10.9 (169)	11.2 (144)	11.8 (144)
Other	0.2 (5)	0.2 (5)	0.2 (3)	0.2 (3)	0.2 (2)	0.2 (2)
Subtotal	44.5 (1279)	45.3 (1256)	39.3 (641)	41.2 (641)	47.9 (615)	50.4 (615)
Total	100 (2915)	100 (2775)	100 (1630)	100 (1555)	100 (1285)	100 (1220)

4.2.1 Versions of the Questionnaire in Different Languages

All field materials were provided in seven different languages, as a significant number of respondents were not proficient in German at the time of the survey (see Table 6). The same languages were used as in the M3 & M4 sub-samples. At the beginning of each

[2]In small states like Bremen and Saarland, no household interviews were completed. The absence of household interviews in small states is unfortunate, but is due to the relatively low variation of PSUs in those areas. Further, the gross sample was comparatively small in comparison to M3 & M4. If many respondents are also unwilling to participate or if the address quality in a PSU is low, no interviews can be conducted.

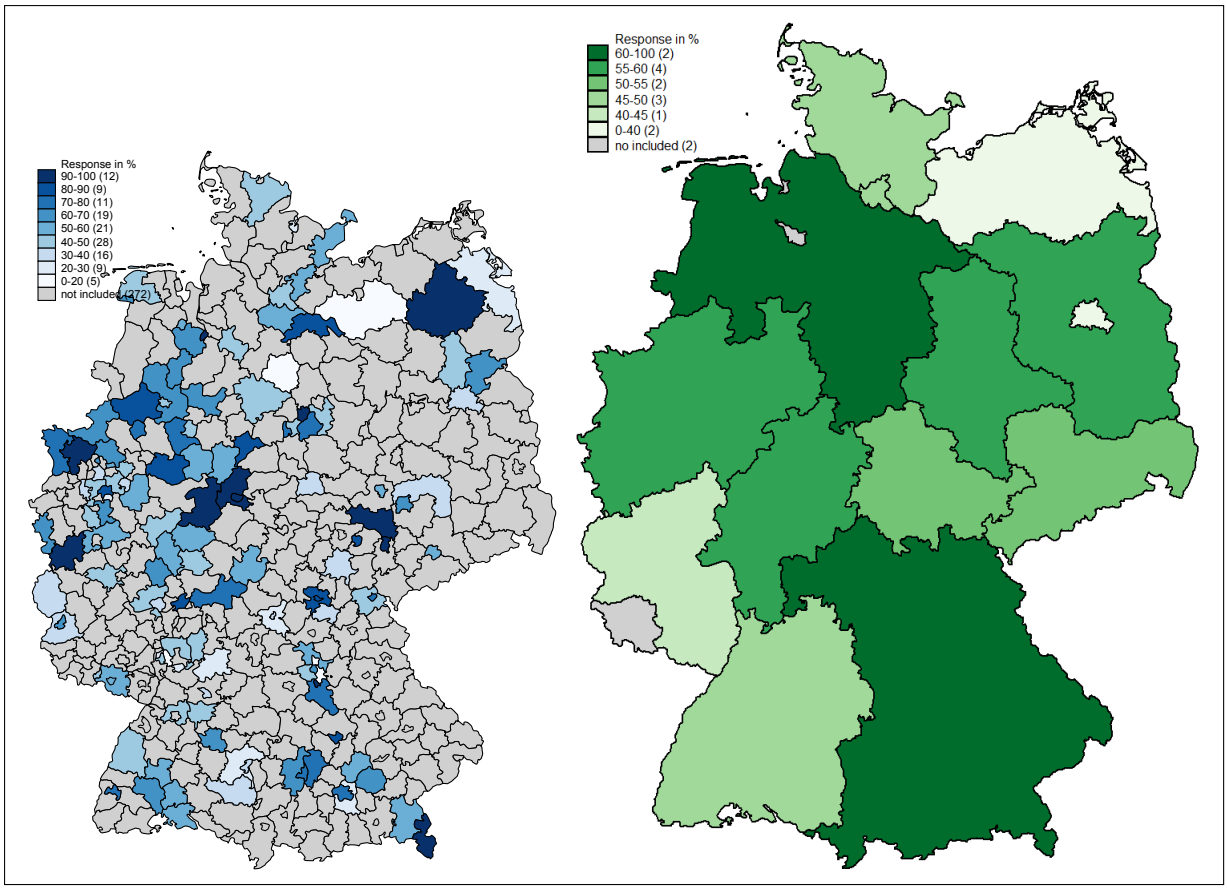

Figure 1: Response Rates at the State and Municipal Level

interview, one of the languages was chosen. Interviews were conducted using the CAPI (Computer-Assisted Personal Interviewing) mode, and the German and chosen language versions were displayed side-by-side on the screen. This allowed language barriers to be overcome quite easily. Moreover, Kantar Public provided an interpreter hotline that could be contacted if any difficulties arose during the interview.

Table 6: Use of Visual Translations in Net Sample

Visual Translation	**Percent (absolute)**
German / English	10.1 (228)
German / Arabic	66.8 (1,505)
German / Farsi	17.4 (392)
German / Pashto	0.8 (17)
German / Urdu	2.0 (46)
German / Kurmanji	2.8 (64)
Total	100 (2,252)

In addition, we provided audio files to deal with potential illiteracy (see Table 7). As

the numbers indicate, most respondents did not use the audio files at all (75%). The interviewer reported that only 8% used the audio files with every question.

Table 7: Use of Audio Files in Net Sample

Audio-Files	**Percent (absolute)**
With every question	8.0 (180)
With around 2/3	5.0 (113)
With around half	4.2 (95)
With fewer than half	8.2 (185)
Not at all	74.6 (1,679)
Total	100 (2,252)

Besides language barriers, interviewers encountered other difficulties. Around 47 % of the net household sample still lived in public group housing (47.4 % public group housing and 52.6 % in private housing). Some interviewers therefore needed to first obtain permission to enter these facilities. To do so, it was crucial that they make contact with the local welfare and other organizations that run the shelters.

5 Cross-Sectional Weighting

As described above, we assigned varying sampling probabilities to target population members. Design weights account for these unequal sampling probabilities of households within sample points. The two-stage sampling design initially applies equal selection probabilities (PPS, probability proportional to size). Only in the subsequent step of randomly selecting secondary sampling units (SSUs) per sample point are unequal sampling factors introduced across countries of origin, legal status, gender, and target population (see Table 3 in section 3.3).

Please note that the Central Register of Foreigners lists individuals without any information about their household context (marital status or relatives). However, as with all of the other samples that make up the Socio-Economic Panel study, the IAB-BAMF-SOEP Survey of Refugees is designed as a household panel survey in which all adult household members are interviewed. Hence, a household with two refugees, for instance, has a higher sampling probability than single households. In order to determine a household's sampling probability, we therefore need to assign sample probabilities to all members of existing households who are part of the sampling frame, even though we did not initially sample these individuals as anchor respondents. To this end, information on country of origin, gender, date of asylum application, and arrival date is needed for all household members. While complete information is available on anchor respondents, it is not always available on other household members, for instance, because some household members did not participate in an interview. In many cases, however, proxy information can be obtained from other household members. Furthermore, the information on whether the respondent is identified as being part of the late registrations or the new arrivals can be inferred from the anchor respondent. If data was not available from the household context, single imputation procedures were used to replace missing values with plausible and consistent information.

As described above, we assigned varying sampling probabilities across countries of origin, legal status, gender, and target sub-population. Combining all the components allowed us to calculate each individual's probability to be sampled in the study. After

having identified the sampling probability for each household member, we could calculate household sampling probabilities for each of the 1,519 households. If at least one household member is sampled, the whole household is part of the study. By knowing individual sampling probabilities (p_i) for each household member and assuming sampling independent of the household context, the sampling probability of a household (p_{hh}) denotes a function of the complementary product of the complementary individual sampling probabilities:

$$p_{\text{hh}} = 1 - \prod_i (1 - p_i)$$

Household weights (w_{hh}) result from the inverse household sample probability:

$$w_{\text{hh}} = \frac{1}{p_{\text{hh}}}$$

Please note that the number of households in the target population is not known and cannot be extracted from the sampling frame, as no household identifier is available in the Central Register of Foreigners. Thus, we estimated the total number of households based on our entire weighting and post-stratification procedure on personal level at 210,254 households.

5.1 Non-Response Weighting

Not all sampled households can be contacted during fieldwork, and those that are contacted may choose to not participate in the survey. *Non-response* may introduce bias into estimates if respondents differ systematically from non-respondents. Non-response weights are constructed to address this issue with the aim of minimizing potential bias due to non-response.

Over recent years, non-response has been increasing constantly in surveys like the SOEP, and very few studies have achieved response rates above 40 percent (Schnell 2012). The response rate in the first wave of the IAB-BAMF-SOEP Survey of Refugees was roughly 50 percent for M3 & M4, whereas the response rate for M5 was slightly higher

(55%). We speculate that refugees have a strong motivation to participate in such surveys because it allows them to provide information about their current situation.

Several techniques have been proposed to adjust for non-response. We used a strategy similar to those used previously in the SOEP: propensity score estimation. This required information on both groups, respondents and non-respondents. Applying logistic regression analysis, we estimated the propensity for each household to participate/not participate. Non-response weights were then calculated by transferring the propensities to probabilities; the inverse of this probability for each household is the final household non-response weight (Kim/Kim 2007).

5.1.1 Data Sources and Documentation on Variables

The main data sources for estimating propensity scores stem from our sampling frame, the Central Register of Foreigners, as well as an interviewer questionnaire. In addition, we made use of external databases at the county (INKAR, INKAR 2018) and municipality level (Regionaldatenbank, *Die Regionaldatenbank Deutschland* 2018).

Data Sources Used in the Modelling of Non-Response:

Municipality: Federal Statistical Office: The "Regionaldatenbank Deutschland" (Regional Database Germany) contains information on different levels of geographic units that was collected as part of a joint project of the Federal Statistical Office and its sub-national counterparts at the state (Länder) level. We made use of variables compiled at county and neighborhood levels for the analysis of non-response.

County: Federal Statistical Office (INKAR): The database "Indikatoren und Karten zur Raum und Stadtentwicklung in Deutschland und in Europa" (INKAR) provides information on regional economic activity (e.g., property prices, household income, welfare benefits) as well as population characteristics (e.g., educational data) for the different regional entities. From this source, the information is available at the county level and was compiled in 2014 and 2015.

Central Register of Foreigners: Additionally, Kantar Public anonymized the gross sample, and we used information from the AZR regarding the anchor respondents. We were able to use the nationality, age, and asylum status at the time of sampling to estimate a propensity score.

a) Asylum status at the time of sampling

b) Country of origin

c) Gender

d) Time of arrival in Germany

e) Age

Interviewer Questionnaire: Furthermore, interviewers were requested to fill out a questionnaire on each household they had attempted to contact. This allowed us to gain a picture of the household's physical surroundings and the interviewer's feelings about these surroundings.

A documentation of all the variables used is provided in the appendix (see Table 11). As was the case with the estimation in the previous sub-samples, we focused on individual characteristics, because refugees are randomly distributed across Germany using the "Königsteiner Schlüssel". We therefore assume that context information has a less systematic impact on response behavior.

5.1.2 Multiple Imputation and Data Coding

In order to generate a non-response weight, we need complete information on all respondents and non-respondents, as individuals with missing values would otherwise drop out of any multivariate estimation. To avoid such exclusion, we imputed missing data using the "Multiple Imputation by Chained Equations" (Royston 2009) methodology implemented in Stata 14. We worked with ten different predictions to deal adequately with the uncertainty in the imputation process. For the final estimation of the non-response weight, we selected one of the ten predictions randomly. Thus only one non-response weight was estimated.

Some variables were recoded and condensed. Metric variables were categorized, resulting in three distinct categories, with the middle category as a reference. Ordinal indicators were condensed to a maximum of five categories, and each category was included as a dummy variable with one category as reference. The same procedure was used with nominal variables. Using categorized variables and their respective binary indicators in regression has several advantages. Non-linear effects were controlled for because individual parameters were estimated for each group. Also, the categorization prevented the estimation of extreme probabilities very close to zero or one because of single outliers on a variable. This was necessary in order not to inflate the estimated weights inappropriately

(for an example, see Kroh et al. 2015).

5.1.3 Results and Calculation of Non-Response Weights

In order to estimate household response propensities, logistic regression analysis was used. In this process, we accounted for multiple imputations. We used robust standard errors, clustered at PSU level, to account for variance due to primary sampling units from which anchor respondents were sampled. The full sample of 2,775 eligible households was used in every estimation. First, a full model was estimated using all of the variables at hand. Then a reduced model was estimated.

We estimated a Pseudo-R^2 of .044 for the final non-response model. It is valuable to take a closer look at the factors influencing the chance of responding to the interview inquiry.

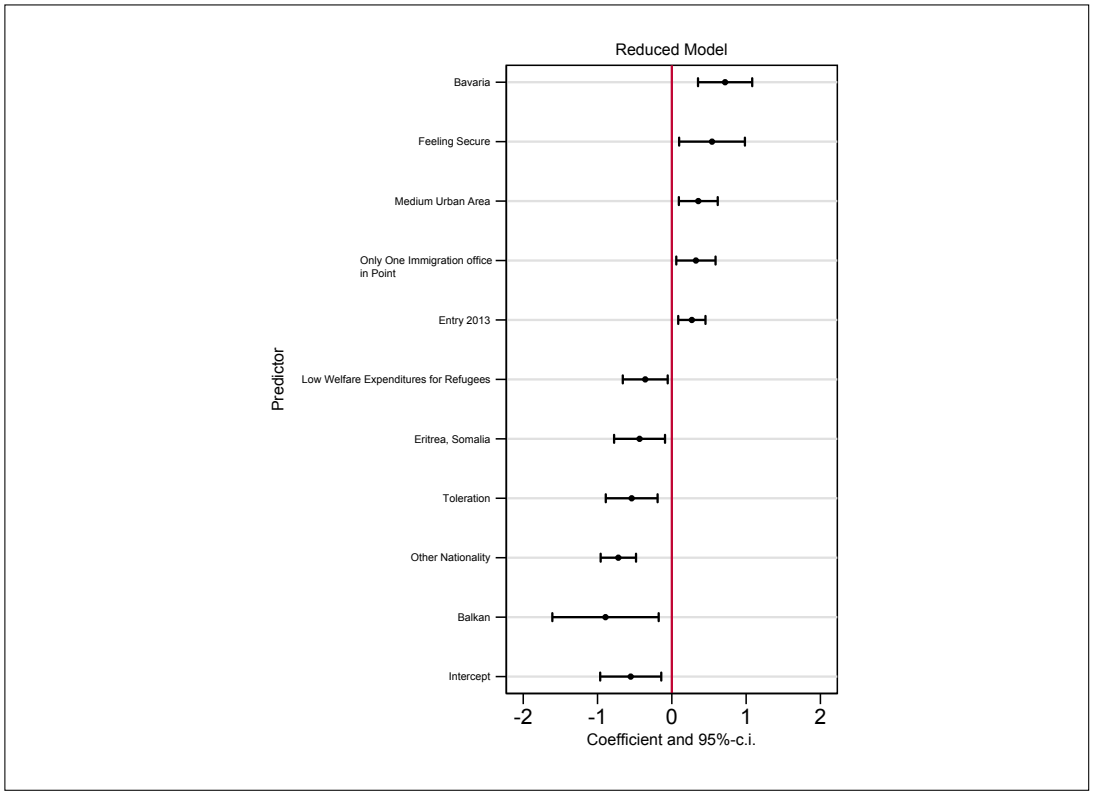

Figure 2: Reduced Non-Response Model

1) **Country of Origin**

We found an effect of the respondent's country of origin. Especially individuals

from Eritrea, Somalia, and the Balkans had a higher risk of not responding to the interviewer inquiry.

2) **Asylum Status**

Regarding the asylum application process, we found an effect only for those respondents who have a postponement of removal. They have a slightly higher chance of not responding to our inquiry.

3) **Interviewer Assessment**

When the interviewer felt safe in the household's neighborhood surroundings, we measured a higher chance of the respondent taking part in the interview. All the other variables describing the interviewer's feelings and assessments were not significant. Therefore, we can conclude that interviewer effects are relatively low.

4) **Sampling Units**

Regarding the sampling units, we measured a higher probability of participation for refugees who are part of a primary sampling unit in which there is only one immigration office.

5) **Characteristics of the Household's Neighborhood Surroundings**

When the household is located in a medium-sized urban area (between 150 and 100 inhabitants per km^2), there is a higher chance of taking part in the interview.

6) **Time of Arrival**

People who entered Germany in 2013 had the highest chance of taking part in an interview compared to other entry time points.

7) **Current Place of Residence**

On a state (*Länder*) level, we found a higher chance for people that live in Bavaria.

8) **Context Information**

Furthermore, in areas where public welfare expenditures on refugees are low, the response rate is lower. In this regard, welfare expenditures represent proxy information for the total number of refugees and asylum seekers living in an area.

The reduced non-response model was used to predict household participation probabilities. The inverses of these probabilities function as non-response weights. Table 8 shows the summary statistics of the weights.

Table 8: Characteristics of Household Non-Response Weight - M5

		Quantiles								
	Min	10%	25%	50%	75%	90%	Max	Mean	SD	N
Non-response Weight	1.3	1.4	1.6	1.7	2.0	2.3	5.3	1.8	0.5	1,519

We estimated a non-response weight for all participating households. Due to our response rate of around 54 percent, the mean of the weight is close to two.

5.2 Post-Stratification

In addition to the aforementioned combination of design and non-response weights, the weights were corrected to meet known cell distributions, or marginal totals. These were derived from the Central Register of Foreigners solely for this purpose. To count the totals used in the procedure described below, we used the December 2017 version of the Central Register of Foreigners.

Following the post-stratification procedures used previously in the SOEP, we used the technique of "iterative proportional fitting" (Deming/Stephan 1944), also referred to as "raking". This is a special type of post-stratification and is usually used "when post-strata are formed using more than one variable, but only the marginal population totals are known" (Lohr 2010).

Table 9 shows a list of characteristics that were used in the raking process for the individual weight: country of origin, sex, age as a grouped variable, the date of arrival in Germany, and a variable for the region in which the household lives. These variables apply to the raking process at the individual level.

Often in household surveys, not all household members fill out a questionnaire. These individuals have also been part of the weighting strategy so far, meaning that they were assigned a design weight and a household non-response weight as well. Due to the fact that these individuals are not included in the net sample, we have to correct for this

distortion in order to keep the net sample representative. Therefore, the raking procedure at individual level only includes respondents who actually filled out a questionnaire. Thus, we corrected for individuals in households in which not all members took part in our survey. In the end, the weighted net sample meets known cell distributions from the Central Register of Foreigners.

Table 9: Population Characteristics Used in the Raking Process

Variable	Values
Country of Origin	1, Syria 2, Afghanistan 3, Iraq 4, Albania/Serbia/Kosovo 5, Eritrea/Somalia 6, Russia/Pakistan 7, Other
Sex	1, Male and unknown 2, Female
Age	0-4, 5-9, 10-14, 15-17, 18-20, 21-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60+
Date of Arrival	Each Quarter of 2014 and Before Each Quarter of 2015 Each Quarter of 2016 and After
Region	1, Berlin/Brandenburg 2, Hamburg/Schleswig Holstein 3, Bremen/Lower Saxony 4, North Rhine-Westphalia 5, Hesse 6, Saarland/Rhineland-Palatinate 7, Baden-Wuerttemberg 8, Saxony-Anhalt 9, Bavaria 10, Western Pomerania 11, Thuringia 12, Saxony

The raking process completes the three-step first-wave weighting procedure for the M5 sub-sample of the IAB-BAMF-SOEP Survey of Refugees.[3] These weights are of special

[3]With regard to the joint usage of M5 and older samples of the IAB-BAMF-SOEP Survey of Refugees, we also make use of the data from the AZR. Although M3 & M4 are basically distinct from M5, as mentioned above, there is an overlap of two months (May and June) in 2016, when the children in M4 and adults in M5 were sampled. Due to the fact that these adults, as parents, could already have been sampled for M4, we decided to add the totals (children and adults) from the raking procedure for those two months to M5. We thus artificially reduced the totals for M3 & M4. However, this does not pose a problem for the analytical potential because the weights for M3-M5 are constructed to be used jointly. The reduction of the total sample size for M3 & M4 is therefore compensated for through the raking process in M5.

importance as they serve as a basis for future longitudinal and cross-sectional weighting. The final individual weights are labeled as `bhphrfm5` and household weights as `bhhhrfm5`. For SOEP-Core, they will be distributed in the `phrf.dta` for individual weights and in the `hhrf.dta` for household weights in the SOEP scientific use file. With regard to SOEPlong, the weights are stored in `ppfadl.dta (phrf0)` and `hpfadl.dta (hhrf0)`.

5.3 Characteristics of Cross-Sectional Weight

As mentioned above, the weighting process in the IAB-BAMF-SOEP Survey of Refugees is a three-step process: (1) design weighting, (2) non-response weighting, and (3) post-stratification. A combination of these three steps results in the so-called "first-wave weights". Such weights are available for all sub-samples of the SOEP.

Table 10 displays summary statistics at all three steps of our weighting procedure.

Table 10: Summary Statistics for Household Weights

		Quantiles								
	Min	10%	25%	50%	75%	90%	Max	Mean	SD	N
Complete Weight	13.9	31.2	49.6	88.3	169.4	293.8	2188.8	138.4	161.6	1519
Design*Non-Response	10.6	36.6	51.9	81.5	155.9	257.2	892.8	126.2	115.9	1519
Design	7.0	22.4	28.6	47.5	68.8	144.6	289.2	68.5	55.8	1519

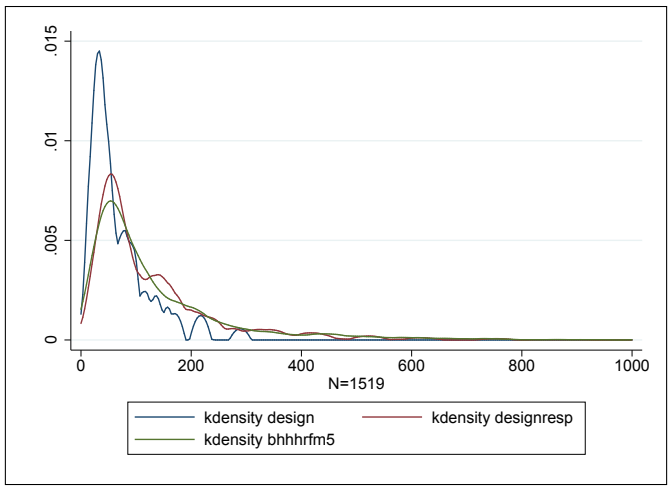

Figure 3: Distribution of Household Weights Across All Three Weighting Steps

Variance in the design weight is due to the disproportionate sampling probabilities for different subgroups of refugees. In the second stage, the design weight was multiplied by the non-response weight. As expected, the variance increased. Finally, this second weight

was adjusted in the raking process. This process, again, increased the variance to some extent. The distribution of the different steps is displayed in figure 3. As can be seen, all weights are strongly right-skewed, but to a lesser extent in the case of the complete weights than with the design weights alone.

6 Appendix

Table 11: Variables Used Estimating the Propensity Score

Variable	Source	Type	Values	Level	Year
Share Unemployed Migrants	Inkar	metric		Municipality	2014
Tax Revenue	Inkar	metric		Municipality	2014
Accessibility of Rural Centres in km	Inkar	metric		Municipality	2015
Accessibility of Medium Rural Centres in km	Inkar	metric		Municipality	2015
Share of Foreign Born Children in Day Care	Inkar	metric		County	2015
Local debt	Inkar	metric		County	2014
GDP per Capita	Inkar	metric		County	2014
Asylum benefits	Regional-datenbank	metric		County	2015
Bundesland	Field Information	nominal	1 (HB/NI/SH/HH) 2 (SL/RP/HE) 3 (SN/ST/TH) 4 (BY) 5 (BW) 6 (MV/BB/BE) 7 (NW)	Individual	2017
Type of Municipality	Field Information	ordinal	Classification by the BIK 1 (500tsd and more / Urban core) 2 (less than 500tsd / Urban core) 3 (less than 100tsd / dense district) 4 (less than 50tsd / Rural) 5 (less than 5tsd / Rural)	Individual	2017
Size of Municipality	Field Information	ordinal	Number of people living in Area 1 (less than 2tsd) 2 (less than 50tsd) 3 (less 100tsd) 4 (less than 500tsd) 5 (more than 500tsd)	Individual	2017
Settlement Structure	Field Information	ordinal	Classification by the BfLR 1 (Dense Area) 2 (Medium Density) 3 (Rural Area)	Individual	2017
Size of PSU I (Number People in Point)	Field Information	metric		Individual	2017
Size of PSU II (Number of Immigration Offices per per Point)	Field Information	ordinal	1 (1 Office) 2 (2 Offices) 3 (More than 3 Offices)	Individual	2017
Language Barriers by First Contact	Field Information	ordinal	1 (no) 2 (some) 3 (big)	Individual	2017
Condition of Housing	Field Information	ordinal	1 (very good, superior) 2 (good) 3 (in part unkempt) 4 (shabby) 5 (don't know)	Individual	2017
Feeling in Street/Residential Complex	Field Information	dummy	1 (safe) 0 (unsafe)	Individual	2017
Type of Residence	Field Information	dummy	1 (shared accomodation) 0 (private)	Individual	2017
Problems with Entry	Field Information	dummy	1 (yes) 0 (no)	Individual	2017
Description of Living Area	Field Information	nominal	1 (residential area with older buildings) 2 (residential area with new buildings) 3 (mixed-use zone) 4 (business district) 5 (industrial park)	Individual	2017
Age of Anchor Person	Register Data	ordinal	1 (minor) 2 (18-49) 3 (older than 50)	Individual	2017
Country of Origin of Anchor Person	Register Data	nominal	1 (Syria) 2 (Afghanistan) 3 (Iraq) 4 (Albania, Serbia, Kosovo) 5 (Eritrea, Somalia) 6 (Iran, Pakistan) 7 (Other)	Individual	2017
Sex of Anchor Person	Register Data	binary	1 (male and unknown) 2 (female)	Individual	2017
Status of Asylum Application of Anchor Person	Register Data	nominal	1 (In Application Process) 2 (Refugee, Asylum Status) 3 (Toleration and other)	Individual	2017
Year of Entry of Anchor Person	Register Data	ordinal	1 (2013) 2 (2014) 3 (2015) 4 (2016)	Individual	2017

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