

Supplementary Material for:

Communication Barriers and Infant Health:
The Intergenerational Effect of Randomly Allocating Refugees Across
Language Regions

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A Additional data information

A.1 Data sources

Table A.1.1: Overview of data set and sources

File	Description	Source	Accessed	Level	
Foreigner registry					
ZEMIS	Asylum seeker registry & cantonal al-location (2010–2017)	SEM	2018/08/14	Individual-time	
Birth registry					
BEVNAT I	Full birth registry (2010–2017)	FSO	2018/11/19	Individual time	
BEVNAT II	Stillbirth registry (2010–2017)	FSO	2018/11/19	Individual time	
BEVNAT III	Death registry children < 1year (2010–2017)	FSO	2018/11/19	Individual-time	
Crime registry					
PKS	Registry of criminal charges brought against individuals on a case-by-case basis (2010–2016).	FEDPOL	2020/04/03	COB-Cnt-year	
Employment registry					
ZAS	Registry of social security–relevant income, spell data (2010–2017)	FSO	2021/10/24	COB-Cnt-year	
Migrant health monitoring					
GMM	Official health monitoring focused on health and healthcare utilization of immigrants and refugees.	BAG	2023/09/21	Individual	link
Structural survey					
SE	Individual repeated large-N cross-sections used to measure language usage at home and at work.	FSO	2018/11/19	COB-Cnt-year	
Country of origin data					
Language	Used to classify: German, Spanish, Portuguese, English, French, Italian whether either is an (official) language or main language spoken	CIA World Factbook	2019/06/05	Country	link
Alternative language	Indicator for common (official) language in Switzerland	CEPII	06/03/2020	Dyadic ctry-year	link
Health	Indices for healthy life expectancy at birth; maternal mortality per 10,000; share of proportion births attended by health professionals	UN	2018/10/29	Country	link
Genital mutilation	Share of 0-14- and 15-50-year-old females with genital mutilation	UNICEF	2020/11/09	Country	link
Elevation	Average elevation of the country (used as placebo)	CIA World Factbook	2019/03/09	Country	
Canton data					
Language	Used to classify cantons by language (German, French, Italian, and bilingual) and by main language (German, French, Italian)	FSO	2017/10/30	Canton	link
Health infrastructure	Counts of the number of hospitals, number of neonatology clinics, number of hospitals with > 10 births	BAG	2020/10/28	Canton birth year	link
Elevation	Average elevation of canton (placebo)	FSO	2019/03/19	Canton	

SEM = *State Secretariat for Migration*, FSO = *Federal Statistical Office*, FEDPOL = *Federal Police*,
 BAG = *Federal Health Agency*, CIA = *Central Intelligence Agency*
 CEPII = *Centre d'Etudes Prospectives et d'Informations Internationales*,
 UN = *United Nations*, UNICEF = *United Nations Children's Fund*.

A.2 Refugee data

Here, we briefly present the descriptive statistics of our refugee sample. We describe first the patterns of arrivals over time and then their allocation to cantons relative to the expected shares. Overall, the Swiss administrative data is of high quality. Among the 234,783 entries, there are only 256 identical copies of refugees, of which 31 lack background information (e.g., arrival date) and 37 lack information on the allocation. We drop these but retain all other refugees to assess potential selection concerns. Arrivals have been relatively stable across the years, with a peak in 2015 due to the increased immigration of Syrian refugees, as in many other European countries. The share of female refugees arriving has been relatively constant and close to 30% (Figure A.2.1).

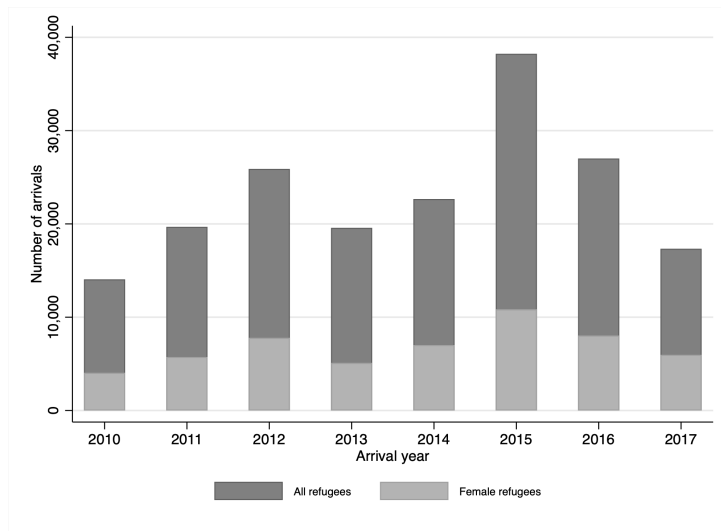


Figure A.2.1: NUMBER OF TOTAL AND FEMALE REFUGEE ARRIVALS ACROSS YEARS

Note: The figure plots total and female arrivals between 2010–2017, based on the first observed system entry. *Source:* ZEMIS 2010–2017.

Next, we compare the allocation of refugees across countries with the expected share based on the population-proportional quotas. Table A.2.1 presents the descriptive statistics of the allocated refugee population by canton. Column 1 shows the official language and column 2 our language coding. The next columns present the allocation quotas per canton set in 1999 and after their revision in 2018 (beyond our sample period). Over the sample period, the average share of allocated refugees matches the official quotas fairly well, not only regarding the mean but also across years, with minor deviations, which are probably due to the small sample sizes (Columns 5–13 should each reflect the target shares in Columns 3 and 4, respectively). In Columns 14–16, we show the share of refugees with a French- or Italian-speaking background (the coding is detailed in Table A.4.1). The country of origin can have French either as an official language or as a spoken language. Both Somalia and Libya have some Italian-speaking populations. As noted above, the share of refugees from countries with French as an official language is slightly higher in French-speaking cantons, but the same is not true for countries in

which French or Italian is a spoken language. The main driver of this higher share is family reunification requests that are part of the allocation regulation. In the main text, we show that conditional on those, allocation is uncorrelated with important observables and well-documented risk factors for infant health. The share of requests for allocation to a specific canton is even tilted to the German-speaking cantons that are, on average, economically more prosperous.

Table A.2.1: Descriptive statistics of all and female refugees by allocation canton

State	State language		Allocation quotas and realizations														Origin language			Age at		Share
	Official	Main	Law, 1999	Law, 2018	Mean	Allocation quotas and realizations								Fre-off	Fre-any	Ita-any	arrival	request				
						(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)						(9)	(10)	(11)	
Panel A: Females																						
AG	Ger	Ger	7.7	7.9	7.4	7.9	7.9	8.0	8.2	7.6	6.6	6.7	6.9	2.8	19.5	0.0	21.0	34.1	4.878			
SG	Ger	Ger	6.0	5.9	6.0	6.4	5.9	5.7	6.3	5.8	6.6	5.2	5.9	2.4	17.6	0.1	20.5	40.4	3.941			
LU	Ger	Ger	4.9	4.8	5.1	4.5	4.9	6.0	4.3	5.4	5.1	5.4	4.4	2.5	19.4	0.0	20.2	38.1	3.354			
SO	Ger	Ger	3.7	3.4	4.1	4.0	3.7	4.4	5.2	4.2	3.4	4.2	3.8	1.3	13.1	0.0	21.2	62.6	2.671			
BL	Ger	Ger	3.5	3.2	3.7	3.6	3.3	4.1	3.5	3.8	3.7	3.8	3.8	3.9	19.7	0.1	20.4	34.3	2.453			
BS	Ger	Ger	2.3	2.3	2.7	3.1	2.9	1.9	2.6	2.7	2.2	3.1	4.3	2.3	17.9	0.0	21.9	72.0	1.804			
TG	Ger	Ger	2.8	3.2	2.4	2.3	2.5	2.4	2.6	2.9	2.0	2.4	2.4	1.5	13.8	0.0	22.2	57.1	1.578			
ZH	Ger	Ger	17.0	17.7	16.2	18.1	16.1	17.3	16.1	15.4	16.2	15.7	14.6	2.8	20.1	0.1	20.6	45.1	10.634			
SZ	Ger	Ger	1.8	1.9	1.9	2.0	1.9	1.6	1.8	1.4	2.2	1.9	1.9	0.5	16.3	0.0	21.3	37.3	1.222			
ZG	Ger	Ger	1.4	1.5	1.2	1.4	1.4	1.3	1.3	1.2	1.3	0.9	1.2	1.2	13.2	0.1	20.8	47.3	820			
SH	Ger	Ger	1.1	1.0	1.1	1.2	1.0	1.0	1.6	1.2	1.2	1.0	1.0	0.9	17.4	0.0	21.9	49.1	746			
AR	Ger	Ger	0.8	0.7	0.7	0.8	0.4	0.6	0.7	0.9	0.4	0.9	0.4	1.4	17.9	0.0	20.8	45.7	442			
GL	Ger	Ger	0.6	0.5	0.5	0.7	0.4	0.5	0.4	0.5	0.7	0.5	0.6	0.3	10.0	0.0	22.0	37.2	349			
UR	Ger	Ger	0.5	0.4	0.4	0.4	0.5	0.4	0.3	0.4	0.6	0.4	0.4	0.0	14.4	0.0	21.7	48.6	292			
OW	Ger	Ger	0.5	0.4	0.4	0.7	0.5	0.3	0.4	0.4	0.4	0.1	0.3	0.4	7.1	0.0	20.5	40.9	252			
NW	Ger	Ger	0.5	0.5	0.4	0.3	0.6	0.3	0.6	0.3	0.4	0.3	0.4	0.0	16.0	0.0	21.2	46.5	256			
AI	Ger	Ger	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.7	17.1	0.1	22.7	39.7	146			
GR	Bil	Ger	2.7	2.3	2.4	2.1	2.1	2.5	2.0	2.7	2.3	2.4	2.8	1.6	16.6	0.0	20.4	34.8	1.571			
BE	Bil	Ger	13.5	12.2	14.3	12.8	14.3	14.5	15.4	15.1	14.8	14.0	12.9	2.9	19.6	0.0	20.7	34.0	9.419			
VD	Fre	Fre	8.8	9.3	8.6	8.3	9.1	8.3	9.1	8.4	7.9	8.8	9.3	7.6	24.2	0.0	20.6	40.7	5.625			
GE	Fre	Fre	5.2	5.8	5.7	6.1	6.1	5.2	5.1	5.4	5.6	6.0	6.5	6.3	19.8	0.1	21.4	42.6	3.760			
NE	Fre	Fre	2.4	2.1	2.2	2.2	2.3	2.3	1.4	2.3	2.0	2.5	2.2	5.8	20.8	0.1	20.8	41.4	1.436			
JU	Fre	Fre	1.0	0.9	0.9	0.7	1.0	1.1	0.9	0.9	0.9	0.8	1.0	3.6	20.2	0.0	20.8	31.7	618			
VS	Bil	Fre	3.9	4.0	5.1	4.0	4.2	3.9	4.4	4.5	6.4	6.8	6.0	5.8	19.1	0.0	21.1	19.6	3.380			
FR	Bil	Fre	3.3	3.7	3.2	2.9	2.9	3.0	2.4	3.5	3.4	3.3	3.7	5.4	20.9	0.0	20.7	36.7	2.087			
TI	Ita	Ita	3.9	4.2	3.0	3.3	3.2	3.0	3.5	3.1	2.8	2.9	2.8	2.9	19.1	0.0	21.2	38.7	1.999			
Panel B: All refugees																						
AG	Ger	Ger	7.7	7.9	7.8	7.9	7.5	7.9	8.2	7.6	8.0	7.6	7.6	5.8	25.7	0.0	22.1	19.3	14.382			
SG	Ger	Ger	6.0	5.9	5.9	6.0	6.1	5.9	6.1	6.0	5.9	5.6	5.8	5.6	25.7	0.0	21.8	23.4	10.887			
LU	Ger	Ger	4.9	4.8	5.2	4.8	5.0	4.9	4.5	5.8	5.6	5.4	5.0	5.2	25.4	0.0	21.4	23.2	9.594			
SO	Ger	Ger	3.5	3.2	3.8	3.4	3.3	3.7	4.1	4.0	3.9	3.9	3.8	6.1	25.6	0.0	21.8	20.0	7.014			
BL	Ger	Ger	3.7	3.4	3.7	3.9	3.9	4.1	3.7	3.4	4.0	3.1	3.8	18.3	0.0	21.8	52.0	6.876				
TG	Ger	Ger	2.8	3.2	2.8	3.2	3.0	2.6	3.2	2.9	2.0	2.8	3.5	4.4	21.9	0.0	23.3	51.4	5.100			
BS	Ger	Ger	2.3	2.3	2.7	3.0	2.6	2.0	2.3	2.2	1.8	3.6	5.1	4.1	24.0	0.0	23.1	69.4	4.940			
ZH	Ger	Ger	17.0	17.7	16.1	17.0	16.3	17.2	14.5	15.1	16.1	16.2	17.1	5.4	27.3	0.0	21.9	35.5	29.784			
SZ	Ger	Ger	1.8	1.9	1.9	1.8	1.9	1.9	2.1	2.0	2.1	1.8	1.8	3.9	25.2	0.0	22.6	20.7	3.573			
ZG	Ger	Ger	1.4	1.5	1.3	1.3	1.5	1.5	1.5	1.4	1.2	1.0	1.0	4.0	24.8	0.1	22.3	25.2	2.370			
SH	Ger	Ger	1.1	1.0	1.2	1.1	1.2	1.2	1.4	1.2	1.2	1.1	1.1	3.7	26.0	0.0	22.4	25.8	2.217			
AR	Ger	Ger	0.8	0.7	0.8	0.7	0.8	0.8	0.9	0.8	0.9	0.5	0.9	1.7	23.4	0.0	22.4	22.3	1.479			
GL	Ger	Ger	0.6	0.5	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.4	20.0	0.0	23.4	17.8	1.093			
NW	Ger	Ger	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.1	23.0	0.1	23.3	18.8	922			
UR	Ger	Ger	0.5	0.4	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.7	18.9	0.1	22.8	27.2	896			
OW	Ger	Ger	0.5	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.1	0.1	0.6	18.6	0.0	22.4	27.9	649			
AI	Ger	Ger	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	17.4	0.1	22.6	20.3	380			
GR	Bil	Ger	2.7	2.3	2.8	2.7	2.6	2.8	2.7	2.9	3.0	2.8	3.0	5.3	24.7	0.0	22.4	24.0	5.221			
BE	Bil	Ger	13.5	12.2	14.1	13.5	13.5	13.5	14.8	14.8	14.7	14.2	13.2	6.5	25.7	0.0	21.8	23.0	26.074			
VD	Fre	Fre	8.8	9.3	8.2	8.4	8.5	8.3	8.5	8.1	8.1	8.0	8.0	10.7	27.7	0.0	22.0	26.0	15.149			
GE	Fre	Fre	5.2	5.8	5.6	5.9	5.8	5.4	5.6	5.2	5.7	5.9	5.2	9.8	25.8	0.0	22.4	26.5	10.289			
NE	Fre	Fre	2.4	2.1	2.2	2.2	2.5	2.4	1.7	2.4	2.2	2.3	1.8	9.5	27.0	0.0	22.1	24.6	4.078			
JU	Fre	Fre	1.0	0.9	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.1	1.0	10.2	28.2	0.0	23.3	16.3	1.993			
VS	Bil	Fre	3.9	4.0	4.0	3.6	3.9	3.7	3.8	4.0	4.3	4.1	4.0	8.6	24.0	0.0	21.2	17.0	7.321			
FR	Bil	Fre	3.3	3.7	3.4	3.1	3.2	3.4	3.0	3.4	3.7	3.5	3.5	8.5	26.6	0.0	22.0	20.3	6.257			
TI	Ita	Ita	3.9	4.2	3.2	3.5	3.4	3.7	3.9	3.2	2.9	2.7	2.8	6.3	30.5	0.0	22.8	32.7	5.917			

Request for allocation to a specific canton

The allocation officers do not know or meet the refugees in person. Requests made by refugees and other allocation-relevant notes are entered by the caseworkers in the free text field of the case file and transmitted to the SEM’s central allocation office. We observe all information that is provided to the allocation officer in the free-text fields.

We tested whether some allocation officers are more likely to send refugees to matching language regions, which is not the case in our data, as shown in Figure 3 (for more details on allocation data and refugee allocation, see also [Auer, 2018](#); [Hangartner and Schmid, 2021](#)).

For reasons of confidentiality and (personal) security, the SEM does not allow access to the *request* file in combination with individual background characteristics or any of our outcome variables of the refugees. Instead, the SEM provided us with the requested canton, free-text entries, and a pseudo identifier. We categorized the free-text entries into topics on the basis of a limited set of indicator variables. The SEM then merged these identifiers back to the main data, including the exact arrival time and identifiers to relate the refugee allocation to births and birth outcomes (see Section [A.6](#)).

There are roughly 240,000 free texts in the case files of all refugees.¹ To make this data usable, we first extracted topics and features using the Latent Dirichlet Allocation [LDA] developed by [Blei et al. \(2003\)](#). We run this algorithm over all entries—independent of refugees’ requests for allocation to a specific canton (which are not part of the estimation in this step) or eventual allocation.

Figure [A.2.2](#) plots the different categories of allocation requests from refugees for each canton. In AI, AR, NW, and UR, all of which are less populated cantons, the main 30 topics selected algorithmically from the requests are distributed slightly differently. Overall, however, the main 30 topics extracted from the requests are relatively balanced across all 26 cantons.

Based on the most common features found in the LDA analysis, such as “brother”, “medical”, or “police”, we defined indicator variables of whether any of these features were stated. We used all indicators (for the 349 features) in a regression tree analysis to validate the predictive power of the features extracted. As an outcome, we defined an indicator of whether a specific canton was requested, e.g., French-speaking ($y_i = 1$) or Italian-speaking canton, separately.²

To validate the most important features, we run regression trees and Random Forest

¹The higher sample size of the free-text requests compared to the refugee sample results from the fact that it includes all refugees who arrived between 2008 to 2018 and that we do not observe outcome data for those who arrived between 2008–2010. It is not possible to distinguish this group in the free-text files, thus resulting in a higher sample size.

²Note that we did not use the actual allocation decision in this part of data extraction, which was not provided to us. If allocation to a specific canton was not requested in the dedicated column but described in the free text, we extracted those as well and included them in the definition of the corresponding indicator.

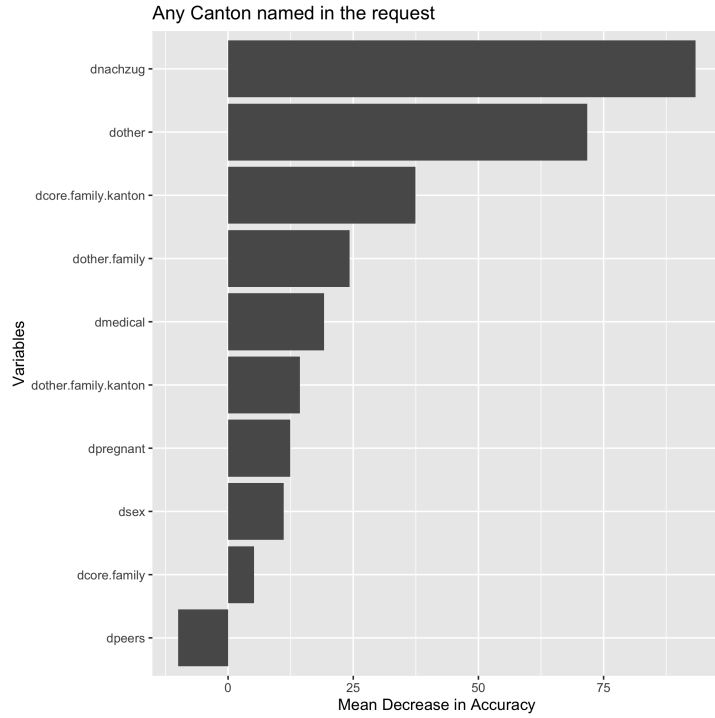


Figure A.2.3: LDA TOPIC DISTRIBUTION ACROSS CANTONS

Note: The figure plots the mean decrease in accuracy of dropping the indicated variable. The results are based on 1,000 regression trees, trained on a sample of 50,000 refugees and tested on the remaining refugees. *Source:* SEM asylum seekers' free-text requests, 2008–2017.

Requests for medical and and pregnancy reasons

In principle, pregnancy is not a reason for suspending random allocation. One possible exception is if the pregnant mother requires special medical treatment (possibly related to the pregnancy). We observe all the reasons put forward by the caseworkers for lifting the random allocation. 11.9% of the entries state pregnancy, approximately 4.3% state a medical condition, and 1.2% mention a critical medical condition and pregnancy. Only the match effect of those arriving pregnant could partly be driven by such a suspension. Given that the effects are similar for mothers who arrived pregnant (in the first trimester) and who conceived after arrival in Switzerland (c.f. Figure 5), suspended random allocation due to medical issues and pregnancy is unlikely to bias our findings, even without controlling for reasons in the main regressions.

To assess this in more detail, we tested whether the probability of a language match is correlated with stating pregnancy, medical condition, and their intersection. The unconditional correlations are 0.002 (p-value 0.744) for pregnancy, 0.054 (p-value 0.000) for critical medical condition—a valid reason—and 0.0365 (p-value 0.100) for medical condition and pregnancy. In Table A.2.2 Panel B, we condition on the origin and arrival time fixed effects. The correlations reduce further to -0.001 (p-value 0.868), 0.028 (p-value 0.007), and 0.021 (p-value 0.276), respectively. Thus, we conclude that pregnancy is neither a valid nor an empirically useful reason to predict allocation.

In Panel A, we also show that our conclusions remain valid when considering the subset of those not making allocation requests, first by subsamples and second by including the interaction of the request with the match indicator across the three types of requests.

Table A.2.2: REQUESTS FOR MEDICAL AND PREGNANCY REASONS

	Request: Pregnancy Subsample	Interaction	Request: Medical Subsample	Interaction	Request: Pregnancy & Medical Subsample	Interaction
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A.</i> Language match effect on weight by gestation						
Match	0.141 (0.074)	0.220 (0.067)	0.189 (0.072)	0.211 (0.068)	0.209 (0.071)	0.233 (0.070)
Match $\times$ 1(Pregnant)		0.009 (0.149)				
Match $\times$ 1(Medical)				0.138 (0.217)		
Match $\times$ 1(Pregnant & Medical)						-0.722 (0.334)
<i>Panel B.</i> Effect of request on language match						
Request	-0.001 (0.006)		0.028 (0.010)		0.021 (0.019)	
<i>N</i>	6,769	7,683	7,353	7,683	7,588	7,683
Share	11.9%		4.3%			1.2%
Canton FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Place year & month FE	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓

Notes: The table presents the coefficient estimates of the main model and the weight by gestation outcome. Standard errors are clustered at the canton level in Panel A. The three request indicators are pregnancy, medical condition, or both. Each first column uses the subset of mothers who made such a request, while the second columns use the language match–request interaction on the full sample. Panel B shows the analogous correlations of the match indicator and the mentioned request. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

A.3 Cantonal data

Languages of the resident population

Figure A.3.1 provides evidence of Switzerland’s exceptionally sharp language borders using micro census data on approximately 2.3 million individuals between 2010 and 2017. We define a binary indicator for spoken language (German, French, Italian) that takes the value 1 if the language is either the respondent’s main language or is regularly spoken by the respondent at home or work. Note that most Swiss learn a second Swiss language at school, which presumably enables them to hold basic conversations in this language. Accordingly, the share of residents in a monolingual canton who are proficient in another Swiss language (e.g., French speakers in the German-speaking region) is always below 10 percent. These patterns hold for the resident population and the health personnel (incl. doctors). In combination with the lack of systematic interpreter services in the Swiss health sector (e.g., [Ikhilior et al., 2017](#)), it is therefore reasonable to assume that French- or Italian-speaking refugees do not have access to similarly proficient professionals in another linguistic region.

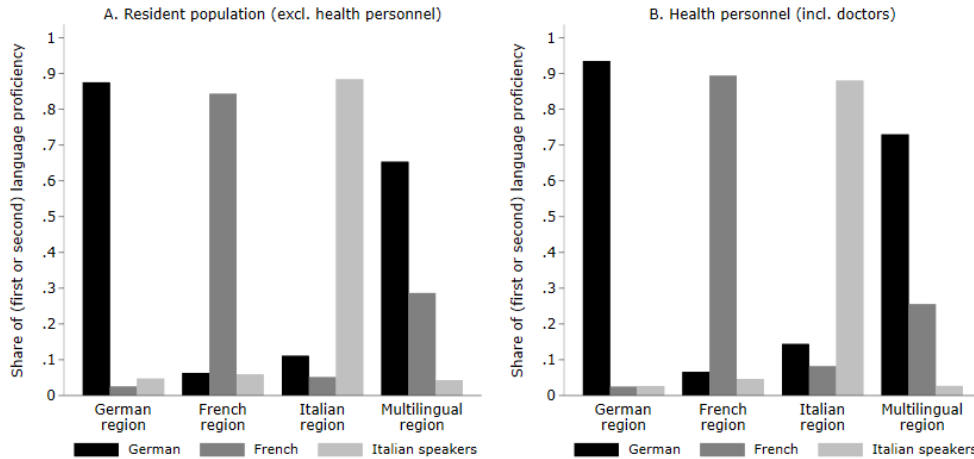


Figure A.3.1: LANGUAGE SHARES BY LANGUAGE REGIONS

Note: The figure shows the share of residents (Panel A) and health sector professionals (Panel B) speaking German, French, or Italian as their first or second language across the Swiss language regions. *Source:* Swiss micro census 2010–2017, own representation.

Table A.3.1 presents descriptive statistics for the 26 cantons. It displays the language classification by official language and—for the bilingual cantons—the language spoken by the majority of their residents. Next, we report the number of people residing in the canton based on the 2010 Census (the last census before our sample period), the average (overall) unemployment rate, which is substantially lower in German-speaking cantons, and the average age, which is relatively balanced. The table also presents selected health system characteristics, such as the number of hospitals and the number of neonatal intensive care units (NICU) in 2010. Furthermore, the table depicts the average values of

the yearly number of births in the cantons, the hospital beds per resident, the C-section rate, and the local infant mortality rate.

Table A.3.1: Descriptive statistics of cantons

Canton		Language		Population in 2010	Average 2010		2010 Number of		Average 2010–2017			
Name	ISO	Official	Main		Unempl.	Age	Hospitals	NICUs	# births	Hospital beds pp	C-rate	IMR
Zurich	ZH	German		1,383,940	3.6	41.1	50	3	16,318.8	3.2	36.2	4.2
Bern	BE	Bilingual	German	986,643	2.7	42.7	39	1	9,751.0	3.1	33.3	3.9
Luzern	LU	German		379,878	2.4	40.5	8	1	4,136.8	2.6	33.0	3.2
Uri	UR	German		35,742	1.3	41.8	1	0	332.8	2.0	31.0	4.4
Schwyz	SZ	German		147,822	2.0	40.6	4	0	1,528.1	1.8	33.5	5.0
Obwalden	OW	German		35,983	1.3	40.5	1	0	372.0	1.5	26.2	2.7
Nidwalden	NW	German		41,248	1.5	41.8	2	1	384.3	1.9	32.2	3.0
Glarus	GL	German		39,164	2.4	42.0	1	0	376.5	2.4	37.3	5.6
Zug	ZG	German		114,315	2.4	40.9	5	0	1,267.4	1.9	40.8	3.1
Freiburg	FR	Bilingual	French	280,443	2.6	39.1	6	1	3,277.5	2.0	30.2	2.7
Solothurn	SO	German		256,802	3.5	42.3	3	0	2,437.5	2.0	36.9	4.1
Basel-Stadt	BS	German		187,803	4.2	44.0	13	1	1,959.9	6.4	32.6	4.0
Basel-Landschaft	BL	German		275,750	3.3	43.1	16	3	2,520.0	2.7	35.8	5.0
Schaffhausen	SH	German		77,041	3.0	43.1	2	0	724.9	2.5	37.5	3.2
Appenzell AR	AR	German		53,194	1.9	42.0	8	0	538.0	4.3	28.5	5.9
Appenzell IR	AI	German		15,729	1.0	40.3	2	0	175.0	1.5	28.9	9.1
St. Gallen	SG	German		481,490	3.0	40.5	16	2	5,114.1	3.2	33.2	3.7
Graubunden	GR	Bilingual	German	201,189	1.6	42.4	17	0	1,725.5	3.4	31.2	4.0
Aargau	AG	German		614,524	3.1	40.8	22	2	6,566.9	2.3	34.3	4.1
Thurgau	TG	German		250,536	2.9	40.6	13	0	2,596.8	2.2	30.2	3.8
Tessin	TI	Italian		336,000	4.7	43.8	14	0	2,878.5	4.1	33.0	3.0
Vaud	VD	French		720,767	5.0	40.1	30	4	8,344.4	2.9	31.9	3.8
Wallis	VS	Bilingual	French	320,380	3.7	41.3	7	0	3,171.0	2.4	26.8	3.7
Neuenburg	NE	French		173,011	6.2	41.3	5	0	1,770.1	2.2	27.0	3.8
Genf	GE	French		461,281	6.6	40.3	11	0	5,207.1	3.0	31.7	2.7
Jura	JU	French		70,294	5.1	41.5	4	1	679.5	2.2	20.7	2.2

Source: Official data on employment is provided by the Federal Employment Agency, population information comes from the Federal Statistical Office, and hospital data comes from the Federal Department of Health.

Source: Official data on employment is provided by the Federal Employment Agency, population information comes from the Federal Statistical Office, and hospital data comes from the Federal Department of Health.

A.4 Country of origin information

Figure A.4.1 Panel A shows the sample distribution of our main sample of refugee mothers by country of origin (darker fill color indicates larger shares). Panel B shows the corresponding effective samples based on regression weights (Aronow and Samii, 2016).

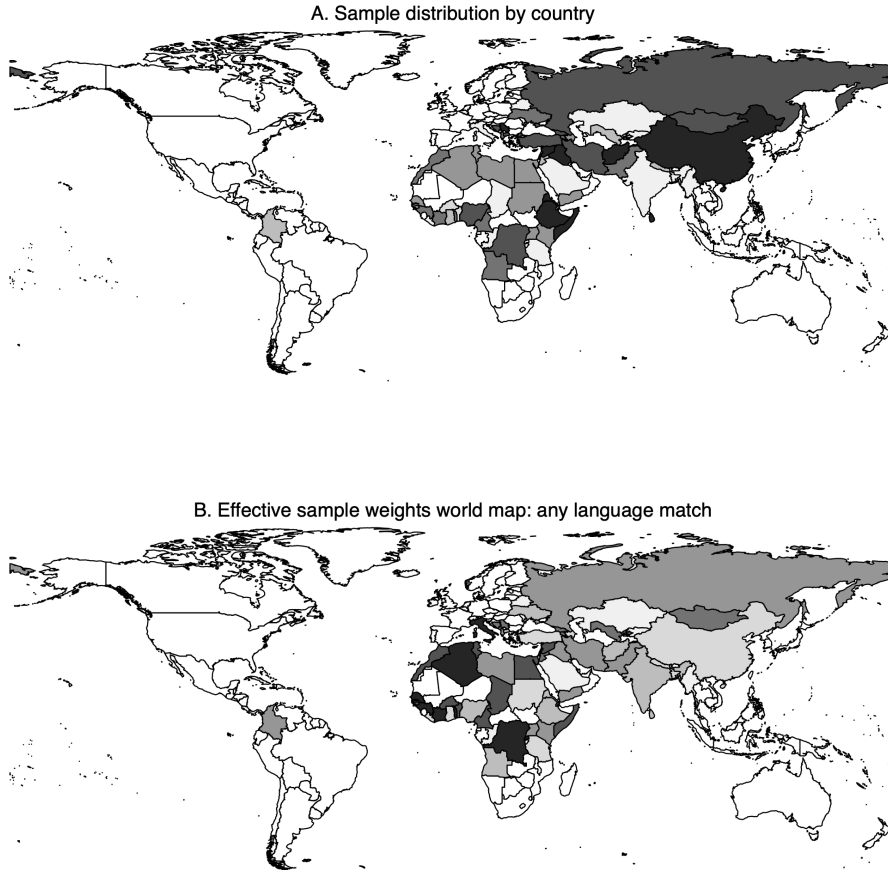


Figure A.4.1: REFUGEES’ COUNTRIES OF ORIGIN AND EFFECTIVE WEIGHTS

Note: The figure displays the overall sample distribution of countries in A. with effective regression weights based on the main model in B. Darker shades indicate higher shares and weights. See Appendix Table A.6.1 for their construction. *Source:* BEVNAT 2010–2017, ZEMIS 2010–2017, CIA 2018, own calculations.

Next, we describe the details of our language classification. Our main data source is the CIA World Factbook. Example classifications are:

- For Benin, the CIA lists: “*French (official), Fon and Yoruba (most common vernaculars in south), tribal languages (at least six major ones in north)*”. Accordingly, our classification defines Benin as *French spoken* = 1 and *official French* = 1.
- For Algeria, the CIA lists: “*Arabic (official), French (lingua franca), Berber or Tamazight (official); dialects include Kabyle Berber (Taqbaylit), Shawiya Berber (Tacawit), Mzab Berber, Tuareg Berber (Tamahaq)*”, which is *French spoken* = 1.

- For Libya, the CIA lists: “*Arabic (official), Italian, English (all widely understood in the major cities); Berber (Nafusi, Ghadamis, Suknah, Awjilah, Tamasheq)*”, in our classification defined as *Italian spoken* = 1.

In the text, we also compare the list of French- or Italian-speaking countries with CEPII’s dyadic country-level data (c.f. [Mayer and Zignago, 2011](#)).

Table A.4.1 summarizes our classifications of refugee countries’ language exposure and shows the sample shares and birth outcomes in Switzerland. For reasons of privacy protection, we only report information for countries with more than 10 observations.

Table A.4.1: COUNTRY OF ORIGIN INFORMATION

Country	Main language	Language exposure			<i>N</i>	weight	Birth outcomes		
		French	French, official	Italian			logweight	gestation	IUGR
Cameroon	FRENCH	1	1	0	26	3363.1	8.11	277.6	12.07
Congo(Kinshasa)	FRENCH	1	1	0	113	3228.3	8.06	274.4	11.72
Côte d’Ivoire	FRENCH	1	1	0	16	3248.8	8.05	275.3	11.7
Guinea	FRENCH	1	1	0	15	2995.0	7.99	276.3	10.83
Togo	FRENCH	1	1	0	18	3336.7	8.10	277.2	12.03
Egypt	ARABIC	1	0	0	11	3265.0	8.09	275.6	11.85
Morocco	ARABIC	1	0	0	18	3315.8	8.09	278.4	11.87
Syria	ARABIC	1	0	0	1,061	3274.9	8.08	275.5	11.86
Tunisia	ARABIC	1	0	0	14	3187.5	8.02	272.4	11.55
Libya	ARABIC	0	0	1	14	3519.3	8.16	277.4	12.68
Somalia	SOMALIAN	0	0	1	351	3269.7	8.08	280.3	11.63
Afghanistan	DARI, PASHTO	0	0	0	502	3372.3	8.11	276.5	12.18
Albania	ALBANIAN	0	0	0	22	3490.2	8.14	279.1	12.48
Angola	PORTUGUESE	0	0	0	25	3190.2	8.05	274.0	11.59
Armenia	ARMENIAN	0	0	0	26	3323.1	8.10	279.2	11.89
Azerbaijan	AZERBAIJANI	0	0	0	12	3377.5	8.11	279.3	12.07
Bosnia and Herzegovina	BOSNIAN	0	0	0	44	3358.3	8.11	278.0	12.06
China	MANDARIN	0	0	0	290	3469.9	8.13	278.3	12.42
Eritrea	TIGRINAYA	0	0	0	3,200	3340.0	8.10	279.3	11.93
Ethiopia	AMHARIC	0	0	0	271	3352.5	8.10	279.2	11.98
Georgia	GEORGIAN	0	0	0	31	3304.3	8.09	276.4	11.94
Iran	PERSIAN	0	0	0	98	3285.0	8.08	274.1	11.96
Iraq	ARABIC	0	0	0	249	3284.7	8.09	276.1	11.88
Kenya	ENGLISH	0	0	0	11	3358.6	8.11	278.8	12.07
Macedonia	MACEDONIAN	0	0	0	47	3096.0	8.03	274.6	11.26
Mongolia	MONGOLIAN	0	0	0	30	3439.0	8.12	275.7	12.40
Nigeria	ENGLISH	0	0	0	95	3265.9	8.08	275.9	11.80
Pakistan	PUNJABI	0	0	0	16	2817.5	7.90	263.3	10.53
Russia	RUSSIAN	0	0	0	61	3454.8	8.14	278.7	12.39
Serbia and Montenegro	SERBIAN	0	0	0	187	3261.6	8.08	276.4	11.78
Sri Lanka	TAMIL	0	0	0	300	3150.1	8.04	274.4	11.45
Sudan	ARABIC	0	0	0	11	3415.0	8.12	276.6	12.33
Turkey	TURKISH	0	0	0	174	3287.9	8.09	275.8	11.91
Ukraine	UKRANIAN	0	0	0	21	3466.9	8.14	276.0	12.50
Yemen	ARABIC	0	0	0	14	3052.1	8.01	270.0	11.25
Stateless/NA		0	0	0	130	3364.3	8.11	279.6	12.03
Other ^a		.25	.21	.02	159	3183.0	8.05	275.1	11.53

Note: Other^a include: French: Benin, Burkina Faso, Burundi, Chad, Congo (Brazzaville), Djibouti, Equatorial Guinea, Haiti, Niger, Rwanda, Senegal, Algeria, Lebanon; Italian: Italy; Other: Bangladesh, Belarus, Bulgaria, Cabo Verde, Colombia, Croatia, Cuba, Czechia, Gambia, Ghana, Guinea-Bissau, Hungary, India, Israel, Jordan, Kazakhstan, Kyrgyzstan, Liberia, Moldova, Montenegro, Myanmar, Nepal, Netherlands, Nicaragua, Norway, Palestine, Portugal, Romania, Saudi Arabia, South Africa, Spain, Tajikistan, Tanzania, Turkmenistan, Uganda, Uzbekistan, Venezuela, Zimbabwe, which can not be shown separately as $N \leq 10$. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

A.5 Match information

Table A.5.1 combines the information provided in Tables A.3.1 and A.4.1 and indicates for each canton whether its official language matches the language of the refugees from the various countries of origin. The quasi-experimental design is further discussed in Appendix Section B.

Table A.5.1: LANGUAGE MATCH DEFINITION BY COUNTRY OF ORIGIN

Country	Main	French	French	Italian	Language Match	
	language	main	official	main	yes	no
Benin	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
BurkinaFaso	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Cameroon	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Congo(Kinshasa)	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Côte d'Ivoire	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Djibouti	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Guinea	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Senegal	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Togo	FRENCH	1	1	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Algeria	ARABIC	1	0	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Egypt	ARABIC	1	0	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Lebanon	ARABIC	1	0	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Morocco	ARABIC	1	0	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Syria	ARABIC	1	0	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Tunisia	ARABIC	1	0	0	VD, GE, NE, JU, <i>VS, FR</i>	TI, all German
Libya	ARABIC	0	0	1	TI	all French, all German
Somalia	SOMALIAN	0	0	1	TI	all French, all German
Afghanistan	DARI, PASHTO	0	0	0	None	None
Albania	ALBANIAN	0	0	0	None	None
Angola	PORTUGUESE	0	0	0	None	None
Armenia	ARMENIAN	0	0	0	None	None
Azerbaijan	AZERBAIJANI	0	0	0	None	None
Bosnia and Herzegovina	BOSNIAN	0	0	0	None	None
China	MANDARIN	0	0	0	None	None
Colombia	SPANISH	0	0	0	None	None
Croatia	CROATIAN	0	0	0	None	None
Eritrea	TIGRINAYA	0	0	0	None	None
Ethiopia	AMHARIC	0	0	0	None	None
Georgia	GEORGIAN	0	0	0	None	None
Ghana	ASANTE	0	0	0	None	None
Guinea-Bissau	CRILOLO	0	0	0	None	None
Iran	PERSIAN	0	0	0	None	None
Iraq	ARABIC	0	0	0	None	None
Jordan	ARABIC	0	0	0	None	None
Kenya	ENGLISH	0	0	0	None	None
Macedonia	MACEDONIAN	0	0	0	None	None
Mongolia	MONGOLIAN	0	0	0	None	None
Montenegro	MONTENEGRIN	0	0	0	None	None
Nepal	NEPALI	0	0	0	None	None
Nigeria	ENGLISH	0	0	0	None	None
Pakistan	PUNJABI	0	0	0	None	None
Russia	RUSSIAN	0	0	0	None	None
Serbia and Montenegro	SERBIAN	0	0	0	None	None
Sri Lanka	TAMIL	0	0	0	None	None
Sudan	ARABIC	0	0	0	None	None
Turkey	TURKISH	0	0	0	None	None
Uganda	ENGLISH	0	0	0	None	None
Ukraine	UKRANIAN	0	0	0	None	None
Uzbekistan	UZBEK	0	0	0	None	None
Yemen	ARABIC	0	0	0	None	None
Stateless/NA		0	0	0	None	None

Notes: Cantons with German as official/dominant language: AG, SG, LU, BL, SO, BS, TG, ZH, SZ, ZG, SH, AR, GL, UR, OW, NW, AI, *GR, BE*. Cantons with French as official/dominant language: VD, GE, NE, JU, *VS, FR*. Canton with Italian as the official language: TI. Italics denote bilingual cantons. Only origins are shown for more than 3 observations.

A.6 Birth and vital statistics data

Based on the individual identifiers (social security number), we link the mother identifier in the birth registry to the foreign registry. Note that the birth registry covers all birth events in Switzerland, including native and other immigrant mothers, which we use for a number of comparisons and robustness checks. Again, the data is of high quality; there are only 28 exact duplicates. We exclude the following birth events of the total of 10,798 births of refugee women from our main analyses, following [Chen et al. \(2016\)](#): 2,926 higher-order births, 105 twin births, 61 stillbirths (which we assess separately), 12 births that were too light (< 500 grams), and 6 that were too young (< 153 days).

Table A.6.1: DESCRIPTIVES OF MOTHER AND BIRTH CHARACTERISTICS

	Natives	Immigrants/ former ref.	Refugees All	Refugees Main sample	Effective weights sample match	Effective weights sample French off	Effective weights sample No request
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel a. Mother and birth characteristics</i>							
Mother age at birth	31.730 (0.009)	31.159 (0.012)	27.780 (0.063)	27.351 (0.063)	27.388 (0.067)	28.293 (0.070)	27.844 (0.098)
Number of previous children	0.746 (0.002)	0.651 (0.002)	0.671 (0.010)	0.403 (0.010)	0.408 (0.010)	0.227 (0.008)	0.460 (0.016)
Married at birth (Yes/No)	0.770 (0.001)	0.792 (0.001)	0.441 (0.006)	0.401 (0.006)	0.492 (0.006)	0.171 (0.004)	0.358 (0.008)
Month married at birth ^b	46.523 (0.082)	55.051 (0.104)	70.163 (0.947)	69.403 (1.039)	67.135 (1.016)	47.688 (0.899)	78.534 (2.004)
Number of children at birth (i.e., twins)	1.039 (0.000)	1.039 (0.001)	1.026 (0.002)	-	-	-	-
Child is a girl (Yes/No)	0.486 (0.001)	0.487 (0.001)	0.485 (0.005)	0.482 (0.006)	0.485 (0.006)	0.514 (0.006)	0.454 (0.008)
<i>Panel b. Outcome variables</i>							
Birth weight in grams	3806.404 (3.580)	3970.250 (4.781)	3306.745 (6.356)	3315.645 (5.749)	3276.880 (5.740)	3278.042 (6.059)	3296.006 (7.829)
Log birth weight	8.164 (0.001)	8.192 (0.001)	8.083 (0.002)	8.093 (0.002)	8.081 (0.002)	8.079 (0.002)	8.089 (0.003)
Days of gestation	274.547 (0.027)	274.277 (0.034)	276.475 (0.162)	277.697 (0.140)	275.867 (0.140)	275.831 (0.144)	276.277 (0.193)
Weight by gestation	11.884 (0.003)	11.936 (0.004)	11.893 (0.020)	11.911 (0.019)	11.848 (0.018)	11.852 (0.020)	11.905 (0.025)
LBW $\times 100$	6.459 (0.042)	6.185 (0.050)	6.010 (0.252)	4.621 (0.240)	4.931 (0.247)	4.868 (0.250)	4.377 (0.342)
Rate of stillbirth in 1,000	4.239 (0.110)	4.971 (0.147)	5.649 (0.819)	-	-	-	-
1-year IMR	3.314 (0.091)	3.836 (0.121)	5.309 (0.746)	3.384 (0.663)	5.233 (0.824)	0.264 (0.189)	4.612 (1.134)
N	450,604	299,961	10,798	7,683	7,674	7,418	3,573
N ^b	346,848	237,442	4,765	3,078	3,076	2,917	838

Notes: The table presents means and standard errors (clustered if multiple observations by mother, cols 1–3) across samples of mothers: natives, immigrants, and former refugees (indistinguishable in our data due to identical residence permits), refugees arriving in 2010–2017, and our core sample refugees. *IMR* refers to the rate of one-year mortality in a 1,000. Columns 5 and 6 are weighted means and show our effective sample, following [Aronow and Samii \(2016\)](#). In the last column, we run the effective weighting for the no request sample. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

In Figure 4 in the main text, we show that neither correlates with either match

indicator. 5 events had missing key variables, such as birth weight or gestation, which we also excluded, and 138 mothers were stateless or had no nationality information, which we included in the control group but dropped in a robustness test due to the ambiguity of the potential language exposure. Next, we describe sample properties of the refugee mother population relative to the Swiss mother and immigrant mother populations.

In Table A.6.1 we show selected descriptive statistics of our sample by origin groups: natives, immigrants, refugees (all births), refugees (first birth and minor sample restrictions), refugees who are allocated to a familiar language environment, those who originate from a country where French is the official language, and refugees who have no request/reason for suspending random allocation in the case file. The Swiss and immigrant mothers in our sample are, on average, older than our refugee mothers. The average age of refugee mothers is 27 years (unrestricted sample including multiple births and main sample). Refugee mothers have fewer children overall and fewer previous children, which is probably due to the relatively short period in which we observe refugee mothers since we mainly look at the first births in Switzerland. Refugee mothers are more often married than natives or immigrants, possibly due to the higher marriage rates in the refugees' origin countries, where marriages as a source of insurance are more common than in Western societies. On the other hand, the twinning rate is very similar, and so is the lack of any missing females, which is prevalent in many origin countries.

The birth weight in grams of children born to refugee women is substantially lower than for children born to Swiss mothers (3,300 vs. 3,806, Panel B). Non-refugee immigrants have the highest average birth weight (3,970 grams). Figure A.6.1 shows a consistent pattern of best health at birth in the German-speaking region for all three groups: natives, immigrants, and refugees without language correspondence in Switzerland. It is thus important to account for place effects in our design.

The average log birth weight of refugees is relatively similar to that of the main population (Table A.6.1), although they have one stillbirth per 1,000 births more than natives and immigrants and the first-year infant mortality rate is 1.5 deaths higher. Note that these figures correspond to very few observations for the refugee sample, so statistical uncertainty is high.

In Columns 5, 6, and 7 of Table A.6.1, we present the implied samples based on the effective weighting approach by Aronow and Samii (2016). We use our main regression specification and regress either match indicator on the full set of controls and fixed effects, square the residual from these regressions, and weigh the means by those. The results show that the regressions using only the refugee mothers from countries with French as the official language are less representative of the overall refugee population. There are trade-offs between internal and external validity. Refugees from origin countries in which French is the official language arguably constitute the cleanest treatment group. At the same time, they are less representative and more “negatively selected”.

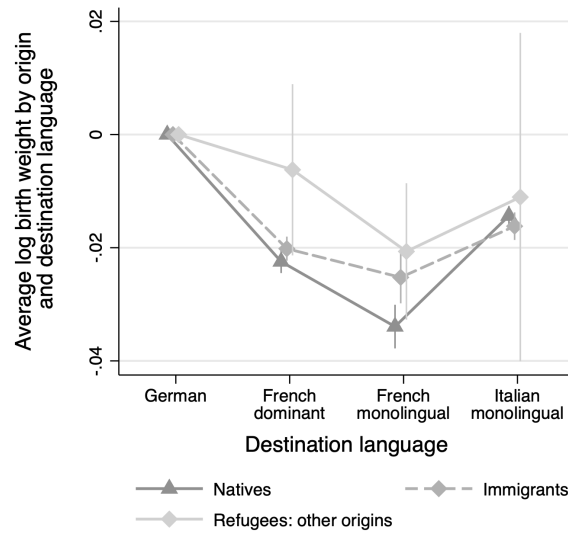


Figure A.6.1: AVERAGE LOG BIRTH WEIGHT DIFFERENCES BETWEEN SWISS LANGUAGE REGIONS BY POPULATION GROUPS

Note: The figure presents the mean log birth weight of different groups of natives and immigrants, standardized within the country of origin using the German-speaking region as a baseline: native mothers, non- or former-refugee immigrants, and refugee mothers from countries whose language is not prevalent in Switzerland. *Source:* BEVNAT 2010–2017, ZEMIS 2010–2017, CIA 2018, own calculations.

Table A.6.2 shows the descriptive statistics, separately for the treatment group and the control groups in match and no match regions, respectively. Column (5) tests their differences (as in Figure 3).

Table A.6.2: DESCRIPTIVE STATISTICS OF MOTHER AND BIRTH CHARACTERISTICS BY TREATMENT STATUS

	Control group, region: German		Match group, region: Control		Δ
	(1)	(2)	(3)	(4)	(5)
<i>Panel a. Mother and birth characteristics</i>					
Mother age at birth	27.549 (0.083)	27.446 (0.137)	26.551 (0.156)	27.505 (0.320)	-0.243 (0.498)
Number previous children (prior to arrival)	0.388 (0.013)	0.289 (0.018)	0.595 (0.030)	0.381 (0.046)	-0.082 (0.063)
Married at birth (Yes/No)	0.369 (0.007)	0.332 (0.012)	0.559 (0.014)	0.500 (0.026)	-0.037 (0.022)
Month married at birth ^a	26.265 (0.747)	22.902 (1.169)	37.210 (1.457)	33.262 (2.672)	-1.309 (3.688)
Child is a girl (Yes/No)	0.479 (0.008)	0.483 (0.012)	0.490 (0.014)	0.481 (0.026)	-0.015 (0.029)
<i>Panel b. Outcome variables</i>					
Birth weight in grams	3342.739 (7.670)	3288.533 (12.509)	3273.040 (13.484)	3270.257 (25.979)	59.023 (20.417)
Log birth weight	8.101 (0.003)	8.085 (0.004)	8.079 (0.005)	8.079 (0.009)	0.019 (0.007)
Days of gestation	278.392 (0.187)	277.113 (0.292)	276.849 (0.351)	275.162 (0.612)	0.425 (0.562)
Weight by gestation	11.979 (0.025)	11.841 (0.041)	11.792 (0.044)	11.856 (0.084)	0.193 (0.068)
LBW $\times$ 100	4.160 (0.303)	5.802 (0.581)	4.844 (0.586)	4.054 (1.027)	-2.790 (1.510)
1-year IMR	2.068 (0.689)	3.704 (1.510)	6.706 (2.229)	5.405 (3.817)	-1.287 (4.449)
N ^a	4,351	1,620	1,342	370	7,683

Notes: The table presents means and standard errors across samples of mothers grouped by treatment status, i.e., Column (1) comprises refugees without language correspondence in Switzerland in the German-speaking region and (2) in potential match regions (French/Italian). Columns (3) and (4) show the same for those that have a language match in Switzerland, first in the no match region, i.e., Italian- or French-heritage refugees in the German-speaking region, and (4) those in a familiar language region. Column (5) tests for the difference in means (including allocation but not birth fixed effects). The month married at birth is only defined for those married (the group-specific observations are 1,605, 538, 750, and 185). *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

A.7 Network measures

In Figure A.7.1, we plot the distribution of the five network measures that we use in Figure 7 in the main text. Panel A shows all immigrant mothers; this includes (potentially) earlier refugees and immigrant mothers from the same origin allocated in the same canton who gave birth before the respective refugee mother-to-be (excluding anyone from their arrival family, which we define as arrived together, handled by the same caseworker, coming from the same origin, allocated to the same canton, and allocated on the same day). Panel B uses the same sample but is restricted to immigrant mothers who gave birth in the year prior (-365 days). Panel C uses all refugee women who arrived before the focal mother, came from the same origin, and were randomly allocated to the same canton before the focal mother. Panels D and E use the birth registry but only for refugee mothers; the definitions are analogous to Panel A and B; thus, these arguably constitute increasingly important subsets of peers for the focal mother-to-be. We drop refugees arriving in 2010 to calculate meaningful network measures. All measures exhibit a sizable skewness, which is why we use various checks, including quartiles in Table E.1.2 Panel B.

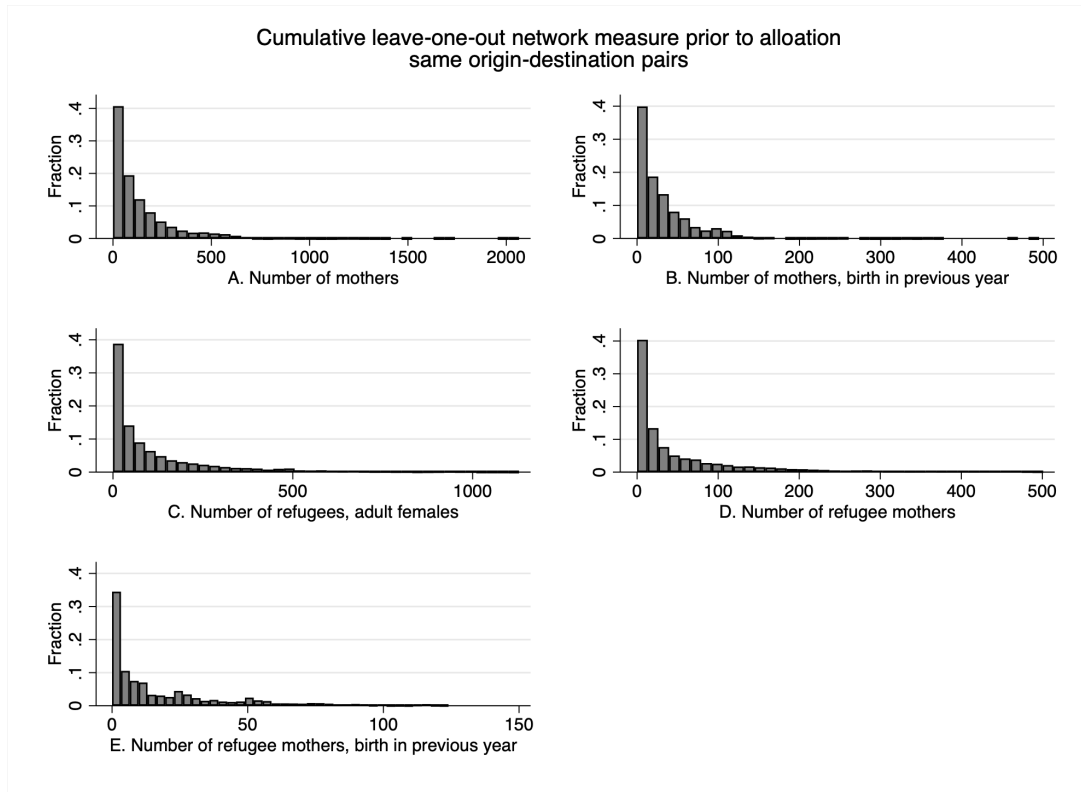


Figure A.7.1: REFUGEE'S CO-ETHNIC NETWORKS

Note: The figure plots refugees' network sizes according to different definitions used in Table A.7.1 Panel A and C. *Source:* BEVNAT 2010–2017, ZEMIS 2010–2017, own calculations.

A.8 Employment

Figure A.8.1 provides the annual employment shares of refugees by their duration of residence in Switzerland. The data stems from the foreign registry and covers all individuals in the asylum system (mostly asylum seekers and accepted refugees) between 2010 and 2016. Note that this cohort is not identical to our refugee population that arrived between 2010 and 2017 since it also includes refugees who arrived before 2010 to maximize the sample size of refugees with longer residence duration. We observe a maximum number of 8 residence years for mothers who arrived in 2010. As shown in Figure A.8.1, employment shares are close to zero for women in the first years after arrival and soon level out at around 10 percent for females. The employment rates for refugee partners are not higher than 30% overall. These low shares are partly explained by various employment restrictions that are in place for asylum seekers (e.g., [Slotwinski et al., 2019](#)). Hence, we can safely assume that our health effects are not driven by earnings effects, especially when considering mothers (and couples) who arrived recently (see also [Auer, 2018](#)).

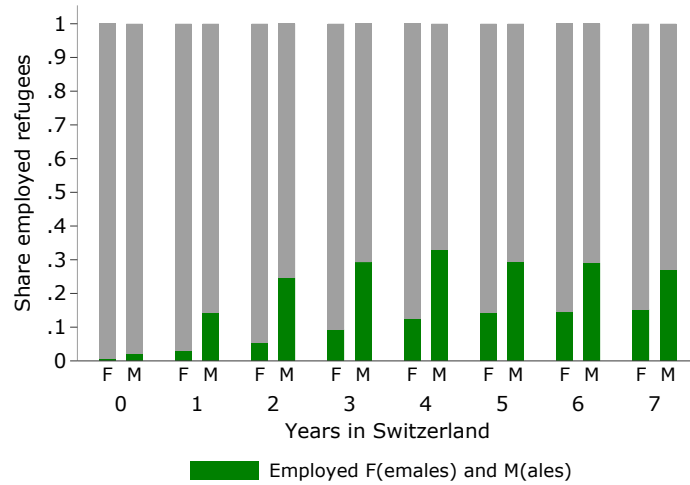


Figure A.8.1: EMPLOYMENT SHARES OF REFUGEES BY SEX AND OVER TIME

Note: The figure plots the annual shares of employed female and male refugees by their duration of residence in Switzerland. All individuals registered in the asylum system between 2010 and 2016 are included (asylum seekers, temporarily admitted persons, accepted refugees, and accepted refugees with permanent residence permits). *Source:* ZEMIS 2010–2017, own calculations.

B Heterogeneity and weighting

B.1 Quasi-experimental design and heterogeneity

The Swiss refugee allocation leads to various implicit treatment and control groups. Using a single match indicator is a parsimonious and general way to assess the average language match effect, yet it may hide important heterogeneity across treatment arms. Figure B.1 presents a simplified version of our experimental design. It shares similarities with cross-over experimental designs (Jones and Kenward, 2014; Kershner and Federer, 1981), often regarded as being among the most credible research designs.⁴

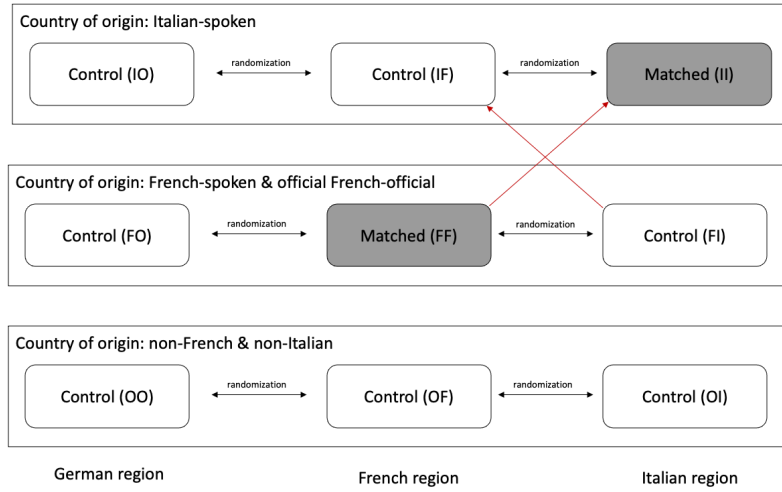


Figure B.1: SIMPLIFIED EMPIRICAL DESIGN OF THE REFUGEE ALLOCATION

There are three groups of refugees, those from an Italian-speaking country of origin (top), those from a French-speaking country of origin (middle), and others (bottom), which are allocated to three language regions in Switzerland—the German-speaking, the French-speaking, and the Italian-speaking region. Thus, in contrast to a standard 2x2 DiD design, we have *seven* 2x2 sub-DiDs in this 3x3 matrix. Both language match groups—French-exposed refugees in French-speaking regions (FF) and Italian-exposed refugees in the Italian-speaking region (II)—can each be compared to three control pairs. For instance, the four groups in the bottom left corner constitute a simple, straightforward DiD that compares French-speaking refugees allocated to the French-speaking region (FF) with those allocated to the German-speaking region (FO) and contrasts this difference to the difference *other* refugees have in the French-speaking (OF) and in the German-

⁴It is not a real cross-over design, in which the same individual is observed over time being once in the treatment and once in the control group. Here, we observe, for example, refugees from a French-speaking country as treatment and as a control against refugees of an Italian-speaking origin, but not the same individual mothers.

speaking region (OO), such that

$$DiD_1 = y_{FF} - y_{FO} - (y_{OF} - y_{OO}).$$

Similarly, one can use the Italian-speaking region as control for Italian-exposed refugees in French-speaking and German-speaking regions. The Italian-exposed refugees in the Italian-speaking region have the same three comparison groups. Finally, the two treatment groups (FF) and (II) can be compared against each other.⁵ It is, however, important to note that refugees originating from an Italian-speaking country are a small group and that there is only one Italian-speaking canton. Nevertheless, we believe it is reasonable to test our hypothesis across all languages, keeping in mind potential small sample issues.

B.2 A perspective on weighting

Aggregating different treatment groups is not always innocuous. Recent contributions (e.g., [de Chaisemartin and D’Haultfoeuille, 2020](#); [Goodman-Bacon, 2018](#)) have cast doubt on the validity of aggregating treatment groups, that is, when more than 2x2 possible comparisons exist. This is precisely the case in our setting, where treatment groups can act as controls for other treatment groups. In extreme cases, their weights in the aggregation could be negative. While the treatments discussed in the literature so far have not covered our case of spacial variation (instead of variation over time) and switching of treatment, it is obvious from Figure B.1 that we are aggregating across different 2x2 DiDs. Thus similar problems of potentially negative implicit weights might arise.

Again, a simple way to assess whether this is an issue in our application is to show all implied treatment groups and corresponding difference-in-differences estimates separately ([Goodman-Bacon, 2018](#), proposes this in his Appendix), as shown in Figure B.2. For example, among the seven possible DiDs for log birth weight (see Figure B.1 for the three outcomes) only one comparison is negative and marginally significant, which may be expected under random chance alone. Almost all sub-comparisons are insignificantly different from our main specification, and almost all are larger than our preferred specification, again confirming that we apply the most conservative approach. It is important to note that we expect more variability for all comparisons involving refugees of an Italian-speaking origin and the one Italian-speaking canton in Switzerland (Ticino) due to the much smaller treatment group. They are strongly consistent with our hypothesis but perhaps should not be over-interpreted.

Our setup even allows for further disaggregation, distinguishing between bilingual French and French regions, and countries in which French is the official language and

⁵In sum, this gives seven sub-DiDs in this setup, namely, $DiD_1 = y_{FF} - y_{FO} - (y_{OF} - y_{OO})$, $DiD_2 = y_{FF} - y_{FI} - (y_{OF} - y_{OI})$, $DiD_3 = y_{FF} - y_{FO} - (y_{IF} - y_{IO})$, $DiD_4 = y_{II} - y_{IO} - (y_{FI} - y_{FO})$, $DiD_5 = y_{II} - y_{IO} - (y_{OI} - y_{OO})$, $DiD_6 = y_{II} - y_{IF} - (y_{OI} - y_{OF})$, and $DiD_7 = y_{FF} - y_{FO} - (y_{II} - y_{IF})$.

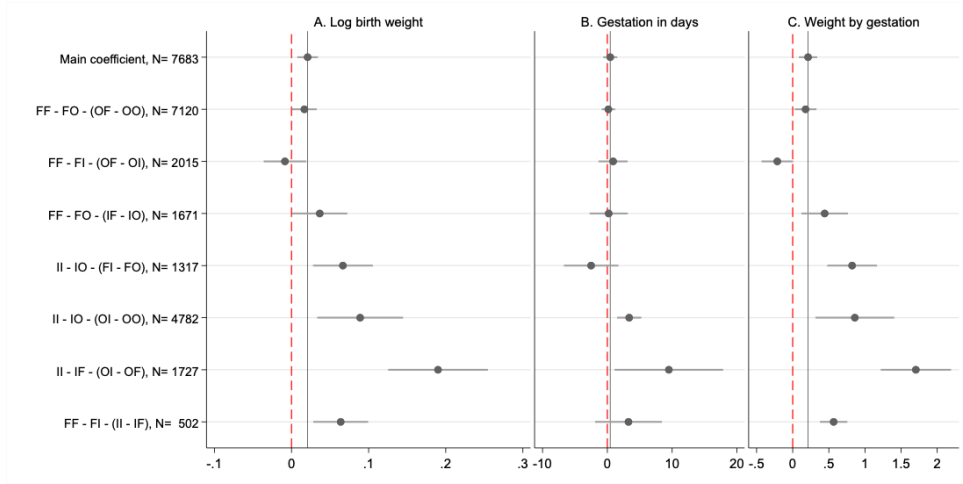


Figure B.2: DiD DECOMPOSITION

Note: The figure displays separate DiD regressions, keeping only one treatment–control comparison at a time. The first row shows the aggregate estimates from Table 1, Column 3 for all three outcomes (log birth weight, gestation, and weight by gestation). The design of the sub-DiD comparisons can be seen in Figure B.1. The first corresponds to the DiD comparing the difference between F(-rench-exposed) refugees in F(-rench)-speaking cantons to O(-ther) refugees in the O(-ther) cantons (German-speaking). In Appendix Figure B.4, we further split these into 25 groups, which, however, are often small. *Source:* BEVNAT 2010–2017, ZEMIS 2010–2017, CIA 2018, own calculations.

some exposure. This design would imply 25 separated 2x2 sub-DiDs. The sample sizes become relatively small, yet, they tend to confirm the disaggregated treatment effects presented in Figure B.2 (F-rench, I-talian, O-ther origin/canton combinations indicated with capital letters). Figure B.4 top panel, displays the more detailed setup. Here, we can go one step further and disaggregate the French origin–French destination category into countries with French as the official language and countries with French as the spoken language.

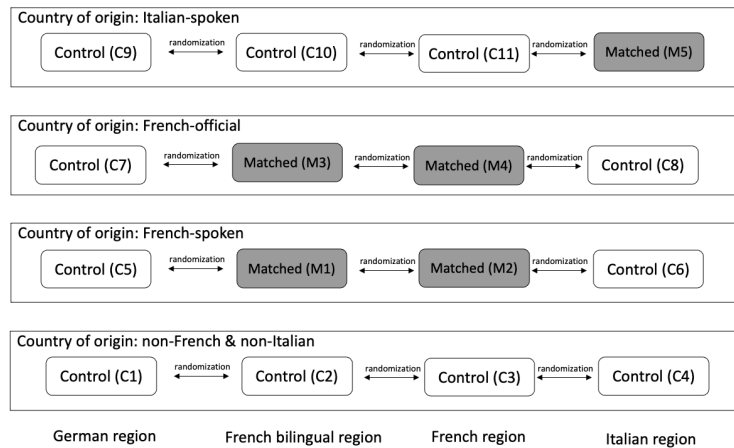


Figure B.3: DETAILED 4-BY-4 DESIGN

Although the samples are small in some instances, the match effects are almost never significantly different from our main effects, which are mostly positive and often significant; for example, in the log birth weight regressions, only one is significantly negative out of 25 possible decompositions, and three are negative but highly insignificant. This

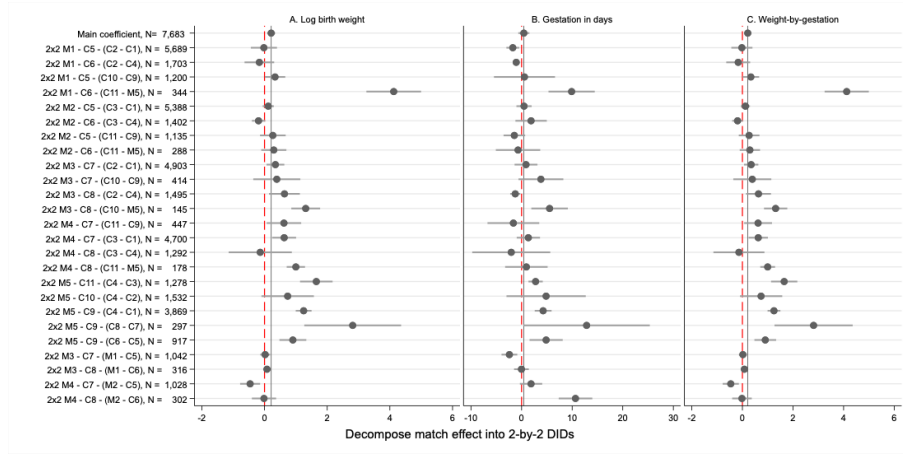


Figure B.4: DiD DECOMPOSITION FOR 4-BY-4 DESIGN

shows that negative weighting, as discussed by [Goodman-Bacon \(2018\)](#) is very unlikely in our setup.

C Additional estimation information

C.1 Fertility selection

We further assess whether fertility choices are affected by a language match. Table C.1.1 shows that birth events are not more or less likely when mothers experience a language match. We find no relationship between fertility and the match effects for different ages at arrival cohort (Columns 1–3), capturing a more narrow range of childbearing ages, nor do we observe any timing differences, that is, duration in Switzerland until the first birth (Column 4), age at first or any (higher-order) birth (Columns 5 and 6), nor teenage birth (Column 7). Further, there is no difference between mothers with a language match and mothers with no language match with regard to children born before arriving in Switzerland (Column 8), nor in terms of any observed child in our data (i.e., including children born before arrival in Switzerland, first and higher-order births in Switzerland, and first and higher-order births after a previous stillbirth incident—which we exclude from our main analysis).

Table C.1.1: FURTHER FERTILITY OUTCOMES AND SUBSAMPLES

	Birth indicator, ages at arrival subsamples			Time till 1 st birth	Age at birth		Teen- age birth	Number of children Before arrival	in CH
	all	2-53	6-49		First birth	Any birth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Panel A. Language match</i>									
Match	-0.008 (0.010)	-0.008 (0.011)	-0.009 (0.014)	0.037 (0.050)	-0.205 (0.499)	-0.175 (0.367)	0.014 (0.019)	-0.050 (0.032)	0.005 (0.026)
Mean no match	0.19	0.24	0.27	1.65	27.36	27.80	0.06	0.23	1.37
R2	0.18	0.20	0.21	0.30	0.12	0.11	0.06	0.12	0.19
<i>Panel B. Match only French official</i>									
Match	0.014 (0.018)	0.023 (0.019)	0.018 (0.023)	-0.147 (0.150)	-0.516 (0.667)	-0.708 (0.530)	0.007 (0.019)	-0.028 (0.024)	0.075 (0.057)
Mean no match	0.19	0.24	0.26	1.64	27.36	27.79	0.06	0.23	1.37
R2	0.18	0.20	0.21	0.30	0.12	0.11	0.06	0.12	0.19
<i>N</i>	57,105	45,584	40,827	7,683	7,683	10,798	7,683	7,683	8,007
Canton FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Place year & month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficient estimates for various outcomes and samples analogous to Model (4) in Table 1 and cluster-robust standard errors clustered at the canton level. The outcome variable Columns (1) - (3) is an indicator for birth observed. Column (1) uses the full sample. Column (2) restricted these to those arriving between ages 2 and 53. The youngest refugee mother in our sample was 11 at the time of delivery, and the oldest was 53. Thus, when arrived at the age of 2 in 2010, we could observe birth events for this person until the age of 11 in 2017; 53 is if they just arrived and gave birth in the following year. Column (3) further restricts to those arriving older than 6 (so 15 at the end of the sample period) and 49. Column (4) presents as an outcome the time in Switzerland in years/10 until first birth; Columns (5) and (6) the mother's age when giving birth in Switzerland, (5) for the first child, (6) for any child using multiple observations by mother. Column (7) uses as outcome an indicator of teenage birth (age 19 or younger). Columns (8) and (9) use the number of children born to a woman, (8) before coming to Switzerland, (9) the maximum observed children in our data using one observation per mother (slightly higher than our main sample as these count higher-order births even after stillbirths and twin births, which are excluded from our main regressions).

Source: ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

C.2 Further balancing and selection results

In Table C.2.1, we present the within-country balance tests, i.e., the binary comparison rather than the DID specification. We consider the subset of refugees who made no request and with one of the Swiss languages as their origin language. Finally, we account for the fact that refugees originating from a French- versus an Italian-speaking country have a differential probability of being assigned to the treatment condition since the probabilities of being assigned to a language match canton are $\Pr \sim 0.246$ for a French-speaking canton and $\Pr \sim 0.039$ for Ticino, the only Italian-speaking canton.

In Table C.2.2, we present the numbers behind our preferred DID balancing tests (Figure 3), which include corresponding randomization inference p-values. Similarly, Table C.2.3 presents the underlying values from the selection tests (Figure 4). Finally, Figure C.2.1 presents balance and selection tests for the subsample of refugees who made no request.

Table C.2.1: COVARIATE BALANCE WITHIN LANGUAGE GROUPINGS

	Decompose by			
	Any match	Any French	French-official	Any Italian
	(1)	(2)	(3)	(4)
Birth (Yes/No) ^a	0.017 (0.032)	0.026 (0.034)	0.041 (0.035)	-0.130 (0.021)
Mean no match	0.21	0.21	0.18	0.23
RI	$p = 0.63$	$p = 0.41$	$p = 0.25$	$p = 0.00$
<i>Only birth sample</i>				
Age at arrival /10 ^b	-0.009 (0.075)	-0.023 (0.080)	-0.162 (0.066)	0.303 (0.096)
Mean no match	2.53	2.64	2.65	2.29
RI	$p = 0.95$	$p = 0.80$	$p = 0.03$	$p = 0.04$
Married at arrival (Yes/No) ^b	-0.045 (0.039)	-0.059 (0.040)	-0.090 (0.130)	0.235 (0.076)
Mean no match	0.41	0.36	0.77	0.52
RI	$p = 0.28$	$p = 0.16$	$p = 0.51$	$p = 0.13$
Pseudo arrival family size/10 ^b	-0.006 (0.204)	0.006 (0.225)	-0.232 (0.261)	-0.345 (0.250)
Mean no match	2.64	3.03	1.57	1.82
RI	$p = 0.96$	$p = 0.97$	$p = 0.47$	$p = 0.27$
Arrived with adult females (Yes/No) ^b	-0.025 (0.042)	-0.026 (0.046)	0.032 (0.066)	-0.072 (0.076)
Mean no match	0.15	0.19	0.02	0.06
RI	$p = 0.60$	$p = 0.58$	$p = 0.80$	$p = 0.48$
Main caseworker (Yes/No) ^b	-0.068 (0.035)	-0.056 (0.033)	-0.049 (0.080)	-0.160 (0.096)
Mean no match	0.28	0.29	0.26	0.25
RI	$p = 0.10$	$p = 0.08$	$p = 0.55$	$p = 0.24$
Second caseworker (Yes/No) ^b	0.061 (0.049)	0.049 (0.048)	0.026 (0.080)	-0.020 (0.132)
Mean no match	0.55	0.53	0.61	0.60
RI	$p = 0.30$	$p = 0.37$	$p = 0.77$	$p = 0.95$
Other caseworker	0.007 (0.032)	0.007 (0.036)	0.022 (0.049)	0.180 (0.066)
Mean no match	0.17	0.18	0.13	0.15
RI	$p = 0.79$	$p = 0.85$	$p = 0.72$	$p = 0.05$
N^a all refugee women sample	3,677	2,841	1,016	836
N^b first birth samples	780	594	203	186
Origin country FEs	✓	✓	✓	✓
Month & Year FEs	✓	✓	✓	✓
Allocation characteristics indicators	✓	✓	✓	✓

Notes: The table focuses on those randomly assigned (i.e., the “No request” sub sample presented) and is restricted to refugees from origin countries with French/Italian language since, by definition, the other refugees could not be randomly assigned to a matching canton in terms of language spoken. Consequently, we regress the match indicator only within the same language groups and present it in 4 columns: (1) any match pooling the three language groupings, (2) those from countries where French is spoken, (3) those from countries where French is an official language, and (4) those from countries where Italian is spoken. We present coefficient, cluster-robust, and randomization inference clustered-robust standard errors. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

Table C.2.2: TABLE OF FIGURE 3: COVARIATE BALANCE

	Any language match		Exposure to French official	
	All women	Later mothers	All women	Later mothers
	(1)	(2)	(3)	(4)
Age at arrival /10 (std)	0.050 (0.030)	-0.016 (0.035)	0.007 (0.056)	-0.022 (0.046)
Mean no match	-0.00	0.37	0.00	0.37
RI	$p = 0.13$	$p = 0.70$	$p = 0.91$	$p = 0.71$
Married at arrival (Yes/No)	-0.000 (0.013)	0.038 (0.029)	0.002 (0.034)	-0.016 (0.081)
Mean no match	0.67	0.51	0.67	0.50
RI	$p = 0.93$	$p = 0.24$	$p = 0.89$	$p = 0.79$
Pseudo arrival family size/10 (std)	-0.022 (0.028)	-0.097 (0.053)	0.067 (0.054)	0.113 (0.069)
Mean no match	-0.01	-0.19	0.01	-0.18
RI	$p = 0.42$	$p = 0.15$	$p = 0.41$	$p = 0.21$
Arrived with adult females (Yes/No)	-0.009 (0.013)	-0.030 (0.023)	0.027 (0.020)	0.057 (0.016)
Mean no match	-0.01	-0.19	0.01	-0.18
RI	$p = 0.42$	$p = 0.15$	$p = 0.41$	$p = 0.21$
Request: Other family (Yes/No)	0.030 (0.019)	-0.012 (0.037)	0.033 (0.020)	0.016 (0.049)
Mean no match	0.22	0.24	0.22	0.24
RI	$p = 0.19$	$p = 0.79$	$p = 0.11$	$p = 0.75$
Request form: Peers (Yes/No)	-0.004 (0.004)	0.003 (0.007)	0.009 (0.005)	0.026 (0.015)
Mean no match	0.02	0.05	0.02	0.05
RI	$p = 0.38$	$p = 0.70$	$p = 0.14$	$p = 0.13$
Request form: Birth (Yes/No)	-0.020 (0.009)	0.009 (0.010)	0.007 (0.010)	0.030 (0.019)
Mean no match	0.08	0.00	0.08	0.00
RI	$p = 0.04$	$p = 0.45$	$p = 0.55$	$p = 0.28$
Request form: Other reasons (Yes/No)	-0.001 (0.001)	-0.001 (0.001)	-0.003 (0.002)	-0.005 (0.004)
Mean no match	0.00	0.00	0.00	0.00
RI	$p = 0.34$	$p = 0.49$	$p = 0.16$	$p = 0.44$
Main caseworker (Yes/No)	-0.027 (0.018)	-0.021 (0.025)	-0.054 (0.022)	-0.080 (0.043)
Mean no match	0.31	0.28	0.31	0.28
RI	$p = 0.13$	$p = 0.46$	$p = 0.08$	$p = 0.15$
Second main caseworker (Yes/No)	0.007 (0.020)	0.000 (0.023)	0.054 (0.023)	0.032 (0.050)
Mean no match	0.51	0.53	0.51	0.53
RI	$p = 0.78$	$p = 0.98$	$p = 0.09$	$p = 0.68$
Other caseworkers (Yes/No)	0.020 (0.014)	0.020 (0.015)	-0.000 (0.018)	0.048 (0.033)
Mean no match	0.18	0.19	0.18	0.19
RI	$p = 0.31$	$p = 0.23$	$p = 0.99$	$p = 0.17$
<i>N</i>	57,105	7,683	57,105	7,683
Origin country FEs	✓	✓	✓	✓
Allocated canton FEs	✓	✓	✓	✓
Month & Year FEs	✓	✓	✓	✓
Allocation characteristics indicators	✓	✓	✓	✓

Notes: The table presents coefficient estimates of equation (4), identical to those presented in Figure 3. Additionally, it includes means of the no match group, p-values from a randomization inference test, strata (country of origin), and treatment cluster (canton) with 99 replications.

Source: ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

Table C.2.3: TABLE OF FIGURE 4: POST-ALLOCATION SELECTION

	Any language match	Exposure to French official
	(1)	(2)
Birth ^a	-0.008 (0.010)	0.014 (0.018)
Mean no match	0.19	0.19
RI	$p = 0.49$	$p = 0.63$
Time in Switzerland till first birth (std) ^b	0.035 (0.034)	0.013 (0.085)
RI	$p = 0.38$	$p = 0.83$
Multiple entries ^a	-0.005 (0.008)	-0.014 (0.012)
Mean no match	0.04	0.04
RI	$p = 0.56$	$p = 0.33$
Placed before birth ^b	0.058 (0.058)	0.022 (0.143)
Mean no match	0.01	0.00
RI	$p = 0.38$	$p = 0.83$
Reallocated Canton ^c	-0.011 (0.012)	-0.032 (0.025)
Mean no match	0.03	0.03
RI	$p = 0.41$	$p = 0.32$
Dropped main sample: stillbirth ^c	0.003 (0.006)	0.006 (0.009)
Mean no match	0.00	0.00
RI	$p = 0.75$	$p = 0.93$
Dropped main sample: too young or light ^c	-0.001 (0.004)	0.002 (0.011)
Mean no match	0.01	0.01
RI	$p = 0.81$	$p = 0.77$
Dropped main sample: twins (or higher) ^c	-0.003 (0.008)	0.009 (0.014)
Mean no match	1.01	1.01
RI	$p = 0.78$	$p = 0.72$
Conception month march (Yes/No) ^d	-0.001 (0.010)	-0.009 (0.033)
Mean no match	0.08	0.08
RI	$p = 0.92$	$p = 0.88$
Age of mother at first birth in Switzerland /10 (std) ^d	-0.044 (0.089)	-0.102 (0.119)
Mean no match	-0.00	-0.00
RI	$p = 0.70$	$p = 0.49$
Teenage mother (Yes/No) ^d	0.014 (0.019)	0.007 (0.019)
Mean no match	0.06	0.06
RI	$p = 0.56$	$p = 0.79$
Child is female (Yes/No) ^d	-0.015 (0.029)	-0.085 (0.053)
Mean no match	0.48	0.48
RI	$p = 0.71$	$p = 0.28$
Previous children (std) ^d	-0.093 (0.072)	0.001 (0.074)
Mean no match	0.00	0.00
RI	$p = 0.21$	$p = 0.99$
Birth in different canton than placement (Yes/No) ^d	0.009 (0.017)	0.024 (0.039)
Mean no match	0.06	0.06
RI	$p = 0.60$	$p = 0.54$
N^a all refugee women sample	57,105	57,105
N^b multiple birth sample	10,798	10,798
N^c pre-sample selection	7,873	7,873
N^d main sample	7,683	7,683
All FEs	✓	✓
Allocation characteristics indicators	✓	✓

Notes: The table presents coefficient estimates of equation (4), identical to those presented in Figure 4. Additionally, it includes p-values from a randomization inference test, strata (country of origin), and treatment cluster (canton) with 99 replications. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

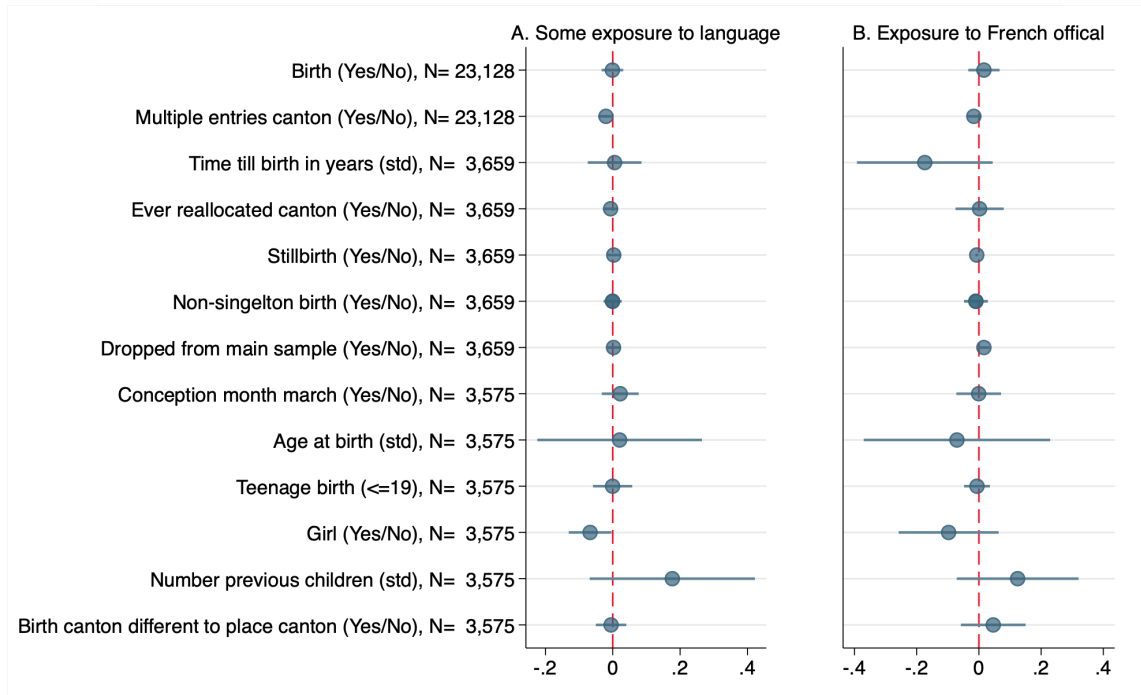
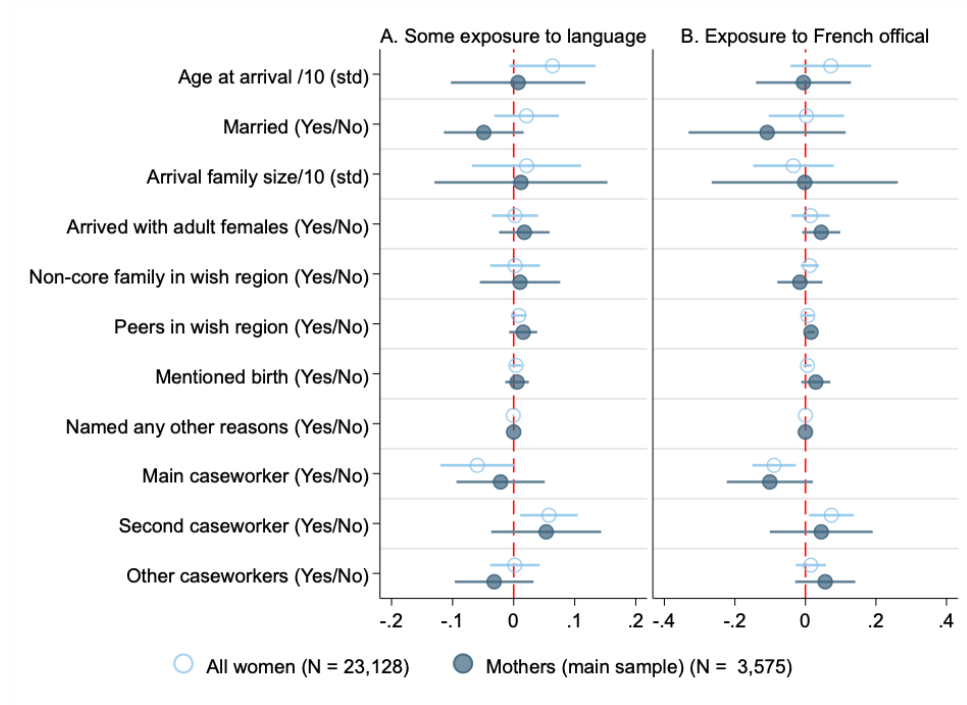


Figure C.2.1: COVARIATE BALANCE AND POST-ALLOCATION SELECTION AMONG ALL REFUGEE WOMEN AND MOTHERS FROM THE MAIN SAMPLE BY LANGUAGE MATCH: No request sample

Note: The figure plots coefficients based on Equation (4), using various outcomes in separated regressions; standard errors are clustered and 95% confidence intervals are shown. Several observations indicate our sample selection (the same sample as in our main regression). Indicator variables correspond to percent changes, std - standardized variables as changes in standard deviations. Post-allocation balance in characteristics; regressions analogous to those in Figure 3, see notes for details. *Source:* BEVNAT 2010–2017, ZEMIS 2010–2017, CIA 2018, own calculations.

C.3 Additional aggregate results and bounding

This appendix presents several complementary results to our main analysis. In Table C.3.1, we present the aggregated (to country of origin and the allocated canton) estimate of our main effect. The Table in Columns 2 and 3 shows that only French-exposed refugees benefit from being allocated to a French-speaking canton and Italian-exposed from being allocated to an Italian-speaking canton, but not vice versa. Since in the monolingual French cantons, there is a slightly larger number of French-exposed females (c.f. Table A.2.1), we present conservative bounds. Following Horowitz and Manski (2000), we artificially increase the respective FO population using both the lowest and the highest observed log birth weights to impute the outcome values. It is well known that these bounds are very conservative and often too large to make meaningful bounds. Lee (2009) adds an assumption on the monotonicity, thereby achieving tighter bounds. In our application, this means that F(rench-exposed) refugees only have a larger propensity to be placed in the F(rench-speaking)-region (not lower), which we believe is reasonable in our application. Thus, we proceed by trimming the FF group and dropping observation from the lower part and upper part of the distribution (96th and 31st percentile in our case). Note that the excess is very small across the three treatment groups. Our treatment group is 4.8% of the overall sample, with the target being 4.6%.

Table C.3.1: DESCRIPTIVE AGGREGATE COMPARISON

	Country of origin			Bounds	
	Overall	French	Italian	Horowitz-Manski	Lee
	(1)	(2)	(3)	(4)	(5)
Match	0.021 (0.009)			[-0.075; 0.364]	[-0.005; 0.033]
French-speaking canton		0.018 (0.008)	-0.018 (0.002)		
Italian-speaking canton		-0.035 (0.035)	0.081 (0.000)		

Notes: The table presents the coefficients and cluster-robust standard errors on the canton level. The coefficients in Column 1 are based on aggregate population-weighted regressions of log birth weight on the match indicator, 3 indicators for the origin language, and 4 for the host language. Column 2 separates the French from the Italian region and assesses whether French-exposed refugees benefit from being allocated to the Italian region. Column 3 applies analogously to the Italian-exposed refugees. Columns 4 and 5 are similar to Column 1 but replace the log birth weight with adjusted values, in 4 imputing the excess control group with the lowest (highest) possible value of the log birth weight distribution based on Horowitz and Manski (2000) and in 5 trimming the FF group by those at the bottom (and top) of the birth weight distribution following Lee (2009). *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

C.4 Clinical health indicators

We investigate whether specific segments of the birth weight distribution drive the average health effect. We replace our continuous outcomes (birth weight, gestation, and weight by gestation) with clinical indicators of ill health at birth that are commonly adopted in the literature. In Table 1 in the main text, we show that the probability of a child being born with low birth weight ($< 2,500$ grams; e.g., [Blencowe et al., 2019](#)) decreases when the refugee mother is allocated to a familiar language environment.⁶ In Table C.4.1, we do not find such an effect for very low birth weight ($< 1,500$ grams; Column 1), nor a higher probability of high birth weight in the case of a language match ($> 4,500$ grams; Column 3). In line with the main findings, however, we observe a substantial decrease in the probability of being born small for gestational age when mothers are allocated to a familiar language region, which subsequently results in a lower infant mortality rate.

Table C.4.1: ALTERNATIVE BIRTH OUTCOMES: CLINICAL HEALTH INDICATORS

	vLBW ×100	HBW ×100	vPT ×100	PT ×100	LT ×100	SGA ×100	IMR ×1000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A. Language match</i>							
Match	0.449 (0.436)	0.578 (0.552)	-0.254 (0.312)	0.997 (1.305)	-0.247 (0.255)	-2.767 (1.589)	-0.806 (4.336)
Wild bootstrap	$p = 0.37$	$p = 0.36$	$p = 0.52$	$p = 0.46$	$p = 0.41$	$p = 0.08$	$p = 0.91$
RI	$p = 0.34$	$p = 0.33$	$p = 0.50$	$p = 0.52$	$p = 0.31$	$p = 0.13$	$p = 0.87$
Mean no match	0.74	0.57	0.29	4.14	0.74	8.49	3.28
R2	0.03	0.03	0.02	0.04	0.04	0.05	0.02
<i>Panel B. Match only French official</i>							
Match	0.149 (1.069)	0.373 (0.192)	-0.762 (0.914)	-3.362 (2.790)	-1.858 (1.122)	-12.848 (3.579)	-2.909 (1.796)
Wild bootstrap	$p = 0.89$	$p = 0.06$	$p = 0.67$	$p = 0.26$	$p = 0.18$	$p = 0.03$	$p = 0.17$
RI	$p = 0.83$	$p = 0.15$	$p = 0.89$	$p = 0.33$	$p = 0.23$	$p = 0.05$	$p = 0.10$
Mean no match	0.74	0.57	0.28	4.25	0.71	8.55	3.43
R2	0.03	0.03	0.02	0.04	0.04	0.05	0.02
<i>N</i>	7,683	7,683	7,683	7,683	7,683	7,683	7,683
Canton FE	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓
Place year & month FE	✓	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficient estimates for various discrete outcomes analogous to model (4) in table 1 and cluster-robust standard errors clustered at the canton level. Table D.1 estimates a bias-reduced fixed effect probit model ([Kunz et al., 2021](#)) on the low birth weight indicator, for example, to show that the linear probability model specification is appropriate. *vLBW* = very low birth weight; *HBW* = high birth weight; *vPT* = very preterm (< 196 days); *PT* = preterm (< 259 days); *LT* = late-term (> 294 days); *SGA* = small for gestational age (lowest 10 percent of weight/gestation distribution); *IMR* = infant mortality. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

In accordance with our earlier results, we do not observe any significant effect on the probabilities of (very) pre- and late-term birth (Columns 4 to 6; e.g. [Chawanpaiboon et al., 2019](#)). Yet, again, the binary indicator for small for gestational age children (ratio

⁶We also estimate a bias-reduced fixed effect probit model ([Kunz et al., 2021](#)), with almost identical results, supporting the linear probability estimates presented here, c.f. D.1.

is in the lowest 10th percentile of the distribution; e.g. [Smith et al., 1997](#)) is statistically significant and large in magnitude. Being allocated to a familiar language environment reduces the probability of an SGA child by 3% for refugees from a country in which French or Italian is spoken and 13% for refugees from an officially French-speaking country. Eventually, a language match reduces infant mortality among refugees from an officially French-speaking country by approximately 3 per 1,000 live births. This effect is only marginally significant for the match based on countries with French as an official language.

Figure [C.4.1](#) shows the over-time results for the remaining outcomes (log weight, gestation, and LBW), mirroring those we discussed in the main text.

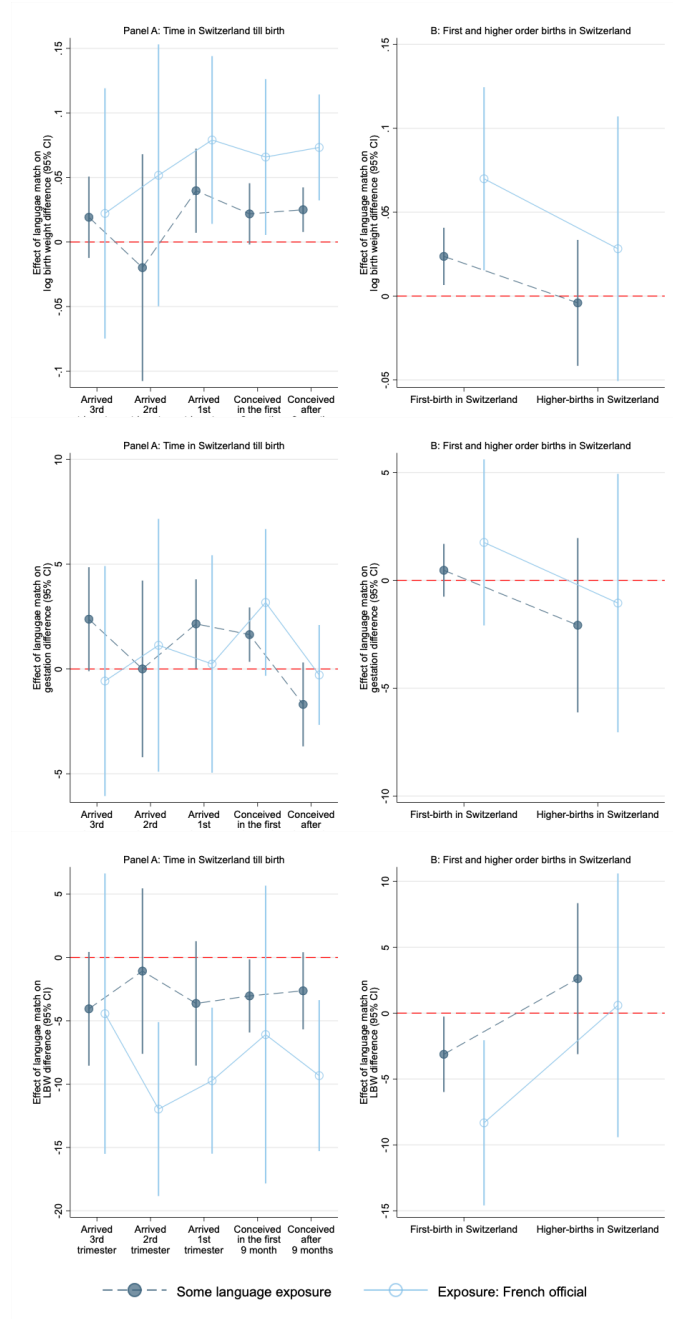


Figure C.4.1: MATCH EFFECTS OVER TIME AND ACROSS BIRTH OUTCOMES

Note: The figure displays coefficient estimates from the main model interacted with time in Switzerland and births in Switzerland, analogous to Figure 5 for our main outcomes: log birth weight, gestation, and low birth weight. *Source:* BEVNAT 2010–2017, ZEMIS 2010–2017, CIA 2018, own calculations.

D Robustness

Table D.1 presents further tests for the functional form of the non-linear outcomes. Table D.2 presents various additional robustness tests, including the results from Figure 6 in table form. Table D.3 shows the triple-difference models in more detail.

Table D.1: ROBUSTNESS MAIN TABLE 1: FUNCTIONAL FORM

	Baseline Log Weight	OLS Weight	Poisson Weight	Negbin Weight	Baseline LBW×100	FEBR Probit LBW
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel a. Any language exposure (French, Italian)</i>						
Match	0.022 (0.008)	67.038 (21.965)	0.020 (0.007)	0.021 (0.007)	-2.928 (1.393)	-0.274 (0.123)
Percent increase		0.02				
AME						-2.89
Mean no match	8.09	3317.94	3317.94	3317.94	4.65	0.05
R2	0.06	0.07			0.04	
<i>Panel b. Official French only</i>						
Match	0.063 (0.017)	169.362 (45.943)	0.052 (0.014)	0.053 (0.013)	-8.414 (3.054)	-0.695 (0.214)
Percent increase		0.05				
AME ×100						-7.34
Mean n match	8.09	3315.92	3315.92	3315.92	4.66	0.05
R2	0.06	0.07			0.04	
N	7,683	7,683	7,683	7,683	7,683	7,683
Canton FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Place Year & Month FE	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficient estimates from alternative specifications for the weight and LBW outcomes to our main results in Table 1. Columns 1 and 5 are the same for comparison in Table 1. Column 2 is estimated using OLS on the non-logged birth weight. Column 3 also shows a Poisson and 4 negative binominal generalized linear regression on the non-logged birth weight. Column 6 estimates a bias-reduced fixed effect Probit model (Kunz et al., 2021) on the indicator for low birth weight. Percent increase is calculated as the coefficient/average in the OLS model; we calculate the average marginal effect for the Probit model. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

Table D.2: ROBUSTNESS MAIN TABLE 1: VARIOUS SUBSAMPLES

	Dose-response				Subsample control groups			Match: French, Official		CEPII-definition	
	Base	No bilingual Cantons		Only French Official	Africa only	No stateless	No Syria & Eritrea	Base	Control English	Match	official French
		(1)	(2)	(3)	(4)	(5)	(6)				
<i>Panel a. Log birth weight</i>											
Match	0.022 (0.008)	0.030 (0.009)	0.064 (0.016)	0.050 (0.015)	0.022 (0.008)	0.051 (0.015)	0.063 (0.017)	0.037 (0.016)	0.052 (0.018)	0.044 (0.017)	
Mean no match	8.09	8.09	8.09	8.10	8.09	8.09	8.09	8.08	8.09	8.08	
R2	0.06	0.08	0.06	0.06	0.06	0.07	0.06	0.06	0.06	0.06	
<i>Panel b. Gestation in days</i>											
Match	0.465 (0.569)	0.959 (0.547)	0.801 (1.098)	0.436 (1.229)	0.466 (0.568)	0.915 (1.488)	0.759 (1.132)	-0.618 (1.445)	0.570 (1.017)	-0.026 (1.322)	
Mean no match	277.83	277.70	277.83	279.10	277.79	278.06	277.74	274.50	275.33	274.90	
R2	0.06	0.07	0.06	0.05	0.06	0.06	0.06	0.05	0.06	0.06	
<i>Panel c. Weight by gestation</i>											
Match	0.221 (0.073)	0.291 (0.074)	0.629 (0.173)	0.538 (0.147)	0.221 (0.073)	0.519 (0.132)	0.615 (0.175)	0.428 (0.142)	0.516 (0.190)	0.474 (0.170)	
Mean no match	11.91	11.93	11.91	11.89	11.91	11.92	11.91	11.87	11.97	11.94	
R2	0.07	0.09	0.08	0.08	0.07	0.08	0.07	0.08	0.07	0.07	
<i>Panel d. Low birth weight × 100</i>											
Match	-2.928 (1.393)	-3.641 (1.708)	-8.679 (3.011)	-6.697 (2.504)	-2.992 (1.403)	-7.192 (2.466)	-8.414 (3.054)	-6.490 (3.197)	-7.529 (2.737)	-7.165 (2.725)	
Mean no match	4.65	4.83	4.65	4.79	4.69	4.65	4.66	2.63	1.67	2.40	
R2	0.04	0.05	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	
<i>N</i>	7,683	5,850	7,426	4,287	7,553	6,351	7,683	4,123	7,680	7,680	
Canton FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Place Year & Month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Request FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Birth characteristics FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Notes: The table presents coefficient estimates from alternative samples analogous to our main results in Table 1. Column 1 repeats our main specifications for reference. Column 2 drops bilingual cantons, and Column 3 only uses countries in which French is the official language in the match group. Column 4 uses only refugees from Africa, 5 drops stateless refugees from the control groups, and 6 drops the two largest sending countries (Syria as a country in which French is spoken and Eritrea from the control group). Column 7 uses the same match definition as 3 but places the French- and Italian-exposed into the control group, and 8 uses only English-speaking countries as control. 9 and 10 analogously use the CEPII language match definition (exposed and French-official); the main difference is that it categorizes Tunisia, Algeria, Lebanon, and Morocco from main to official match; it also classifies Somalia as non-Italian, which hence becomes a control. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, CEPII 2019 own calculations.

Table D.3: ROBUSTNESS MAIN TABLE 1: DiDiD

	Not imputed	GDiD	Covars	Conditional	French off	No Bilang
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel a. Log birth weight</i>						
Match	-0.001 (0.003)	-0.001 (0.004)	-0.001 (0.004)	-0.000 (0.004)	-0.003 (0.006)	-0.000 (0.003)
Match × refugee	0.019 (0.007)	0.019 (0.006)	0.020 (0.007)	0.020 (0.007)	0.065 (0.019)	0.028 (0.008)
R2	0.02	0.02	0.02	0.04	0.04	0.05
<i>Panel b. Gestation in Days</i>						
Match	0.108 (0.173)	0.119 (0.175)	0.119 (0.175)	0.090 (0.174)	-0.355 (0.542)	0.165 (0.231)
Match × refugee	0.308 (0.490)	0.312 (0.487)	0.270 (0.501)	0.198 (0.498)	1.031 (1.223)	0.632 (0.573)
R2	0.02	0.02	0.02	0.02	0.02	0.02
<i>Panel c. Weight by gestation</i>						
Match	-0.010 (0.032)	-0.010 (0.033)	-0.010 (0.033)	0.001 (0.031)	-0.038 (0.053)	0.020 (0.034)
Match × refugee	0.191 (0.063)	0.188 (0.062)	0.200 (0.068)	0.204 (0.064)	0.654 (0.188)	0.249 (0.076)
R2	0.03	0.03	0.03	0.06	0.06	0.07
<i>Panel d. Low birth weight × 100</i>						
Match	0.083 (0.357)	0.074 (0.365)	0.075 (0.365)	0.035 (0.371)	-0.192 (1.241)	0.550 (0.474)
Match × refugee	-2.669 (1.594)	-2.644 (1.609)	-2.757 (1.493)	-2.784 (1.479)	-8.046 (3.479)	-4.045 (1.763)
R2	0.01	0.01	0.01	0.01	0.01	0.02
<i>N</i>	58,114	58,114	58,114	58,114	53,954	47,763
Canton FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Placement Year & Month FE		✓	✓	✓	✓	✓
Request FE			✓	✓	✓	✓
Birth characteristics FE				✓	✓	✓

Notes: The table is analogous to the main Table 1. Imputed values for immigrants and earlier refugees, allocated canton, place year, and month of allocation are replaced with birth canton, birth year, and month for immigrants only; all others are imputed 0s, i.e., for the request indicators in Columns 3 and 4. For immigrants, we only use first observed birth. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

E Heterogeneity & Mechanisms

E.1 Networks

Here, we show the network effects for all of our main outcomes in Table E.1.1. In Panel A of Table E.1.2, we assess whether there are non-linear effects in terms of network size by using $\text{arcsinh}(\text{network})$ as an outcome; in Panel B, we show the unrestricted quartiles of the network distribution and C shows the association between the match and the network measures. In Table E.1.3, Panel A, we alternatively use the population shares and the median split based on the population shares (Panel B), and in C and D, we return to the $\text{arcsinh}(\text{network})$ measure, but include municipality fixed effects.

Table E.1.1: SUBSTITUTING NETWORKS

	All co-national mothers			Co-national refugees		
	Base	All	Recent	All	mothers	
					All	Recent
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Log birth weight</i>						
Match	0.022 (0.008)	0.020 (0.009)	0.023 (0.011)	0.026 (0.009)	0.035 (0.011)	0.032 (0.010)
Network (std)		-0.000 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.005 (0.003)
Match $\times$ Network (std)		0.003 (0.006)	-0.000 (0.015)	-0.005 (0.003)	-0.015 (0.004)	-0.029 (0.007)
<i>Panel B. Gestation in Days</i>						
Match	0.363 (0.607)	-0.108 (0.643)	-0.292 (0.727)	-0.341 (0.863)	0.727 (0.740)	0.589 (0.751)
Network (std)		0.021 (0.033)	-0.115 (0.070)	-0.110 (0.074)	-0.032 (0.034)	-0.252 (0.198)
Match $\times$ Network (std)		0.781 (0.720)	1.631 (1.545)	0.986 (0.348)	-0.420 (0.323)	-0.543 (0.712)
<i>Panel C. Weight by gestation</i>						
Match	0.227 (0.070)	0.240 (0.090)	0.276 (0.102)	0.304 (0.092)	0.354 (0.110)	0.323 (0.096)
Network (std)		-0.003 (0.008)	-0.019 (0.010)	-0.016 (0.008)	-0.014 (0.005)	-0.049 (0.027)
Match $\times$ Network (std)		-0.015 (0.046)	-0.081 (0.092)	-0.100 (0.036)	-0.143 (0.052)	-0.282 (0.072)
<i>Panel D. Low birth weight indicator $\times$ 100</i>						
Match	-2.821 (1.374)	-2.039 (1.374)	-1.998 (1.256)	-3.639 (1.398)	-4.003 (1.406)	-3.620 (1.422)
Network (std)		0.084 (0.092)	-0.015 (0.193)	0.516 (0.112)	0.200 (0.095)	0.519 (0.345)
Match $\times$ Network (std)		-1.651 (0.614)	-1.805 (1.465)	0.965 (0.505)	1.244 (0.545)	2.246 (1.249)
<i>N</i>	7,590	7,590	7,590	7,590	7,590	7,590
Canton FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Placement Year & Month FE	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficient estimates for interactions with various network measures based on Equation (4) and cluster-robust standard errors clustered at the canton level, analogous to Column 3 in Table 1. Columns 2–6 interact the match indicator with the network measure. We use a standardized version of the network measure standardized via $(\text{Network} - \mu) / (50sd(\text{Network}))$, for readability, and its main effect. Column (2) shows the effect of all co-ethnic (same origin–same allocation) mothers, including immigrants, giving birth before the refugee. Column (3) restricts to those giving birth recently (~ 365 days). Columns 4–6 use refugees arriving before the focal mother, 4 all co-ethnic refugee women, 5 who gave birth before the focal mother, and 6 in the previous year. The sample size is smaller since we dropped the year 2010 to calculate meaningful networks. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

Table E.1.2: NETWORK EFFECTS (PRIOR ALLOCATED/RESIDING CO-NATIONALS)

	All co-national mothers			Co-national refugees		
	Base	All	Recent	All	mothers	
					All	Recent
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A.</i> Outcome: weight/gestation, network measure: $\text{arcsinh}(\text{size})$						
Match	0.227 (0.070)	0.359 (0.310)	0.538 (0.221)	0.474 (0.168)	0.443 (0.212)	0.453 (0.126)
Network		0.066 (0.030)	0.049 (0.033)	-0.065 (0.039)	0.050 (0.028)	0.024 (0.036)
Match $\times$ network		-0.037 (0.065)	-0.111 (0.065)	-0.059 (0.035)	-0.074 (0.062)	-0.104 (0.048)
$\tau_{\text{Match}} + \tau_{\text{Match} \times \text{network}} \times \overline{\text{network}}$		0.180 $p = .019$	0.153 $p = .106$	0.213 $p = .012$	0.174 $p = .041$	0.173 $p = .060$
<i>Panel B.</i> Outcome: weight/gestation, network measure: network quartiles						
Match	0.227 (0.070)	0.254 (0.115)	0.341 (0.109)	0.463 (0.111)	0.376 (0.111)	0.380 (0.105)
$1[\text{network} > q_{25}]$		0.189 (0.071)	0.135 (0.049)	0.115 (0.072)	0.131 (0.062)	0.070 (0.086)
$1[\text{network} > q_{50}]$		0.209 (0.095)	0.114 (0.071)	0.115 (0.093)	0.235 (0.060)	0.092 (0.095)
$1[\text{network} > q_{75}]$		0.156 (0.112)	0.084 (0.090)	0.125 (0.126)	0.218 (0.081)	0.041 (0.118)
Match $\times 1[\text{network} > q_{25}]$		0.006 (0.228)	-0.229 (0.205)	-0.307 (0.118)	-0.168 (0.140)	-0.192 (0.144)
Match $\times 1[\text{network} > q_{50}]$		-0.168 (0.191)	-0.152 (0.151)	-0.363 (0.158)	-0.206 (0.163)	-0.148 (0.182)
Match $\times 1[\text{network} > q_{75}]$		0.376 (0.346)	0.181 (0.930)	-0.406 (0.131)	-0.617 (0.113)	-0.588 (0.139)
<i>Panel C.</i> Outcome: network measure $\text{arcsinh}(\text{size})$						
Match		0.409 (0.103)	0.358 (0.094)	0.185 (0.084)	0.155 (0.093)	0.116 (0.113)
N	7,590	7,590	7,590	7,590	7,590	7,590
Canton FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Placement year & month FE	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficients analogous to E.1.1, see notes therein; we use alternative network measures for our main outcome: weight by gestation. In Panel A, we use the arcsinh transformation to account for the skewed distribution, and in B, the unrestricted quartile indicators, C shows that the network is not correlated with other refugees but with earlier immigrants (mothers), as expected. Panel A shows the math effect evaluated at the mean network, via $\tau_{\text{Match}} + \tau_{\text{Match} \times \text{network}} \times \overline{\text{network}}$ shows the marginal effect of the match evaluated at the mean of the respective network measure and p the corresponding p-value of the joint significance. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

Table E.1.3: ROBUSTNESS NETWORK: SHARES, MUNICIPALITY

	All co-national mothers			Co-national refugees		
	Base	All	Recent	All	mothers	
					All	Recent
	(1)	(2)	(3)	(4)	(5)	(6)
Share of population						
<i>Panel A.</i> Outcome: weight/gestation, network measure: Share of population						
Match	0.227 (0.070)	0.262 (0.114)	0.296 (0.107)	0.355 (0.098)	0.412 (0.132)	0.416 (0.109)
Network		1.839 (1.499)	4.102 (6.287)	-0.048 (1.486)	0.941 (3.140)	4.153 (13.688)
Match × network		-3.848 (4.562)	-22.778 (19.055)	-8.289 (4.141)	-39.258 (22.524)	-99.014 (41.331)
<i>Panel B.</i> Outcome: weight/gestation, network measure: Share of population median-split						
Match	0.227 (0.070)	0.231 (0.092)	0.272 (0.078)	0.392 (0.091)	0.343 (0.079)	0.374 (0.074)
Match × 1[<i>network</i> > <i>q</i> ₅₀]		-0.009 (0.231)	-0.269 (0.135)	-0.337 (0.079)	-0.264 (0.128)	-0.373 (0.175)
Birth municipality fixed effects						
<i>Panel C.</i> Outcome: weight/gestation, network measure: <i>arcsinh</i> (<i>size</i>)						
Match	0.194 (0.074)	0.489 (0.301)	0.605 (0.271)	0.504 (0.214)	0.489 (0.248)	0.484 (0.164)
Network		0.094 (0.027)	0.068 (0.028)	-0.002 (0.035)	0.073 (0.026)	0.056 (0.037)
Match × network		-0.077 (0.062)	-0.147 (0.082)	-0.079 (0.050)	-0.101 (0.072)	-0.137 (0.065)
<i>Panel D.</i> Outcome: weight/gestation, network measure: network quartiles						
Match	0.194 (0.074)	0.295 (0.123)	0.392 (0.137)	0.466 (0.141)	0.376 (0.174)	0.420 (0.159)
Match × 1[<i>network</i> > <i>q</i> ₂₅]		-0.161 (0.189)	-0.412 (0.208)	-0.304 (0.180)	-0.128 (0.201)	-0.279 (0.215)
Match × 1[<i>network</i> > <i>q</i> ₅₀]		-0.271 (0.214)	-0.229 (0.192)	-0.523 (0.222)	-0.359 (0.224)	-0.302 (0.223)
Match × 1[<i>network</i> > <i>q</i> ₇₅]		0.264 (0.465)	-1.166 (1.203)	-0.425 (0.213)	-0.646 (0.256)	-0.745 (0.221)
<i>N</i>	7,590	7,590	7,590	7,590	7,590	7,590
Canton FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓
Placement year & month FE	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficients analogous to [E.1.1](#), see notes therein; we use alternative network measures for our main outcome, the weight by gestation, in Panel A and Panel B, the network shares and quartiles, respectively. Panels C and D use local area fixed effects, analogous to hospital fixed effects. *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, own calculations.

E.2 Heterogeneity and mechanisms

Table E.2.1: MECHANISMS: SUBSTITUTES AND COMPLEMENTS OF THE MATCH

Outcome variable: Weight by gestation							
	Asylum decision (1)	Resident permit (2)	Arrival family Any (3)	Adult females (4)	Cantonal availability of co-language (health) services:		
					Translator (5)	Hospital (6)	GPs (7)
Match	0.129 (0.104)	0.147 (0.097)	0.134 (0.077)	0.207 (0.085)	0.232 (0.086)	0.548 (0.263)	0.679 (0.235)
Match $\times D_i$	0.135 (0.080)	0.291 (0.174)	0.144 (0.130)	0.055 (0.125)	-0.060 (0.181)	-0.371 (0.276)	-0.525 (0.247)
N	7,683	7,683	7,683	7,683	7,683	7,683	7,683
Mean no match	11.91	11.91	11.91	11.91	11.91	11.91	11.91
Prob($D_i = 1$)	0.628	0.188	0.641	0.187	0.094	0.769	0.409
	Canton-level health environment:			Origin-level health environment:			
	Hospital beds > med (8)	NICU available (9)	1-yr IMR > med (10)	Life expect > med (11)	Births att. health pers. (12)	FGM common (13)	
Match	0.156 (0.087)	0.145 (0.122)	0.242 (0.083)	0.141 (0.089)	0.130 (0.080)	0.135 (0.089)	
Match $\times D_i$	0.342 (0.161)	0.176 (0.146)	-0.062 (0.155)	0.679 (0.370)	1.309 (0.296)	0.657 (0.333)	
N	7,683	7,683	7,683	7,683	7,683	7,683	
Mean no match	11.91	11.91	11.91	11.91	11.91	11.91	
Prob($D_i = 1$)	0.496	0.391	0.505	0.145	0.521	0.566	
Canton FE	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓
Place year & month FE	✓	✓	✓	✓	✓	✓	✓
Request FE	✓	✓	✓	✓	✓	✓	✓
Birth characteristics FE	✓	✓	✓	✓	✓	✓	✓

Notes: The table presents coefficient estimates and standard errors of regressions corresponding to Figure 7. Interaction indicators of different characteristics are denoted in the column header (and the corresponding main effect is added to the set of regressors). The share of the sample where $D_i = 1$ is shown at the bottom, as is the mean among the mothers with no language match. Based on our main data, Column 1 assesses the change in effects when the mother received her asylum decision by the time of giving birth, and Column 2 tests the change in effects when a residence permit was granted. Columns 3 and 4 assess whether the focal refugee mother arrived with family (3) or at least one other adult woman (4). Using employer–employee data on the total population, we assess whether at least one co-national is employed in translation business or in a hospital, or works as a general practitioner in the canton and at the year of birth. In the Panel below, we assess interactions based on the health (care) environment in the country of origin and the allocated canton. At the cantonal level, we interact the language match with an indicator for the above-median number of hospital beds per canton resident (8), an indicator capturing whether there is a NICU available (9), and the yearly (one year) infant mortality rate (10). At the county-of-origin level, we estimate interactions with the above median life expectancy at birth (11), an indicator capturing whether the share of births attended by health professionals is higher than 50% (12), and if female genital mutilation is common as reported by UNICEF (13). *Source:* ZEMIS 2010–2017, BEVNAT 2010–2017, CIA 2018, UNICEF 2019, UN 2019, BFS 2019, own calculations.

Table E.2.2: MECHANISMS: ALTERNATIVE OUTCOMES (NON-STANDARDIZED VERSION OF FIGURE 8)

	Good subj. health (1)	Any medication (2)	Psychotropic-medication (3)	Psychological problems (4)	Visited doctor or hospital (5)	Local language (6)	Consultations performed w translator (7)	Co-ethnic doctor (8)	Trust (9)	Health personnel Communication (10)
Match	0.133 (0.053)	0.133 (0.035)	-0.064 (0.082)	-0.117 (0.042)	0.045 (0.017)	0.162 (0.016)	-0.386 (0.034)	-0.051 (0.045)	0.013 (0.029)	0.161 (0.043)
N	4,332	4,307	2,152	4,332	1,249	1,188	1,189	1,191	1,222	1,228
Mean no match	0.58	0.47	0.72	0.25	0.95	0.69	0.63	0.19	0.89	0.72
Canton FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	all refugees 1 st year (11)	later (12)	female refugees 1 st year (13)	later (14)	Care duty offenses by fem. refugees (15)	Percentile share LBW (16)	Municipality-level Number of births (17)	Average refugee income (18)	Cumulative moves until birth (19)
Match	0.031 (0.019)	0.392 (0.265)	0.073 (0.046)	0.380 (0.378)	-0.004 (0.002)	0.028 (0.083)	522.412 (1014.886)	-447.516 (225.565)	0.002 (0.002)
N	8,379	8,379	4,929	4,929	4,929	7,683	7,683	7,683	7,683
Mean no match	0.04	1.57	0.03	1.28	0.00	6.08	4425.38	9050.50	0.03
Canton FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Month FE						✓	✓	✓	✓
Request FE						✓	✓	✓	✓
Birth characteristics FE						✓	✓	✓	✓

Notes: Corresponding to Figure 8, the table presents coefficients and cluster-robust standard errors clustered at the canton level. We present the non-standardized versions, including the mean of the respective groups with no language match. The first panel is based on the migrant health monitoring in 2004 (GMM). The survey sample includes female migrants (refugees and regular migrants). Match equals one when the interview was conducted in the residence canton's language (French or Italian). Interviews conducted in German are excluded (including them does not affect the estimates). The resulting sample thus reflects our main sample of refugee women well. Column 1: indicator for Likert-scaled subjectively assessed health (1 for good and very good). Column 2: indicator if currently taking any prescription medication (yes/no). Column 3: indicator for any mental health prescription medication (sleep, opioids, sedatives). Column 4: indicator for stated psychological problems (yes/no). Column 5: indicator if the respondent has been to the doctor or hospital in Switzerland since arrival. Columns 6-8: indicators of the mode of communication during these visits (at least once in the local language, with a translator, done by a co-ethnic doctor). Columns 9 and 10 capture Likert-scale questions on the perceived trust in doctors and health personnel as well as communication quality during these visits (1 for high and highest trust/quality). In the second Panel, the data includes all refugees in the respective register data (employment registry and crime registry). These registries cannot be merged with the birth registry and do not contain canton allocation information. However, both cover the full population data and, therefore, the individuals in our main sample. Shares are calculated by the total number of employed or crimes committed divided by the total number of arrivals times 100 in each origin-canton-year cell. Columns 11-14 capture the employment shares in the first year after arrival and at any point during the observation period (7 years), respectively, for all and for female refugees. Column 15 measures the share of care-duty violations. Columns 16-19 use our main data to assess the role of municipality-year-level variables, similar to neighborhoods with short travel distances. In principle, refugees are free to locate anywhere within their assigned canton. In practice, refugees often do not have the means to organize or pay for housing themselves, so that housing is assigned. Columns 16-18 show neighborhood characteristics in the refugee mothers' residence at the time of birth: percentile of the share of (all) children born with low birth weight (from the birth registry), the total number of children born, and the yearly average income among all employed refugees. Column 19 is a count variable capturing the mother's number of moves across municipalities before birth. *Source:* Employment registry 2010–2017, Crime registry 2010–2017, ZEMIS 2010–2017, BEVNAT 2010–2017, CIA World Factbook 2018, own calculations.

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