The Intra-household Effects of Refugee Inflows on Native Families

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Abstract

The mass refugee migration from Syria to Turkey has heterogeneous impacts on the labor market outcomes of natives. In particular, women are more adversely affected than men. Motivated by this gendered effect, I investigate the intra-household consequences of this forced displacement on native households. Using a distance instrument to address the endogeneity in refugees' location choices, I first show that husbands' relative earnings in native households increase with the influx of refugees. Using a structural household labor supply model, I then estimate the impact of refugee inflows on spouses' joint labor supply, intra-household transfers, and the welfare of household members. In native families, women's share of household resources and their welfare decrease with the refugee influx, while men's resource share and welfare increase. The magnitude of the estimated effects varies by spouses' education and earnings potential. I simulate the effect of imposing quotas on the number of refugees in the country or limiting refugee intensity in each region. I find that quotas slightly alleviate the intra-household impacts. By contrast, regional limits may have the unintended effect of worsening women's intra-household welfare in most native families.

Keywords: collective model, labor supply, intra-household resource allocations, individual welfare, migration, Syrian refugees, Turkey.

JEL Codes: D10, D13, F22, I31, I32, J22, O15.

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1 Introduction

Forced migration impacts the labor market outcomes of natives in host countries. Previous studies show that the effect can be heterogeneous across genders (Whitaker, 2002; Alix-Garcia and Bartlett, 2015; Morales, 2018; Aksu et al., 2022). As the intra-household bargaining position of family members is closely linked to their earnings potential (Browning et al., 2014), mass migration with gendered labor market effects might change the bargaining power distribution within native households. The salience of intra-household bargaining pertains to intra-household inequality, as household members' share of household resources depends on their say (Browning et al., 1994, 2013). For this reason, shocks that change spouses' earnings potential might have significant welfare repercussions.[1] This study explores the intra-household effects of mass refugee migration from Syria to Turkey, which had differential impacts on the labor market outcomes of native men and women.

The Syrian refugee migration to Turkey is one of the most significant episodes of forced migration in recent history. The civil war in Syria, which started in 2011, resulted in an unprecedented displacement of people from the country. Currently, 6.76 million of its former citizens (around 32% of its pre-war population) live in other countries as refugees. And Turkey is the most common destination country as it hosts 3.7 million Syrian refugees, which corresponds to around 4.3% of its population (UNHCR, 2022b).

Two institutional factors are critical in identifying the impact of the refugee influx in Turkey. First, refugees are not granted work permits by the Turkish government and enter the local labor markets as informal employees. As a consequence, they compete with native workers in the informal sector, which mostly comprises women and low-educated individuals. This situation resulted in potentially severe adverse effects on the labor market outcomes of these groups (Aksu et al., 2022; Cengiz and Tekgüç, 2022). Second, the movement of refugees in Turkey is unrestricted, which has led to significant spatial heterogeneity in refugee intensity across regions.[2] That is, some regions are affected by the refugee inflows more than others. This heterogeneity, together with the timing of the refugee inflows, provides a natural setting to analyze the impacts of this mass migration in a difference-in-differences design with continuous (refugee intensity) treatment.

First, using a difference-in-differences IV identification strategy, which addresses the endogeneity in refugees' location choices by a distance instrument, I provide quasi-experimental evidence of the impact of the refugee influx on various labor market outcomes of men and women in native households. I show that refugee inflows decrease wives' employment probability with no adverse effects on husbands'. Among employed individuals, husbands work less, and wives work more due to refugee migration. Therefore, the results show that the employment opportunities of spouses are differently impacted. Moreover, the refugee influx increases the earnings gap between spouses in favor of husbands, except in households where the wife is more educated than the husband. Overall, these findings suggest that the bargaining power distribution within native households might change with an increase in refugee presence.

Motivated by these preliminary results, I develop a structural intra-household model to understand the impact of this mass migration on the inner workings of native households. Specifically, I

[1] Previous research shows that household resources are not equally distributed among household members, and intra-household inequality accounts for a considerable portion of total inequality in society (Lise and Seitz, 2011; Dunbar et al., 2013; Calvi, 2020).

[2] Refugee intensity is defined as the (percentage) ratio of the number of refugees to natives in a region. This definition is used throughout the paper.

use a collective household model (Chiappori, 1988, 1992) to estimate the changes in the labor supply decisions of households, intra-household transfers, and the welfare of household members due to refugee inflows. The collective model is particularly useful for this task as it can accommodate the differential impact of this exogenous shock on husbands and wives. Unlike in the unitary household model, in the collective model, each member has different preferences over goods and leisure and can be allocated different shares of household resources. Moreover, the model can be used to measure the changes in individual-level intra-household welfare due to refugee inflows.

I extend the basic collective labor supply model so that local refugee intensity shifts the labor supply functions of each household member and the intra-household *sharing rule*. Moreover, as in the quasi-experimental analysis, I tackle the endogeneity in refugee intensity across regions using a distance instrument. So, I incorporate the difference-in-differences IV approach into the structural household model and estimate the causal impact of refugee inflows on the structural parameters underlying individual preferences for leisure and the intra-household allocation of resources.

The empirical results show that Syrian refugee inflows decrease women's resource share in Turkish households while the resource share of men increases. The estimated impact, at the average refugee intensity, amounts to a reduction in wives' share equivalent to 3.88% of the average household full income. Using the underlying preferences for the structural labor supply functions as an intra-household welfare measure, I estimate a decrease in women's intra-household welfare equivalent to a 4.03% reduction in their share of full household income, on average. By contrast, men experience welfare gains, equivalent to an increase of 3.34% in their share of household resources. Taken together, the findings presented in this study indicate that the forced migration of Syrian refugees into Turkey has adverse intra-household effects for native women, while native men seem to be better off.[3] The magnitude of the effects varies depending on the relative wage between spouses and their educational attainment. The model estimates are robust to a set of different specifications tackling pre-treatment trends and the choice of instrument.

Based on the structural estimates, I simulate the effect of two types of policy experiments. First, I analyze the impact of quotas that limit the number of refugees admitted to the country. Second, I investigate the effect of regional limits on refugee intensity, which essentially restrict the share of refugees as a fraction of the native population in each region. The counterfactual analyses show that quotas slightly alleviate the intra-household impacts. By contrast, imposing regional limits on refugee intensity re-distributes the effects from the regions with the highest refugee intensity to other areas and hence may have the unintended effect of further decreasing women's share of resources in most native families.

In terms of policy implications, my analysis shows that taking into consideration the intra-household repercussions of refugee inflows that have gendered impacts on the local labor market is critical. The findings show that certain policies may help alleviate the adverse intra-household effects on women of the refugee influx, while others might unintentionally exacerbate them. If the latter policies are to be pursued, it is advised to introduce complementary policies to counteract those effects that could aggravate the existing intra-household inequalities. Finally, the estimated number of individual refugees who have fled from Ukraine between February and October 2022 totals 7.6 million (UNHCR, 2022a). While this study focuses on the influx of Syrian refugees in Turkey,

[3]Note that the main focus of the study is leisure (labor supply) preferences and resource allocation within the household. Therefore, the findings address one aspect of overall well-being and are silent about others. Section 6 discusses the welfare measure in detail.

it stresses the importance of accounting for the differential effects by gender of other episodes of forced migration when devising policy solutions to address them.

The rest of the paper proceeds as follows. Section 2 reviews the literature. Section 3 provides background information about the Syrian refugee crisis. Section 4 introduces the data used in the study. Section 5 describes the quasi-experimental analysis and documents the impact of refugee inflows on the labor market outcomes of native households. Section 6 presents the theoretical framework and empirical strategy for the structural analysis. Section 7 provides the main results and discusses robustness checks and policy experiments. Section 8 concludes.

2 Related Literature

This paper relates to two separate fields in the literature: economics of migration and economics of the family. Within the latter, a set of papers document intra-household impacts of changes in labor market conditions; others develop structural models to analyze the inner workings of the household. This study is at the intersection of these two lines of research as it explores the intra-household effects of an exogenous shock to the labor market within the framework of a structural household model. The exogenous shock is mass migration, making the study particularly relevant to the economics of migration literature. This section discusses the paper's contribution to these different areas of research.

The repercussions of mass migration in terms of labor market outcomes in host countries have been extensively studied in economics using quasi-experimental methods. Examples include Card (1990), Hunt (1992), Carrington and De Lima (1996), Friedberg (2001), Mansour (2010), and Glitz (2012). In developing country contexts, researchers have studied the Darfur conflict in Sudan (Alix-Garcia and Bartlett, 2015), Colombian conflicts (Calderón-Mejía and Ibáñez, 2016; Morales, 2018), and refugee influx from Burundi and Rwanda to Tanzania (Maystadt and Verwimp, 2014; Ruiz and Vargas-Silva, 2015; Maystadt and Duranton, 2019) to analyze various labor market impacts of involuntary mass migration. Recently, the civil war in Syria and the refugee influx to neighboring countries have received significant attention. Several studies documented how Syrian refugee inflows to Turkey influence the labor market outcomes of natives (Del Carpio and Wagner, 2015; Ceritoglu et al., 2017; Aksu et al., 2022; Cengiz and Tekgüç, 2022).[4] Their findings show that the impact of refugee inflows is heterogeneous regarding gender and education. The effect is particularly negative and severe for women and less educated. Motivated by these findings, the present study explores the intra-household impacts of forced migration on native households. Specifically, the study contributes to this literature by shedding light on the effect of the migrant influx on joint labor supply decisions of spouses, intra-household transfers, and the welfare of household members. In regard to welfare results, some previous studies in this literature use consumption (household-level or per adult equivalent) as a proxy for welfare (Maystadt and Verwimp, 2014; Maystadt and Duranton, 2019), whereas others use self-reported subjective well-being measures (Akay et al., 2014; Betz and Simpson, 2013; Kuroki, 2018; O'Connor, 2020). The present study complements this research by estimating the impact of migration on natives' intra-household welfare, which is based on their

[4] Others studied the impacts of the Syrian migration to Turkey in terms of consumer prices (Balkan and Tumen, 2016), mortality of natives (Aygün et al., 2021), school enrollment and human capital accumulation among native children (Tumen, 2018, 2021), capital intensity of firms and tasks performed by native employees (Akgündüz and Torun, 2020), and crime (Kırdar et al., 2022).

preferences and bargaining position in their households.

Forced migration constitutes an exogenous shock to the labor market with differential impacts on spouses. Previously, the impact of changes in labor market conditions on intra-household time allocations (Skoufias, 1993), bargaining and decision-making power of women (Dasgupta, 2000; Majlesi, 2016; Kim and Williams, 2021), domestic violence (Aizer, 2010; Heath, 2014; Erten and Keskin, 2021), and women's marriage and fertility decisions (Jensen, 2012; Heath and Mobarak, 2015) has been studied. In particular, Erten and Keskin (2021) analyze the effect of female employment on intimate partner violence by using the refugee influx from Syria to Turkey as an exogenous shock, which causes a decline in female employment with no significant impact on males'. These studies rely on direct (self-reported) survey measures of decision-making power and domestic violence. The present study is a step forward in this line of research as it analyzes the consequences of (potential) changes in intra-household bargaining due to changes in labor market conditions.

The main analysis of the study is not possible with reduced-form methods, as the distribution of household resources and household members' welfare are not observed in standard household surveys. The structural analysis is based on the collective household model developed by Chiappori (1988, 1992). The restrictions of the model have been tested in various contexts, and the findings give strong evidence in favor of the collective model against more restrictive unitary household models (Fortin and Lacroix, 1997; Browning and Chiappori, 1998; Kapan, 2009; Dauphin et al., 2011; Sözbir, 2022). In particular, Kapan (2009) shows that Turkish households behave in a way that is compatible with the collective model. Chiappori's seminal model is extended to allow non-participation (Donni, 2003; Blundell et al., 2007; Bloemen, 2010) and used to recover intra-household resource allocation (Chiappori et al., 2002; Couprie, 2007; Lise and Seitz, 2011; Cherchye et al., 2012; Bloemen, 2019). An important advantage of the model from an empirical point of view is that observing the labor supply decisions of household members is sufficient to identify the resource allocation (up to a constant) within the household.[5]

The theoretical framework of the study is based on Donni (2003), which extends the basic collective model to allow for corner solutions. This is particularly important as the labor force participation rate of women is low in Turkey. Methodology-wise, empirical papers by Bloemen (2010) and Lacroix and Radtchenko (2011) are similar to this study. Taking the participation decisions of spouses into account, Bloemen (2010) develops and estimates a collective model, allowing parameters to change with marital status (married vs. cohabiting). Relying on a similar model, Lacroix and Radtchenko (2011) estimate the intra-household effects of economic transition in Russia by allowing the model parameters to shift before and after 1998. I develop a collective labor supply model that incorporates spouses' participation decisions, where mass migration affects household labor supply and intra-household transfers. Specifically, the parameters of the model are specified as functions of local refugee intensity, which allows the estimation of the impact on various components of the model. In this regard, this study provides an empirical collective labor supply model that can incorporate a continuous treatment effect on household decisions. The use of quasi-experimental methods is not common in the collective household literature; as a result, most studies provide descriptive findings (e.g., intra-household inequality) based on the model estimates. Us-

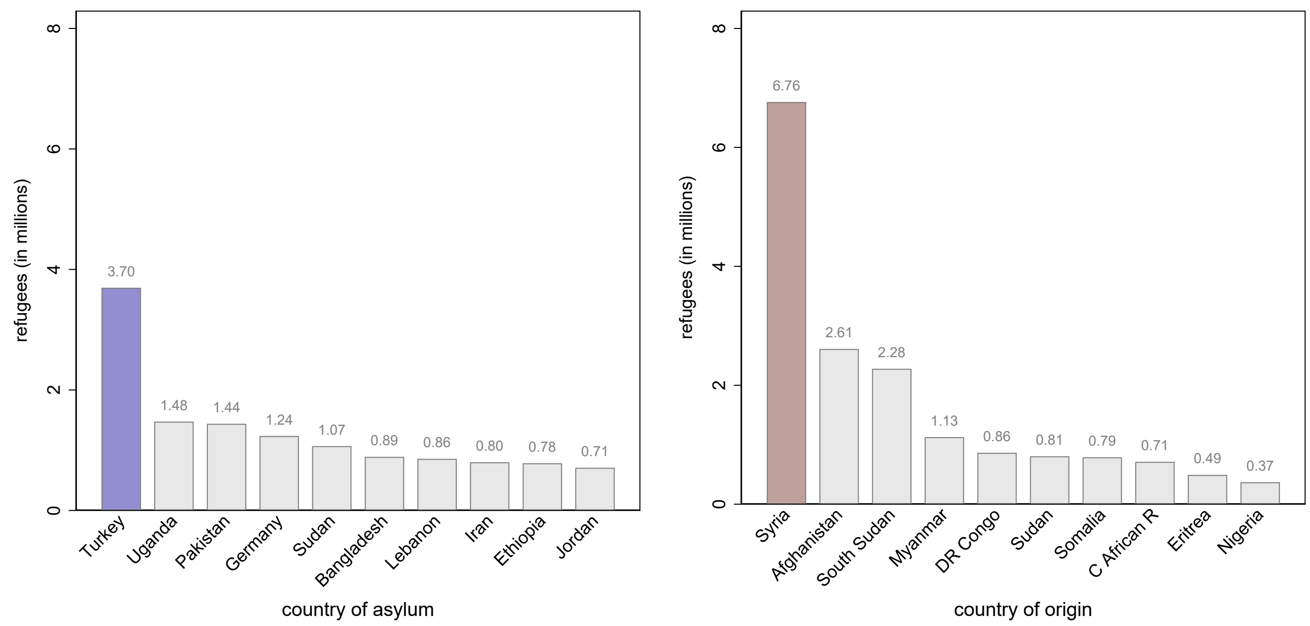
[5]Assuming the separability of consumption and leisure/labor supply decisions, another line of research in the collective household literature focuses solely on household expenditure. Examples include Browning et al. (1994), Lewbel and Pendakur (2008), Browning et al. (2013), Dunbar et al. (2013), Calvi (2020).

ing a difference-in-differences IV design within the collective model, this study estimates the causal impacts of an exogenous shock on intra-household outcomes.

3 Background Information: Syrian Refugees in Turkey

The institutional framework is important in identifying the intra-household impacts of forced migration in host countries. This section provides background information on Syrian refugee migration and the legal framework pertaining to refugees in Turkey.

Figure 1: Refugees in the World: Countries of Asylum and Origin



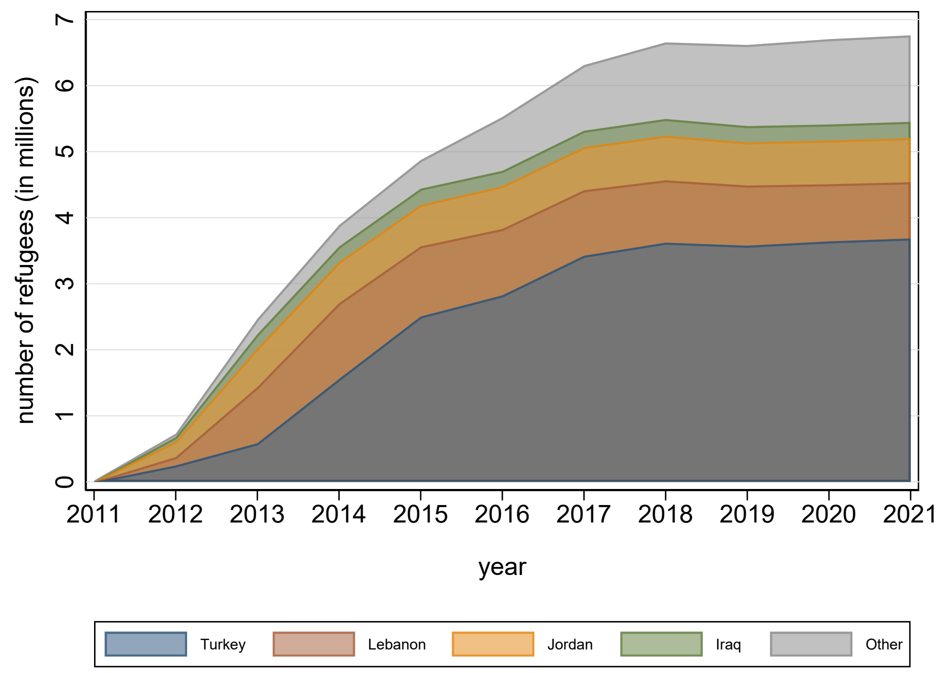
Notes: The left (right) figure shows top ten destination (origin) countries in terms of refugee population. Source: UNHCR, year 2021.

The wave of pro-democracy protests, so-called the Arab Spring, started in December 2010 in Tunisia and spread to other North African and Arab countries, causing regime changes in Tunisia, Libya, and Egypt. In March 2011, protests broke out in Syria which led to a civil war that caused an unprecedented displacement of people from the country. Currently, around 6.76 million Syrians are living in other countries as refugees and Turkey hosts 3.7 million of them. Figure 1 shows the top ten asylum and origin countries in terms of numbers of refugees in the world by the end of 2021. Syria and Turkey are the most significant countries of origin and destination for refugees, respectively.

Since the beginning of the civil war in Syria, Turkey followed an open border policy towards Syrians. From 2011 to 2018, number of Syrian refugees in Turkey dramatically rose from 8,000 to around 3.6 million, and stabilized afterwards. A survey conducted by the Turkish Disaster and Emergency Management Authority (TDEMA) shows that 55.7% of Syrian refugees entered Turkey through unofficial border crossing points, and 27.7% used official border crossing points without having a passport (TDEMA, 2017). Turkey has been the most significant destination country, yet other three neighboring countries of Syria, namely Lebanon, Jordan, and Iraq have received considerable number of refugees as well. Figure 2 shows the number of Syrian refugees in four neighboring countries over time.[6] An important factor for refugees' choices of destination country was their location in Syria before the war. Field surveys show that accessibility and ease of transportation

[6]Germany has the highest number of Syrian refugees among non-neighboring countries.

Figure 2: Syrian Refugees in Neighboring and Other Countries



Notes: Number of Syrian refugees in neighboring and other countries during 2011-2021. Germany is the most important destination country within the "Other" category. Source: UNHCR, year 2021.

were the most important factors affecting refugees' destination (TDEMA, 2013, 2017). As a result, among thirteen regions (governorates) in Syria, Turkey received more refugees from the ones that are closer to its border with Syria. For example, while 24% of Syrians were living in Aleppo before the war in 2011, the share of refugees coming from Aleppo in Turkey is 51%.[7]

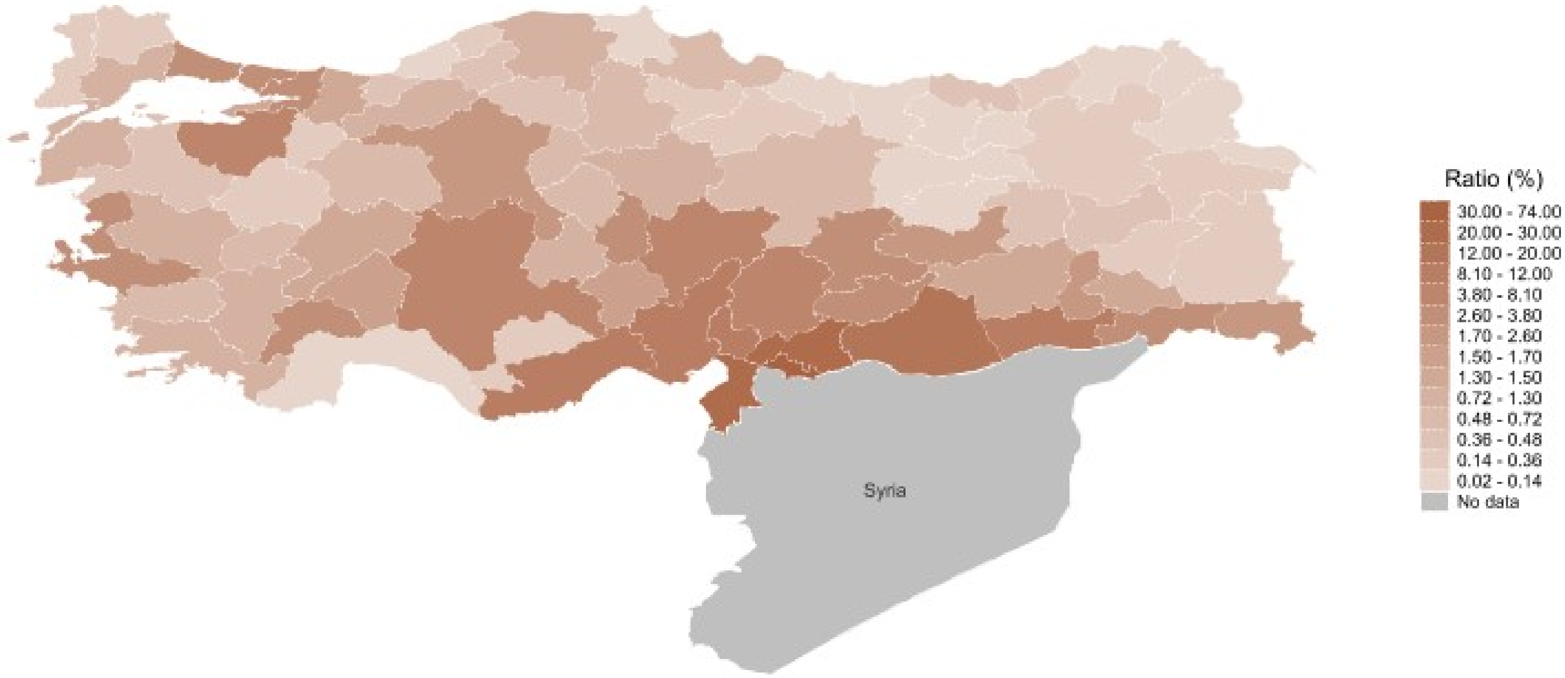
The survey by TDEMA (2017) shows that 79.6% of refugees chose to migrate to Turkey due to safety reasons, and others left Syria due to political and economic reasons. Among surveyed refugees, 35.7% (28.8%) report that at least one of their household members have been killed (injured) during the civil war. The Turkish government enacted a law that gave refugees a "temporary protection" status.[8] Under this policy, refugees are provided with certain rights and services including access to education and health services. However, the temporary protection regulation does not provide refugees with work permits. As a result, Syrian refugees entered the labor market in Turkey as informal workers (i.e., without social security coverage).[9] Concerning the demographic characteristics of refugees, a survey by TDEMA and WHO (2016) shows that the sex ratio of refugees is close to one and on average refugees are less educated than natives (see Figure 15 and Table 12 in Appendix C for the comparison of educational attainment of refugees and natives). Among refugees aged 18-65, 80.5% are currently married. On average, 3.5 adults aged 18-65 live in refugee households. With regard to employment, 15.4% of refugees do not work, and 84.4% of refugee women work at home (informally). Overall, lower educational attainment compared to natives, lack of work permits, together with common occupational downgrading (Dustmann et al., 2013), refugees become substitutes for natives who are more likely to be employed informally, i.e., women and low educated. In this regard, the refugee crisis in Turkey can be seen as an exogenous shock to the labor market, with differential impacts on natives depending on their gender and educational

[7] See the map in figure 13, which is based on Syrian Civil Affairs records, and the maps in figure 14, which are based on TDEMA (2013) and TDEMA (2017), in Appendix B.

[8] Syrians are given this status under Temporary Protection Regulation, in accordance with Article 91 of Law No: 6458, 2013. The law was promulgated in October, 2014 after published in Official Gazette No:29153.

[9] Very few work permits are issued for refugees until the beginning of 2016.

Figure 3: Syrian Refugees in Turkey, Province Level



Notes: Year 2020. Number of Syrian refugees divided by Turkish population multiplied by 100 (refugee intensity) at the province level. Source: Turkish Directorate General of Migration Management (TDGMM) and Turkish Statistical Institute (TurkStat).

attainment.[10]

Another important factor that allows identifying the impact of refugee influx concerns refugees' location choices. The movement of refugees in Turkey is not restricted.[11] Initially, they are settled in 25 camps established in the southeast part of the country, which is close to Syria. However, as the number of refugees increased the capacity of the camps, they moved to different provinces of Turkey. By the end of 2016, only 9.3% percent of refugees were living in camps (TDEMA, 2017). Figure 12 in Appendix B provides maps showing the spatial distribution of refugees across 26 NUTS2 regions of Turkey.[12] Specifically, I show the refugee intensity, defined as the ratio of refugees to native population (multiplied by 100) in each region during 2013-2015. As visible on these maps, the number of refugees substantially increased in the country during this period and many refugees moved to central and western parts. While the refugee intensity is still highest in southeast regions, considerable number of refugees are living in big cities in other regions including Istanbul, Bursa, Izmir, or Konya. Figure 3 shows the spatial distribution of Syrian refugees across 81 Turkish provinces by the end of 2020.[13]

To complement the visual evidence provided by the maps, I formally test whether refugees are clustered in certain regions. Specifically, I test the spatial auto-correlation in refugee distribution with Moran's I test using the k-nearest neighbor spatial weight matrix.[14] The results show that

[10]Section 5 documents these differential impacts on the population of interest for the present study.

[11]Refugees are also allowed to visit Syria during their stay in Turkey: 23% of them reported that they visited Syria at least once to visit their families (53.4%), check their houses/assets (32.2%), or for commercial reasons (6.5%) (TDEMA, 2017).

[12]NUTS (Nomenclature of Territorial Units for Statistics) levels are standard geographic subdivisions used in Europe. There are 12 NUTS1 and 26 NUTS2 regions in Turkey.

[13]I show the province-level map for the latest available data, which was year 2020 by the time this paper is written. The empirical analysis is based on years 2013-2015, and larger geographic units (NUTS2). See Section 4 for details.

[14]Appendix B provides the details of the spatial analyses.

there is a significant positive spatial auto-correlation across provinces of Turkey in terms of Syrian refugee intensity. The results hold for each year 2013-2020, and under each choice of $k \in 1, \ldots, 4$ for the spatial weight matrix. This means that refugees are not randomly distributed, and there are clusters of regions with high (or low) intensity. The spatial heterogeneity in refugee intensity across regions of Turkey is exploited in this study to identify the impact of the influx. Moreover, I consider a policy experiment limiting regional intensity, i.e., re-distributing the refugees from high-intensity to low-intensity regions, in Section 7.3.

4 Data

The main dataset used in this study is the Turkish Household Labor Force Survey (THLFS) conducted by the Turkish Statistical Institute (TurkStat). The THLFS is a repeated cross-sectional survey of Turkish residents and is representative of the population in each NUTS2 region. The survey provides detailed information on the employment and demographic characteristics of household members aged 15 and above. It has been used in previous studies that analyze the impacts of Syrian migration to Turkey, including Del Carpio and Wagner (2015), Ceritoglu et al. (2017), and Aksu et al. (2022). I use rounds 2004-2015 of the THLFS except for 2012, as the number (and spatial distribution) of refugees in Turkey is not known for that year. I start with the year 2004 since the structure of the survey changed in that year. Finally, I stop at the year 2015 due to a significant minimum wage increase at the beginning of 2016, which can impact the labor supply decisions of natives.

There are three sources of data on the number of Syrian refugees in each of 81 provinces of Turkey: TDEMA (2013) for the year 2013, Erdoğan (2014) for the year 2014, and the Turkish Directorate General of Migration Management (TDGMM) provides information for the year 2015 and following years.[15] I aggregate these province-level numbers to NUTS2 level and combine them with the micro-level household data from the THLFS.[16] Table 6 in Appendix B shows refugee intensity (calculated as the number of refugees divided by native population) in each NUTS2 region for each year. To construct the distance instrument defined in Section 5, I use information from Syrian Civil affairs records from 2011 on the shares of pre-war Syrian population across 13 governorates of Syria.[17] Finally, I use data on the trade activity of each Turkish province with Syria during the sample period, which is provided by the TurkStat (see Table 13 in Appendix).

As usual in the collective household literature, the sample selection is relatively restrictive. The main estimation sample consists of nuclear households with positive labor income. Specifically, I select households where (1) both spouses (or parents) are present, (2) there are no children aged above 14 or other adult members, and (3) either or both spouses are wage income earners. The research question is particularly relevant for households with both spouses; therefore, the first condition excludes single-member or single-parent households.[18] The second condition ensures that the spouses are the only decision-makers in the household. If there are older children or other adults (e.g., el-

[15] TDEMA (2013) provides information on the number of refugees only for provinces with camps. Around 80,000 refugees are reported as residing in other provinces. Following Aksu et al. (2022), I distribute these Syrians to those provinces without camps, based on their shares in 2014.

[16] The information on the number of refugees is for the end of each year, while the THLFS represents the full year. Therefore, I adjusted the refugee numbers based on monthly refugee information in the whole country provided by the UNHCR.

[17] The governorates Damascus, which includes the capital, and the countryside Damascus (Rif Dimashq) are combined.

[18] Also note that single-member or single-parent households correspond to a tiny fraction of Turkish households.

derly or other relatives), they are likely to have intra-household bargaining power; therefore, their labor supply decisions need to be modeled as well. The third condition is required to identify the structural household model; if neither of the spouses is working, there is no labor supply function to estimate the parameters of interest. Finally, I drop households at the lowest and highest one percent in total labor earnings to make sure that the results are not driven by outlier observations.[19] This leaves me with a sample size of 273,576 households (the main sample).

Table 1: Descriptive Statistics: Main Sample

	mean	sd
Household:		
Household size	3.52	1.09
Number of children	1.52	1.09
Total labor income (weekly)	314.50	222.96
Husband:		
Age	35.91	7.57
Below high school	0.49	0.50
High school	0.27	0.45
Above high school	0.24	0.43
Employed	0.98	0.14
Hours (weekly)	51.73	12.93
Labor income (weekly)	265.62	153.55
Hourly wage	5.68	4.06
Wife:		
Age	32.24	7.61
Below high school	0.63	0.48
High school	0.21	0.41
Above high school	0.16	0.36
Employed	0.22	0.41
Hours (weekly)	42.68	11.92
Labor income (weekly)	263.04	142.88
Hourly wage	6.80	4.53
Observations	273,576	

Notes: THLFS, years 2004-2015 excluding 2012. Estimation sample corresponds the set of households used in the empirical application of the structural model. Labor income is in Turkish Lira and CPI adjusted (base year 2010).

Table 1 shows the descriptive statistics for the estimation sample. There are, on average, 1.52 children (aged less than 15) in selected households. The average ages of husbands and wives are 35.91 and 32.24, respectively. Husbands are, on average, more educated than their wives. The educational attainment of 51% (37%) of husbands (wives) is high school and above. Husbands are employed in 98% of the households, while only 22% of the wives are employed. Therefore, in 2% of households wife is the sole income earner.[20] Among those employed, on average, husbands work 52 hours per week with a 5.68 hourly wage rate, and wives work 43 hours with an hourly wage rate of 6.80.[21]

[19] Additionally, I drop ten households where spouses' wages are extremely high (hourly wage is more than 80 for husband or more than 60 for wife). Dropping observations at the top of the wage distribution is common (e.g., Lise and Seitz (2011)). I drop households at the bottom one percent of labor income because these households might have significant (unobserved) non-labor income.

[20] Again, these employment figures are affected by the sample selection. When all nuclear households are considered, 81% of husbands and 24% of wives are working. See Table 7 in Appendix.

[21] Note that the wage rates and weekly hours are for employed individuals. The predicted wage rates of non-working women are much

To analyze how restrictive is the third condition of the sample selection, I provide descriptive statistics of all nuclear households that satisfy the first two sample selection criteria in Table 7 in Appendix C. Note that most employed people (69% of male and 57% of female) are wage income earners in these households. The main sample consists of spouses that are younger and more educated on average. Therefore, the study's main results are relevant to a select population, though still corresponding to a significant portion of the whole population. A similar analysis focusing on households that are excluded due to household composition (e.g., extended families) or members' employment statuses (e.g., self-employed) is left for future research.[22]

5 Preliminary Analysis

In this section, I document the impact of the refugee influx on various labor market outcomes of Turkish households and their members. I exploit the variation in refugee intensity across NUTS2 regions over time to identify the impact. As refugees can choose to settle in regions with high labor market returns (the source of endogeneity), simply regressing the labor market outcomes of natives on regional refugee intensity will give biased estimates. To address this endogeneity, I use an instrumental variable strategy, which utilizes a distance-based instrument. The findings of this section then motivate the structural intra-household model developed in the next section.

Let y_{ijt} denote the labor market outcome of individual (or household) i, residing in (NUTS2) region j at time t. I estimate the following equation,

$$y_{ijt} = \beta_0 + \beta_1 r_{jt} + \beta_2 x_{ijt} + \beta_3 z_{jt} + \mu_j + \mu_t + \theta_{kt} + \epsilon_{ijt}, \tag{1}$$

where r_{jt} denotes the refugee intensity (in percentage), calculated by dividing the total number of refugees by native population in region j at time t, multiplied by 100. Therefore, the parameter of interest β_1 shows the effect of increasing migrant to native ratio by one percentage point on the outcome of interest. The individual-level outcomes that I consider are: a binary variable for employed (or worked), log income, weekly hours, and hourly wage rate, which is calculated by dividing earnings to hours. The household-level outcomes are (log) total labor income, and the relative earnings between couples calculated by subtracting the log income of the wife from the log income of the husband. For individual-level outcomes, x_{ijt} includes age, age square, three education categories of individual i, and the number of children in his/her household.[23] Education categories are below high school, high school, and above high school. For household-level outcomes, x_{ijt} includes age, age square, and three education categories for both spouses as well as the number of children in household i.[24] In addition to individual and household characteristics, I include the log trade volume of each region j with Syria for each year t as a proxy for time-varying region characteristics (z_{jt}). Region and time fixed effects are denoted by μ_j and μ_t. Finally, θ_{kt} denotes (broader) region and time interactions, which are included to ensure that the results are not driven

lower. See Section 6 for further discussions regarding wage equations.

[22]Note that the impact of refugee influx might be more severe in these households considering the educational attainment of their members.

[23]For individual-level regressions, I use adults (spouses) in all nuclear households with no children aged 15 or above. See Table 7 in Appendix C for descriptive statistics of this sample.

[24]The sample of households used in the household-level regressions is the same sample used in the structural analyses. See Section 4 for the details of the sample selection.

by differential pre-existing time trends across regions. Following Aksu et al. (2022), I use three different specifications for θ_{kt}: the interaction of 5-broad-region and year fixed effects as well as time trends for 5 broad regions and 12 NUTS1 regions. These 5 broad regions are (1) West, (2) Central, (3) South, (4) North, (5) East.[25] In addition to these alternative specifications regarding θ_{kt}, I estimate the model (1) without any region and time interactions as well. The main specification, which the results in this section are based on, includes the interaction of 5-broad-region and year fixed effects. In line with the sampling design of the survey, standard errors are clustered at the year and NUTS2 region in all regressions.

Refugees can make location choices considering local economic opportunities. Therefore, r_{jt} is likely to be endogenous, and estimating the equation (1) by OLS is likely to give biased estimates. To address this endogeneity, I use the following distance-based instrument suggested by Aksu et al. (2022) for refugee intensity r_{jt},

$$i_{jt} = \sum_{s} \frac{\frac{1}{D_{sT}}}{\frac{1}{D_{sT}} + \frac{1}{D_{sL}} + \frac{1}{D_{sJ}} + \frac{1}{D_{sI}}} \pi_s \frac{M_t}{D_{js}}, \quad (2)$$

where π_s denotes the share of the pre-war Syrian population in Syrian governorate s, D_{js} is the travel distance from Syrian governorate s to Turkish region j, D_{sc} is the travel distance between the Syrian governorate s and four neighboring countries (c), which are Turkey (T), Lebanon (L), Jordan (J), and Iraq (I), and M_t is the total number of Syrians in these countries at time t.[26] The instrument (2) is an extension of the instrument suggested by Del Carpio and Wagner (2015), defined as $i_{jt}^{alt} = \sum_s \frac{1}{D_{js}} \pi_s M_t^T$, where M_t^T is the total number of refugees in Turkey.[27] The advantage of the instrument i_{jt} over i_{jt}^{alt} is that while Turkey is the most important destination country, other neighboring countries received a significant number of refugees as shown in Figure 2. And the pre-war location of Syrians (i.e., their distance to neighboring countries) affected their choice of the destination country. For the main specification, I estimate the equation (1) by 2SLS using the instrument i_{jt} for r_{jt}. As robustness checks, I estimate by OLS and 2SLS using the instrument i_{jt}^{alt}.[28] For individual-level outcomes, I estimate the model separately for male and female individuals. I also run separate regressions for sub-samples of high-educated and low-educated individuals. A person is considered as low educated if his/her educational attainment is below high school, and high educated if high school or above. For household-level outcomes, I estimate the model for four different household types, depending on the educational attainment of the spouses. Refugees have become substitutes to those who are more likely to be employed informally, i.e., women and less educated. Therefore, it is important to estimate the impact of migration on household outcomes (e.g., the income gap between spouses) for different education combinations of couples. Appendix D provides the results for all specifications. Here I present the results of individual-level outcomes

[25] Table 6 in Appendix B shows the NUTS2 regions contained in each of these five broad regions.

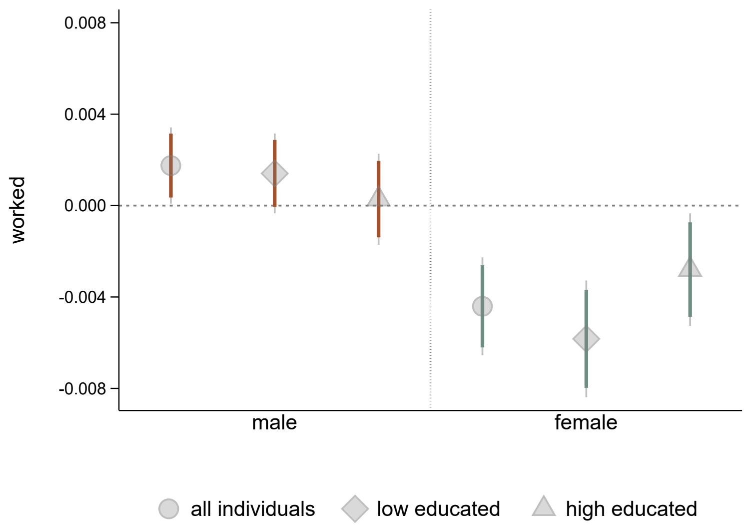
[26] There are 13 governorates in Syria. I use Google Maps to measure the shortest travel distance between Syrian governorates and neighboring countries (or regions of Turkey) using one of the 15 borders of Syria to Turkey (6), Lebanon (4), Jordan (2), and Iraq (3).

[27] Distance-based instruments are particularly relevant as the refugee migration was initially considered as temporary; therefore, refugees chose to settle in regions that are closer to Syria. Camps are established in border regions for the same reason. Moreover, as discussed in Section 3, some refugees visit their families/relatives in Syria during their stay in Turkey. Finally, temporary protection status allow them to access education and health services in regions where they are registered. Although not strictly enforced, this institutional setting might create further inertia for refugees to move to other regions in Turkey (Aksu et al., 2022).

[28] All the results in this study are quite similar using either of the instruments. See Del Carpio and Wagner (2015) and Aksu et al. (2022) for further discussions of these instruments.

employed and working hours, and household-level outcomes log total household income and the relative income between spouses, based on the main specification.

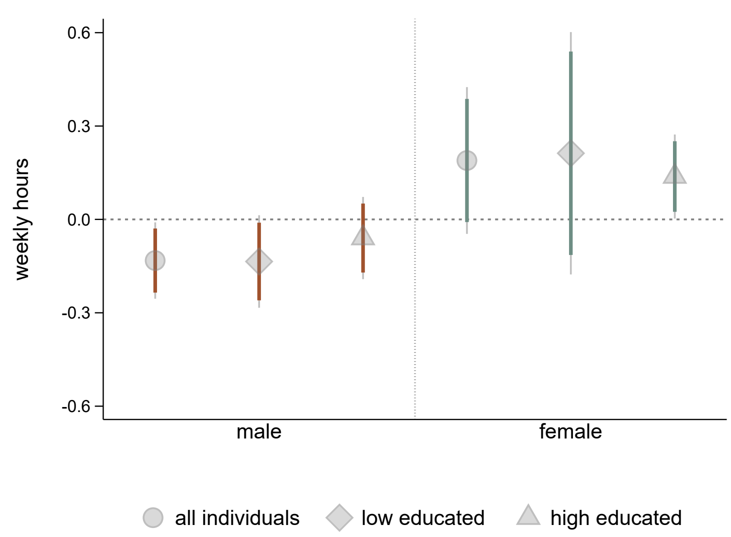
Figure 4: Individual-level Outcome: Employed



Notes: The predicted impact of refugee intensity r, using the distance instrument, on the binary outcome of employed (worked). The regression includes the interaction of 5-region and time fixed effects (θ_{kt}). Standard errors are clustered at the year and NUTS2 region. Spikes around the coefficient estimates show the 90th and 95th confidence intervals.

Figure 4 demonstrates the results for the binary outcome variable employed. The predicted impact of the refugee intensity, separately for male and female, are presented. The results show that refugee inflows have a significant negative impact on the employment of married women in nuclear households; one percentage point increase in the local refugee intensity reduces the employment probability of women by 0.4%. The negative impact on the employment of women is more severe for low educated. These results hold in all specifications (see Appendix D), whereas migration has no negative impact on the employment probability of men. Only for the main specification with the interaction of 5-region and time fixed effects, I find a significant positive impact when all male individuals are considered. Overall, there is strong evidence for a differential impact of migration on the employment probability of native men and women.

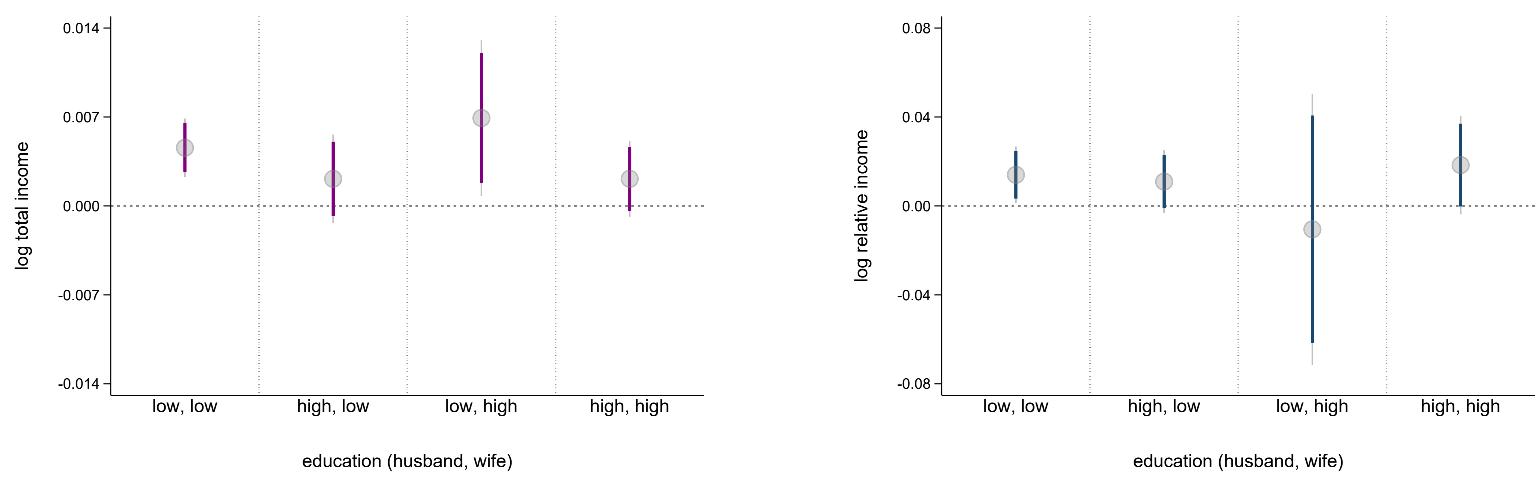
Figure 5: Individual-level Outcome: Weekly Hours



Notes: The predicted impact of refugee intensity r, using the distance instrument, on weekly hours. The regression includes the interaction of 5-region and time fixed effects (θ_{kt}). Standard errors are clustered at the year and NUTS2 region. Spikes around the coefficient estimates show the 90th and 95th confidence intervals.

Figure 5 demonstrates the results for the weekly hours of work, conditional on being employed. The predicted impact of the refugee intensity, separately for male and female, are presented. The coefficient estimates show that for those employed individuals, refugee inflows decrease men's weekly hours of work while increase women's. This result holds across different specifications, yet the estimates are not significant in all. Considering the main specification, refugee inflows significantly decrease the working hours of all male combined (at 5%) and of low-educated (at 10%), and significantly increases the working hours of only high-educated women (at 5%). Similar to employment probability, these results suggest that refugee inflows have a differential impact on the working hours of employed native men and women. Tables 14-19 in Appendix D provide further results on income and hourly wage rates of individuals. In all specifications, refugee inflows have a positive impact on natives' income, except for OLS results on women's income. I find some positive wage effects of migration, yet the estimates are not significant in every specification.

Figure 6: Household-level Outcomes: Total Income and Relative Income



Notes: The predicted impact of refugee intensity r, using the distance instrument, on (log) total household labor income and the (log) relative income of husband against wife. The regression includes the interaction of 5-region and time fixed effects (θ_{kt}). Standard errors are clustered at the year and NUTS2 region. Spikes around the coefficient estimates show the 90th and 95th confidence intervals.

Figure 6 shows the results for household-level regressions. Each household is categorized in terms of spouses' educational attainment. The left figure shows the results for log total household income, and the right figure shows the results for relative income between couples. An increase in migrant to native ratio tends to increase the total income of native households, yet the estimates are significant only for households where both couples are low educated, or wife is high educated while the husband is low educated. Regarding relative income, an increase in refugee intensity increases the earnings gap between couples in favor of the husband in those households where both spouses are low educated. Moreover, although the estimates are not significant, the earnings gap increases in favor of husbands in two other household types: those households where both spouses are high educated or only the husband is high educated. The impact is negative, yet insignificant, for those households where only the wife is highly educated. The signs of coefficient estimates are similar across different specifications. However, the significance of estimates varies. For example, when region and time interactions are not used, the estimates become significant at the 1% level, except for the subsample of households with high educated wife and low educated husband.[29] Overall, the household-level regression results show that relative income between spouses increases in favor

[29]Note that imprecise estimates for this subsample of households (high educated wife, low educated husband) are due to small sample size.

of husbands with migration for most households. The education of spouses is an important factor in the impact of migration.

This preliminary quasi-experimental analysis suggests that the bargaining power distribution, therefore, the resource allocation within native households might be influenced by the refugee influx. This is because migration affects the employment and earnings potential of husbands and wives (i.e., the labor market opportunities) differently. Motivated by these findings, important follow-up questions are: how the resource allocation within native households changes as a result of migration, and how household members' welfare is affected. By estimating the joint labor supply decisions of married couples, I provide answers to these questions in the next section.

6 A Structural Model of Household Labor Supply

In this section, I develop a collective household labor supply model (Chiappori, 1992; Chiappori et al., 2002). This model can accommodate the differential impact of refugee inflows on husbands and wives in native households, in line with the evidence from Section 5. I extend the basic collective labor supply model in a way that refugee intensity in the local labor market shifts the labor supply of each household member and the intra-household transfers. Moreover, the model allows corner solutions, i.e., non-participation, (Donni, 2003; Blundell et al., 2007; Bloemen, 2010) which is especially important in the context of Turkey.

For notational simplicity, the local refugee intensity is excluded from the theoretical framework of Section 6.1, as all parts of the model, i.e., preferences, labor supply functions, the Pareto weight, and the sharing rule (and therefore the individual consumption) are potentially affected by the refugee influx. Section 6.2 discusses the details regarding the identification and estimation of the impact of refugee inflows on various components of the model.

6.1 The Collective Labor Supply Model

Consider a household with two decision-maker members, husband (m) and wife (f).[30] Each member allocates his/her time between leisure and market work.[31] Let h_i and l_i denote the market work and leisure of member $i = m, f$ and the hourly wage rate is given by w_i. The private (Hicksian) consumption of member i is denoted with c_i with price normalized to 1, and $c = c_m + c_f$ is the total household consumption. Each member has (egoistic) preferences over his/her private consumption and leisure.[32] The utility function of member i is given by $u_i(c_i, l_i)$, which is assumed to be strongly concave, infinitely differentiable, strictly increasing in both arguments and $\lim_{c_i \to 0} u_i(c_i, l_i) = \lim_{l_i \to 0} u_i(c_i, l_i) = -\infty$.

Assume that household decisions lead to Pareto efficient outcomes. Then there exists a scalar function $\lambda(w_m, w_f, z)$, called the Pareto weight, such that household decisions are solutions to the

[30]The empirical application includes nuclear households with or without children no older than 15. These children are unlikely to be decision-makers in their households (Dauphin et al., 2011; Sözbir, 2022), and therefore can be considered as public goods to their parents (Blundell et al., 2005).

[31]Similar to most empirical studies based on the collective labor supply model, home production is not taken into account. That is, non-work time is considered leisure. The main reason is that the THLFS does not provide time-use data. See Donni (2008) for the conditions which ensure that the welfare analyses based on the collective model are valid even if domestic time-use data are not available.

[32]All the results can be generalized to Beckerian-type "caring" preferences. See Appendix A for a discussion.

problem:

$$
\begin{aligned}
\max_{c_m,c_f,l_m,l_f} \; & \lambda(w_m,w_f,z)u_f(c_f,l_f)+(1-\lambda(w_m,w_f,z))u_m(c_m,l_m) \\
\text{subject to} \;\; & c_m+c_f=w_mh_m+w_fh_f, \\
& h_i+l_i=T, \quad i=m,f,
\end{aligned}
\tag{3}
$$

where z denotes the set of distribution factors, defined as variables affecting the bargaining power of household members but not the preferences or the household budget constraint.[33] The relative earnings potential of spouses, the sex ratio in society, and legislation that favors a particular spouse are examples of distribution factors. The Pareto weight $\lambda(w_m,w_f,z)$ can be seen as the relative bargaining power of the wife against the husband. It depends on wages, as well as the distribution factors.[34]

As an application of the second welfare theorem, the household program (3) can be decentralized in two stages (Chiappori, 1992). In the first stage, the household decides the amount of transfers among members.[35] Let $\rho_i(w_m,w_f,z)$ denote the transfers received by member i from the other spouse. Transfers add up to zero, i.e., $\rho_m=-\rho_f$. The vector $\rho=(\rho_m,\rho_f)$ is called the *sharing rule*. Given $\rho_i(w_m,w_f,z)$, in the second stage, each member $i=m,f$ solves the problem,

$$
\max_{c_i,l_i} \; u_i(c_i,l_i) \;\; \text{subject to} \;\; c_i \le w_ih_i+\rho_i(w_m,w_f,z) \;\; \text{and} \;\; h_i+l_i=T. \tag{4}
$$

The same problem can be written in terms of the allocation of household full (potential) income, $\phi=(w_m+w_f)T$ among spouses in the first stage.[36] If $\phi_i(w_m,w_f,z)$ denotes the share of full income that member $i=m,f$ receives, then ϕ_i and ρ_i are related as $\rho_i=\phi_i-Tw_i$. Note that the sharing rule $\rho=(\rho_m,\rho_f)$ can be a function of wages and distribution factors, but it does not depend on hours of work. This is an implication of Pareto efficiency. If the sharing rule depends on the labor supply choices, then a member could over-supply labor to change the first-stage household resource allocation.

Let $H_i(w_i,\rho_i)$ denote the structural labor supply function based on the individual problem (4). It is unobserved as ρ_i is not observable. Let $h_i(w_m,w_f,z)$ denote the observed, reduced-form labor supply function. It follows that,

$$
\begin{aligned}
h_m(w_m,w_f,z) &= H_m(w_m,\rho_m(w_m,w_f,z)), \\
h_f(w_m,w_f,z) &= H_m(w_f,\rho_f(w_m,w_f,z)).
\end{aligned}
\tag{5}
$$

Note that the distribution factors and the spouse's wage affect the labor supply through the sharing

[33] The budget constraint can be written as $c_m+c_f=w_mh_m+w_fh_f+y$ where y is the non-labor income of the household. However, non-labor income is not observed, therefore excluded from the model throughout. The Turkish Household Budget Survey conducted by TurkStat shows that the average non-labor income is very small compared to labor earnings, and equal to zero for a significant portion of households.

[34] Pareto weights, as well as the consumption and leisure choices, can depend on preference variables (like demographics) which are excluded here for notational simplicity. They will be included later in the empirical application.

[35] Or households decide the allocation of non-labor income among members. Note that transfers can be positive or negative, i.e., they can exceed the non-labor income.

[36] The second stage individual problem then can be written as,

$$
\max_{c_i,l_i} \; u_i(c_i,l_i) \;\; \text{subject to} \;\; c_i+w_il_i \le \phi_i(w_m,w_f,y,z) \;\; \text{and} \;\; h_i+l_i=T, \quad i=m,f.
$$

rule. Assuming both spouses participate, the relationships (5) can be used to identify the sharing rule ρ up to a constant (Chiappori, 1992; Chiappori et al., 2002). Thus, the changes in intra-household transfers with wages or distribution factors can be recovered.

Allowing corner solutions (i.e., non-participation) in the collective labor supply model is crucial in the context of Turkey, where the labor force participation rate of women is low. Donni (2003) extends to identification results of Chiappori (1992) to the case of a non-participating spouse.[37] When the individual labor supply is modeled, the reservation wage is simply defined as the wage rate that is equal to the marginal rate of substitution between consumption and labor supply at zero working hours. However, in the collective setting, the wage rate of a spouse has a direct effect on his/her labor supply, and an indirect effect on both spouses' labor supply through the sharing rule. Therefore the reservation wage is not necessarily unique.

Donni (2003) provides the conditions that ensure the uniqueness of the reservation wage. Define the reservation wage of spouse i as the marginal rate of substitution between leisure and consumption at $h_i = 0$ (i.e., $l_i = T$),

$$\omega_i(w_m, w_f, z) = -\frac{\partial u_i(c_i(w_m, w_f, z), T)/\partial h}{\partial u_i(c_i(w_m, w_f, z), T)/\partial c}. \tag{6}$$

Suppose preferences and the sharing rule are such that the system of equations (6) for $i = m, f$ is a contraction with respect to wages. That is,

$$\max_{i=m,f}(|\omega_i(w_m^*, w_f^*, z) - \omega_i(\tilde{w}_m, \tilde{w}_f, z)|) \leq \max_{i=m,f}(|w_i^* - \tilde{w}_i|),$$

for any (w_m^*, w_f^*, z) and $(\tilde{w}_m, \tilde{w}_f, z)$. This condition is satisfied if the impact of wages on the sharing rule is "small enough", and it ensures the uniqueness of the reservation wage. Then, for each spouse i, there exists a function $\gamma_i(w_j, z)$ with $i \neq j$ such that if her wage is higher than this function, then she participates. Let q_i denotes the binary participation decision of i, then,

$$q_i = \begin{cases} 1 & \text{if} \quad w_i > \gamma_i(w_j, z) \\ 0 & \text{if} \quad w_i \leq \gamma_i(w_j, z) \end{cases} \quad \text{for} \quad i \neq j.$$

Note that $\gamma_i(w_j, z)$, which is a function of the distribution factors and other spouse's wage rate, completely characterizes the participation of member i. Taking the non-participation case into account, the relationship between the structural and reduced-form labor supply functions becomes,

$$\begin{aligned} h_m(w_m, w_f, z) &= H_m(w_m, \rho_m(w_m, w_f, z, q_m, q_f)), \\ h_f(w_m, w_f, z) &= H_m(w_f, \rho_f(w_m, w_f, z, q_m, q_f)). \end{aligned} \tag{7}$$

When both spouses participate, the first and second derivatives of (5) give a set of partial differential equations from which the sharing rule is recovered (Chiappori, 1992). Assuming that the labor supply functions are continuous around the participation frontier, Donni (2003) shows that the sharing

[37] Donni (2003) and Blundell et al. (2007) provide two different ways to tackle the issue of non-participation in the collective model. Blundell et al. (2007) assume that husbands make a discrete participation decision, whereas wives make a continuous hours of work decision. This is motivated by the observation that there is a small variation in weekly hours of work for men in the UK, while the range of hours that women supply is large. Donni (2003) assumes that the labor supply choice of either spouse is continuous.

rule is identified up to a constant on the non-participation set of i when $w_i \to \gamma_i(w_j, z)$, using the first and second derivatives of (7). Once the unidentified constant is chosen, the individual utility functions are uniquely identified. The empirical application of these theoretical results relies on a switching regression framework, which is discussed in the next subsection.

6.2 Empirical Specification and Estimation

To estimate the model, I consider the following labor supply function,

$$h_i = \alpha_{0i} + \alpha_{1i} w_i + \alpha_{2i} w_i^2 + \alpha_{3i} \rho_i, \tag{8}$$

where the coefficients are different for each spouse $i = m, f$. This functional form has several desirable features compared to alternatives (Stern, 1986). It allows a flexible response to wages, and the labor supply curve can be backward bending. The vector of demographic controls d_i for member i enters the labor supply function through the parameter α_{0i}. The refugee intensity r is allowed to affect the labor supply through α_{0i} and α_{1i}. Therefore, the labor supply parameters α_{0i} and α_{1i} are specified as $\alpha_{0i} = \alpha_{00i} + \alpha_{0ri} r + \delta_i' d_i$ and $\alpha_{1i} = \alpha_{10i} + \alpha_{1ri} r$. In addition to leisure preferences, the lump-sum transfers coming from the other spouse ρ_i depend on r, which will be discussed below. The indirect utility function associated with the labor supply function (8) is,

$$v_i(w_i, \rho_i) = e^{\alpha_{3i} w_i} \Big[\rho_i - (\zeta_{0i} + \zeta_{1i} w_i + \zeta_{2i} w_i^2) \Big], \tag{9}$$

where

$$\zeta_{0i} = -\frac{\alpha_{0i}}{\alpha_{3i}} + \frac{\alpha_{1i}}{\alpha_{3i}^2} - \frac{2\alpha_{2i}}{\alpha_{3i}^3}, \quad \zeta_{1i} = -\frac{\alpha_{1i}}{\alpha_{3i}} + \frac{2\alpha_{2i}}{\alpha_{3i}^2}, \quad \zeta_{2i} = -\frac{\alpha_{2i}}{\alpha_{3i}}.$$

Applying Roy's identity to (9) will give the labor supply function (8). The Slutsky condition is satisfied when $\alpha_{1i} + 2\alpha_{2i} w_i - h_i \alpha_{3i} \geq 0$. This indirect utility function is the basis for assessing the welfare effects of refugee influx on native households' members.

Without further restrictions, the transfers among spouses are not point identified in the collective household model. To identify the changes in transfers with respect to wages or distribution factors, one can specify a parametric function for ρ_i. Assuming $\rho_m = -\rho_f$, I use the following transformation to estimate the changes in transfers with respect to exogenous variables.[38] Let $\psi = \frac{\phi_f - \phi_m}{2}$ is the difference between the full income shares of the spouses divided by two, which is unobserved as we cannot observe ϕ_m and ϕ_f. Then ϕ_m and ϕ_f can be written in terms of ϕ and ψ as,

$$\phi_m = \frac{\phi}{2} - \psi, \quad \phi_f = \frac{\phi}{2} + \psi.$$

Using $\rho_i = \phi_i - T w_i$ and rearranging terms, transfers can be written as,

$$\rho_m = -g(w_m, w_f) - \psi, \quad \rho_f = g(w_m, w_f) + \psi,$$

where $g(w_m, w_f) = \frac{T(w_m - w_f)}{2}$. Note that $g(w_m, w_f)$ is observed and varies across households while

[38] A similar approach is used by Lacroix and Radtchenko (2011). However, in their empirical application, they use full income shares instead of transfers.

ψ is unobserved and to be estimated. Also note that ψ is small when the household full potential income is nearly equally shared among the spouses.

As the sharing rule is likely to be affected by the bargaining power of spouses, I specify ψ as a linear function of a set of distribution factors. Moreover, the local refugee intensity r is included in the sharing rule. Therefore,

$$\psi(z, r) = \eta_0 + \eta_r r + \eta_z(z - \bar{z}), \tag{10}$$

where η_0 is the unidentified constant. I include two distribution factors in z: the relative wage of husband, defined as $z_1 = \frac{w_m}{w_m + w_f}$, and the relative age between spouses, $z_2 = \frac{age_m}{age_m + age_f}$. I subtract the observed mean values, $\bar{z}_1$ and $\bar{z}_2$, of these distribution factors and choose $\eta_0 = 0$ in the estimation. This means that in the absence of refugee inflows and at the mean relative wage and age difference, husband and wife share the household full income equally.

The specification (10) is the baseline specification for the sharing rule, which gives a single estimate, η_r, for the effect of refugee inflows on intra-household transfers. Additionally, I consider alternative specifications to explore the heterogeneous effects. Specifically, I include the interaction of r and z_1 to investigate how the effect differs across different levels of relative wage. Moreover, I estimate the impact separately for each household type depending on spouses' education (husband and wife being high-educated or low-educated; see Section 5 for definitions) by replacing r with r interacted with four dummies corresponding to four household types.

Given the specifications of the individual labor supply functions and the sharing rule, the system of labor supply equations for the husband and wife becomes,

$$\begin{aligned} h_m(w_m, w_f, z, r, d_m) &= \alpha_{0m} + \alpha_{1m} w_m + \alpha_{2m} w_m^2 - \alpha_{3m}[g(w_m, w_f) + \psi(r, z)], \\ h_f(w_m, w_f, z, r, d_f) &= \alpha_{0f} + \alpha_{1f} w_f + \alpha_{2f} w_f^2 + \alpha_{3f}[g(w_m, w_f) + \psi(r, z)], \end{aligned} \tag{11}$$

where r shifts the preferences (α_{0ri}, and α_{1ri}) and the sharing rule (η_r). The vector of demographic controls d_i, which enters the labor supply functions through α_{0i}, includes the age and education of member i and the number of children in the household.

The system of equations (11) corresponds to the case where both spouses supply positive hours. The important point for the non-participation is that the parameters of the husband's (wife's) labor supply equation can shift with the participation decision of the wife (husband). Moreover, the parameters of the sharing rule can shift with the non-participation of either spouse. Therefore, a switching regression framework is suitable to account for non-participation. The condition that ensures the Pareto efficiency in different participation regimes of spouses is the continuity of the labor supply functions as well as the sharing rule around the participation frontiers. That is, the husband's (wife's) labor supply function has to be continuous around the participation frontier of the wife (husband). Moreover, the sharing rule has to be continuous around the participation frontier of either spouse. These continuity restrictions of Donni (2003) are similar to the "double indifference" assumption of Blundell et al. (2007), which states that if the wife (husband) is indifferent between working or not, then the husband (wife) is indifferent as well. That is, there cannot be any discrete jump in the labor supply functions (or preferences) around the participation frontier of the spouse. Otherwise, there would be room for Pareto improvement.

Let $\check{h}_i(w_m, w_f, z, r, d_i)$ denotes the labor supply of $i = m, f$ when $j \neq i$ does not participate. At the participation frontier of j, this function must be equal to $h_i(w_m, w_f, z, r, d_i)$. Therefore, the parameters of $\check{h}_i(w_m, w_f, z, r, d_i)$ are such that,

$$\check{h}_i(w_m, w_f, z, r, d_i) = h_i(w_m, w_f, z, r, d_i) + s_{hi} h_j(w_m, w_f, z, r, d_j),$$

where s_{hi} is a free parameter. Note that at the participation frontier of j, i.e., when $h^j(w_m, w_f, z, r, d_j) = 0$, the last term vanishes and the labor supply of i is continuous. Similarly, let $\check{\rho}_i(w_m, w_f, z, r)$ is the amount of transfers $i = m, f$ receives when $j \neq i$ does not participate. The parameters of this function must be such that,

$$\check{\rho}_i(w_m, w_f, z, r) = \rho_i(w_m, w_f, z, r) + s_{\rho i} h_j(w_m, w_f, z, r, d_j),$$

where $s_{\rho i}$ is a free parameter. Given the above specifications, the continuity of the labor supply functions and the sharing rule is related through ψ. The following transformation ensures this continuity:

$$\tilde{\psi} = \begin{cases} \psi + s_{\rho m} h_f, & \text{if } (q_m, q_f) = (1, 0), \\ \psi + s_{\rho f} h_m, & \text{if } (q_m, q_f) = (0, 1). \end{cases}$$

Substituting $\tilde{\psi}$, the labor supply equations become

$$\begin{aligned} h_m &= \alpha_{0m} + \alpha_{1m} w_m + \alpha_{2m} w_m^2 - \alpha_{3m} [g(w_m, w_f) + \psi] + s_{hm} h^f, \\ h_f &= \alpha_{0f} + \alpha_{1f} w_f + \alpha_{2f} w_f^2 + \alpha_{3f} [g(w_m, w_f) + \psi] + s_{hf} h^m, \end{aligned} \tag{12}$$

where the continuity parameters associated with the sharing rule and the labor supply functions are related as $s_{\rho m} = -s_{hm}/\alpha_{3m}$ and $s_{\rho f} = s_{hf}/\alpha_{3f}$.

So far, the wages are assumed to be observable even for individuals who do not work. For working individuals, I use the observed wages, which are calculated by dividing earnings (labor income) to working hours. For non-participants, I predict wages using selection-corrected wage equations (Heckman, 1979). I regress the logarithm of wages on age, age square, education, year and region dummies, and the local refugee intensity for men and women separately. Labor income, age, age square, and education of the spouse are excluded from the wage equation to identify the selection equation.[39]

Taking the participation decisions of both spouses into account and adding error terms to the labor supply functions, I estimate the following system of non-linear equations,

$$\begin{aligned} \tilde{h}_m &= h_m(w_m, w_f, z, r, d_m) + s_{hm}(1 - q_f) h_f(w_m, w_f, z, r, d_f) + \epsilon_m, \\ \tilde{h}_f &= h_f(w_m, w_f, z, r, d_f) + s_{hf}(1 - q_m) h_m(w_m, w_f, z, r, d_m) + \epsilon_f, \end{aligned} \tag{13}$$

by nonlinear least squares, allowing the additive error terms ϵ_m and ϵ_f to be correlated. The labor supply functions $h_i(w_m, w_f, z, r, d_m)$ for $i = m, f$ are given by (11), and q_i is equal to one if i participates, and zero otherwise. I use observations with positive hours, i.e., $\tilde{h}_i > 0$, adding inverse Mill's ratios obtained from the same probit model used to estimate wages for non-participants to each equation in (13). Region (μ_j) and time (μ_t) fixed effects, as well as the interaction of broad region

[39] See Table 26 in Appendix E for results.

and time fixed effects (θ_{kt}) are included in each equation. Similar to the preliminary reduced-form analysis, I use the distance instrument i_{jt}, which is defined in (2), to address the potential endogeneity in refugee intensity r. Specifically, I use a first-stage regression for r, then use the predicted values in (13). Finally, I bootstrap the standard errors, clustering at the year and region (NUTS2) levels, in line with the household survey design.[40]

Using the estimates of the structural model, I measure the impact of refugees on labor supply elasticities, intra-household transfers, and individual welfare. Given the baseline functional form of $\psi(z, r)$, the impact on transfers are simply $\frac{\partial \rho_f}{\partial r} = \eta_r$ for the wife and $\frac{\partial \rho_m}{\partial r} = -\eta_r$ for the husband.[41] As discussed above, the labor supply function that I use is based on preferences represented by the indirect utility function (8). To measure the welfare impact of refugees, I measure the changes in this indirect utility functions with respect to r,

$$\frac{\partial v_i(w_i, \rho_i)}{\partial r} = e^{\alpha_{3i} w_i} \Big(\frac{\partial \rho_i}{\partial r} + \frac{\alpha_{0ri} + \alpha_{1ri} w_i}{\alpha_{3i}} - \frac{\alpha_{1ri}}{\alpha_{3i}^2} \Big), \tag{14}$$

where again $\frac{\partial \rho_f}{\partial r} = \eta_r$ and $\frac{\partial \rho_m}{\partial r} = -\frac{\partial \rho_f}{\partial r}$. Note that this derivative does not depend on the level of ρ_i. Moreover, the indirect utility function is linear in r, making the derivative unaffected by the level of refugee intensity.

While the derivative (14) shows the impact of refugee intensity on the indirect utility, it is hard to interpret it. That is, if the parameter estimates give $\frac{\partial v_i(w_i, \rho_i)}{\partial r} = n$ for some real number n, then this result would not be informative about whether the impact of refugee influx is sizable or not. To address this, I compare r's impact on the utility with the impact of transfers from the other spouse. Note that the derivative of indirect utility with respect to ρ_i is

$$\frac{\partial v_i(w_i, \rho_i)}{\partial \rho_i} = e^{\alpha_{3i} w_i}, \tag{15}$$

which is always positive. Then, I divide (14) by (15) to get,

$$\frac{\partial v_i(w_i, \rho_i)}{\partial r} \Big/ \frac{\partial v_i(w_i, \rho_i)}{\partial \rho_i} = \frac{\partial \rho_i}{\partial r} + \frac{\alpha_{0ri} + \alpha_{1ri} w_i}{\alpha_{3i}} - \frac{\alpha_{1ri}}{\alpha_{3i}^2}, \tag{16}$$

which shows the impact of r on the indirect utility compared to the impact of transfers. Therefore, if the parameter estimates give $\frac{\partial v_i(w_i, \rho_i)}{\partial r} / \frac{\partial v_i(w_i, \rho_i)}{\partial \rho_i} = n$ for some real number n, this means that the impact of a one percentage point increase in local refugee intensity r on the utility is equivalent to n times the impact of receiving unearned income amounting 1 Turkish Lira (in 2010 prices) from the other spouse. The welfare impact of refugee influx is based on (16).

[40] Note that a particular difficulty in the estimation of endogenous Tobit models pertains to the problem of coherence (Gourieroux et al., 1980). An econometric model is coherent if it has a unique, well-defined reduced-form. The problem of coherence precedes the identification problem, which is the uniqueness of the model parameters given the distribution of observable variables (see Amemiya (1974), Heckman (1978), Ransom (1987), Kooreman (1994), Fortin et al. (2007) for further discussions). For given values of $(w_m, w_f, z, r, d_m, d_f, \epsilon_m, \epsilon_f)$, the system (13) might generate multiple outcomes for spouses' participation. As a result, the sum of the probabilities of four participation outcomes can exceed one. Bloemen (2010) shows that the system (13) is coherent if $|s_{hm} s_{hf}| < 1$. I do not impose this restriction during the estimation; it is verified afterwards. The condition is satisfied in all specifications.

[41] Note that $\frac{\partial \rho_i}{\partial r}$ is different in the alternative specification (for heterogeneity), which will be discussed in the next section.

7 Empirical Results

The main specification, which all the results in this section are based on, includes the interaction of 5 broad regions and time dummies and uses the distance instrument (2). It is the most restrictive specification in terms of pre-treatment trends, and tackles the endogeneity in refugee distribution. The bootstrap standard errors are clustered at the year and NUTS2 region level, in line with the sampling of the survey.

Table 2: Structural Estimation Results

		Husband	**Wife**
Labor supply:			
r (refugee intensity)	$\alpha_{0rm}, \alpha_{0rf}$	2.2816	0.0552
		(1.0147)	(0.4111)
Wage	$\alpha_{10m}, \alpha_{10f}$	-0.7549	-0.3900
		(0.0693)	(0.0864)
Wage $\times$ r	$\alpha_{1rm}, \alpha_{1rf}$	-0.0534	0.0440
		(0.0302)	(0.0100)
Wage square	α_{2m}, α_{2f}	0.0079	0.0036
		(0.0004)	(0.0006)
Transfers	α_{3m}, α_{3f}	-0.1136	-0.1373
		(0.0011)	(0.0085)
Sharing rule:			
r	η_r	-95.9567	
		(33.3984)	
Relative wage	η_{z_1}	-24.1166	
		(0.5073)	
Relative age	η_{z_2}	10.9971	
		(1.4067)	
Demographics:			
Age	δ_{1m}, δ_{1f}	-0.6243	0.0381
		(0.0456)	(0.0525)
Age square	δ_{2m}, δ_{2f}	0.0055	-0.0013
		(0.0006)	(0.0008)
High school and above	δ_{3m}, δ_{3f}	-4.8867	0.1256
		(0.0282)	(0.0512)
Number of children	δ_{4m}, δ_{4f}	0.6858	-1.4162
		(0.0243)	(0.1992)
Continutity:			
Labor supply	s_{hm}, s_{hf}	0.0036	0.0007
		(0.0008)	(0.0002)
Sharing rule	$s_{\rho m}, s_{\rho f}$	0.0315	-0.0049
		(0.0066)	(0.0015)
Observations		273,576	

Notes: Structural estimates. r denotes the ratio of the number of refugees to native population in the region. Relative wage, relative age, r are in percentages. Bootstrap standard errors (in parentheses) are clustered at the year and NUTS2 region level.

Table 2 shows the structural estimation results. The table has four parts: the labor supply estimates, the sharing rule (or transfers) estimates, the estimates regarding demographic controls, and finally, the estimates of continuity parameters. The parameters corresponding to each variable used in the estimation are provided next to the variables. Each column shows the results for the husband

and the wife. The sharing rule estimates show the effects on transfer to wife from husband. The Slutsky condition is (locally) imposed in the estimation. The estimated continuity parameters show that $|s_m s_f| < 1$, which implies that the system is coherent.

The parameters α_{0ri} for $i = m, f$ show the marginal impact of an increase in the local refugee intensity on the level of working hours, and the parameters α_{1ri} for $i = m, f$ show the impact of refugee inflows on the slope of the labor supply curves, given the sharing rule. Note, however, that the refugee intensity has an indirect effect on the labor supply through transfers between spouses. The total effect of r on h_i is $\alpha_{0rm} + \alpha_{1rm} w_m - \alpha_{3m} \eta_r$ for the husband and $\alpha_{0rf} + \alpha_{1rf} w_f + \alpha_{3f} \eta_r$ for the wife. The labor supply of both spouses decreases with wage, yet the husband's labor supply is more sensitive to hourly earnings. The refugee intensity has opposite impacts on the slope of the labor supply curve of husbands and wives; the negative impact of the wage on the husband's labor supply is exacerbated with refugee inflows, while the slope of the wife's labor supply curve decreases as refugee intensity increases. Transfers from the other spouse decrease the weekly hours of work of both husbands and wives. This suggests that leisure is a normal good for both.

The second part of Table 2 shows the estimates of the sharing rule. All the variables included in the sharing rule, which are refugee intensity, relative wage ($\frac{w_m}{w_m + w_f}$), and relative age ($\frac{age_m}{age_m + age_f}$), have significant effects. The significant estimates for the distribution factors give evidence against the unitary model, in which such variables affecting the relative bargaining power of household members would not affect the household demand (like the leisure demand of spouses here). When the husband's relative wage increases against the wife's, the transfers received by the wife decrease. The estimates show that in the absence of migration and at the mean relative age, when husbands' relative wage increases by one percentage point, transfers from husbands to wives decrease by 24.12 Turkish Lira on average. When the age difference between husband and wife is larger, wives receive more transfers from husbands on average. In the absence of refugees and at the mean relative wage, when husbands' relative age increases by one percentage point, transfers from husband to wife increase by 11 Turkish Lira on average. With regard to the impact of refugee inflows, at the mean relative wage and age, a one percentage point increase in the refugee intensity decreases the transfers from husband to wife by 95.96 TL. This implies that refugee inflows have a significant negative impact on wives' share of household resources.

The third part of Table 2 shows the parameter estimates associated with the demographic characteristics. Again, demographic controls affect the labor supply equations linearly through the parameters α_{0i} for $i = m, f$. The results show that husbands' labor supply significantly decreases with age; one year increase in age results in 0.62 fewer weekly working hours. The impact of age is not significant for the wives in the sample. High-educated men work less, while high-educated women work more. On average, those men with high school degrees or above work 4.89 hours less per week compared to those without high school degrees. Whereas those women with the educational attainment of high school or above work 0.12 hours more per week compared to those without high school diplomas. The number of children increases the hours of work for husbands and decreases for wives. Each child increases (decreases) the weekly working hours of fathers (mothers) by 0.69 (1.42) hours. This is consistent with the fact that mothers spend more time on child care. Fathers might be compensating for the decrease in household income due to a decrease in mothers' labor supply by working more.[42]

In all specifications, regardless of the choice of θ_{kt}, with or without an instrument, and for both instruments, the system is coherent. The continuity parameter estimates for the labor supply and the sharing rule, s_{hm} and s_{hf}, range from 0.02% to 6%. For the main specification, the estimates are minimal but significant. So, taking participation decisions into account is important in estimation, yet the labor supply estimates do not seem to change much at the participation frontier of the spouses. The estimates for the continuity parameters of the sharing rule are also significant and more sizable.

Table 3: Elasticities of the Structural Labor Supply Functions

	mean r	$r = 0$	$r = 1$	$r = 5$
Constant sharing rule:				
Husband own wage	-0.0596	-0.0543	-0.0683	-0.2485
	(0.0054)	(0.0063)	(0.0043)	(0.1705)
Wife own wage	-0.0362	-0.0464	-0.0268	-0.0047
	(0.0100)	(0.0096)	(0.0091)	(0.0029)
Variable sharing rule:				
Husband own wage	-0.2459	-0.2299	-0.2720	-0.8108
	(0.0068)	(0.0057)	(0.0143)	(0.5786)
Husband cross wage	1.0574	0.9970	1.1559	3.1911
	(0.0312)	(0.0100)	(0.0714)	(2.3221)
Wife own wage	-0.7396	-0.8996	-0.5908	-0.2442
	(0.0271)	(0.0251)	(0.0564)	(0.0561)
Wife cross wage	2.4688	2.9947	1.9797	0.8404
	(0.0608)	(0.1213)	(0.1662)	(0.1874)

Notes: Estimates of wage elasticities, evaluated at the mean values. r denotes the ratio of the number of refugees to native population in the region, in percentage. Standard errors are in parentheses.

Table 3 shows the wage elasticities of labor supply of men and women for different refugee intensity levels: mean value of r, which is 0.41, and $r = 0, 1, 5$. The table has two parts: the elasticities where the sharing rule is assumed constant, and the elasticities where the sharing rule can vary. The reason to divide the estimates as such is that wages affect the sharing rule through η_{z_1}. Therefore, I compute the elasticities both assuming this impact away and taking it into account. Spouse's wage can affect the labor supply only through the sharing rule; therefore, the constant sharing rule case includes only own-wage elasticities. The results show that in the case of a constant sharing rule, the own-wage elasticity of both men and women is negative and changes in the opposite way with refugee inflows. With regard to the elasticities when the transfers are allowed to change, own wage elasticities of both men and women are negative again, yet much lower compared to the constant sharing rule case. Cross-wage elasticities, i.e., $\frac{\partial log(h_i)}{\partial log(w_j)}$ for $i \neq j$ are positive and highly responsive to refugee intensity. This means that spouses work more when the other spouse's wage increases. The reason for positive cross-wage elasticities could be that transfers received by each spouse decrease when his/her relative wage against the other spouse decreases (the estimate for z_1). As a result, they supply more labor as leisure is a normal good. Refugee inflows have the opposite effect on the own-wage elasticities of husbands and wives when the sharing rule can vary. Moreover, cross-wage elasticities increase with refugees for husbands and decrease for wives.

[42] Also, it is reasonable to expect household expenditure to increase with household size.

Table 4: Changes in Intra-household Resource Allocation and Welfare

	Husband	**Wife**
Share in household resources	39.87 [3.88%]	-39.87 [-3.88%]
Intra-household welfare	34.35 [3.34%]	-41.47 [-4.03%]

Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

The main goal of the paper is to estimate the impact of the refugee influx, which had a differential impact on native men and women, on intra-household resource distribution in native households, and on household members' welfare. Using structural estimates, I compute the effect of migration on each spouse's share of household resources. Table 4 displays the results. At the mean refugee intensity observed in the data, which is 0.41 for the years 2004-2015 except 2012, wives' (husbands') share of intra-household resources decreases (increases) by 39.87 Turkish Lira (in 2010 prices), which corresponds to 3.88% of average household full income ($\bar{\phi}$). Therefore, refugee migration decreases household resources allocated to women in native households.[43]

With regard to welfare results, I compute (16), which shows the impact of r on indirect utility in terms of (unearned) transfers coming from the other spouse. Table 4 shows the results. At the mean refugee intensity and at the mean hourly wages, the refugee inflows cause a reduction in wives' intra-household welfare equivalent to a 41.47 TL reduction of the transfers coming from the husband. This number corresponds to 4.03% of household full income. The estimated impact of migration on husbands' intra-household welfare is equivalent to a 34.35 TL increase in transfers from wife (or decrease in transfers from husband to wife), which corresponds to 3.34% of the average household full income. Therefore, migration has adverse effects on wives' intra-household welfare, while husbands enjoy welfare gains.

These results show the average impact of migration on Turkish households. Regarding intra-household resource shares, which are based on η_r, the average impact for each region can be computed easily. However, note that households are different in terms of relative wage and relative age between spouses. To see the changes in distribution, I compute the estimated difference in resource shares between wives and husbands ($\phi_f - \phi_m$) for each household. Then I plot the distribution with or without refugees, which is shown in Figure 7. The differences in the means of the two distributions is the average impact given in Table 4.[44] The dashed line, which corresponds to the case without refugees, shows higher values of ($\phi_f - \phi_m$) throughout the distribution.[45]

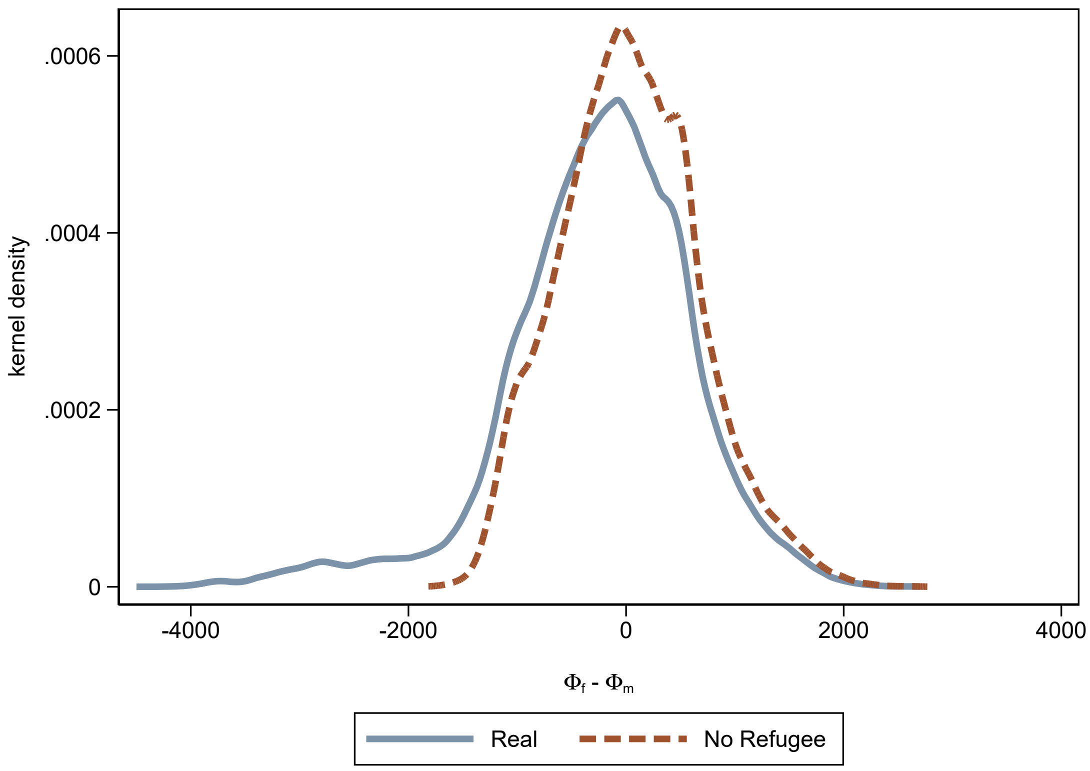
The welfare results in Table 4 show the impact in terms of average household full income. However, households differ substantially in terms of spouses' wages, i.e., the full income. As a result,

[43]Note that this result does not necessarily mean an increase in intra-household inequality as the sharing rule is not point identified. If wives had a larger share of household resources before the refugee influx, this would decrease intra-household inequality. However, previous research shows that, in general, a smaller portion of household resources are devoted to wives compared to husbands (Dunbar et al., 2013; Calvi, 2020).

[44]Note also that the starting values of the estimation imply equal sharing of the full income, as discussed in Section 6.

[45]Note that the left tail of the real case corresponds to the observations in regions with the highest refugee intensity. To see the distributions without outliers, I provide the same graph dropping the observations above the 95th percentile of the distribution in Figure 16 in Appendix E.

Figure 7: Distribution of Changes in Intra-household Allocations with Migration



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

the average impact of migration (computed at $r = 0.41$) corresponds to different levels of ϕ. Figure 8 shows the distribution of changes in welfare for husbands and wives due to refugee inflows in terms of household full income. Note that the effect of wages on changes in welfare due to migration, $\frac{\alpha_{1ri}}{\alpha_{3i}}$, is small.[46] Therefore, the figure shows the estimated impact on households throughout the income distribution. The average welfare impacts (for men and women), which are around 3.5% of household income, can vary from 0 to 15 depending on the potential income of households (lower relative impact at the top of the income distribution).

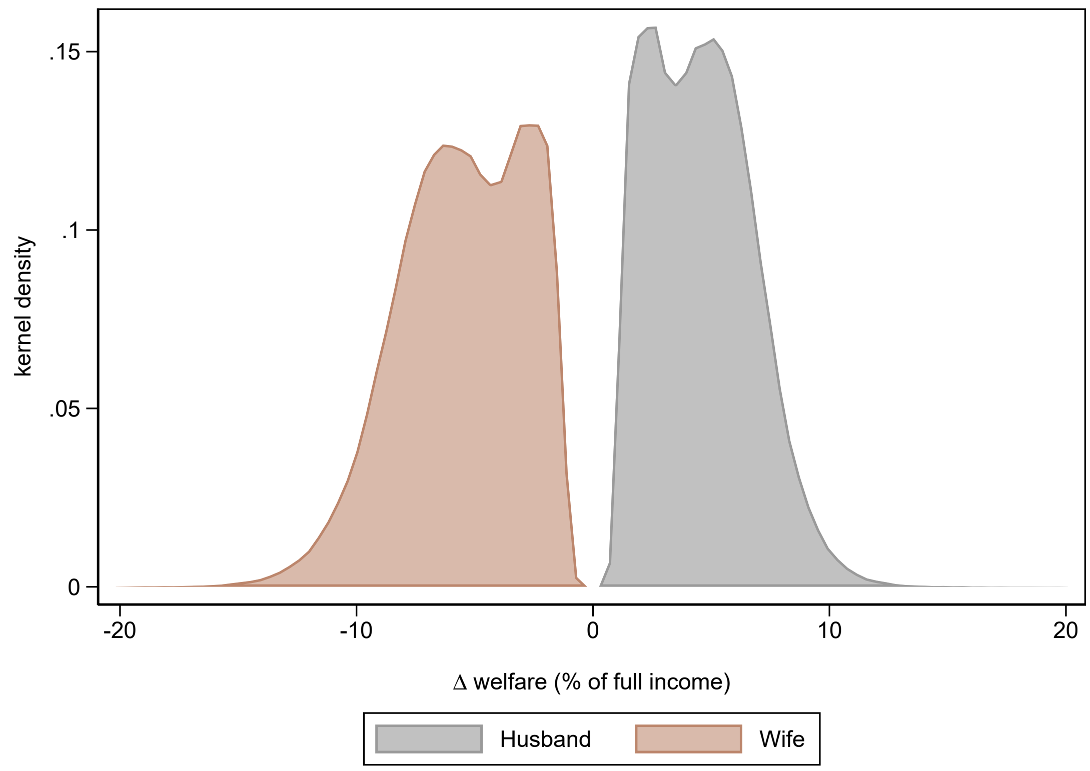
7.1 Robustness Checks

In addition to the main specification, I consider six alternative specifications regarding pre-treatment trends and the instrument. These alternative specifications include linear trends for NUTS1 or 5 broad regions. Moreover, I estimate the model without region and time interactions, i.e., without θ_{kt}. See Tables 29-31, and Figures 23-28 in Appendix E for the main results. All these three specifications give the same main conclusion as the main specification. With regard to the IV, the main instrument used in the present study is the distance instrument (2), suggested by Aksu et al. (2022). The advantage of this instrument over the one suggested by Del Carpio and Wagner (2015) is discussed in Section 5. However, I experiment estimating the model using the instrument by Del Carpio and Wagner (2015) as well.[47] Moreover, I estimate the model without instrumenting r. Tables 32 and 33 and Figures 29-32 in Appendix E provide the main results. The conclusion of the paper does not change without an instrument or with the alternative instrument. Finally, note that

[46]The welfare estimates have two components: one from the sharing rule $\frac{\partial \rho_i}{\partial r}$, and the other from preferences and the wages $\frac{\alpha_{0ri}+\alpha_{1ri}w_i}{\alpha_{3i}} - \frac{\alpha_{1ri}}{\alpha_{3i}^2}$. The estimates show that the effect coming from the sharing rule dominates the preference effect as the results regarding the changes in welfare and intra-household allocations are close to each other.

[47]Also note that some previous research use this instrument (Akgündüz and Torun, 2020; Erten and Keskin, 2021).

Figure 8: Distribution of Changes in Welfare with Refugee Inflows



Notes: Changes in welfare with refugee intensity, in terms of household full income.

98% of husbands are employed in the sample, which is due to the sample selection criteria for the collective labor supply model. To check whether the results continue to hold in a subsample where all husbands work, I estimated the model only using such observations. Table 34 and Figures 33, 34 in Appendix E show the main results. Again, the main findings of the paper do not change.

7.2 Heterogeneous Impacts

The main specification of the sharing rule is given by (10), in which the refugee intensity and the distribution factors are included in a linear way. To analyze the heterogeneity in the impact of migration on different household types, I experiment with alternative sharing rule specifications. First, I check how spouses' relative earnings potential affects migration's impact on the sharing rule. To do that, I included the interaction of r and $z_1 - \bar{z}_1$ in $\psi(z, r)$. Then the effect of a marginal increase in r depends on the level of z_1. Figure 17 in Appendix E shows the results. For all levels of relative wage, migration reduces wives' share. The estimated impact ranges from around -50 to -32 (at the mean refugee intensity) depending on the relative wage between spouses. For households where the husband's wage is much higher than the wife's, the reducing impact of r on the wife's share of household resources is less. The distribution of the impact under this alternative specification is provided in Figure 18. Overall, migration's impact on wives' resource share is less but still negative in households where the husband's relative wage is high.

Another important heterogeneity pertains to the educational attainment of spouses. As discussed in Section 5, the impact of migration can differ in households where spouses are high or low-educated. To analyze this heterogeneity, I consider an alternative specification for $\psi(z, r)$ where r is replaced with r interacted with four dummies corresponding to whether husband and wife are high or low-educated. This allows me to estimate migration's impact separately for four household types. See Tables 27 and 28 in Appendix E for the results. With regard to transfers, the average impact of r ranges from -30 (where the husband is more educated) to -60 (where the wife is more educated). Note that these households differ in their full income; the reducing impact of migration on wives' share in terms of household full income is 6.73% in households where both spouses are low educated, but only 2.44% where both spouses are highly educated. Figure 20 in Appendix E shows the distributions of the difference in household full income shares, with or without migration, for four household types. Concerning welfare results, similar to the main analysis, wives' intra-household welfare decreases while husbands' increase in all household types. Again, the effects in terms of household full income are larger in households where the husband is low educated. The estimated impacts in Table 28 in Appendix E are for average household full income in each type. Figures 21 and 22 in Appendix E show the distribution of welfare changes. Overall, these findings show that migration's effect varies depending on spouses' educational attainment.

7.3 Policy Experiments

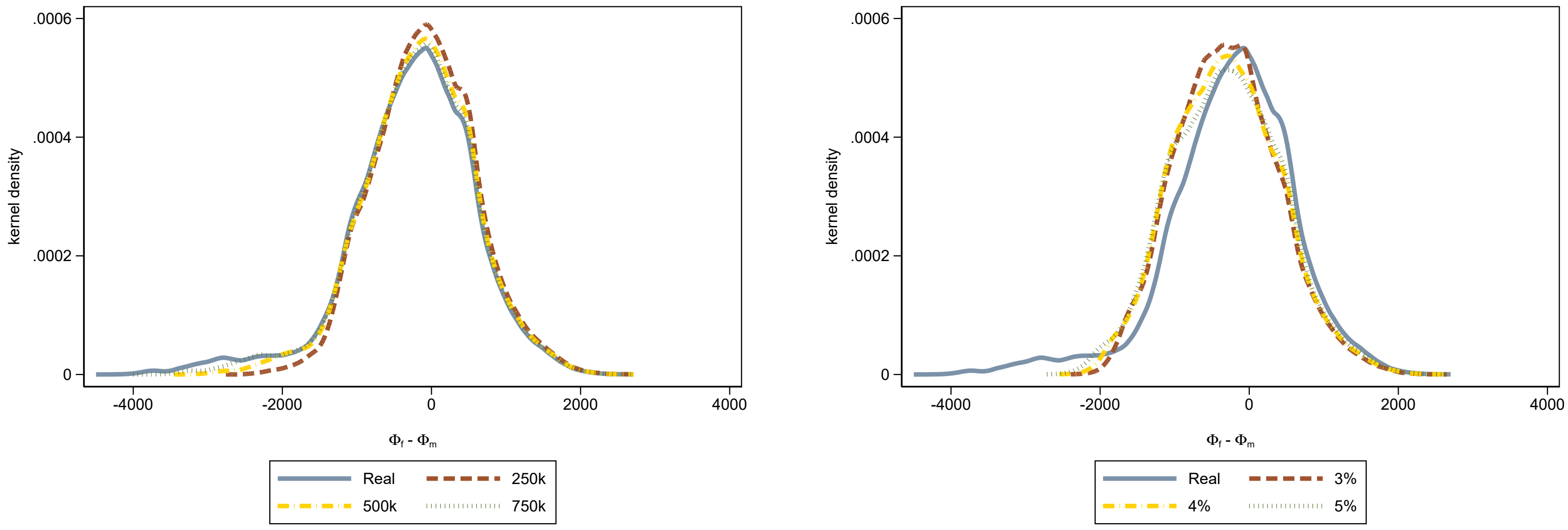
Turkey followed an open border policy during the Syrian refugee crisis and did not restrict the movement of refugees within the country. What would have happened if there were policies that restricted the number of refugees entering the country or the spatial distribution of the refugees? These questions are important to build policies that could alleviate various adverse effects of sudden mass migration for the hosting population. In this section, I analyze two policy experiments: (i) quotas on new migration and (ii) limits on local refugee intensity, based on the structural estimation results.

During the 2012-2015 period, the number of refugees increased from around 150,000 to 2.6 million. As counterfactual, I consider three yearly quotas on the number of refugee migration: 250,000, 500,000, and 750,000 (see Figure 35 in Appendix E). Once a limited number of migrants enter the country, I assume that they move within the country similarly. Therefore, for each counterfactual quota, I divide the refugee intensity, r, in each NUTS2 region by $\frac{quota_t}{M_t}$ where again M_t is the total number of Syrians in Turkey in year t. The question is, how would the intra-household resource allocations change if there were such yearly migration quotas?

Figure 9a shows the impact of migration on the difference between the full income shares of wives and husbands under the three quotas. Under each of these scenarios, the negative impact of migration on wives' relative resource share decreases. Moreover, the impact of this policy increases with the restrictiveness of the quota. As the spatial distribution of refugees is assumed to be the same as the real case, regions are homogeneously affected by this policy.

Another type of policy might concern the spatial distribution of refugees within the country. How would the intra-household impacts of refugee inflow change if refugees were more evenly distributed in the country? As formally provided using Moran's I tests (and maps), refugees are clustered in certain regions of the country. For example, while the number of refugees equals 14% of the native population in NUTS2 region 24 (with the major city of Gaziantep) in 2015, it is less than 0.01% percent of the native population in several regions (see Table 6 in Appendix B). I consider three limits on regional refugee intensity: 3%, 4%, and 5%. Once the regional limit is exhausted, I

Figure 9: Changes in Intra-household Allocations: Policy Experiments



(a) Quota on New Migration

(b) Limit on Refugee Intensity

assume that refugees move to other regions based on the refugee intensity in those regions.[48] The question is, how would the intra-household resource allocations change if there were such limits on regional refugee intensity?

Figure 9a shows the impact of migration on the difference between the full income shares of wives and husbands under three regional limits. On average, wives' share decreases more against husbands under regional limits. This is expected as the (counterfactual) refugee intensity increases in most regions under this policy. However, this policy alleviates the impact on those regions that receive the most migration. As a result, the left tail of the distribution under real case disappears under regional limits. Overall, this policy would increase wives' relative resource share only in those regions with high refugee intensity at the expense of women residing in other regions.

When two types of policies are compared, quotas on new migration seem to decrease the intra-household impacts throughout the country while limits on regional refugee intensity re-distribute the impact from highly treated regions to other regions. Once again, these counterfactual experiments should be considered simple back-of-the-envelope calculations based on structural estimates. More complex error structures for the wage and labor supply equations and allowing randomness in resource shares (Dunbar et al., 2021) can allow researchers to provide a better picture of the intra-household impacts of such counterfactual experiments. Moreover, the effect of such policies on the demand side is not taken into account.

8 Conclusion

The impact of forced mass migration on the labor market outcomes of natives has been studied extensively in the literature. When the labor market impact is gendered, an interesting follow-up investigation pertains to the intra-household effects of forced migration. Focusing on the Syrian refugee inflows to Turkey, which have differential impacts on the labor market outcomes of native

[48] I follow a sequential method. Specifically, in the case of 5% cap for the year 2015, regions 12, 13, 24, and 25 become full. I distribute the remaining refugees to the other 22 regions based on their shares. If, for example, r in a certain region corresponds to 10% of the sum of r's in all these 22 regions, then this region gets 10% of r remaining from 4 regions that become full. Once distributed, in the second round, region 26 becomes full. Then, I distribute the remaining similarly.

men and women, I study the effects of forced displacement on resource allocation within native households and the intra-household welfare of natives.

First, relying on a diff-in-diff IV strategy using a distance-based instrument, I show that the refugee influx reduces the employment probability of wives in nuclear households with no negative impact on husbands' employment. For those employed men, hours of work decrease, and hourly wage increases with refugee migration, whereas working hours of employed women increase. Notably, the relative earnings between couples increase in favor of husbands, except for those households where the wife is more educated than the husband.

These empirical findings suggest that the intra-household bargaining power of spouses might change with the refugee influx. As a result, the resource allocation in native households, as well as the individual welfare of household members might change. To shed light on these issues, I develop a collective household labor supply model, which allows me to estimate the impact of refugee inflows on spouses' joint labor supply decisions, intra-household transfers, and the intra-household welfare of household members. The model incorporates the participation decision of both spouses, which is essential in Turkey, considering the low employment rate among women. The model's novelty pertains to extending the basic collective model so that the local refugee intensity changes the parameters of individual labor supply functions and the sharing rule. Moreover, endogeneity in refugee intensity is addressed by a distance instrument.

The results show that refugee migration alters spouses' joint labor supply decisions and intra-household outcomes in native households. Women's share of household resources and their welfare decrease with refugee inflows, while men experience welfare gains. The estimated impact, on average, is a reduction (increase) of wives' (husbands') share equivalent to 3.88% of the average household full income. With regard to welfare outcomes, the refugee influx causes a decrease in women's intra-household welfare, equivalent to a 4.03% reduction in their share of household full income. Men's welfare increases with refugee inflows, equivalent to an increase of 3.34% in their resource share. The exact impact varies depending on the spouses' education and the relative wage between them. The findings are robust to a set of alternative specifications regarding the pre-treatment trends, as well as to alternative instruments.

The present study is among the earliest studies that investigate the effect of forced displacement on the intra-household outcomes of native households. The paper's main findings are based on a structural household model, which allows for recovering the intra-household outcomes that are not observed in household surveys. This study contributes to the line of research that explores the intra-household impacts of labor market shocks. Unlike previous papers that document the impacts on the decision-making power of spouses based on self-reported measures, this paper goes one step further by estimating the effects on intra-household resource distribution that are based on household members' joint decisions and bargaining power. Moreover, unlike previous research that documents the impact of mass migration on native households' consumption as a proxy for their members' welfare, or the subjective well-being of natives based on self-reported measures, I estimate the impact of the refugee influx on natives' welfare based on their preferences. In this regard, the findings of this study complement previous evidence regarding the welfare effects of forced displacement on host countries.

There are several limitations to this study, which future research should address. First, the population of interest is nuclear households with wage-worker spouses. This is the most significant household type in study's context. Yet, future research should investigate the effect of mass migration on other (e.g., extended or single-parent) household types. Second, due to data limitations, the model does not feature public good consumption or domestic production. Time not spent in market work is considered leisure, yet household chores or child care might be important, especially for women's time allocation decisions. Future research should investigate the impact of refugee inflows on household members' time allocations. With these extensions, the intra-household effects of forced migration on host countries will be better understood.

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Appendices

The Appendix includes five sections. Appendix A provides further theoretical discussions. Appendix B provides the details of spatial analyses, including maps and Moran's I tests. Appendix C provides further descriptive results. Appendix D provides all the results from reduced-form analyses. Appendix E provides further results based on the structural model.

A Theory: Further Discussions

The collective labor supply model developed in the main text assumes egoistic preferences. While the identification of the model is not possible with paternalistic preferences where a member's preferences can depend on the other members' consumption and leisure, Chiappori (1992) shows that it is possible to identify the model with Beckerian caring preferences where a member's preferences can depend on the other members' utility. Therefore, the sharing rule is identified if individual utility functions are specified as,

$$\tilde{u}_m = W_m\Big[u_m(c_m, l_m), u_f(c_f, l_f)\Big],$$
$$\tilde{u}_f = W_f\Big[u_f(c_f, l_f), u_m(c_m, l_m)\Big],$$

where W_i for $i = m, f$, is continuous, increasing, and quasi-concave. Any household decision that is Pareto efficient under the caring preferences is also efficient under the egoistic preferences. However, as pointed out by Lise and Seitz (2011), under caring preferences the interpretation of the sharing rule changes as it will absorb the caring. A special type of caring preferences discussed in Browning et al. (2006) is given by,

$$\tilde{u}_m = u_m(c_m, l_m) + \tau_m u_f(c_f, l_f),$$
$$\tilde{u}_f = u_f(c_f, l_f) + \tau_f u_m(c_m, l_m),$$

where $\tau_m, \tau_f \in [0, 1]$. Under these preferences, the household maximizes,

$$\begin{aligned}\lambda\tilde{u}_f + (1-\lambda)\tilde{u}_m &= \lambda(u_f + \tau_f u_m) + (1-\lambda)(u_m + \tau_m u_f)\\ &= (\lambda + \tau_m(1-\lambda))u_f + (\tau_f\lambda + (1-\lambda))u_m\\ &= \tilde{\lambda}u_f + (1-\tilde{\lambda})u_m,\end{aligned}$$

which is a re-weighted version of the household utility function where the weight associated with husband's utility is

$$\tilde{\lambda} = \frac{\lambda + \tau_m(1-\lambda)}{1 + \tau_m + (\tau_f - \tau_m)\lambda},$$

with $\tilde{\lambda} \in [\frac{\tau_m}{1+\tau_m}, \frac{1}{1+\tau_f}]$ for $\lambda \in [0, 1]$. Note that similar to λ, this weight is a function of the wages and distribution factors; however, it also depends on the degree of caring (τ_m, τ_f).

B Spatial Analyses: Further Details and Results

This section provides the details of the Moran's I test for spatial autocorrelation. The Moran's I (Moran, 1950) is defined as,

$$\text{Moran's } I = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij} r_i r_j}{\sum_{i=1}^{n} r_i^2},$$

where n is the number of provinces in Turkey ($n = 81$), r_i is the refugee intensity (calculated as the ratio of refugees to total population) in province i, w_{ij} is the $(i,j)^{th}$ element of the row-standardized spatial weight matrix W. Moran's I lies in the range $[-1, 1]$, where 0 implies random distribution of refugees (or refugee intensity), while a positive (negative) value indicates positive (negative) spatial autocorrelation across regions. There are different spatial weight matrices used in the literature. I consider the k-nearest neighbor spatial weight matrix given by,

$$w_{ij} = \begin{cases} \frac{\mathbb{1}(d_{ij} \leq d_{i[k]})}{\sum_{j=1}^{n} \mathbb{1}(d_{ij} \leq d_{i[k]})}, & \text{if } \; i \neq j, \\ 0, & \text{otherwise,} \end{cases}$$

where $\mathbb{1}(d_{ij} \leq d_{i[k]})$ is the indicator function taking value 1 if province j is among the k nearest neighbors of province i, and 0 otherwise. All the diagonal elements of the spatial weight matrix are equal to 0.

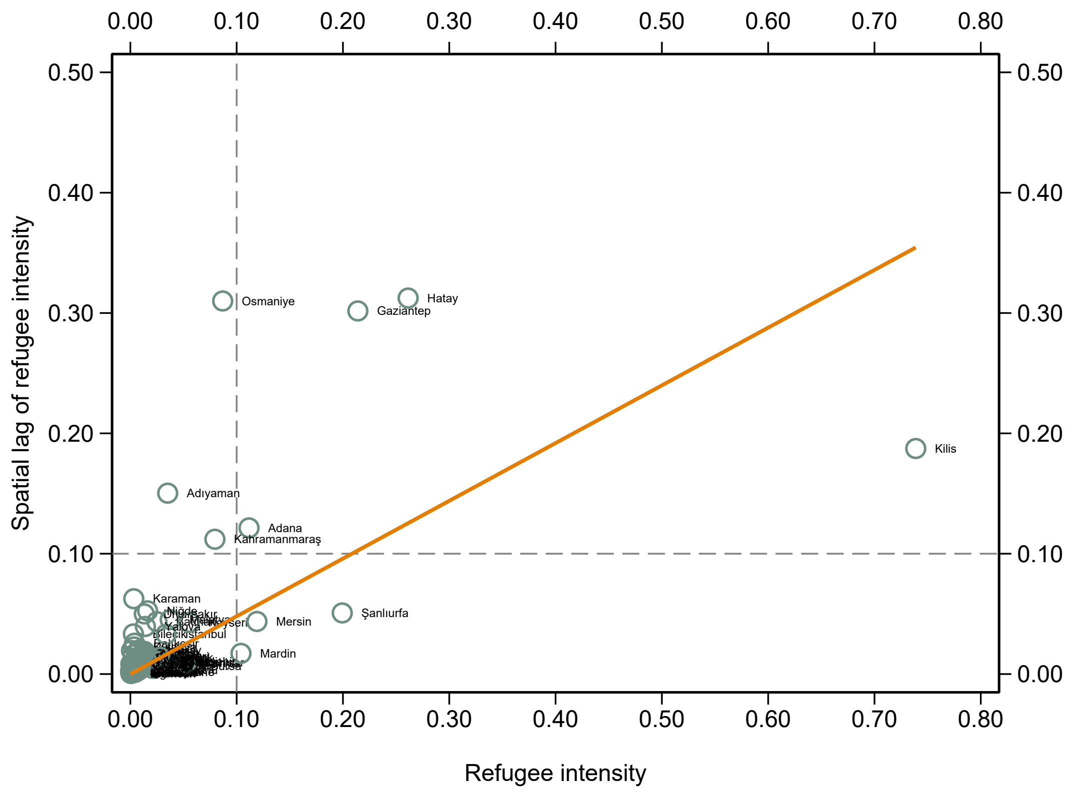
Table 5: Moran's I Results

year	$k=1$	$k=2$	$k=3$	$k=4$
2013	0.53	0.36	0.33	0.30
	(0.00)	(0.00)	(0.00)	(0.00)
2014	0.50	0.35	0.28	0.26
	(0.00)	(0.00)	(0.00)	(0.00)
2015	0.50	0.37	0.30	0.27
	(0.00)	(0.00)	(0.00)	(0.00)
2016	0.49	0.37	0.31	0.28
	(0.00)	(0.00)	(0.00)	(0.00)
2017	0.52	0.40	0.33	0.30
	(0.00)	(0.00)	(0.00)	(0.00)
2018	0.64	0.48	0.40	0.36
	(0.00)	(0.00)	(0.00)	(0.00)
2019	0.65	0.48	0.40	0.36
	(0.00)	(0.00)	(0.00)	(0.00)
2020	0.68	0.50	0.42	0.38
	(0.00)	(0.00)	(0.00)	(0.00)

Notes: $n = 81$ provinces. Moran's I with k nearest neighborhood. p values in parentheses.

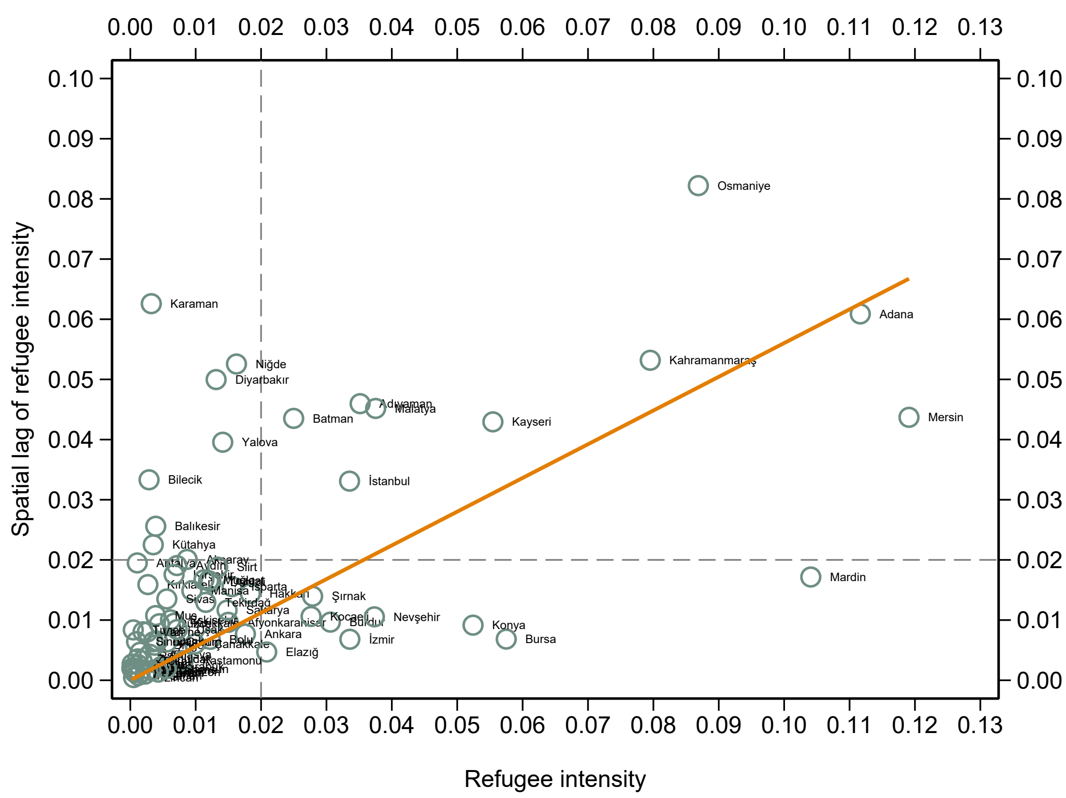
Table 5 shows the results of Moran's I test for $k = 1, \ldots, 4$ nearest neighborhoods. For all years, and for any choice of k, there is a significant (at the 1% level) positive spatial autocorrelation across provinces of Turkey in terms of Syrian refugee intensity. Figure 10 shows the Moran's I scatter plot and the linear fit of spatial lag of refugee intensity for the year 2020 using $k = 3$ nearest neighbor spatial weight matrix (Moran's I = 0.42).

Figure 10: Moran's *I* Scatter Plot



Notes: Year 2020, with $k = 3$ nearest neighbor spatial weight matrix.

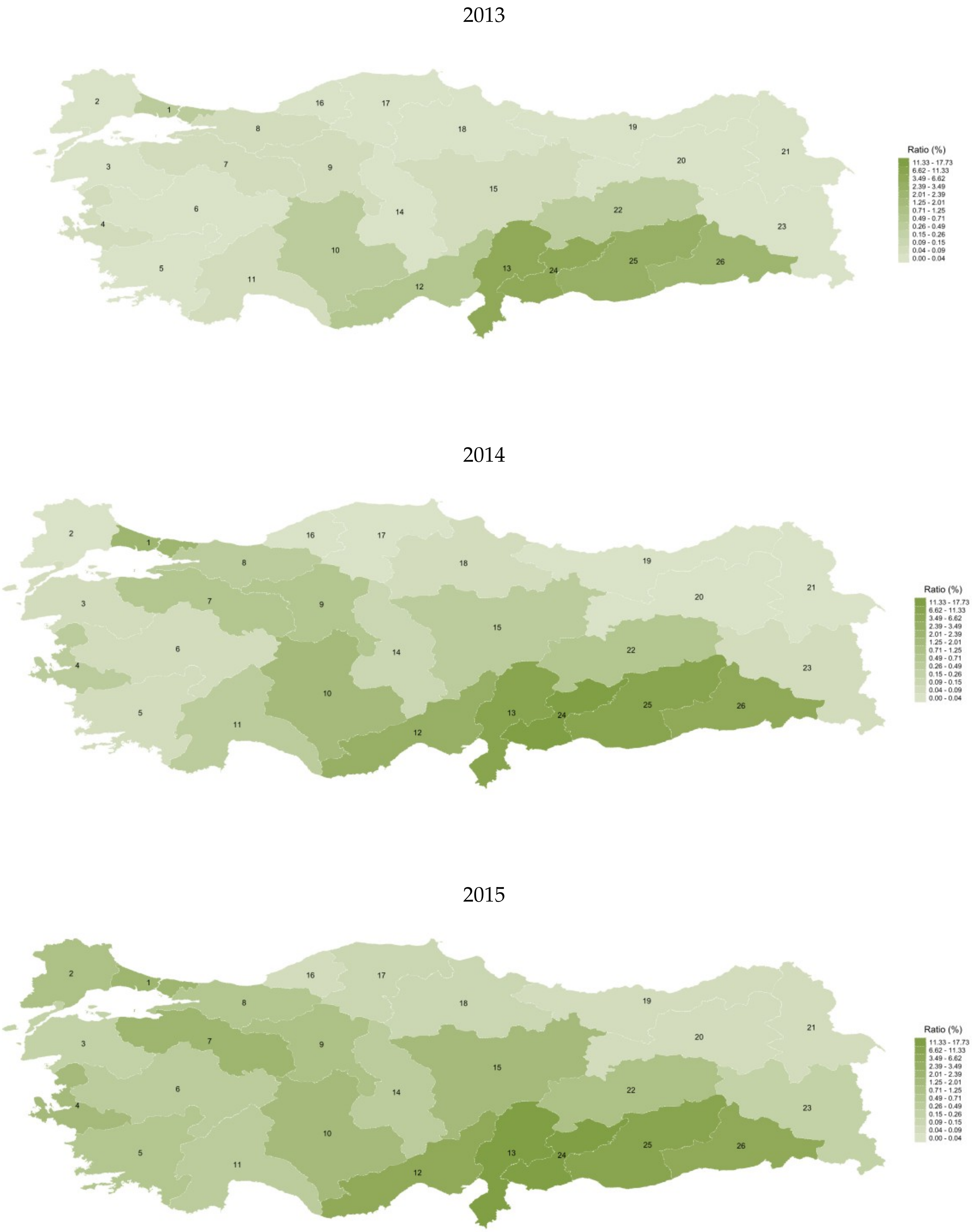
Figure 11: Moran's *I* Scatter Plot Excluding Highest Refugee-Intensity Provinces



Notes: Year 2020, with $k = 3$ nearest neighbor spatial weight matrix. Four provinces, Kilis, Hatay, Gaziantep, and Sanliurfa, are excluded. Moran's *I* statistic equals 0.39, and significant at the 1% level ($p = 0.00$).

To check whether the results of the Moran's *I* test are driven by the outlier provinces in terms of refugee intensity, I repeat the same analysis excluding four provinces: Kilis, Hatay, Gaziantep, and Sanliurfa. Figure 11 shows the Moran's *I* scatter plot for this restricted sample of provinces. Similar to the previous case, there is a significant (at the 1% level) positive spatial autocorrelation across provinces. Moran's *I* is 0.39 for $k = 3$ nearest neighbor spatial weight matrix.

Figure 12: Syrian Refugees in Turkey, NUTS 2 Level

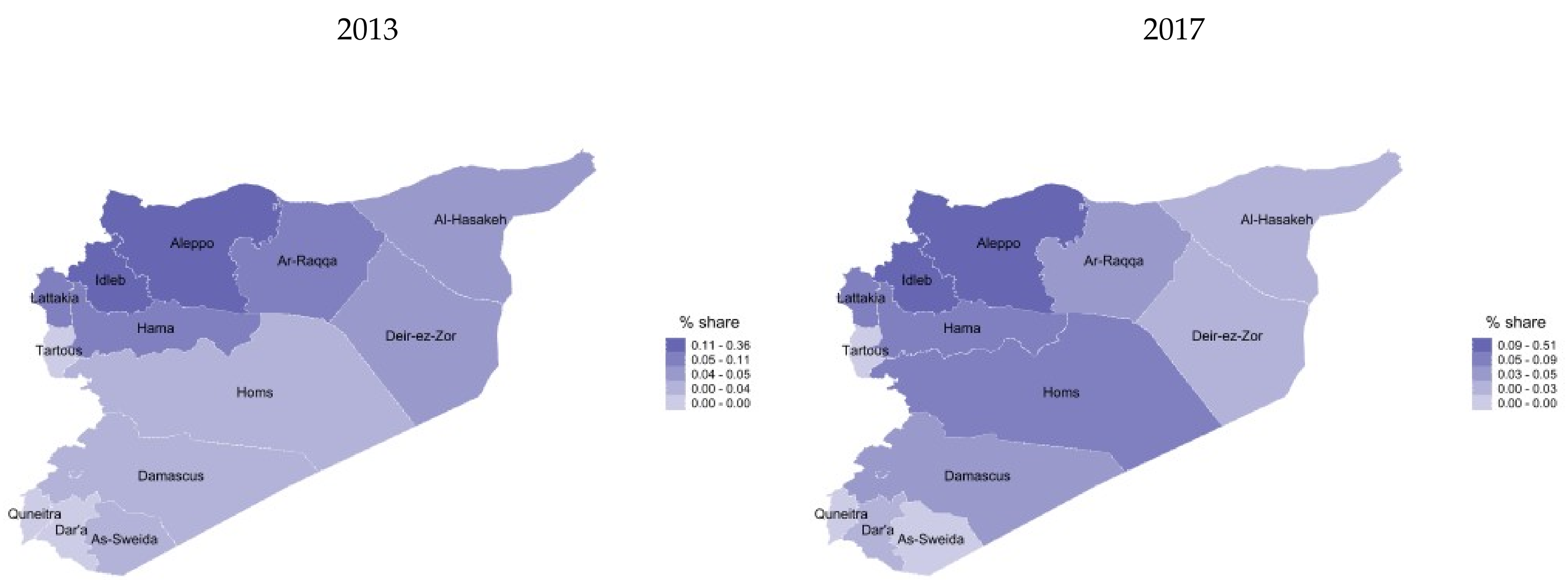


Notes: Years 2013, 2014, 2015. Ratio of Syrian refugees to Turkish population (multiplied by 100) at the NUTS 2 level. Source: AFAD (2013), Erdogan (2013), Directorate General of Migration Management (DGMM) and Turkish Statistical Institute (TurkStat).

Figure 13: Pre-war Distribution of Syrian Population

Notes: 2011 distribution of Syrian population across 13 governorates (Damascus and Rural Damascus combined) of Syria. Source: Syrian Civil Affairs Records, 2011.

Figure 14: Origin of Syrian Refugees in Turkey



Notes: Percentage share of governorates of Syria as origins of refugees in Turkey. Source: TDEMA (2013,2017).

Table 6: Regional Refugee Intensity

5-region	NUTS1	NUTS2	Major Province	2013	2014	2015	2016	2017	2018	2019	2020
1	1	1	Istanbul	0.003	0.023	0.019	0.029	0.033	0.036	0.031	0.034
1	2	2	Tekirdag	0.000	0.000	0.006	0.008	0.009	0.009	0.008	0.008
1	2	3	Balikesir	0.000	0.000	0.002	0.003	0.004	0.005	0.006	0.006
1	3	4	Izmir	0.000	0.003	0.016	0.023	0.028	0.032	0.034	0.034
1	3	5	Aydin	0.000	0.001	0.005	0.008	0.010	0.011	0.010	0.010
1	3	6	Manisa	0.000	0.000	0.002	0.004	0.005	0.007	0.009	0.009
1	4	7	Bursa	0.001	0.005	0.017	0.026	0.031	0.041	0.045	0.044
1	4	8	Kocaeli	0.001	0.005	0.005	0.010	0.016	0.020	0.020	0.020
2	5	9	Ankara	0.001	0.006	0.008	0.012	0.016	0.016	0.017	0.018
2	5	10	Konya	0.002	0.020	0.016	0.029	0.038	0.043	0.046	0.047
3	6	11	Antalya	0.000	0.004	0.002	0.005	0.005	0.006	0.005	0.005
3	6	12	Adana	0.006	0.028	0.053	0.071	0.083	0.107	0.113	0.115
3	6	13	Hatay	0.033	0.094	0.121	0.155	0.171	0.174	0.179	0.170
2	7	14	Kirikkale	0.000	0.001	0.004	0.007	0.010	0.012	0.013	0.015
2	7	15	Kayseri	0.000	0.004	0.014	0.025	0.030	0.034	0.034	0.035
4	8	16	Zonguldak	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002
4	8	17	Kastamonu	0.000	0.000	0.001	0.001	0.002	0.002	0.005	0.005
4	8	18	Samsun	0.000	0.001	0.001	0.002	0.003	0.003	0.004	0.004
4	9	19	Trabzon	0.000	0.000	0.001	0.001	0.002	0.002	0.002	0.002
5	10	20	Erzurum	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001
5	10	21	Agri	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001
5	11	22	Malatya	0.003	0.006	0.010	0.015	0.019	0.024	0.025	0.025
5	11	23	Van	0.000	0.001	0.001	0.002	0.004	0.004	0.005	0.005
5	12	24	Gaziantep	0.057	0.137	0.143	0.167	0.169	0.200	0.212	0.201
5	12	25	Sanliurfa	0.030	0.072	0.091	0.118	0.122	0.127	0.120	0.114
5	12	26	Mardin	0.017	0.056	0.047	0.058	0.053	0.057	0.054	0.053

Notes: Refugee intensity, calculated as the ratio of the number of Syrian refugees to native population, at the broad five region, NUTS1, and NUTS2 level. Sources: TDEMA (2013), Erdogan (2014), TDGMM, and TurkStat.

C Data: Further Descriptive Statistics

Table 7: Descriptive Statistics: Nuclear Households

	mean	sd
Household:		
Household size	3.40	1.25
Number of children	1.40	1.25
Total labor income (weekly)	314.50	222.96
Husband:		
Age	39.87	10.60
Below high school	0.61	0.49
High school	0.22	0.42
Above high school	0.17	0.38
Employed	0.81	0.39
Wage worker	0.69	0.46
Hours (weekly)	52.80	14.95
Labor income (weekly)	273.67	205.02
Hourly wage	5.87	5.10
Wife:		
Age	36.08	10.78
Below high school	0.72	0.45
High school	0.17	0.37
Above high school	0.11	0.32
Employed	0.24	0.43
Wage worker	0.57	0.50
Hours (weekly)	40.46	15.75
Labor income (weekly)	277.95	198.99
Hourly wage	7.14	5.58
Observations	529,977	

Notes: THLFS, years 2004-2015 excluding 2012. Nuclear households with both couples, with or without children aged less than 15. Labor income is in Turkish Lira and CPI adjusted (base year 2010).

Table 8: Descriptive Statistics: High Educated Husband, High Educated Wife

	mean	sd
Household:		
Household size	3.17	0.84
Number of children	1.17	0.84
Total labor income (weekly)	511.06	274.12
Husband:		
Age	35.75	7.33
Employed	0.97	0.17
Hours (weekly)	46.58	11.49
Labor income (weekly)	377.63	179.83
Hourly wage	8.74	4.81
Wife:		
Age	32.41	7.09
Employed	0.45	0.50
Hours (weekly)	40.65	9.49
Labor income (weekly)	326.14	128.72
Hourly wage	8.67	4.35
Observations	83,935	

Notes: THLFS, years 2004-2015 excluding 2012. Subsample of (estimation sample) households where the educational attainment of both husband and wife is high school or above. Labor income is in Turkish Lira and CPI adjusted (base year 2010).

Table 9: Descriptive Statistics: High Educated Husband, Low Educated Wife

	mean	sd
Household:		
Household size	3.58	1.02
Number of children	1.58	1.02
Total labor income (weekly)	282.14	135.42
Husband:		
Age	35.99	7.57
Employed	0.99	0.08
Hours (weekly)	50.04	12.20
Labor income (weekly)	275.50	133.08
Hourly wage	5.99	3.55
Wife:		
Age	31.64	7.72
Employed	0.07	0.26
Hours (weekly)	45.60	14.48
Labor income (weekly)	136.02	60.28
Hourly wage	3.05	1.54
Observations	56,152	

Notes: THLFS, years 2004-2015 excluding 2012. Subsample of (estimation sample) households where the educational attainment is high school or above for husband, below high school for wife. Labor income is in Turkish Lira and CPI adjusted (base year 2010).

Table 10: Descriptive Statistics: Low Educated Husband, High Educated Wife

	mean	sd
Household:		
Household size	3.27	0.86
Number of children	1.27	0.86
Total labor income (weekly)	261.41	141.39
Husband:		
Age	34.05	6.83
Employed	0.95	0.21
Hours (weekly)	55.18	12.15
Labor income (weekly)	219.43	99.89
Hourly wage	4.18	2.29
Wife:		
Age	30.71	6.62
Employed	0.27	0.44
Hours (weekly)	46.90	10.74
Labor income (weekly)	205.27	104.37
Hourly wage	4.64	2.87
Observations	16,900	

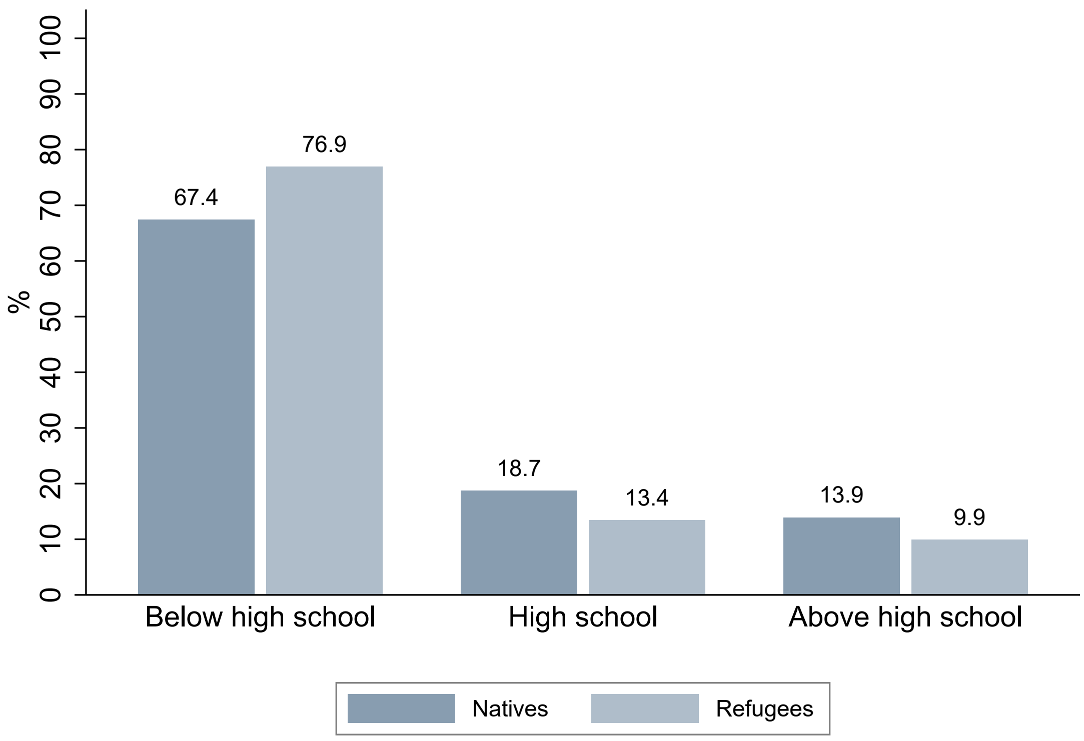
Notes: THLFS, years 2004-2015 excluding 2012. Subsample of (estimation sample) households where the educational attainment is high school or above for wife, below high school for husband. Labor income is in Turkish Lira and CPI adjusted (base year 2010).

Table 11: Descriptive Statistics: Low Educated Husband, Low Educated Wife

	mean	sd
Household:		
Household size	3.79	1.23
Number of children	1.79	1.23
Total labor income (weekly)	196.28	90.09
Husband:		
Age	36.27	7.79
Employed	0.98	0.14
Hours (weekly)	55.74	12.88
Labor income (weekly)	187.65	82.32
Hourly wage	3.58	1.94
Wife:		
Age	32.62	8.01
Employed	0.11	0.31
Hours (weekly)	46.28	15.79
Labor income (weekly)	124.31	56.69
Hourly wage	2.83	1.71
Observations	116,589	

Notes: THLFS, years 2004-2015 excluding 2012. Subsample of (estimation sample) households where the educational attainment of both husband and wife is below high school. Labor income is in Turkish Lira and CPI adjusted (base year 2010).

Figure 15: Educational Attainment of Natives and Refugees



Notes: Data for refugees is based on a survey by AFAD (DEMA) and WHO (2016) of Syrian refugees aged 18-69. Data for natives is based on the 2015 THLFS; the sample is restricted to the same age interval.

Table 12: Educational Attainment of Natives and Refugees by Gender

	Male		**Female**	
	Natives	Refugees	Natives	Refugees
Below high school	61.5	70.2	72.9	81.7
High school	22.4	16.7	15.3	11.0
Above high school	16.1	13.1	11.8	7.3

Notes: Percentage of population at educational attainment level, for each gender and native/refugee group. Data for refugees is based on a survey by AFAD (DEMA) and WHO (2016) of Syrian refugees aged 18-69. Data for natives is based on the 2015 THLFS; the sample is restricted to the same age interval.

Table 13: Regional Trade Volume with Syria

NUTS2	2004	2005	2006	2007	2008	2009	2010	2011	2013	2014	2015
1	19.583	19.023	19.302	19.496	19.911	20.135	20.056	20.426	18.812	19.458	19.055
2	12.127	13.088	12.583	13.540	14.521	14.223	15.073	14.693	13.427	15.593	14.705
3	15.089	15.140	15.008	15.586	15.902	15.966	16.462	16.256	14.032	14.472	14.622
4	16.947	17.764	18.495	18.966	19.446	18.770	18.759	18.292	16.647	17.466	16.945
5	15.988	16.359	16.249	16.817	17.270	17.374	18.027	17.838	16.441	16.054	15.886
6	15.076	15.480	15.564	15.743	15.829	16.319	17.373	17.867	17.606	17.912	17.412
7	16.376	16.702	16.985	18.221	17.681	17.685	17.978	17.301	15.495	16.373	15.882
8	18.305	18.665	17.024	17.602	17.869	18.889	20.108	19.557	16.182	16.793	16.351
9	16.102	17.918	18.356	18.554	18.047	18.866	19.068	17.400	18.611	19.671	18.849
10	16.139	16.001	16.118	16.751	17.489	17.835	17.986	17.169	17.779	18.233	17.911
11	10.519	13.317	14.384	15.480	14.531	16.238	15.947	16.398	13.835	11.380	14.487
12	17.093	17.641	17.499	17.880	18.314	17.992	18.367	17.967	18.642	19.128	19.082
13	17.294	17.863	18.230	18.001	18.473	18.736	19.003	18.867	18.863	19.447	19.418
14	15.207	15.351	15.687	15.777	15.313	15.475	15.320	16.755	16.111	16.592	16.022
15	16.451	17.257	17.340	16.189	16.531	16.344	17.113	16.351	15.524	16.440	16.492
16	15.184	15.070	14.943	13.618	16.208	15.560	17.431	16.985	9.364	11.443	12.222
17	0.000	0.000	0.000	9.859	10.685	9.557	12.855	12.692	11.372	15.042	14.723
18	14.295	14.618	14.750	14.884	14.642	14.819	15.401	16.042	13.596	14.881	15.205
19	13.045	13.985	15.629	15.570	12.768	13.972	14.248	13.071	3.989	11.295	12.487
20	0.000	0.000	0.000	0.000	8.272	0.000	10.398	11.837	0.000	7.907	0.000
21	9.255	10.604	0.000	12.390	13.105	9.170	10.753	10.634	0.000	0.000	5.635
22	12.195	13.191	15.675	14.763	16.119	15.463	15.160	14.420	14.755	15.197	15.703
23	10.207	0.000	13.672	13.150	3.892	4.443	7.782	0.000	0.000	0.000	9.440
24	18.077	18.076	18.159	18.585	18.889	18.776	19.147	18.992	19.540	19.829	19.936
25	13.362	13.817	15.162	16.141	17.383	17.878	18.123	17.827	17.934	18.115	18.014
26	15.544	14.952	16.118	16.028	16.644	16.911	16.831	16.847	17.099	17.694	17.788

Notes: Log trade volume, calculated as $log(1 + exports + imports)$, of each NUTS2 region with Syria during 2010-2015. Source: TurkStat.

D Preliminary Reduced-form Analyses: Further Results

Table 14: Individual-level outcomes, 2SLS, 5-region time fixed effects

	Husband			Wife		
	All	Low educated	High educated	All	Low educated	High educated
Worked	0.002**	0.001	0.000	-0.004***	-0.006***	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	N = 529,977	N = 321,029	N = 208,948	N = 529,977	N = 380,894	N = 149,083
Log income	0.007***	0.006***	0.005***	0.007**	0.010	0.004**
	(0.001)	(0.002)	(0.001)	(0.003)	(0.007)	(0.002)
	N = 284,030	N = 139,704	N = 144,326	N = 69,147	N = 18,631	N = 50,516
Weekly hours	-0.132**	-0.135*	-0.060	0.189	0.213	0.138**
	(0.063)	(0.076)	(0.067)	(0.120)	(0.199)	(0.069)
	N = 429,893	N = 245,545	N = 184,348	N = 128,371	N = 70,351	N = 58,020
Hourly wage	0.018*	0.021***	0.025	0.026	0.026	0.026
	(0.010)	(0.008)	(0.016)	(0.019)	(0.017)	(0.022)
	N = 284,029	N = 139,703	N = 144,326	N = 69,147	N = 18,631	N = 50,516

Notes: Outcome variables are on the left column. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for six subsamples: all men, low-educated men, high-educated men, all women, low-educated women, high-educated women. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 15: Individual-level outcomes, 2SLS, NUTS1 specific time trends

	Husband			Wife		
	All	Low educated	High educated	All	Low educated	High educated
Worked	0.000	0.000	-0.001	-0.005***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
	N = 529,977	N = 321,029	N = 208,948	N = 529,977	N = 380,894	N = 149,083
Log income	0.007***	0.005**	0.006***	0.018***	0.043***	0.008***
	(0.002)	(0.002)	(0.002)	(0.006)	(0.012)	(0.003)
	N = 284,030	N = 139,704	N = 144,326	N = 69,147	N = 18,631	N = 50,516
Weekly hours	-0.032	-0.029	-0.027	0.194	0.200	0.143*
	(0.061)	(0.075)	(0.064)	(0.148)	(0.234)	(0.079)
	N = 429,893	N = 245,545	N = 184,348	N = 128,371	N = 70,351	N = 58,020
Hourly wage	0.019*	0.008	0.034**	0.051**	0.032	0.064**
	(0.010)	(0.009)	(0.017)	(0.025)	(0.022)	(0.030)
	N = 284,029	N = 139,703	N = 144,326	N = 69,147	N = 18,631	N = 50,516

Notes: Outcome variables are on the left column. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for six subsamples: all men, low-educated men, high-educated men, all women, low-educated women, high-educated women. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 16: Individual-level outcomes, 2SLS, 5-region specific time trends

	Husband			Wife		
	All	Low educated	High educated	All	Low educated	High educated
Worked	0.000	0.000	0.000	-0.006***	-0.007***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	N = 529,977	N = 321,029	N = 208,948	N = 529,977	N = 380,894	N = 149,083
Log income	0.007***	0.005**	0.006***	0.013***	0.034***	0.005**
	(0.001)	(0.002)	(0.001)	(0.004)	(0.010)	(0.002)
	N = 284,030	N = 139,704	N = 144,326	N = 69,147	N = 18,631	N = 50,516
Weekly hours	-0.082	-0.076	-0.045	0.249**	0.295	0.152**
	(0.063)	(0.074)	(0.060)	(0.120)	(0.184)	(0.067)
	N = 429,893	N = 245,545	N = 184,348	N = 128,371	N = 70,351	N = 58,020
Hourly wage	0.018**	0.016*	0.030**	0.033	0.030	0.040
	(0.009)	(0.009)	(0.015)	(0.022)	(0.021)	(0.027)
	N = 284,029	N = 139,703	N = 144,326	N = 69,147	N = 18,631	N = 50,516

Notes: Outcome variables are on the left column. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for six subsamples: all men, low-educated men, high-educated men, all women, low-educated women, high-educated women. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 17: Individual-level outcomes, 2SLS, baseline (no θ)

	Husband			Wife		
	All	Low educated	High educated	All	Low educated	High educated
Worked	0.000	-0.001	-0.001	-0.007***	-0.007***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	N = 529,977	N = 321,029	N = 208,948	N = 529,977	N = 380,894	N = 149,083
Log income	0.008***	0.008***	0.004***	0.009**	0.029***	0.002
	(0.001)	(0.002)	(0.001)	(0.004)	(0.008)	(0.002)
	N = 284,030	N = 139,704	N = 144,326	N = 69,147	N = 18,631	N = 50,516
Weekly hours	0.014	-0.017	0.098**	0.196	0.260	0.107
	(0.048)	(0.057)	(0.046)	(0.146)	(0.214)	(0.079)
	N = 429,893	N = 245,545	N = 184,348	N = 128,371	N = 70,351	N = 58,020
Hourly wage	0.000	0.014***	-0.003	0.043*	0.016	0.045
	(0.009)	(0.005)	(0.014)	(0.024)	(0.018)	(0.029)
	N = 284,029	N = 139,703	N = 144,326	N = 69,147	N = 18,631	N = 50,516

Notes: Outcome variables are on the left column. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for six subsamples: all men, low-educated men, high-educated men, all women, low-educated women, high-educated women. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 18: Individual-level outcomes, IV by Del Carpio & Wagner (2015), 5-region time fixed effects

	Husband			Wife		
	All	Low educated	High educated	All	Low educated	High educated
Worked	0.002**	0.001	0.000	-0.004***	-0.006***	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	N = 529,977	N = 321,029	N = 208,948	N = 529,977	N = 380,894	N = 149,083
Log income	0.007***	0.006***	0.005***	0.007**	0.010	0.004**
	(0.001)	(0.002)	(0.002)	(0.003)	(0.007)	(0.002)
	N = 284,030	N = 139,704	N = 144,326	N = 69,147	N = 18,631	N = 50,516
Weekly hours	-0.134**	-0.138*	-0.060	0.176	0.183	0.141**
	(0.062)	(0.076)	(0.067)	(0.121)	(0.202)	(0.069)
	N = 429,893	N = 245,545	N = 184,348	N = 128,371	N = 70,351	N = 58,020
Hourly wage	0.019*	0.022***	0.027	0.028	0.028*	0.028
	(0.010)	(0.008)	(0.016)	(0.019)	(0.016)	(0.022)
	N = 284,029	N = 139,703	N = 144,326	N = 69,147	N = 18,631	N = 50,516

Notes: Outcome variables are on the left column. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for six subsamples: all men, low-educated men, high-educated men, all women, low-educated women, high-educated women. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 19: Individual-level outcomes, OLS, 5-region time fixed effects

	Husband			Wife		
	All	Low educated	High educated	All	Low educated	High educated
Worked	0.001	0.000	0.000	-0.004***	-0.006***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
	N = 529,977	N = 321,029	N = 208,948	N = 529,977	N = 380,894	N = 149,083
Log income	0.005***	0.004***	0.004**	-0.001	-0.008	-0.002
	(0.001)	(0.001)	(0.001)	(0.004)	(0.009)	(0.002)
	N = 284,030	N = 139,704	N = 144,326	N = 69,147	N = 18,631	N = 50,516
Weekly hours	-0.122**	-0.119	-0.058	0.119	0.106	0.102*
	(0.061)	(0.075)	(0.059)	(0.103)	(0.172)	(0.058)
	N = 429,893	N = 245,545	N = 184,348	N = 128,371	N = 70,351	N = 58,020
Hourly wage	0.019*	0.021***	0.027*	-0.007	0.003	-0.009
	(0.010)	(0.007)	(0.015)	(0.021)	(0.019)	(0.023)
	N = 284,029	N = 139,703	N = 144,326	N = 69,147	N = 18,631	N = 50,516

Notes: Outcome variables are on the left column. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for six subsamples: all men, low-educated men, high-educated men, all women, low-educated women, high-educated women. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 20: Household-level outcomes, 2SLS, 5-region time fixed effects

	Total Income			Relative Income	
	Wife			*Wife*	
	Low educated	High educated		Low educated	High educated
Husband Low educated	0.005*** (0.001) N = 116,589	0.007** (0.003) N = 16,900	***Husband*** Low educated	0.014** (0.006) N = 116,589	-0.011 (0.031) N = 16,900
Husband High educated	0.002 (0.002) N = 56,152	0.002 (0.002) N = 83,935	***Husband*** High educated	0.011 (0.007) N = 56,152	0.018 (0.011) N = 83,935

Notes: Outcome variables, total household income and relative income of husband against wife, are in logs. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for four household types depending on spouses' educational attainment. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 21: Household-level outcomes, 2SLS, NUTS1 specific time trends

	Total Income			Relative Income	
	Wife			*Wife*	
	Low educated	High educated		Low educated	High educated
Husband Low educated	0.003** (0.002) N = 116,589	0.003 (0.004) N = 16,900	***Husband*** Low educated	0.011 (0.008) N = 116,589	-0.013 (0.034) N = 16,900
Husband High educated	0.002 (0.002) N = 56,152	0.003 (0.002) N = 83,935	***Husband*** High educated	0.013 (0.009) N = 56,152	0.033*** (0.012) N = 83,935

Notes: Outcome variables, total household income and relative income of husband against wife, are in logs. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for four household types depending on spouses' educational attainment. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 22: Household-level outcomes, 2SLS, 5-region specific time trends

	Total Income			**Relative Income**	
	Wife			***Wife***	
	Low educated	High educated		Low educated	High educated
Husband Low educated	0.003** (0.001) N = 116,589	0.004 (0.004) N = 16,900	***Husband*** Low educated	0.012* (0.007) N = 116,589	-0.002 (0.033) N = 16,900
Husband High educated	0.002 (0.002) N = 56,152	0.002 (0.002) N = 83,935	***Husband*** High educated	0.014* (0.008) N = 56,152	0.031*** (0.011) N = 83,935

Notes: Outcome variables, total household income and relative income of husband against wife, are in logs. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for four household types depending on spouses' educational attainment. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 23: Household-level outcomes, 2SLS, baseline (no θ)

	Total Income			**Relative Income**	
	Wife			***Wife***	
	Low educated	High educated		Low educated	High educated
Husband Low educated	0.005*** (0.001) N = 116,589	0.004 (0.003) N = 16,900	***Husband*** Low educated	0.025*** (0.008) N = 116,589	-0.011 (0.029) N = 16,900
Husband High educated	0.000 (0.002) N = 56,152	0.001 (0.002) N = 83,935	***Husband*** High educated	0.019*** (0.006) N = 56,152	0.042*** (0.009) N = 83,935

Notes: Outcome variables, total household income and relative income of husband against wife, are in logs. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for four household types depending on spouses' educational attainment. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 24: Household-level outcomes, IV by Del Carpio & Wagner (2015), 5-region time fixed effects

		Total Income			Relative Income	
		Wife			*Wife*	
		Low educated	High educated		Low educated	High educated
Husband	Low educated	0.005*** (0.001) N = 116,589	0.007** (0.003) N = 16,900	Low educated	0.015** (0.007) N = 116,589	-0.007 (0.031) N = 16,900
	High educated	0.002 (0.002) N = 56,152	0.002 (0.002) N = 83,935	High educated	0.011 (0.007) N = 56,152	0.017 (0.011) N = 83,935

Notes: Outcome variables, total household income and relative income of husband against wife, are in logs. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for four household types depending on spouses' educational attainment. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Table 25: Household-level outcomes, OLS, 5-region time fixed effects

		Total Income			Relative Income	
		Wife			*Wife*	
		Low educated	High educated		Low educated	High educated
Husband	Low educated	0.003** (0.001) N = 116,589	0.000 (0.003) N = 16,900	Low educated	0.012** (0.005) N = 116,589	0.030 (0.027) N = 16,900
	High educated	0.002 (0.002) N = 56,152	0.000 (0.002) N = 83,935	High educated	0.004 (0.006) N = 56,152	0.015 (0.010) N = 83,935

Notes: Outcome variables, total household income and relative income of husband against wife, are in logs. Each cell shows the estimate of refugee intensity variable (parameter β_1), separately for four household types depending on spouses' educational attainment. Education is high if high school or above, low otherwise. Each regression includes individual controls, regional trade volume, year and NUTS2 region fixed effects. Robust standard errors, clustered at year and NUTS2 region, are in parentheses. Number of observations for each regression is given by N. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

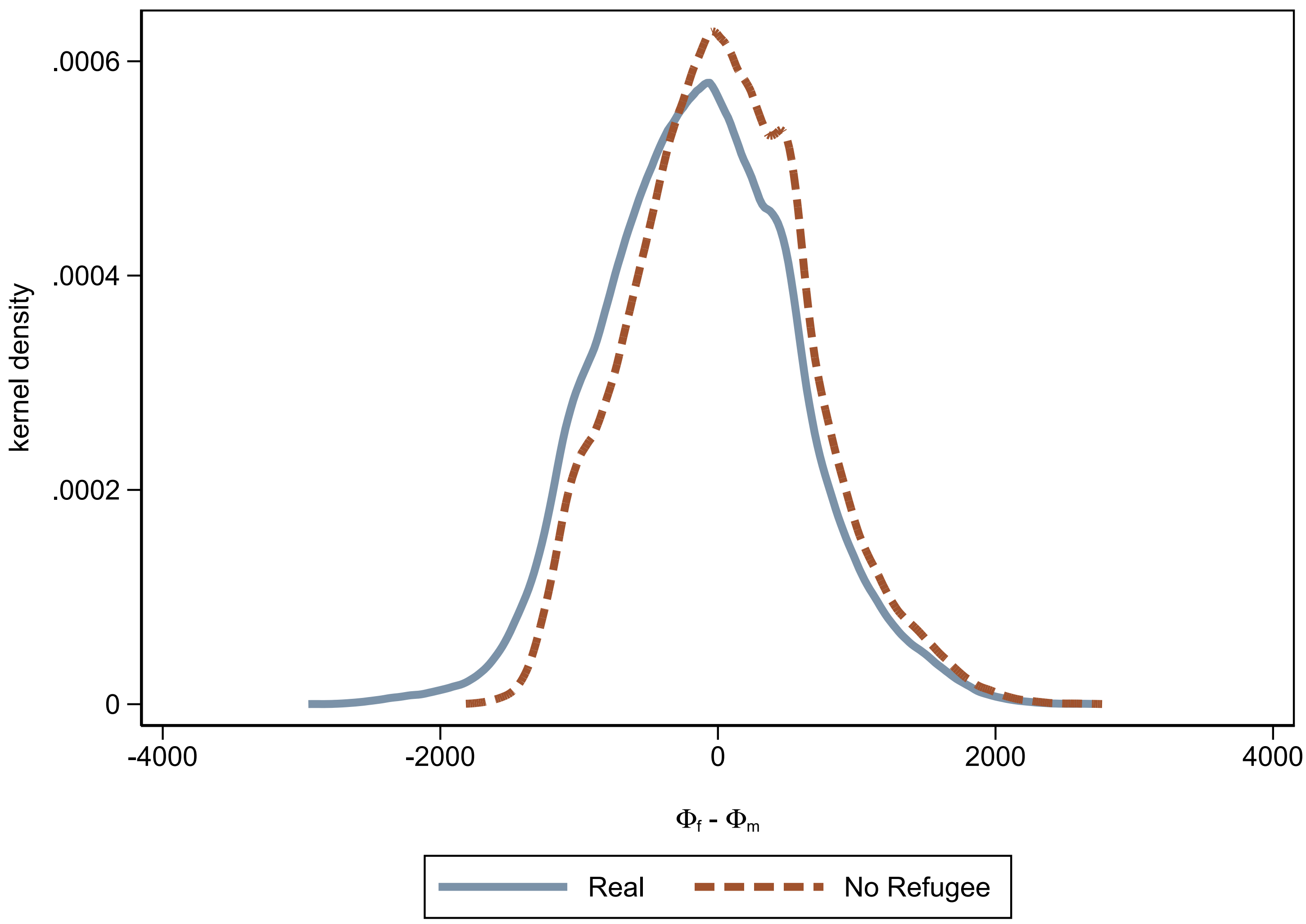
E Structural Analyses: Further Results

Table 26: Selection-Corrected Wage Equations

	Male		Female	
	Log wage	**Selection**	**Log wage**	**Selection**
Age, husband	0.058***	0.102***		0.025***
	(0.004)	(0.011)		(0.006)
Age square, husband	-0.001***	-0.002***		0.000***
	(0.000)	(0.000)		(0.000)
Age, wife		-0.084***	0.064***	0.212***
		(0.010)	(0.004)	(0.007)
Age square, wife		0.001***	-0.001***	-0.003***
		(0.000)	(0.000)	(0.000)
Below high school, husband	-0.993***	-1.197***		-0.157***
	(0.025)	(0.067)		(0.022)
High school, husband	-0.624***	-0.799***		-0.195***
	(0.015)	(0.056)		(0.024)
Below high school, wife		-0.002	-1.407***	-1.926***
		(0.066)	(0.052)	(0.063)
High school, wife		-0.197***	-0.760***	-1.264***
		(0.048)	(0.025)	(0.045)
Labor income, husband				0.000***
				(0.000)
Labor income, wife		-0.001***		
		(0.000)		
Number of children		0.108***		-0.238***
		(0.011)		(0.025)
r	0.633***	-1.551*	-0.125	0.078
	(0.235)	(0.816)	(0.212)	(0.446)

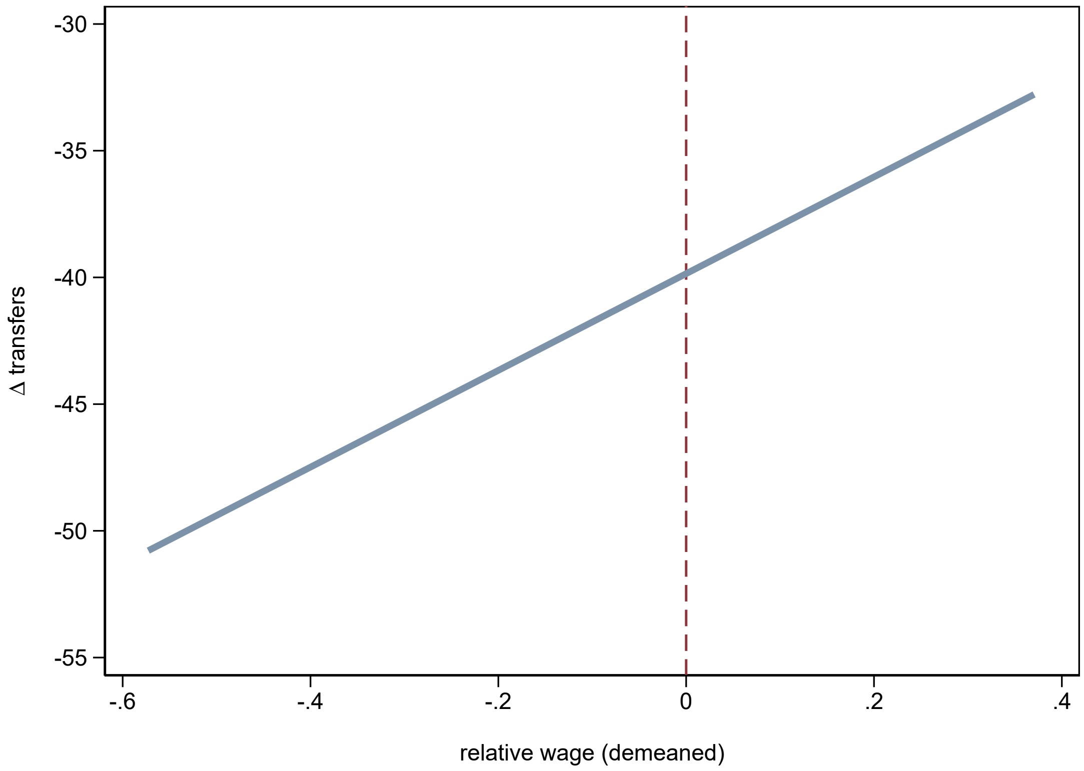
Notes: Reduced-form selection-corrected wage equations (Heckman, 1979). Standard errors are in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels respectively.

Figure 16: Distribution of Changes in Household Resources with Refugee Inflows



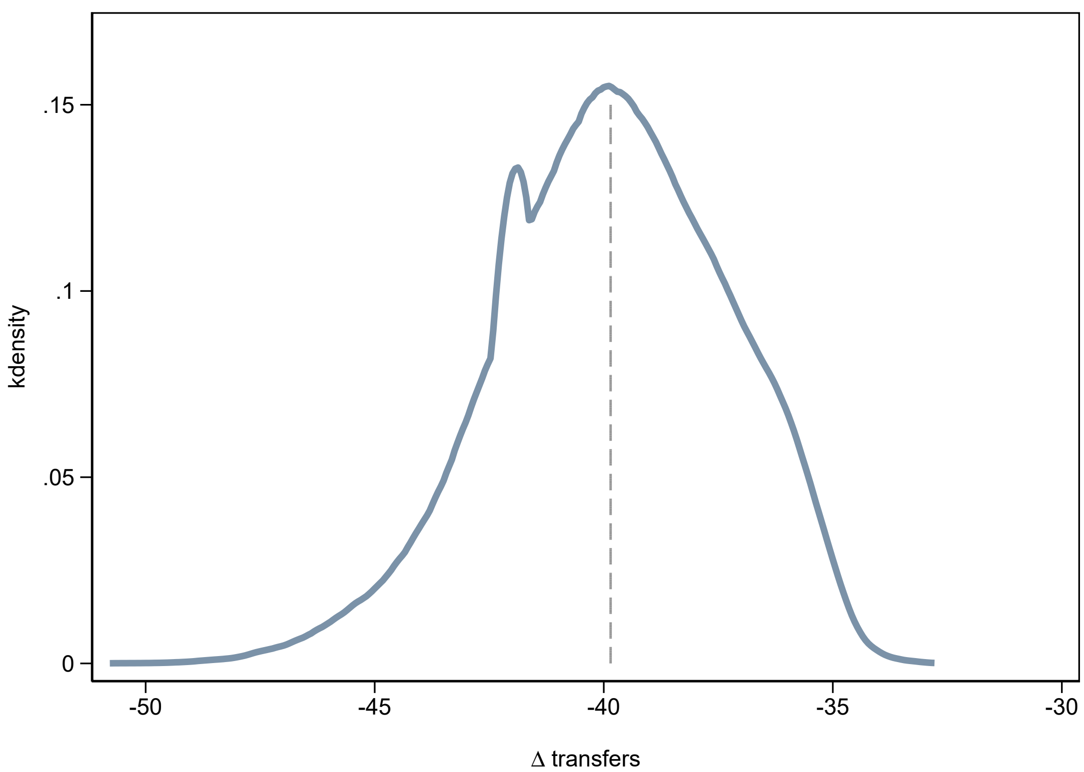
Notes: Excluding outlier (above 95th percentile of the distribution) observations.

Figure 17: Changes in Intra-household Transfers with Refugee Inflows: r interacted with z_1



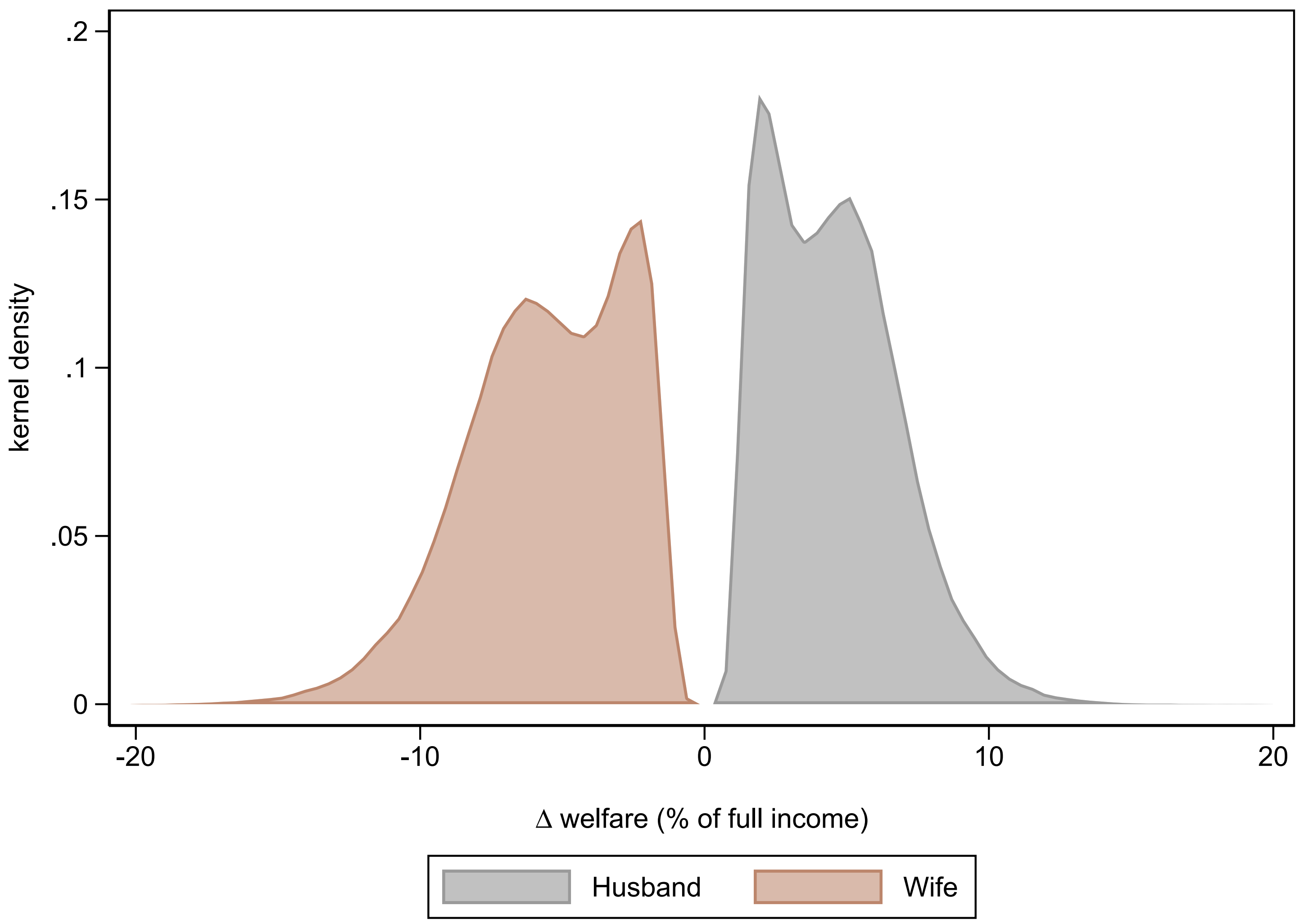
Notes:The interaction of r and $z_1 - \bar{z}_1$ is included in the sharing rule.

Figure 18: Distribution of Changes in Intra-household Transfers with Refugee Inflows: r interacted with z_1



Notes: The interaction of r and $z_1 - \bar{z}_1$ is included in the sharing rule.

Figure 19: Distribution of Changes in Welfare with Refugee Inflows: r interacted with z_1



Notes: Distribution of changes in indirect utility with refugee inflows. The interaction of r and $z_1 - \bar{z}_1$ is included in the sharing rule.

Table 27: Changes in Resource Shares with Refugee Intensity, by Education of Spouses

		Wife Low educated	*Wife* High educated
Husband	Low educated	-41.91 [-6.73%] N = 116,589	-59.53 [-6.49%] N = 16,900
	High educated	-29.63 [-3.33%] N = 56,152	-41.68 [-2.44%] N = 83,935

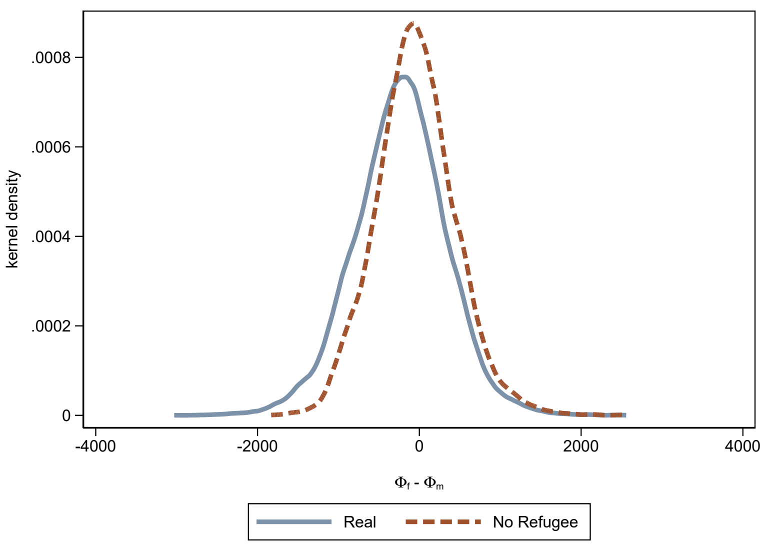
Notes: Average predicted changes in transfers from husband to wife (equivalently, wife's share of household full income) with refugee inflows. Table shows the predictions for four different household types in terms of spouses' educational attainment. The predicted changes as the percentage of household full income are in square brackets. *N* shows the sample size for each estimate.

Table 28: Changes in Welfare with Refugee Intensity, by Education of Spouses

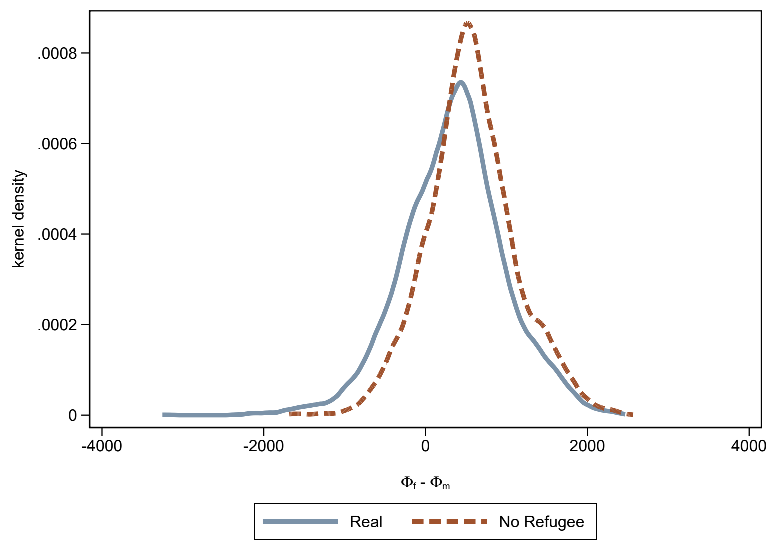
		Wife Low educated	*Wife* High educated
Husband	Low educated	35.74 , -43.26 [5.74% , -6.94%] N = 116,589	53.46 , -61.13 [5.83% , -6.67%] N = 16,900
	High educated	23.94 , -30.97 [2.69% , -3.48%] N = 56,152	36.53 , -43.61 [2.14% , -2.55%] N = 83,935

Notes: Average predicted changes in indirect utility of (husband, wife) with refugee inflows. Table shows the predictions for four different household types in terms of spouses' educational attainment. Each estimate is evaluated at the mean values for the corresponding sample. The predicted changes as the percentage of household full income are in square brackets. *N* shows the sample size for each estimate.

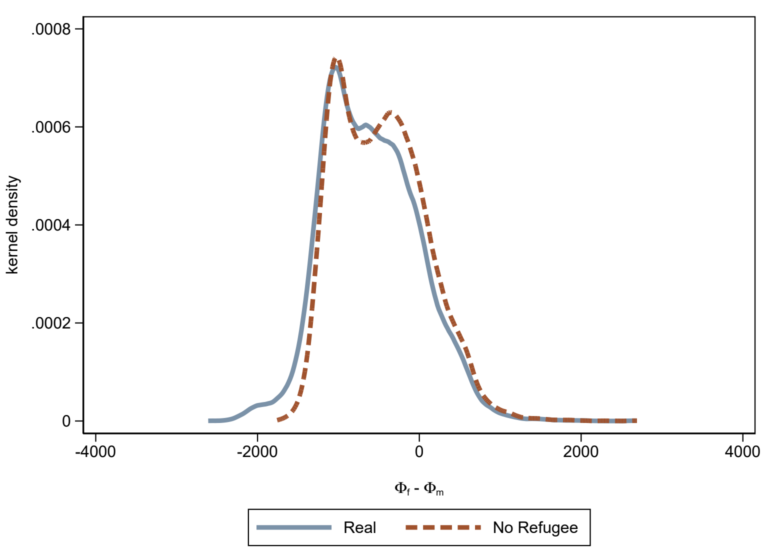
Figure 20: Distribution of Difference in Full Income Shares of Wive and Husband, by Education



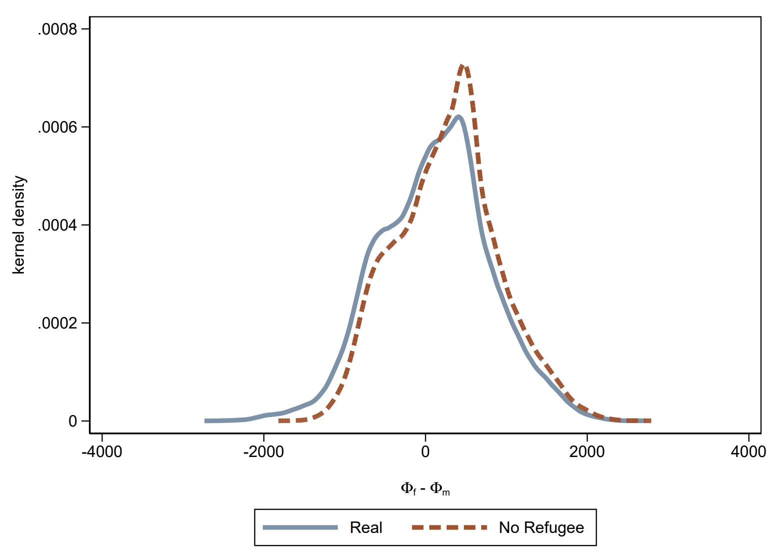
(a) (Husband, Wife) = (Low, Low)



(b) (Husband, Wife) = (Low, High)

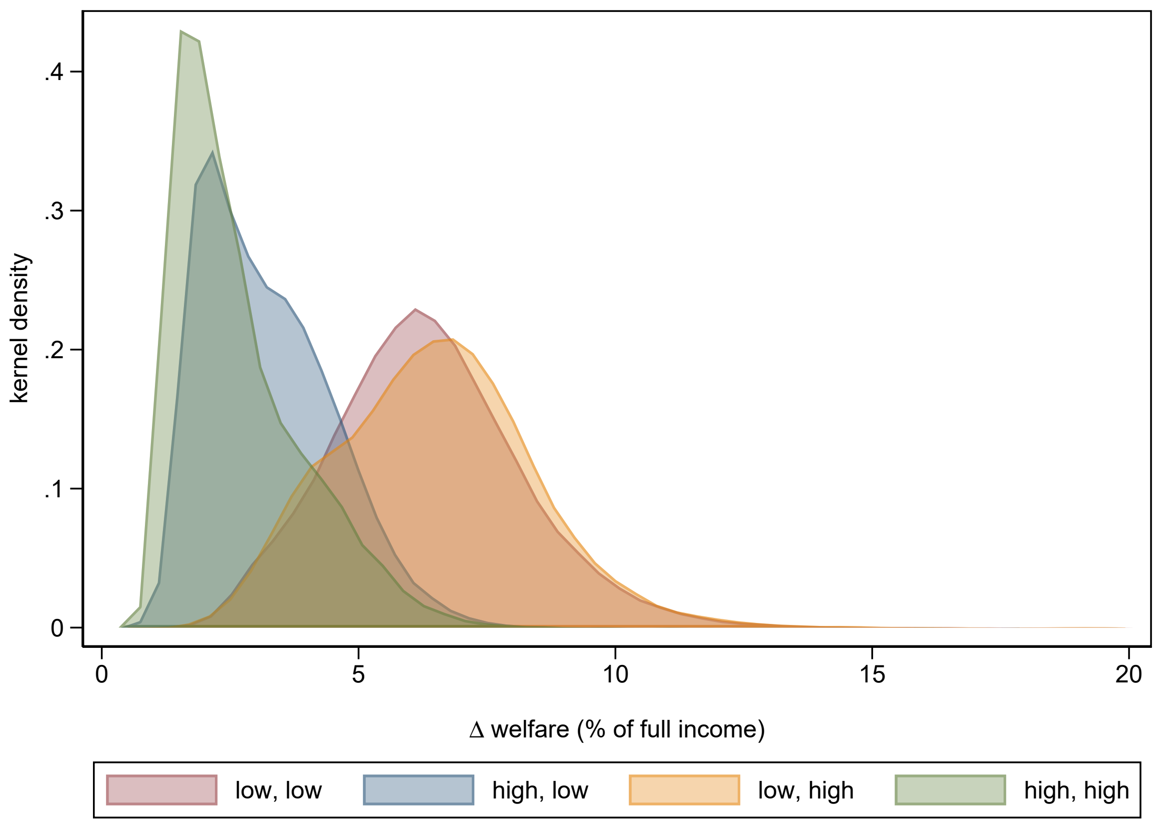


(c) (Husband, Wife) = (High, Low)



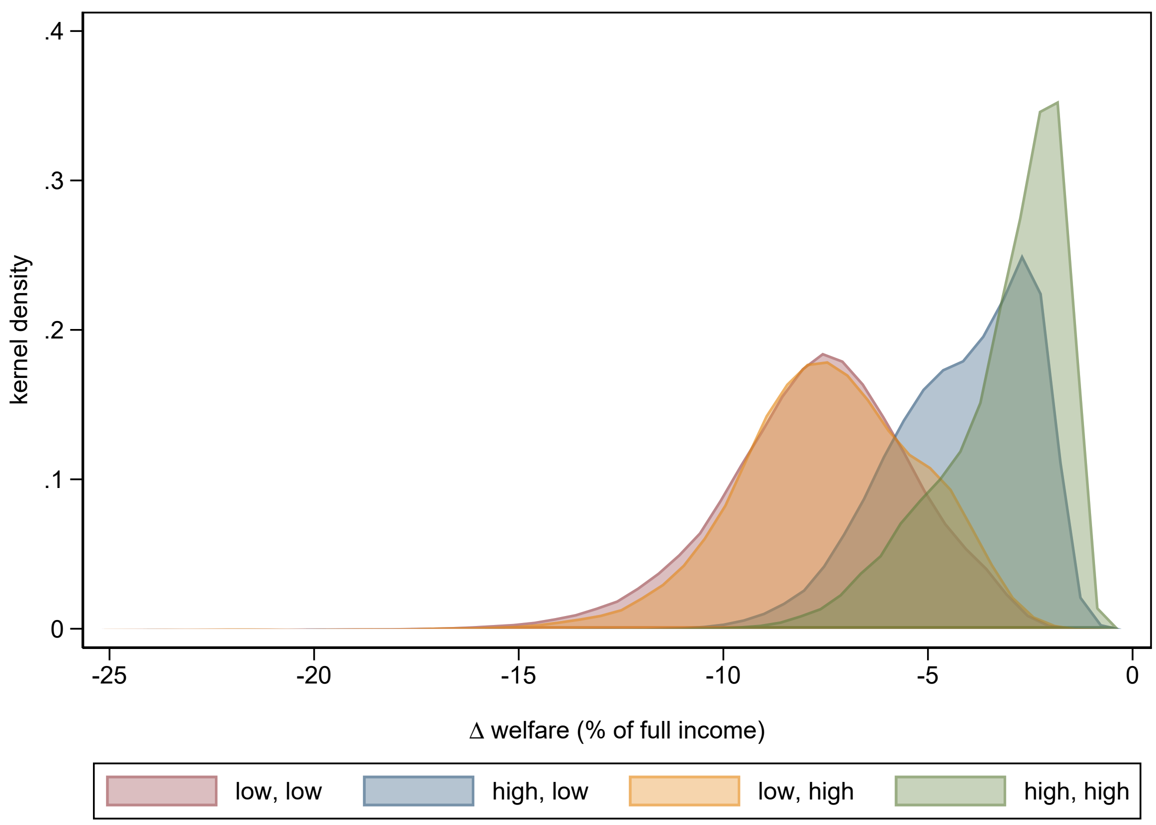
(d) (Husband, Wife) = (High, High)

Figure 21: Distribution of Change in Husband's Welfare with Refugee Intensity



Notes: Kernel (Epanechnikov) distribution of changes in welfare with refugee intensity, depending on education of (husband, wife).

Figure 22: Distribution of Change in Wife's Welfare with Refugee Intensity



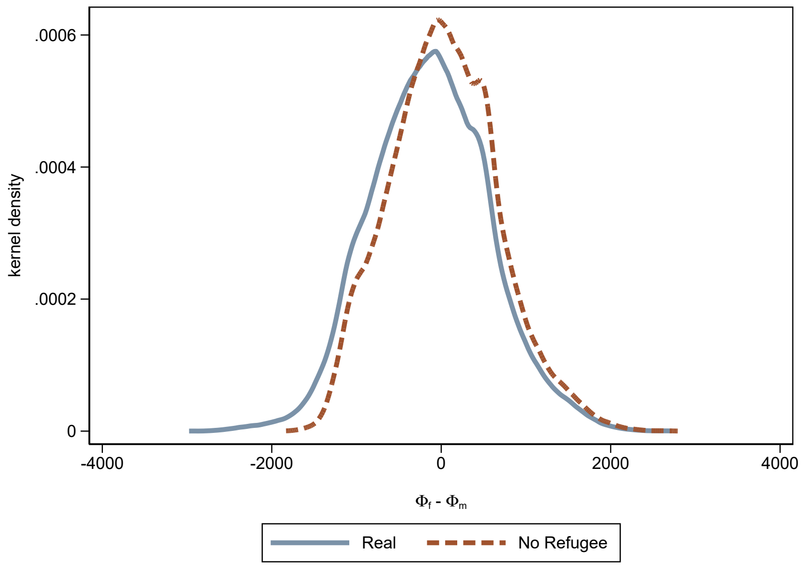
Notes: Kernel (Epanechnikov) distribution of changes in welfare with refugee intensity, depending on education of (husband, wife).

Table 29: Changes in Intra-household Resource Allocation and Welfare, Linear Trends for NUTS1 Regions

	Husband	**Wife**
Share in household resources	40.22 [3.91%]	-40.22 [-3.91%]
Intra-household welfare	35.13 [3.41%]	-42.41 [-4.12%]

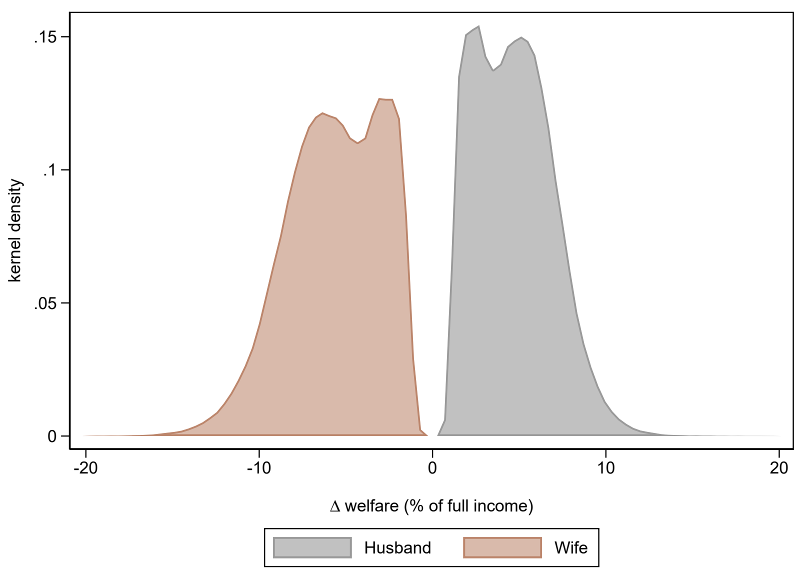
Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

Figure 23: Distribution of Changes in Intra-household Allocations with Migration, Linear Trends for NUTS1 Regions



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

Figure 24: Distribution of Changes in Welfare with Refugee Inflows, Linear Trends for NUTS1 Regions



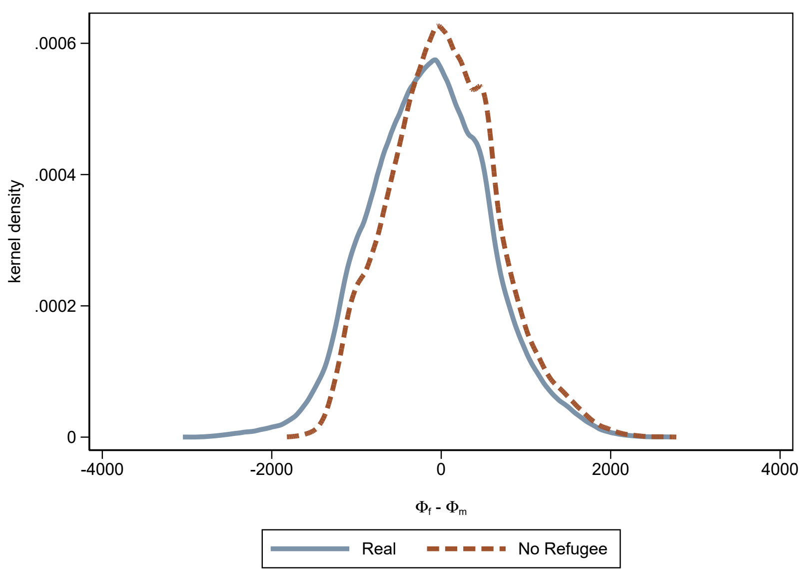
Notes: Changes in welfare with refugee intensity, in terms of household full income.

Table 30: Changes in Intra-household Resource Allocation and Welfare, Linear Trends for 5 Broad Regions

	Husband	**Wife**
Share in household resources	42.58 [4.14%]	-42.58 [-4.14%]
Intra-household welfare	37.03 [3.60%]	-44.74 [-4.35%]

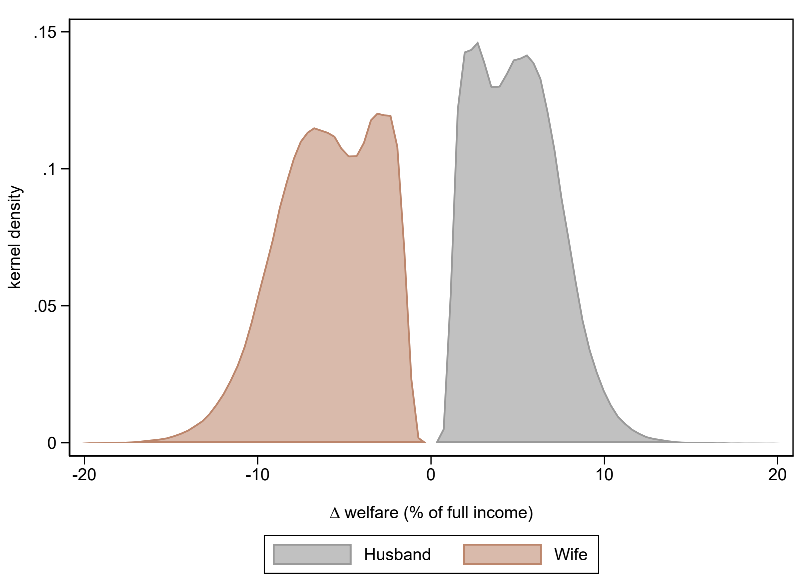
Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

Figure 25: Distribution of Changes in Intra-household Allocations with Migration, Linear Trends for 5 Broad Regions



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

Figure 26: Distribution of Changes in Welfare with Refugee Inflows, Linear Trends for 5 Broad Regions



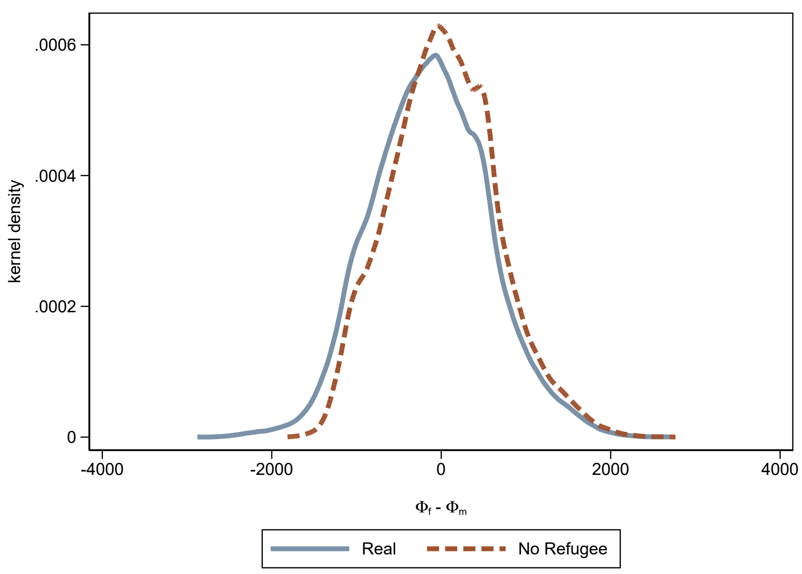
Notes: Changes in welfare with refugee intensity, in terms of household full income.

Table 31: Changes in Intra-household Resource Allocation and Welfare, No Region and Time Interactions

	Husband	**Wife**
Share in household resources	37.83 [3.68%]	-37.83 [-3.68%]
Intra-household welfare	31.98 [3.11%]	-39.12 [-3.80%]

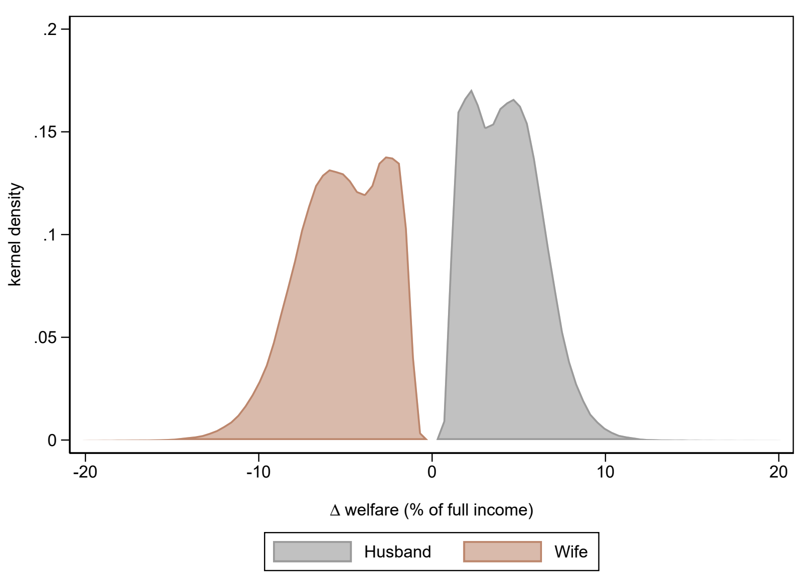
Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

Figure 27: Distribution of Changes in Intra-household Allocations with Migration, No Region and Time Interactions



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

Figure 28: Distribution of Changes in Welfare with Refugee Inflows, No Region and Time Interactions



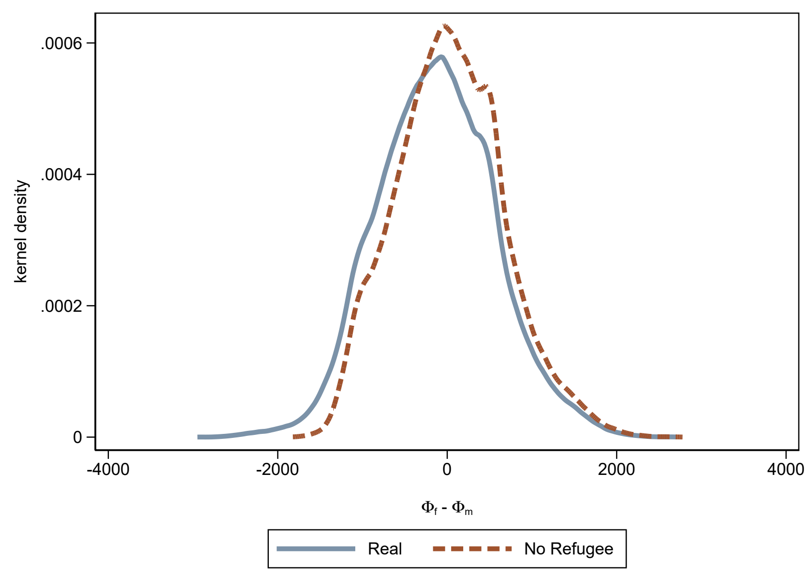
Notes: Changes in welfare with refugee intensity, in terms of household full income.

Table 32: Changes in Intra-household Resource Allocation and Welfare, Del Carpio and Wagner Instrument

	Husband	**Wife**
Share in household resources	39.64 [3.85%]	-39.64 [-3.85%]
Intra-household welfare	34.07 [3.31%]	-41.03 [-3.99%]

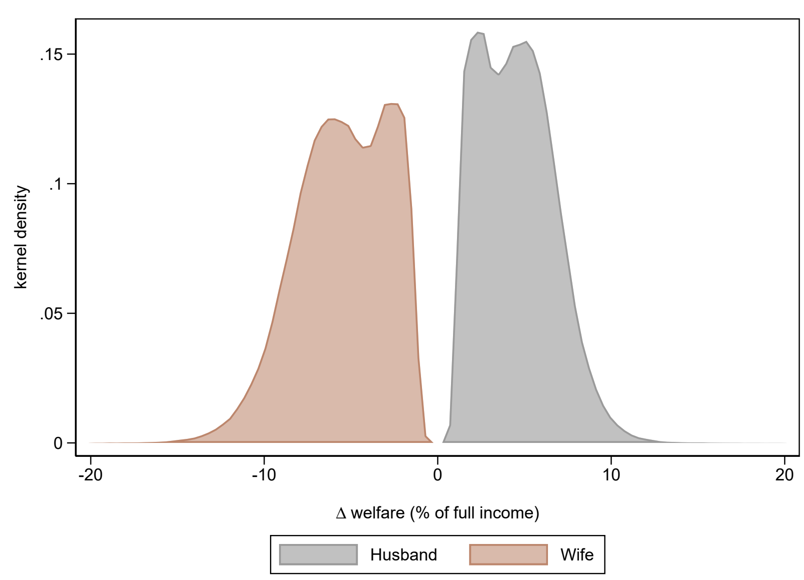
Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

Figure 29: Distribution of Changes in Intra-household Allocations with Migration, Del Carpio and Wagner Instrument



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

Figure 30: Distribution of Changes in Welfare with Refugee Inflows, Del Carpio and Wagner Instrument



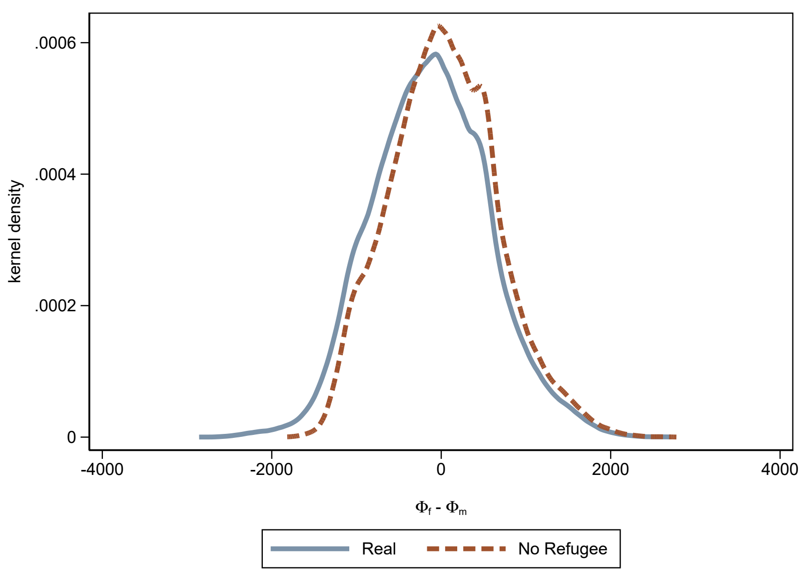
Notes: Changes in welfare with refugee intensity, in terms of household full income.

Table 33: Changes in Intra-household Resource Allocation and Welfare, Without Instrument

	Husband	**Wife**
Share in household resources	37.00	-37.00
	[3.60%]	[-3.60%]
Intra-household welfare	31.61	-37.50
	[3.07%]	[-3.65%]

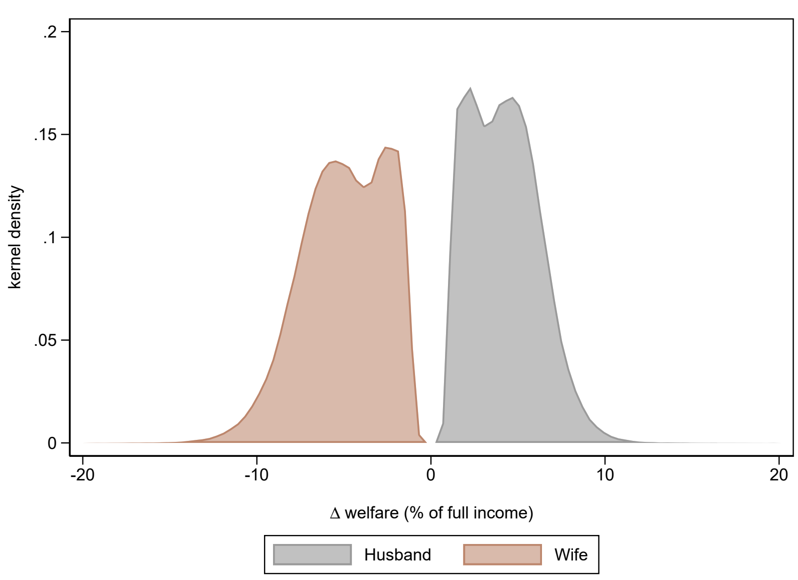
Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

Figure 31: Distribution of Changes in Intra-household Allocations with Migration, Without Instrument



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

Figure 32: Distribution of Changes in Welfare with Refugee Inflows, Without Instrument



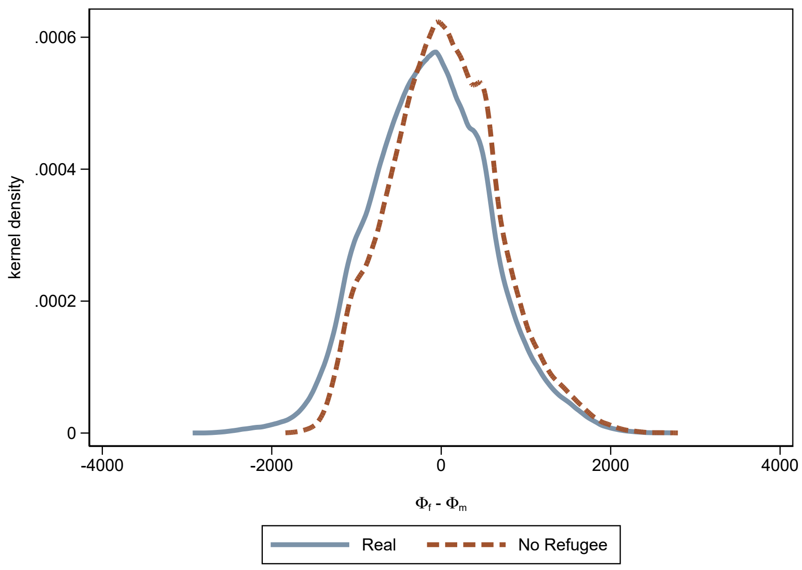
Notes: Changes in welfare with refugee intensity, in terms of household full income.

Table 34: Changes in Intra-household Resource Allocation and Welfare, All Men Working

	Husband	**Wife**
Share in household resources	39.02 [3.79%]	-39.02 [-3.79%]
Intra-household welfare	33.86 [3.29%]	-40.78 [-3.96%]

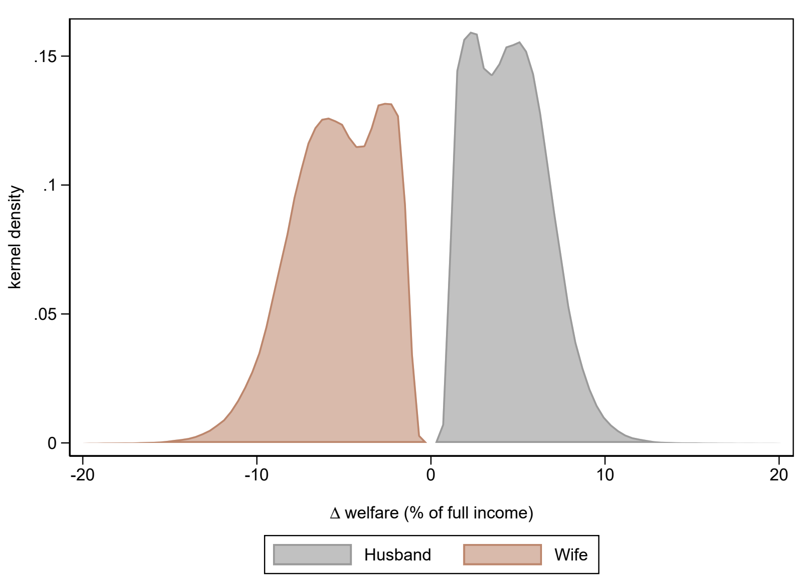
Notes: Average predicted changes in household resources and welfare with refugee intensity. The predicted changes as the percentage of household full income are in square brackets. The welfare predictions are evaluated at the mean wages.

Figure 33: Distribution of Changes in Intra-household Allocations with Migration, All Men Working



Notes: Kernel (Epanechnikov) distribution of difference in wive's and husband's share of household full income, with or without refugees.

Figure 34: Distribution of Changes in Welfare with Refugee Inflows, All Men Working



Notes: Changes in welfare with refugee intensity, in terms of household full income.

Figure 35: Total Number of Refugees in Each Year Under Counterfactual Quotas