

Is a Refugee Crisis a Housing Crisis? Only if Housing Supply is Unresponsive

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August 11, 2020

Abstract

What are the impacts of large inflows of refugees on refugee-hosting housing markets? We examine the effects of the arrival of 1.3 million Syrian refugees on the housing expenditures and income of Jordanian nationals. For this purpose, we exploit that refugees disproportionately locate around the three largest refugee camps after the beginning of the Syrian conflict in 2011. Larger refugee inflows are reflected in two main trends: higher housing expenditures of all Jordanians and increments in rental income of individuals that own real estate property. The effects are explained by the large spike in rental prices that resulted from the higher demand for housing units and the unresponsive housing supply in refugee-hosting areas.

JEL Classification: D22, J61, O17.

Keywords: Refugees, Housing Markets, Forced Migration

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Acknowledgments: We thank Maria José Urbina for her excellent research assistance. We are also grateful to participants of the conference on the impacts of refugees in hosting economies at USC for useful suggestions.

I Introduction

Do large refugee inflows cause housing crisis in hosting locations? Despite the emerging research examining the impacts of refugee inflows in hosting communities, the answer to this question has not been studied directly. Previous studies, for example, have largely focused on documenting the effects of refugee inflows in labor markets¹ and prices.² Relatively little evidence, however, is available on the effects of refugee inflows in housing markets which amount for a relevant share of total consumer expenditures of households. Examining these effects is crucial to determine whether and which actions need to be taken to ameliorate the potential impacts that sudden and large refugee inflows can have on the populations living inside hosting communities.

We examine the effects of the sudden arrival of 1.3 million Syrian refugee inflows on Jordan housing markets with a special focus on housing expenditures and income. For this purpose, we combine annual individual level panel data and administrative surveys from multiple sources and employ a difference-in-difference methodology comparing individuals located in regions closer and farther away from the three largest refugee camps, before and after the beginning of the Syrian Civil War in 2011.

Most Syrian refugees in Jordan, first arrived to a refugee camp where they were able to register as aid recipients and collect permits issued by Jordan's Interior Ministry to leave the camps. As such, and as we show in our analysis, Syrian refugee populations in Jordan tend to resettle close to three formal refugee camps. According to the last Housing and Population Census of Jordan by 2015, approximately 80 percent of the Syrian refugee population in Jordan lived in urban centers which implied a large demand shock on local housing markets.

Our results suggests that after the Syrian conflict onset in 2011, Jordan nationals living in areas closer to the refugee camps increased their housing expenditures. Although we do not find evidence of a change in the overall level of consumption for all the population, we document that

¹See [Card \(1990\)](#); [Ruiz and Vargas-Silva \(2015\)](#); [Del Carpio and Wagner \(2015\)](#); [Ceritoglu et al. \(2017\)](#); [Borjas and Monras \(2017\)](#); [Clemens and Hunt \(2017\)](#); [Mayda et al. \(2017\)](#); [Peri and Yasenov \(2018\)](#)

²See [Alix-Garcia and Saah \(2009\)](#); [Balkan et al. \(2015\)](#); [Tumen \(2016\)](#); [Balkan and Tumen \(2016\)](#).

individuals are compensating the higher housing expenditures by decreasing their consumption of non-durables (including food), education, health care, and communication. We observe, however, reductions in the total consumption expenditures of individuals with less than high school. We also find evidence that the large housing expenditures are being accompanied by worse dwelling quality for individuals who are younger or work in the informal sector.

As we document in our estimates, the increments in housing expenditures are primarily driven by the large increments in housing prices that have spiked due to the sudden larger demand for housing units and the unresponsive supply of new dwellings. In fact, housing supply only began to increase in 2016, five years after the beginning of the refugee crisis.

When exploring for differential patterns on income for individuals located closer and farther away from refugee camps, we observe that after the beginning of the war individuals closer to refugee camps have higher property and rental income. The increments on property and rental income are more pronounced for highly educated Jordanian nationals, who are most likely owners of the properties.

Our results, point to the importance of responding quickly to large sudden migration waves by increasing the housing supply rapidly. Precluding housing supply responses may end up hurting local populations and refugees alike by increasing prices, reducing consumption, and ultimately negatively impacting welfare. It may also contribute to increase tensions between locals and forced migrants.

In order to support the validity of our results, we also estimate a dynamic difference-in-difference model in which we calculate the difference in the outcomes of interest between individuals located in regions closer and farther away from refugee camps in a yearly basis. The exercise supports the validity of the parallel trend assumption and shows similar impacts of refugee inflows than the ones identified in the aggregate regressions. We also test whether our results are sensitive to our choice of measure for refugee inflows exposure by replacing the distance to refugee camps with the pre-existing settlements of Syrians before the beginning of the Syrian Civil War. The results of

this exercise point to the same conclusions. Additionally, we rule out the existence of differential time trends in night light density or labor market outcomes as a proxy for economic growth for subdistricts closer and farther away from refugee camps. Finally, we correct our standard error for spatial correlation.

This investigation contributes to the literature that studies the impacts of refugees in hosting economies. Most of the existing literature has focused on studying the impacts of refugee inflows in labor markets.³ Another smaller groups of studies explores the effects of refugee inflows in general prices,⁴ firms,⁵ political outcomes,⁶ education outcomes,⁷ health,⁸ and overall economic growth.⁹ The closest papers to this study are [Fakih and Ibrahim \(2016\)](#) and [Fallah et al. \(2018\)](#) who study the impacts of refugee inflows in Jordan's labor markets. We contribute to these group of studies by presenting new evidence on the impacts of refugee migration on the housing markets of hosting communities.

II Jordanian Context

The escalation of the Syrian Civil War can be traced back to the beginning of 2011. According to the United Nations Refugee Agency (UNHCR) by 2018, the Syrian Civil War displaced more than 13.1 million individuals, amounting to more than half of the Syrian pre-crisis population. Approximately 5 million individuals have registered as refugees in other countries (see [Figure I](#)), of which approximately 650,000 individuals were registered in Jordan. These figures, however, severely underscore the magnitude of the Jordanian refugee crisis. Data from the 2015 Housing and

³See [Card \(1990\)](#); [Ruiz and Vargas-Silva \(2015\)](#); [Del Carpio and Wagner \(2015\)](#); [Akgündüz et al. \(2015\)](#); [Stave and Hillesund \(2015\)](#); [Ceritoglu et al. \(2017\)](#); [Borjas and Monras \(2017\)](#); [Clemens and Hunt \(2017\)](#); [Mayda et al. \(2017\)](#); [Peri and Yasenov \(2018\)](#) for examples.

⁴See [Alix-Garcia and Saah \(2009\)](#); [Balkan et al. \(2015\)](#); [Tumen \(2016\)](#); [Balkan and Tumen \(2016\)](#); [Al-Hawarin et al. \(2018\)](#).

⁵See [Akgündüz et al. \(2018\)](#); [Altindag et al. \(2020\)](#).

⁶See [Dustmann et al. \(2019\)](#); [Rozo and Juan F. \(2018\)](#).

⁷See [Assad \(2019\)](#); [Namen et al. \(2020\)](#).

⁸See [Ibáñez and Rozo \(2020\)](#).

⁹See [Alix-Garcia et al., 2018](#).

Population Census in Jordan, for instance, suggests that the country was hosting 1.3 million Syrian refugees, corresponding to an increase of approximately 10 percent of the Jordanian population registered in 2015 (9.5 million people).

The Jordanian government has not adhere to the 1951 Geneva convention and its subsequent 1967 protocol, which guarantee that refugees within adhering countries are entitled to dignity and rights in exile (ILO, 2015). Jordanian law, however, respects the concept of non-refoulement and mandates that refugees cannot be returned to a country in which they are liable to be subjected to persecution (Hilal and Shahira, 2008). In fact, Jordan kept an open border with Syria in the beginning of the Syrian conflict in accordance with previous international agreements, which allowed Syrians to travel freely across the border (Betts et al., 2017).

The refugee crisis was acknowledged by Jordan in 2012, when the first refugee camp named *Za'atari* was opened, as a results of coordinated efforts between the Jordan government and UNHCR. A second refugee camp named *Mrajeeb Al Fhood* (known also as the Emirati Jordanian Camp) opened in 2013, and a third, called *Azraq*, was opened in April of 2014. Despite the fact that by 2016, other two informal refugee camps had been informally created in Jordan in Rukban and Hadallat, and that, small populations are also located in two transit centers in Cyber City and King Abdallah Park, approximately 80 percent of the Syrian refugees lives outside of camps (UNHCR, 2018). The refugees registered with United Nations at refugee camps receive humanitarian assistance and shelter, but are not authorized to work in Jordan. In fact, no refugees were authorized to work in Jordan up until 2016, when a few working permits began to be issued (ILO, 2017).

Education and health access for refugees are only available for refugees registered at the Ministry of Interior who have service cards (otherwise known as MOI cards).¹⁰ Refugees outside of camps have access to education mostly through second-shift schooling programs exclusively di-

¹⁰The cards can be obtained at refugee camps or local police stations by presenting Syrian documentation (which was often confiscated by authorities when they crossed the border), formal proof of place of residency, and certificate of the Ministry of Health indicating they do not have infectious diseases.

rected to Syrian refugees (Assad, 2019; Salemi et al., 2018).¹¹ Health access is provided free of charge for camp residents, and is offered by some NGOs outside of camps, but is expensive. In fact, refugees outside of camps pay a foreigner's rate which ranges from 35 to 60% above the price paid by uninsured Jordanians, whereas refugees without a card are not eligible to receive services at government health clinics (Salemi et al., 2018).

In 2013, however, the government started restricting Syrians entrance to Jordan and began putting large efforts to keep refugees at camps. The policy change was prompted by security and economic concerns related with conflict spillovers. In March, for example, the Directorate of Security Affairs for the Syrian Refugee Camps was created with a mandate to control entry and exit of refugees to and from the camps. In addition, in June of the same year, formal western border crossings were closed to all but exceptional cases, pushing forced migrants to travel to informal crossings along the eastern side of the border (Betts et al., 2017). By June of 2016, Jordan sealed its last entry points from Syria after a suicide bomber detonated a car bomb. Since then the country has sporadically allowed entry of a small number of refugees after immense pressure from the international community (The New York Times, 2016).

In February 4 of 2016, United Kingdom, Germany, Kuwait, Norway, the United Nations hosted a Syria donor conference in London to come up with plans to support Syrian refugees and hosting communities. As a result of this meeting the "Jordan Compact" response plan was created. The plan secured pledges for \$1.7 billion in international aid for Jordan to support its Syrian refugee response. As part of the plan Jordan committed to gradually issue working permits for refugees (ILO, 2017).¹² Although, by January of 2016, approximately 45,000 permits had been granted, they only account for 3% of the Syrian refugees identified in the Jordanian population census of 2015.

¹¹The requirements for MOI card to access education for children was dropped in 2018.

¹²Refugees were planned to be employed in firms which had more than 15% of Syrian employees, which according to the Jordan Compact agreement will have the rules of origin temporarily relaxed in European Union.

II.1 Syrian refugees in Jordan

There are two sources of data to characterize the refugee population in Jordan: the Jordanian Housing and Population Census of 2015 and the Labor Market Panel Survey (JLMPS) of 2016. The Jordanian Population and Housing Census of 2015 counts 1.3 million individuals who identified themselves as refugees. Figure II compares their gender, age, and education level relative to that of the Jordanian population, suggesting that the refugee population is balanced in terms of gender and less educated than the Jordan nationals. We are not able to distinguish a notable difference on the age distribution of these two groups of people.

The JLMPS is representative of the refugee population in Jordan for 2016. We used these data to compare three groups of individuals: Jordanian, non-Jordanian (excluding refugees), and the refugee population living in Jordan in 2016 in Figure III. Our results suggest that the refugee population has a similar gender distribution to that of Jordan nationals, although as is common in forced displaced populations more females compose the refugee population (yet, the difference in gender composition between Jordan nationals and refugees is not significant). The refugee population, however, is slightly older relative to Jordan nationals but younger than non-Jordanians.

Concerning household size, there are no significant differences in household size or number of births between the refugees and the Jordanian populations with an average household size of approximately 6 members and 4 live births per women. Refugees also have the lowest levels of education and show the lowest share of student population of the three groups. All three groups of population generally locate in urban centers, but refugees have a lower share of population living in urban areas relative to other two groups.

Refugees also have a highest likelihood of being married relative to the other two groups of populations. They also marry younger and more commonly have marriages in which one of the member is younger than 18 years. However, refugee females have more decision power and are less likely victims of violence relative to the other two groups of population.

Concerning their labor market status, most of the working population in Jordan is composed

of men across the three groups of populations, but female refugees have the lowest employment probability of the three groups. In addition, most of the refugees work in the informal sector and as such, have lower access to health services relative to Jordanian nationals.

In sum, refugees are poorer (as they are less educated and more likely work in the informal sector) and have less access to education and health services relative to Jordanians and Non-Jordanians. Refugees also form families younger in life, but female refugees are more empowered than other women in Jordan.

III Empirical Framework

III.1 Data

This paper combines five main sources of information described below.

1. Consumer Expenditures Data. Data on individual consumer expenditures and income by type comes from the Household Expenditure and Income Surveys (HEIS) conducted by Jordan's statistics agency (Department of Statistics of the Hashemite Kingdom of Jordan) and made available to the public by the Economic Research Forum. They correspond to cross sections with individual and household level information on socio-demographics, income by type (including wages, self-employment, rental or property and transfers), and detailed consumption expenditures.

We classified the main consumption expenditures in six types corresponding to food,¹³ non-food

¹³Includes expenses on food and non-alcoholic beverages. It includes total purchased food, total own-produced food, and total gifts and in-kind food. It also includes catering services and school restaurants expenditures.

but non-durable expenditures,¹⁴ durables,¹⁵ housing,¹⁶ health,¹⁷ education,¹⁸ communication,¹⁹ and transportation.²⁰ The HEIS surveys are available for the years 2006, 2008, 2010 (pre-conflict onset), and 2013 (post-conflict onset). The surveys allow to identify the location of the individuals at the governorate level.

2. *Individual-Level Panel Data.* We use individual level panel data available for 2010 (pre-conflict) and 2016 (post-conflict) to examine the effects of refugee inflows on education and health access as well as dwelling quality. The data comes from the Jordan Labor Market Panel Survey (JLMPS) which was collected by the Economic Research Forum in cooperation with the Jordanian statistics agency.²¹ The surveys include information of individual and household socio-demographics, housing conditions, access to public services, ownership of durable goods, labor market history and actual status, fertility, and gender attitudes. It allows to identify the location of individuals up to the subdistrict level.²²

3. *Children Health Development Outcomes.* Data on children health development outcomes comes from the Demographic and Health Survey (DHS) conducted by the United States Agency for International Development (USAID) and the Jordanian government. It corresponds to cross section surveys that collect primary data on household characteristics, fertility, family planning, and maternal and children health. DHS surveys women of reproductive health (15 to 49) about

¹⁴It is estimated as total expenditures minus food expenditures, durables, and rental housing.

¹⁵It includes housing furnishings and furniture, major household appliances, major other housing equipment and operation, therapeutic appliances and equipment, purchases of transportation vehicles, telephone and telefax equipment, and durables for recreation and culture.

¹⁶It includes actual and imputed rentals for housing.

¹⁷Including expenses on health, medical products, appliances and equipment, outpatient services, and hospital services.

¹⁸Including pre-primary and primary education, secondary education, post-secondary non-tertiary education, tertiary education, and education not definable by level.

¹⁹Corresponds to all on communication, including postal services, telephone and telefax equipment, and telephone and telefax services.

²⁰Represent all expenditures on transport, including purchase of vehicles, operation of personal transport equipment, and transport services.

²¹The wave of 2016 tracked households from 2010, including individuals who split to form new households. The 2016 wave also added a refresher sample that over-sampled neighborhoods which were identified in the November 2015 population census as having a high proportion of non-Jordanian households. Approximately 3,000 refresher households were added in the refresher sample, which stratified on governorate and urban/rural/(official) camps.

²²Locality is also available. Yet, we decided not to use it as we found large inconsistencies in the codes available at this geographic level.

their households, their health and that of their children. We focus on health measures that are not self-reported, but rather directly measured in the interviews to minimize measurement error. They include information related to the height and weight for children younger than 5 years old. Although the surveys also include information for mothers, we focus only on children outcomes as they may respond more quickly and more directly to short-term changes in nutrition or public service access. DHS surveys are available for 1997, 2002, 2007, 2009 (pre-conflict), and 2012 (post-conflict). The surveys allow to identify the location of the individuals at the governorate level.

4. Night Light Density and other controls. To test for the validity of our identification strategy we use additional controls including a constructed subdistrict-year level data on satellite night light density. Night light density data is processed by the National Oceanic and Atmospheric Administration (NOAA). NOAA uses the satellite images collected by the U.S. Air Force Defense Meteorological Satellite Program. The images are collected by two satellites that circle the earth 14 times per day recording the intensity of Earth-based lights with their Operational Linescan System. Each satellite observes every location on the planet every night at some point between 8:30 and 10:00 p.m. local time. For years that have images from both satellites available, we simply average the data. Night light density values range from 0 (no light) to 63 (maximum light density). The information is produced in 30 arc second cells, spanning -180 to 180 degrees longitude and -65 to 75 degrees latitude.²³ We construct average light density at the subdistrict or governorate level, averaging across pixels at the desired level of aggregation. Satellite night light data is available annually from 2001 to 2013.

We also use controls for population density (available annually) and public services, housing, education, economic, and health quality indexes for 2010, which come from the Jordan statistics agency and are available at the governorate level.

5. Refugee Camps Location and Syrian Pre-settlements in Jordan. Information on the exact

²³The light is from cities, towns, and other sites with persistent lighting, including gas flares. Ephemeral events, such as fires, are discarded. We exclude the pixels that include gas flares.

location of the three formal and biggest refugee camps (i.e., Za’atari, Azraq, and the Emirati Jordanian Camp) and their populations in 2016 in Jordan comes from the United Nations Refugee Agency (see Figure IV for the exact location of the camps).

We also use information on Syrian settlements in Jordan before the beginning of the Syrian Civil War using data from the Housing and Population Census of 2004—the last census before the beginning of the Syrian conflict. The information comes from Jordan statistics agency and allows to construct the ratio of individuals born in Syria but living in Jordan to overall population for each governorate in 2004. We use these information to test for the robustness of our results to alternative identification strategies.

Descriptive statistics for all samples are presented in Appendix A.

III.2 Identification Strategy

Our empirical strategy relies on comparing individual outcomes in locations that are exposed to larger refugee inflows with individual outcomes in those locations that are not similarly affected, before and after the onset of the Syrian Civil War in 2011. Refugee resettlement is a potentially endogenous decision and time-varying components for which we cannot account for could be affecting both the resettlement pattern and individual’s behavior. Refugees, for instance, might choose to move to areas that are more prosperous, which would lead us to overestimate the effects of refugees on consumer expenditures. To solve these issues, we estimate the following specification

$$\ln(Y_{ilt}) = \pi \text{SID Camps}_l \times \text{Syrian Conflict Onset}_t + \gamma_l + \gamma_t + \Gamma X_{ilt} + \epsilon_{lt} \quad (1)$$

where i stands for individual, l stands for location (i.e., governorate, or subdistrict depending on the data availability), and t for year; Y_{ilt} represents the individual outcomes, X_{ilt} is a matrix of individual- and location-year controls; *Syrian Conflict Onset* $_t$ is a dummy variable that takes the value of one after 2011; and γ_l and γ_t account for location and year fixed effects. SID Camps

stands for the standardized weighted inverse distance of each individual to refugee camps, which we estimate as

$$SID\ Camps_l = \left[\frac{1}{\sum_{j=1}^3 (w_c \times distance_{jl})} \right] \quad (2)$$

$SID\ Camps_l$, consequently, corresponds to the product of the inverse distance of each geographic unit l to each of the three main refugee camps j . The distance from each geographic unit to each refugee camp is calculated using the Euclidean distance formula from the centroid of each geographic unit to the centroid of each refugee camp. w_c are refugee population weights of each of the camps in 2016.²⁴ $SID\ Camps$ was standardized to ease the interpretation of our results. Standard errors are clustered at the location level to account for time serial correlation in outcomes across geographic areas. A battery of robustness tests that support the validity of our identification strategy are presented in the section **V**.

III.3 Refugee camps in Jordan

The Jordan government has coordinated with UNHCR to open three refugee camps to respond to the large Syrian migration into Jordan: *Za'atari* which opened in 2012; *Mrajeeb Al Fhood*, known also as the Emirati Jordanian Camp, which opened in 2013; and *Azraq* which opened 2014. The location of these camps as well as their registered population in 2016 is presented in Figure **IV**. *Za'atari*, the closest camp to the Syrian border, is the most populated camp.

The location of these camps mainly responded to the intensity and location on the flow of Syrian refugees to Jordan and to land availability. *Za'atari*, for example, was built on land from an old military base totaling an area of 5.3 squared kilometers (Huynh, 2015).

Once a refugee is registered inside a camp they are not allowed to leave officially unless they have a Jordanian sponsor who can fill out the necessary paperwork for their relocation outside of

²⁴They correspond to the ratio of the population registered in each refugee camp over the total population registered in the three camps. The data comes from the United Nations Refugee Office.

the camps (Huynh, 2015). However, despite these regulations, approximately 80 percent of the refugee population lives outside of camps (UNHCR, 2018).

To test whether the distance to refugee camps is a good proxy for refugee settlements, we use the census data of 2015. To do this, we estimate the share of refugee population living in each of the 86 Jordan subdistricts in 2015 and compare these figures with our subdistrict variable of standardized inverse distance to refugee camps as defined according to equation (2) in Figure V. As shown in the figure, *SID Camps* is a good predictor of the share of refugee population observed in each subdistrict in 2015. We speculate that refugees may be locating closer to camps as they are looking for humanitarian support and taking into account that refugees may feel a strong sense of community closer to other Syrian nationals.

IV Impacts of Refugee Inflows on Housing Markets

IV.1 Housing expenditures

We first examine whether there are different housing expenditure patterns in areas that are closer and farther away from refugee camps before and after the beginning of Syrian Civil War. The estimates of the specification in equation (1) using the logarithm of total and housing expenditures as dependent variable are presented in Figure VI. Each bar in the figure corresponds to a separate regression that exploits variation at the governorate-year level. All regressions include fixed effects by governorate and year, as well as individual controls for the characteristics of the head of household,²⁵ the household as a whole,²⁶ governorate-year controls for proxies of population and economic development (including population density (excluding refugees) and night light den-

²⁵Including urban or rural location, age, marital status, education level, source of income, and main economic activity.

²⁶Including number of household members, number of male household members, number of female household members, number of individuals below 14 years of age, number of individuals higher than 65 years of age, and number of income earners in household.

sity),²⁷ and full interactions of an index of living standards for 2010 and year dummy variables.²⁸ Standard errors reported in parentheses were clustered at the governorate-year level to maximize the number of clusters.²⁹

The results suggest that individuals located in areas closer to refugee camps have experienced an increment in housing expenditures after the beginning of the Syrian conflict. Our estimates suggest that when the distance to refugee camps (as measured by *SID Camps*) is reduced in one standard deviation, housing expenditures increase by 3.8 percent.

We also explore for differential effects of refugee inflows on the consumer expenditures of Jordan nationals with different levels of education. For this purpose, we split our sample on the group of individuals with high school or higher education and those with lower education levels. Both groups of individuals see an increase in their housing expenses (with reportedly higher increments for the group of individuals with higher education). However, we only observed an overall negative impact on the level of consumption expenditures for the group of individuals that have less than high school. Our estimates suggest that when the distance to refugee camps is reduced in one standard deviation overall consumer expenditures for low educated individuals drops by 1.8 percent.

In an attempt to explore what re-composition in consumer expenditures that has taken place as a result of the larger housing expenditures, we also examine the impacts of larger refugee inflows on all the other expenditure categories in Appendix B (Figure B.1). These categories include durables, education, health, communications, food, non-food, and transportation. We find that the increment in refugee inflows was also reflected in higher transportation expenses and was compensated with a reduction on food, communication, education, and health expenditures. These effects are concentrated in low educated individuals, who see sharp reductions in almost all the other itemized categories of consumption (including non-food, food, communication and health

²⁷Although, there might be concerns that night light density is endogenous to refugee inflows, we rule out this possibility in the robustness tests section.

²⁸These include full interaction of year dummies and public services, housing, education, economic, and health quality indexes for 2010.

²⁹There are only 12 governorates in Jordan.

expenses); the same effects are not observed for highly educated individuals.

IV.2 Housing income

We use the HEIS data to study the impacts of refugee exposure in types of income in Figure VII. Consistent with our previous results, the estimates consistently show that individuals located closer to refugee camps see an increment of their rental and property income. Our estimates suggest that when the distance to camps is reduced in one standard deviation, rental and property income increases by 5.8 percent.

The estimates also suggest negative effects of refugee exposure on self-employment and transfers income consistent with the idea that refugees may be displacing individuals who work in the informal sector or may be crowding out public funds. Similar results have been documented for the effects of Syrian refugee inflows in Turkish labor markets by [Del Carpio and Wagner \(2015\)](#) and [Altindag et al. \(2020\)](#). In addition, consistent with previous studies on the effects of refugees in Jordanian labor markets by [Fallah et al. \(2018\)](#) and [Fakih and Ibrahim \(2016\)](#), we find evidence of any significant effects of refugee exposure in salaried income.

We also explore the effects of refugee inflows for individuals with more than high school or less education in Figure VIII. Our results suggest that individuals of all education types see a similar decrease in self-employed income and an increase of rental and property income in response to refugee inflows. However, the effects of refugee inflows are more pronounced on the rental and property income of individuals that have higher levels of education.

IV.3 Housing quality

Overall, our results suggest that after the beginning of the Syrian Civil War areas closer to the refugee camps, have experienced higher housing expenditures relative to the regions further away. A subsequent question is whether the higher expenditures in housing are also accompanied by

worst dwelling quality.

To test this hypothesis we employ individual-panel data from the JLMPS available before (2010) and after (2016) the onset of the Syrian Civil War. For these estimates we are able to exploit subdistrict-level variation as the location of the individuals can be identified at this geographic level.³⁰ We restrict our sample to Jordanians in working age (ages 15 to 64) and stratify the sample by gender, education level, formality of job (defined as whether the individual is employed is affiliated to social security), and age.

We use these data to estimate the specification presented in equation (1) using number of rooms in the dwelling, housing area, and floor's materials as dependent variables. These were the only variables with sufficient variation to test for the effects of refugee inflows exposure. Each regression includes fixed effects by individual and year, and controls for age, years of education, marital status, gender, urban or rural location, and for the education level of the mother and father of the individual. Standard errors reported in parentheses were clustered at the subdistrict level.

We do not find any evidence supporting the idea that higher housing expenditures are being accompanied by a change in dwelling quality (see Figure IX). We do find, however, that individuals closer to refugee camps working in the informal sector and those ages 26 to 40 have worst floor materials after the Syrian conflict onset. These results are in line with previous results by [Al-Hawarin et al. \(2018\)](#), who document that housing conditions for poor Jordanians have been adversely affected by the incoming flows of Syrian refugees.

IV.4 Housing prices

Considering a simple supply and demand housing model, the increment in housing expenses in areas more exposed to refugee inflows may be due to rising housing prices. The large refugee population shock expanded housing demand, but housing supply may take time to respond as con-

³⁰Jordan is divided in 12 governorates and 85 subdistricts. In fact, the JLMPS also includes the geographic location of the individual by locality. We refrain to use these information, however, as we found large inconsistencies in the data at this level of aggregation.

struction takes time. A combination of both effects could easily be translated into higher housing prices.

Particularly, data from the Jordanian Ministry of Planning and International Cooperation suggests that Jordan was experiencing a housing shortage preceding the Syrian refugee crisis.³¹ Figures from the same source suggest that the Syrian refugee influx translated into an immediate demand for housing approximated to be of 86,000 units annually, on top of the pre-existing average annual local demand of 32,000 units (MIOPIC, 2013). Additionally, monthly figures from the Central Bank of Jordan on the total number of residential and non-residential building permits, suggest that formal construction supply did not begin to increase in Jordan up until 2016 (see Figure X).

We test for the effects of refugee inflows on housing prices using information on rental prices available through the Housing and Population Census of 2004 and 2015. The information is only available at the governorate level. Using these data we estimate the percentage change in rental prices before (year 2004) and after the Syrian Civil War onset (year 2015). We then estimate the correlation of the change in rental prices and our measure of distance to refugee camps *SID Camps*. We present both sources of variation in Figure XI, the correlation between both variables is high and statistically significant (0.75).

We also estimate a regression of the average rental price (as a total and by room) on our measure of refugee exposure including fixed effects by governorate and year. The results of this exercise are presented in figure in Figure XII and suggest that the larger Syrian refugee inflows have had a significant and positive effects on housing rental prices in Jordan.

³¹The Jordanian housing sector produced an annual average of 28,600 housing units during the period 2004-11, against an annual pre-crisis demand of 32,000 units.

IV.5 Health and education access

Our results so far suggest that individuals more exposed to the refugee shock are increasing their housing expenditures and reducing their consumption of non-durables (including food), health, and education. In this section, we explore whether individuals located in areas closer to refugee camps experience lower access to education or health after the beginning of the Syrian conflict. In addition, we examine whether the lower food expenditures are having effects on children development indicators (measured through anthropometric measurements), as they are the most sensitive to nutrition shocks.

To test these hypotheses, we first estimate equation (1) using data from the JMPLS on the probability of being enrolled to an education establishment and the probability of having health insurance as dependent variables. We do not find any evidence of significant effects of refugee inflow exposure, as measured with proximity to refugee camps, in any of these variables (see Appendix B, Figure B.2)

Second, we examine whether growth and weight development of young children who are presumably more sensitive to changes in nutrition is different for children located closer and farther away from refugee camps after the conflict onset. For this purpose, we employ measures collected for children ages 0 to 5 in the Demographic and Health Survey. These measures include height for age, weight for age, and weight for height. The data is available at the governorate level for the years 1997, 2002, 2007, 2009, and 2012. We find no evidence of an effect of refugee inflows in children development outcomes (see Appendix B, Figure B.3).

V Robustness Tests

We present evidence on the validity of our results in three ways. First, we approach our question using an alternative identification strategy. Second, we test the validity of the parallel trend assumption estimating a dynamic difference-in-differences model. Third, we correct our standard

errors for spatial correlation.

V.1 Alternative identification strategy

In Appendix C we run our estimates replacing *SID Camps* with the interaction of the share of Syrian population pre-settled in each governorate before the Syrian conflict onset (available from the 2004 housing and population census) and the total number of individuals leaving Syria in year t . Formally

$$\text{Syrian Pre-settlements}_{it} = \left[\frac{\text{Syrian Pop}_{i,2004}}{\text{Total Pop}_{i,2004}} \times \text{Syrian Aggregate Displacement}_t \right] \quad (3)$$

where *Syrian Pre-settlements* exploits governorate-year variation and follows the idea initially proposed by [Card \(2001\)](#) and [Altonji and Card, 1991](#) (see [Lewis and Peri, 2015](#) for a review of the literature on applications), which suggests that past migration patterns are excellent predictors of subsequent migration waves within the same ethnic groups.³² We show the geographic variation of Syrian pre-settlements as defined by equations (3) in Appendix C.

We test for alternative patterns in consumption expenditures comparing governorates with a higher and lower share of Syrian pre-settlements after the beginning of the Syrian conflict. Consistent with our previous results we find a significant and positive effect of refugee exposure on housing expenditures. We also observe that individuals who live in governorates with a higher share of Syrians saw an increase in their rental and property income (see Appendix C).

³²A new criticism of the validity of this type of shift-share instrument was recently proposed by [Jaeger et al. \(2018\)](#). The authors suggest that using pre-settlements of migrants in countries where migration flows are stable in time confounds short- and long-term causal effects. Our identification strategy is not sensitive to their critique because the inflows of Syrian refugees were sudden and large in scale as a consequence of the intensification of armed conflict.

V.2 Validity of the parallel trend assumption

As our main estimates include location (governorate or subdistrict) and year fixed effects their validity is not conditional to static differences between governorates (or subdistricts) or aggregate time trends. Our estimates are valid so long as the parallel trend assumption is satisfied, that is if there are no other time-varying covariates which affect differently areas closer and farther away to the refugee camps, changing after the Syrian conflict onset. Although there is no fully robust test to validate the validity of this assumption, we provide evidence to support the validity of this assumption by estimating a dynamic difference-in-differences model given by

$$\ln(Y_{ilt}) = \sum_{j=t_0}^T \theta_j(\text{year}_j \times \text{SID Camps}_l) + \gamma_l + \gamma_t + \Gamma X_{ilt} + \epsilon_{ilt} \quad (4)$$

where l stands for geographic location (governorate or subdistrict), t stands for year, SID Camps is defined in equation 2, year_j is a dummy for year j ; γ_l and γ_t account for location and year fixed effects; and X_{ilt} is a matrix of individual- and location-year controls. Considering the Syrian Civil War began in 2011, our identification strategy will be valid so long as we observe that θ_j is not statistically significant before 2011.

We present the results of the dynamic difference-in-differences model as described in equation (4) in Appendix D, Figure D.1. The estimates exclude the year 2010, which is taken as a baseline. With the exception of consumption expenditures on durables and education, the regressions support the validity of the parallel trend assumption before the conflict onset (year 2011) and support the idea that housing expenditures have increased in areas closer to the refugee camps after the Syrian conflict onset.

One important relevant threat to the validity of our estimates is that regions that are closer to the refugee camps are more or less prosperous relative to the other areas. It is possible, for example, that refugee camps are located closer to urban centers responding to aid-provision concerns. If this is true areas closer to refugee camps may show better economic growth relative to areas further

away from camps, and these differences may be exacerbated over time. As such, our identification strategy may be confounding pre-existing difference in economic growth with the impacts of refugee inflows.

Although there is no governorate or subdistrict time-varying data on economic growth to test this hypothesis in Jordan, we construct a measure of economic growth using satellite night light density, available between 2001 and 2013. As recent studies have shown, night light density is a good proxy for the long-term distribution of contemporary local economic activity and its changes are also effective ways of tracking short-term fluctuations in economic growth (see [Bleakley and Lin, 2012](#); [Henderson et al., 2012](#); [Michalopoulos and Papaioannou, 2013](#) for applications). The analysis of night light density is particularly useful in developing countries like Jordan, where sub-national information on economic growth is unavailable.

To test for pre-existing differences in night light density between areas closer and further away from refugee camps before the conflict onset (year 2011), we estimate the model in equation (3) using the logarithm of night light density as the dependent variables. The results of this exercise are presented in Figure [D.2](#) and confirm the validity of our identification strategy rejecting the existence of pre-trends across subdistricts closer and farther away from refugee camps before the beginning of the Syrian Civil War in year 2011. The estimates also reject significant differences in economic development between areas closer and farther away from the refugee camps, that appeared after the beginning of the Syrian Civil War.

We also test for the parallel trend assumption on labor market outcomes using the Labor Force Surveys available from 2006 until 2016. These correspond to annual cross sections representative at the governorate level. The results of this exercise and presented in Figure [D.3](#) and support the validity of our identification strategy.

V.3 Spatial correlation

A primary concern with the validity of our estimates is that there are relatively few refugee camps concentrated close to the Syria-Jordan border and, as such, the degree of spatial correlation may affect inference. To evaluate this possibility, we constructed maps of changes on the predicted residuals in Appendix E (Figure E.1). Although, there is some degree of independence across governorates for total consumer expenditures, we do observe a higher concentration on the change of the residuals for housing expenditures. Consequently, we proceed to test the robustness of our results to correcting the standard errors for spatial correlation using the methodology proposed by Conley (1999). The results of this exercise are presented in Appendix E and support the validity of our main results.

VI Discussion

In this paper we explore the effects of refugee inflows in the housing markets of hosting communities. For this purpose, we compare Jordan nationals living in areas closer and further away from the three main refugee camps before and after the Syrian conflict onset in 2011.

Our results consistently show that individuals living closer to refugee camps face higher housing expenditures after the beginning of the Syrian conflict. Although we do not find evidence of changes on the overall level of consumption expenditures for the whole population, when dividing our sample between individuals with higher and lower education levels, we find that individuals with low education levels see significant reductions in their consumption expenditures. We also find evidence, that individuals more exposed to refugee inflows who are younger and work in the informal sector live in dwellings of worse quality.

When exploring the effects of refugee inflows on individuals income, consistent with our estimates for consumption expenditures, we find positive and significant effects of refugee inflows on rental and property income. The positive effects on refugee inflows in rental and property income

are largely concentrated in individuals with more than high school, who presumably correspond to property owners.

According to Jordan's Housing and Population census of 2015, more than 80 percent of the Syrian refugees in Jordan live outside of refugee camps. Consequently, the observed increments in housing expenses could be largely due to the demand shock that the higher population may be having in housing markets. Our empirical analysis supports this hypothesis, as we find that the larger inflows of refugee populations has increasing rental prices closer to refugee camps after the beginning of the Syrian crisis. We also document that the housing supply has had a bog lag on responding to the large demand shock.

Addressing the increments in housing expenditures is crucial to prevent welfare losses in the hosting population, supporting the refugee population survive and become economically independent, and prevent more tensions and discrimination between Jordanian hosts and refugees. In the medium- to long-term the implementation of interventions, such as increasing the low-cost adequate housing available in the large urban centers, may prove effective for creating jobs and meeting the growing housing demand without inflating prices.

Particularly, future research should urgently examine the effectiveness of different approaches to increase quality housing supply for refugees. Insightful research, for example, should examine whether the humanitarian programs such as cash-for-rent grants to refugees and low-income Jordanians, which is a lifeline for these populations and ensures they have a roof over their heads, may also be prompting housing prices to go up.

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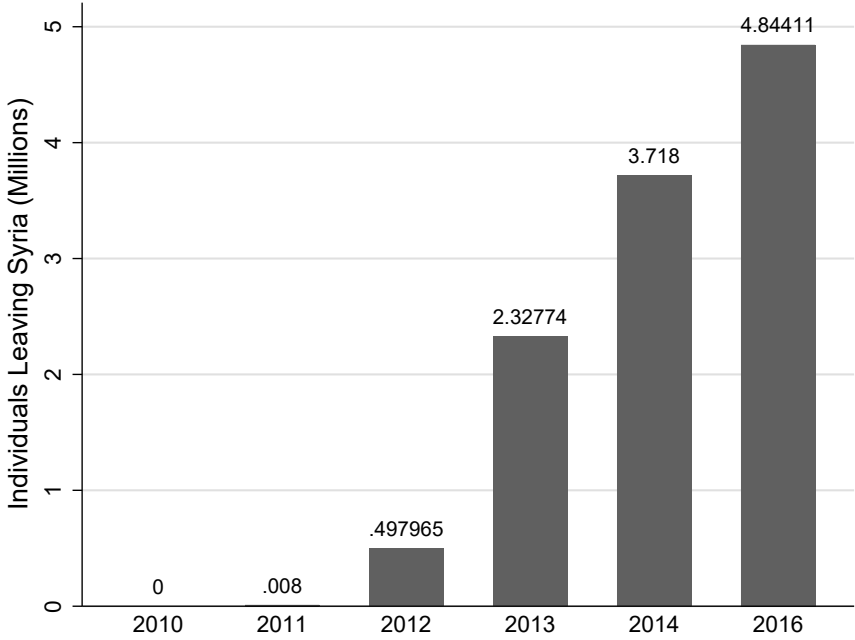
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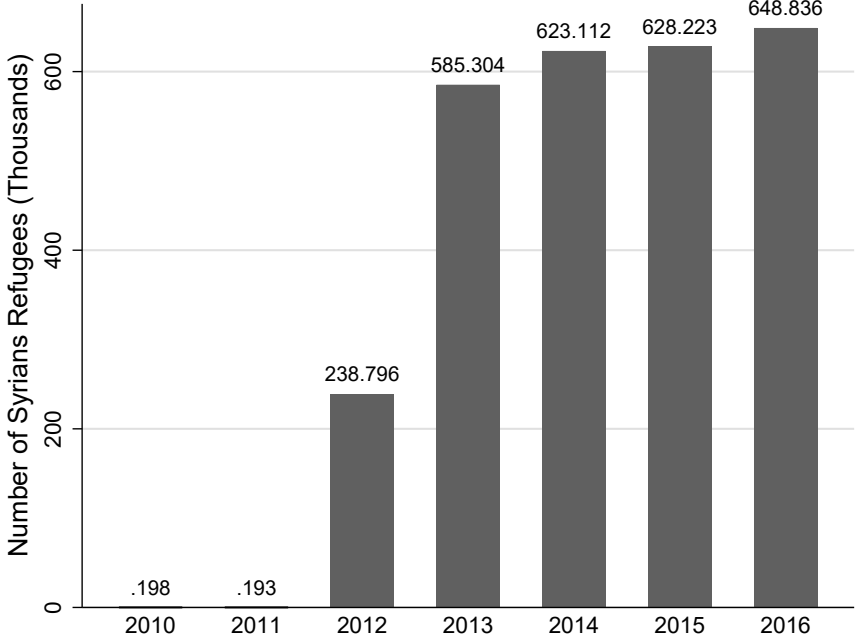
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VII Figures

Figure (I) Syrian refugee flows - UN Refugee Agency Data

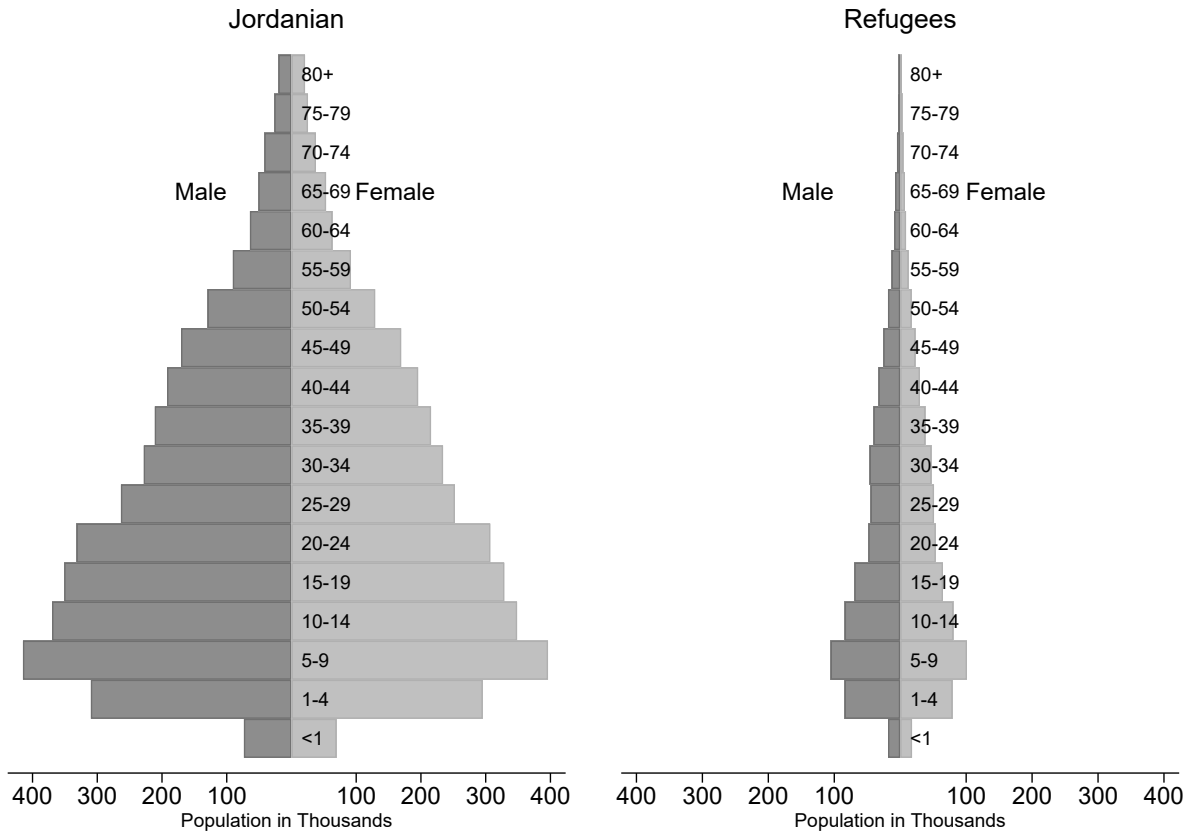


Panel A: Individuals that left Syria (registered individuals)

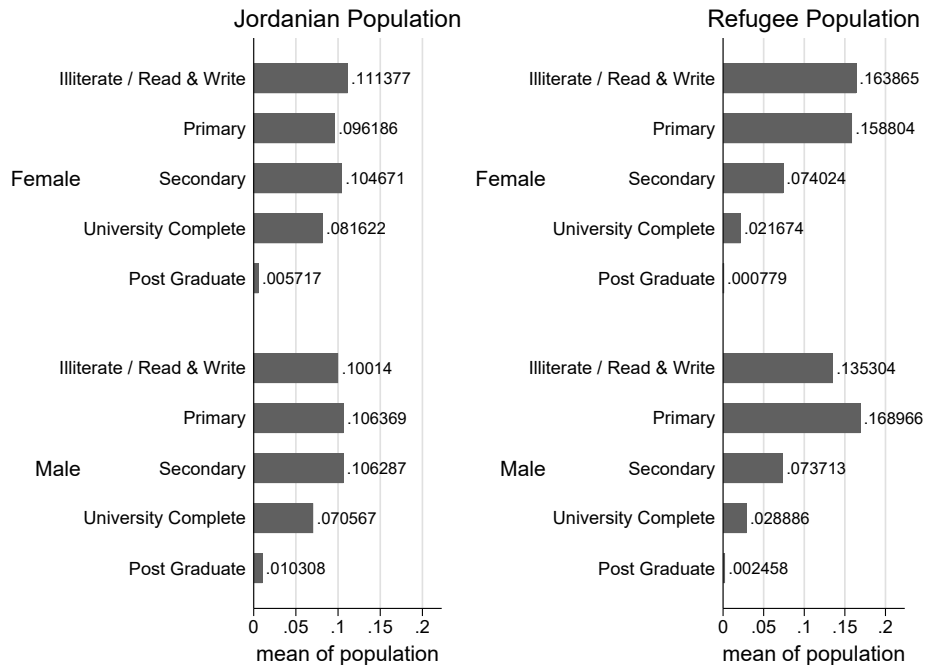


Panel B: Individuals in Jordan (registered individuals)

Figure (II) Refugee characterization - Population and Housing Census 2015

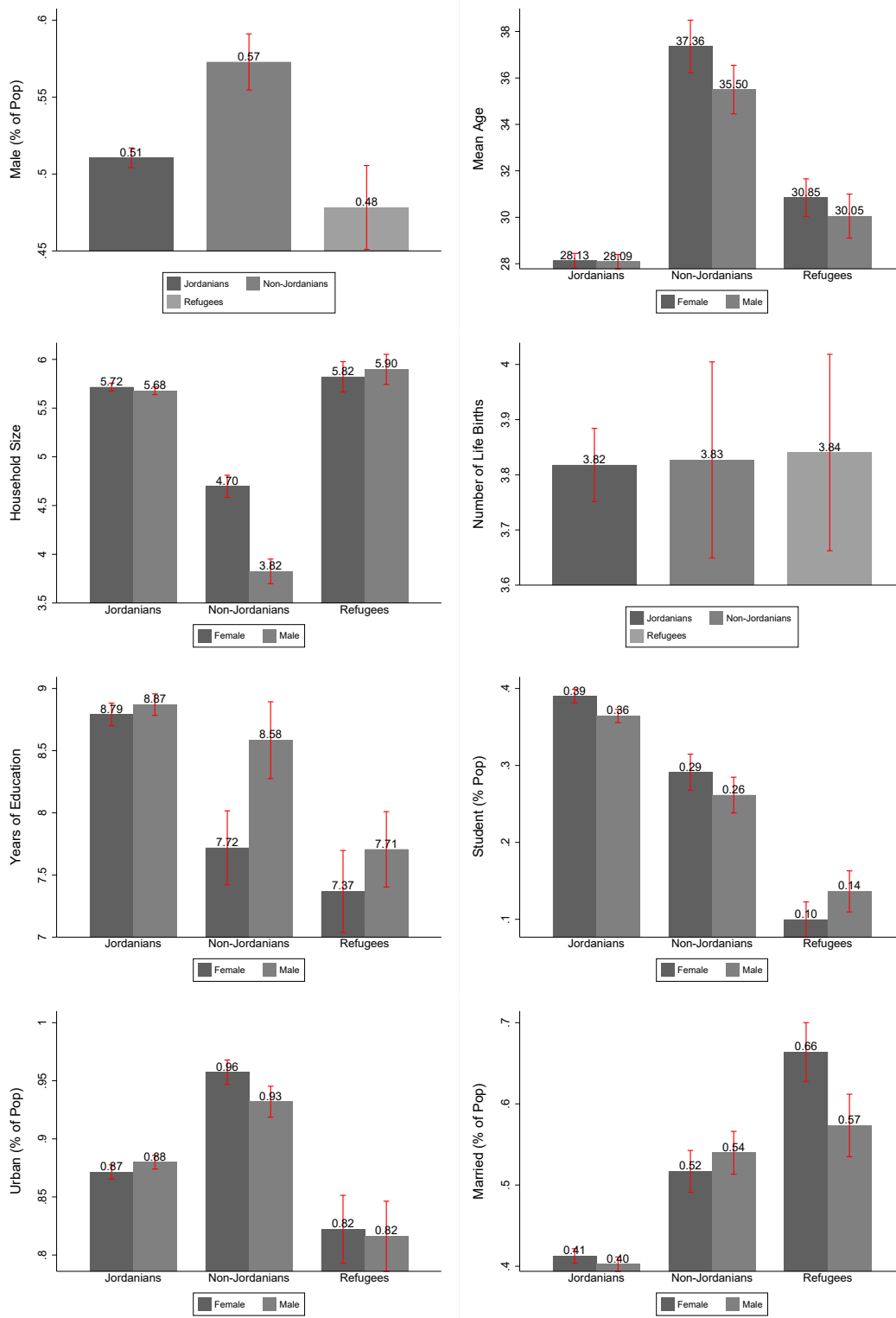


Panel A: Age and gender distribution



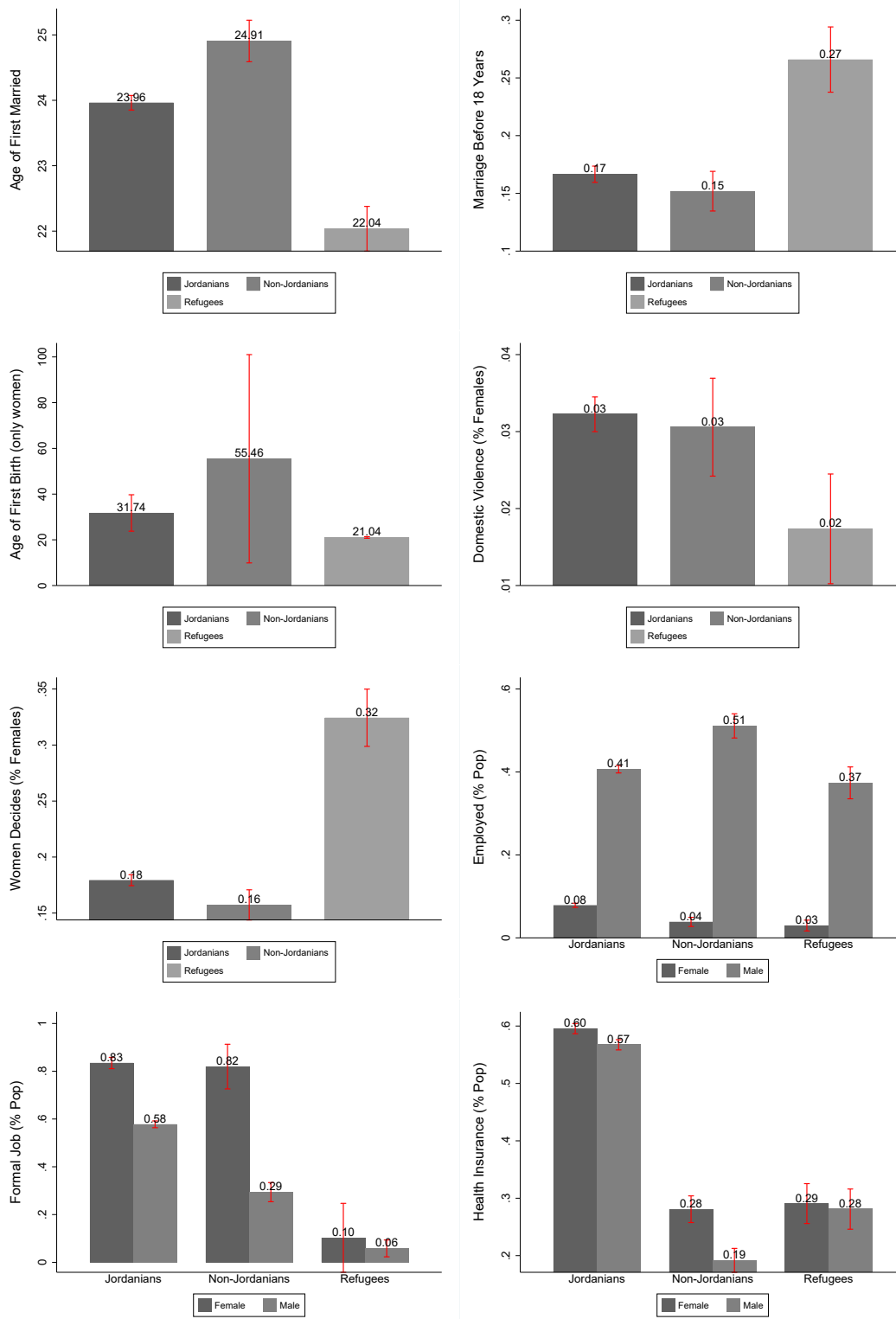
Panel B: Education attainment

Figure (III) Refugee characterization - JLMPS 2016



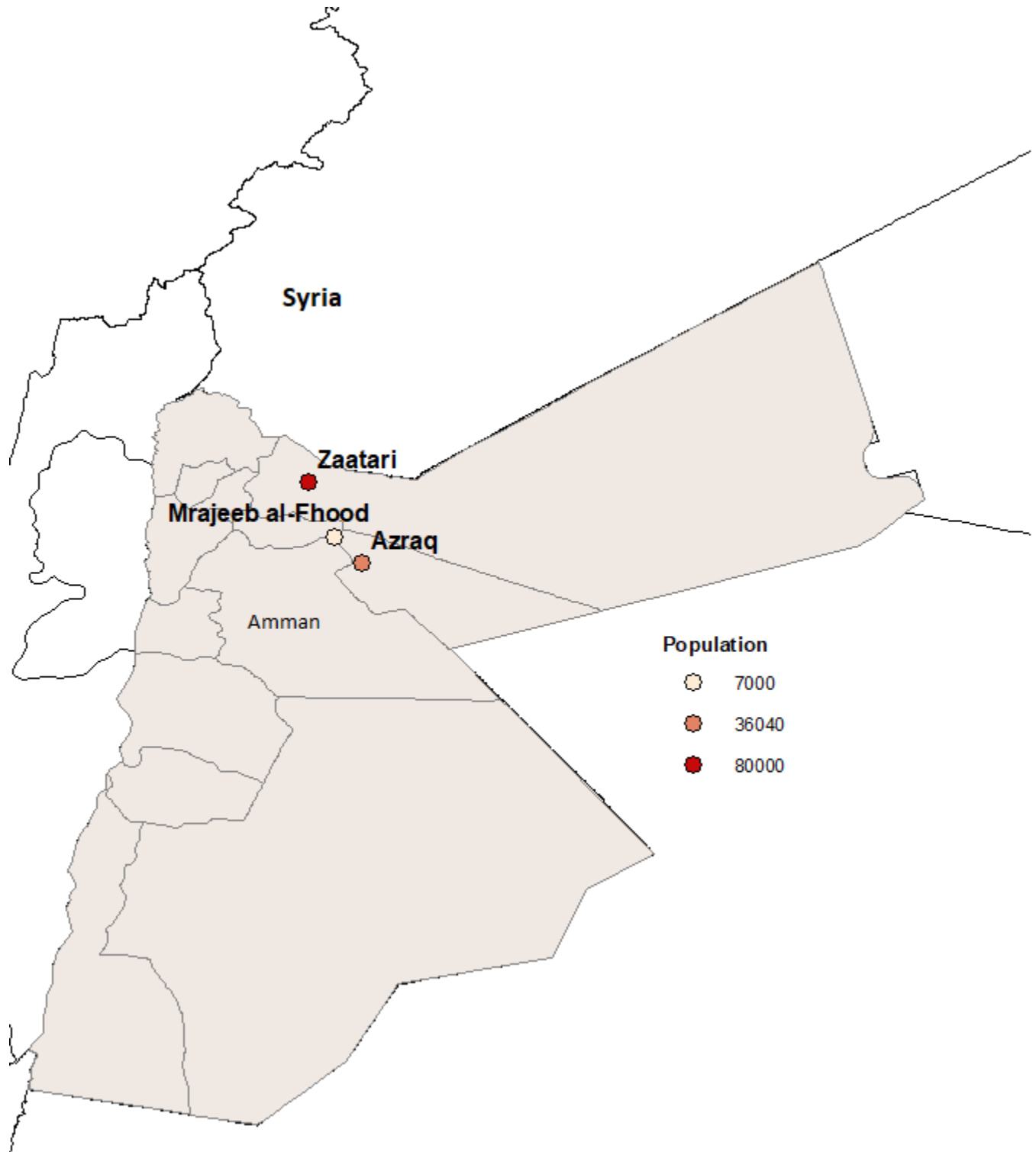
Notes: Red lines represent 95% confidence intervals for the mean. Source Data: JMPLS 2016.

Figure III (cont'd): Refugee characterization - JLMPS 2016



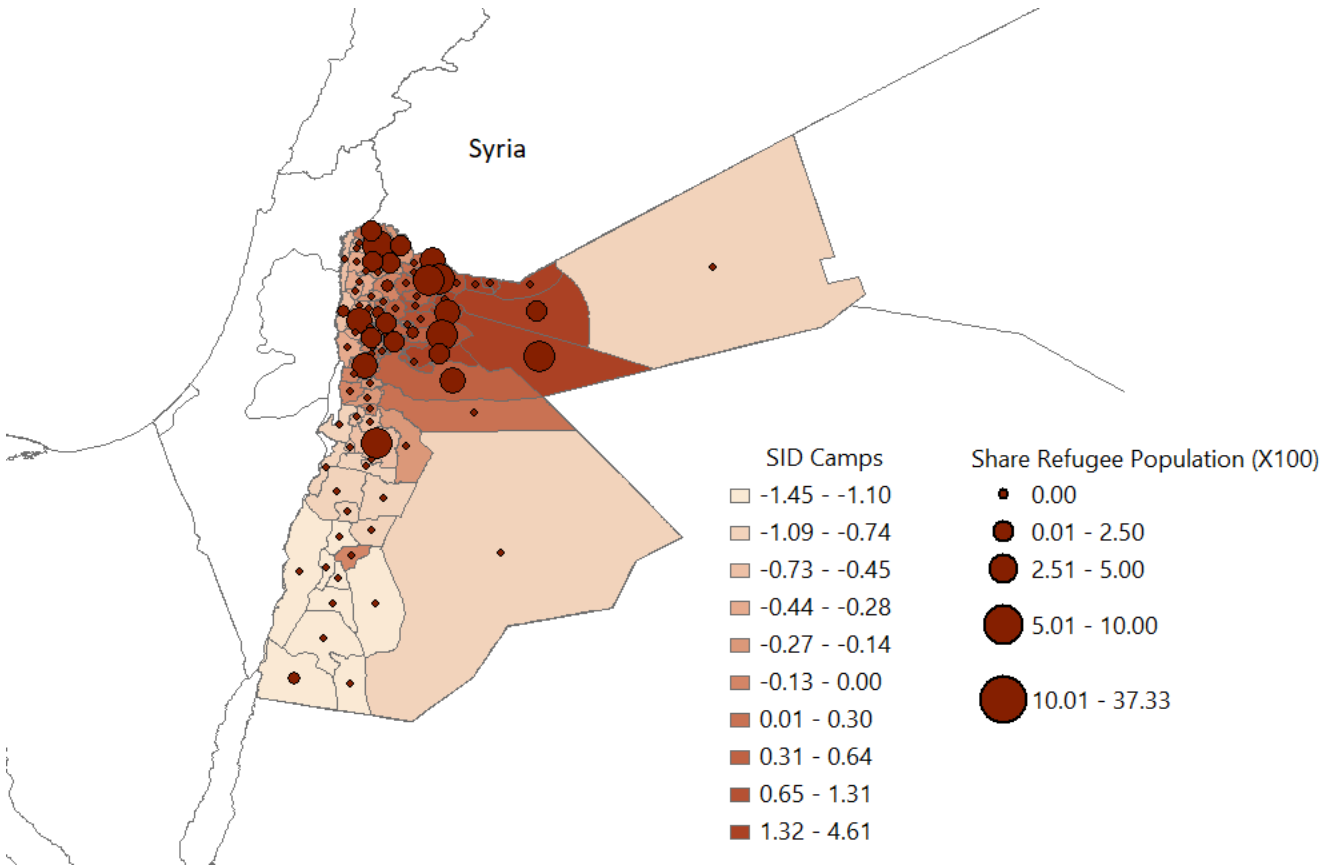
Notes: Red lines represent 95% confidence intervals for the mean. Source Data: JMPLS 2016.

Figure (IV) Location of refugee camps in Jordan and their registered population in 2016



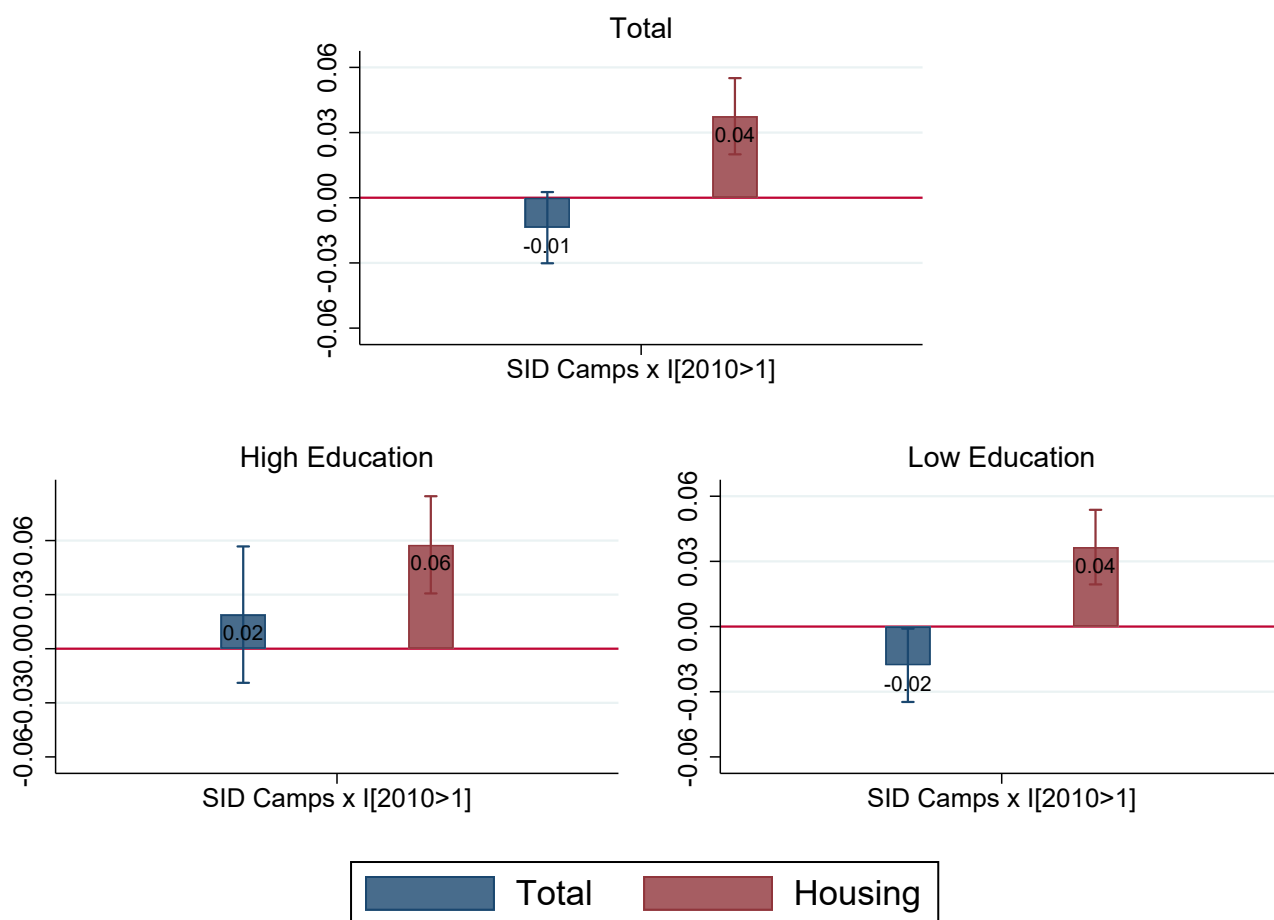
Notes: Figures on the registered population inside camps come from the United Nations Refugee Agency.

Figure (V) Syrian refugee population in Jordan in 2015 and standardized weighted inverse distance to camps (*SID Camps*). Sub-district variation.



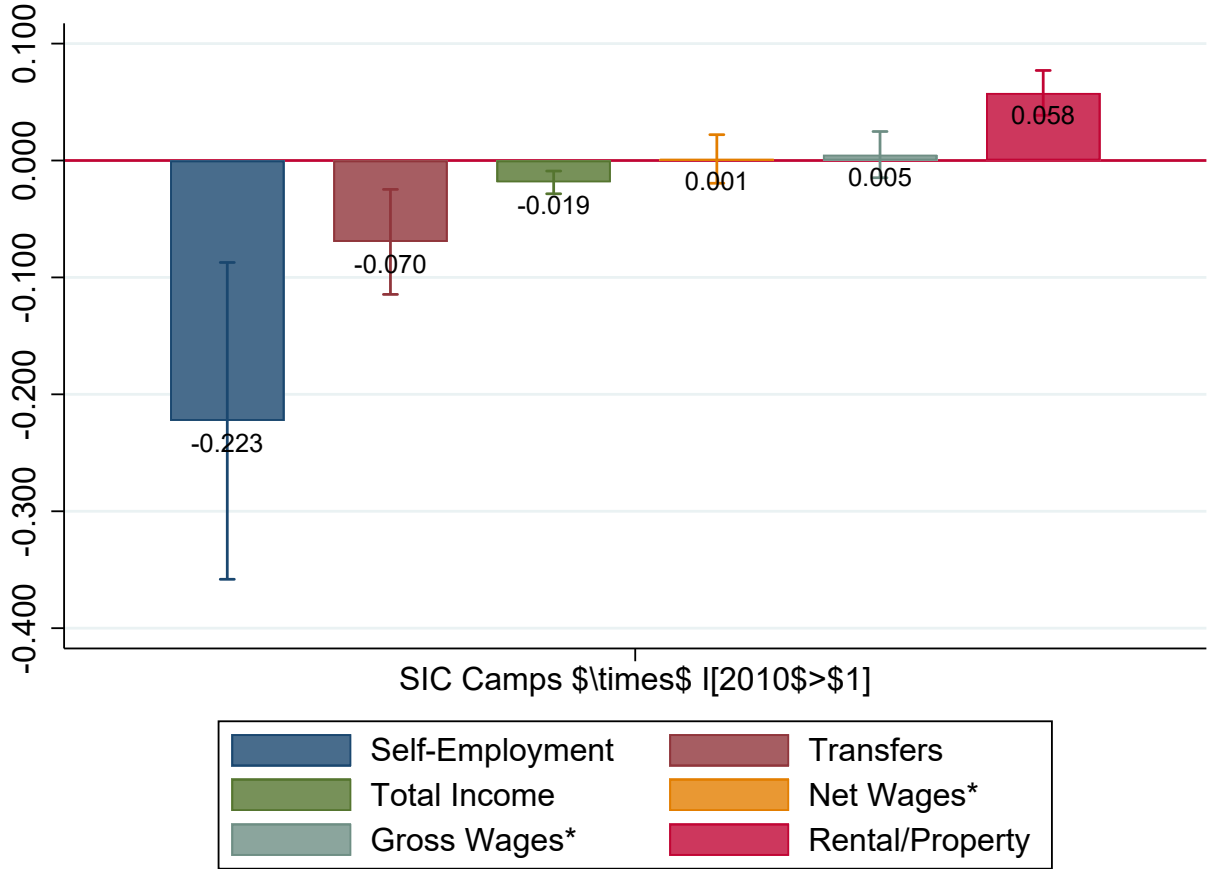
Notes: Figures on the Syrian refugee population in Jordan come from the Jordanian Housing and Population Census of 2015.

Figure (VI) Impacts of refugee inflows on housing expenditures (dependent variable in logs)



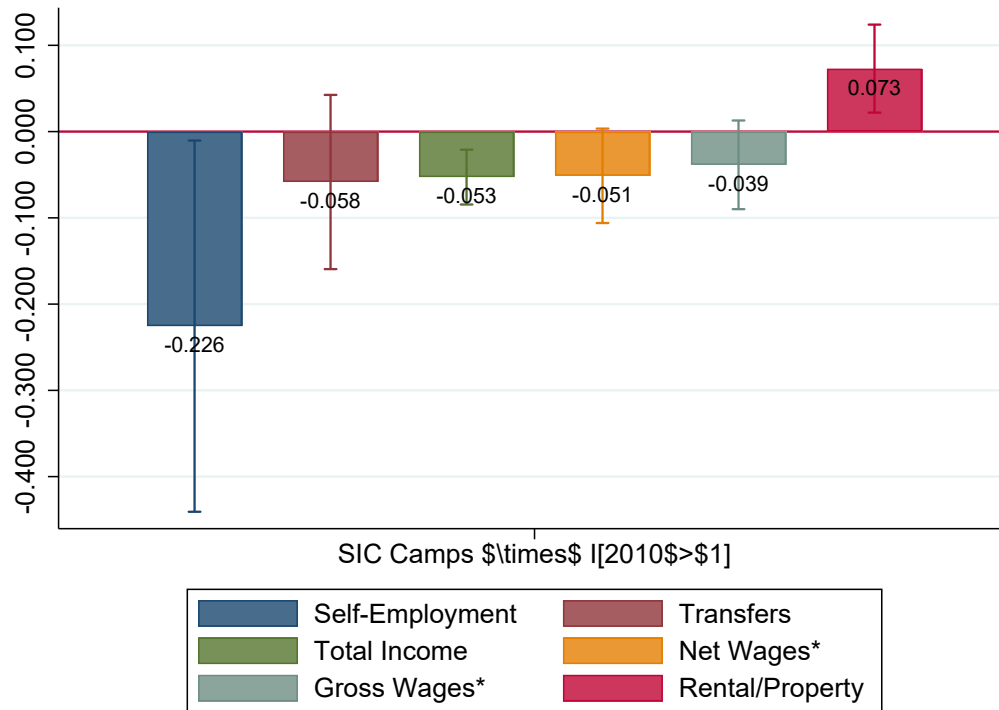
Notes: Each coefficient corresponds to a separate regression and includes approximately 4,150,710 observations. The sample only includes Jordan households. Each regression includes fixed effects by year, governorate, and controls for the urban or rural location, number of household members, number of male household members, number of female household members, number of individuals below 14 years of age, number of individuals higher than 65 years of age, number of income earners in household, age of head of household, marital status of head of household, education level of head of household, source of income of head of households, and main activity of head of household. It also controls for population density and night light density at the governorate-year level and controls for full interactions of year and a governorate-level index of living standards for 2010. Standard errors were clustered at the region-year level. Bars show 10% confidence intervals. *Data Source:* HEIS 2006, 2008, 2010, and 2013.

Figure (VII) Impacts of refugee inflows on income (dependent variables in logs)

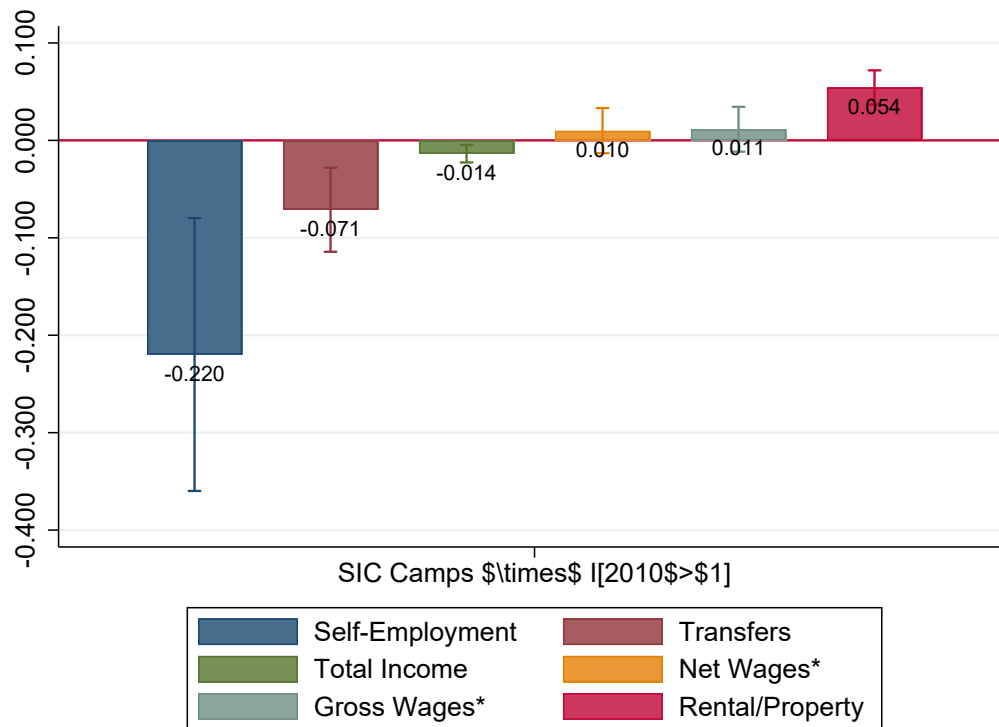


Notes: Each coefficient corresponds to a separate regression and includes approximately 4,150,710 observations. The sample only includes Jordan households. Each regression includes fixed effects by year, governorate, and controls for the urban or rural location, number of household members, number of male household members, number of female household members, number of individuals below 14 years of age, number of individuals higher than 65 years of age, number of income earners in household, age of head of household, marital status of head of household, education level of head of household, source of income of head of households, and main activity of head of household. It also controls for population density and night light density at the governorate-year level and controls for full interactions of year and a governorate-level index of living standards for 2010. Standard errors were clustered at the region-year level. Bars show 10% confidence intervals. Wages were transformed using the inverse hyperbolic sine transformation (see [Burdidge et al., 1988](#) and [MacKinnon and Magee, 1990](#) for details). The coefficients can be interpreted as a log transformation on the dependent variable. *Data Source:* HEIS 2006, 2008, 2010, and 2013.

Figure (VIII) Impacts of refugee inflows in income by education level (dep. var. in logs)



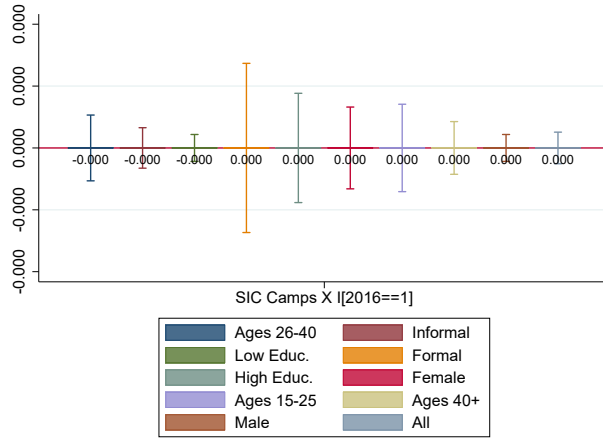
Panel A: Individuals with high education (more than high school)



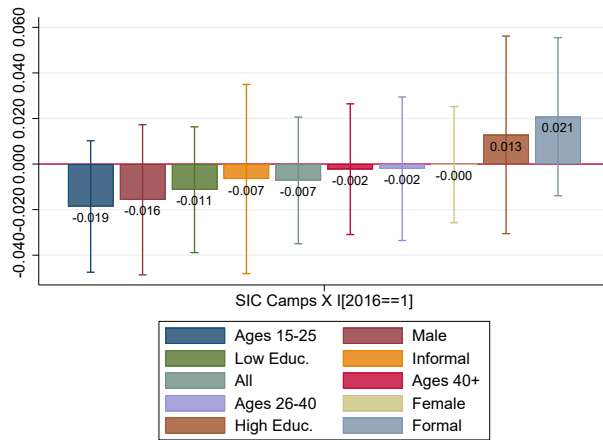
Panel B: Individuals with low education (high school or less)

Notes: All details are the same as in Figure VII.

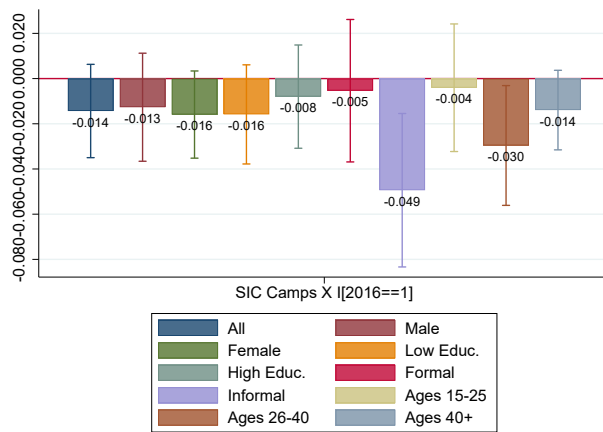
Figure (IX) Impact on refugee inflows on housing quality



Panel A: Log(N. Rooms)



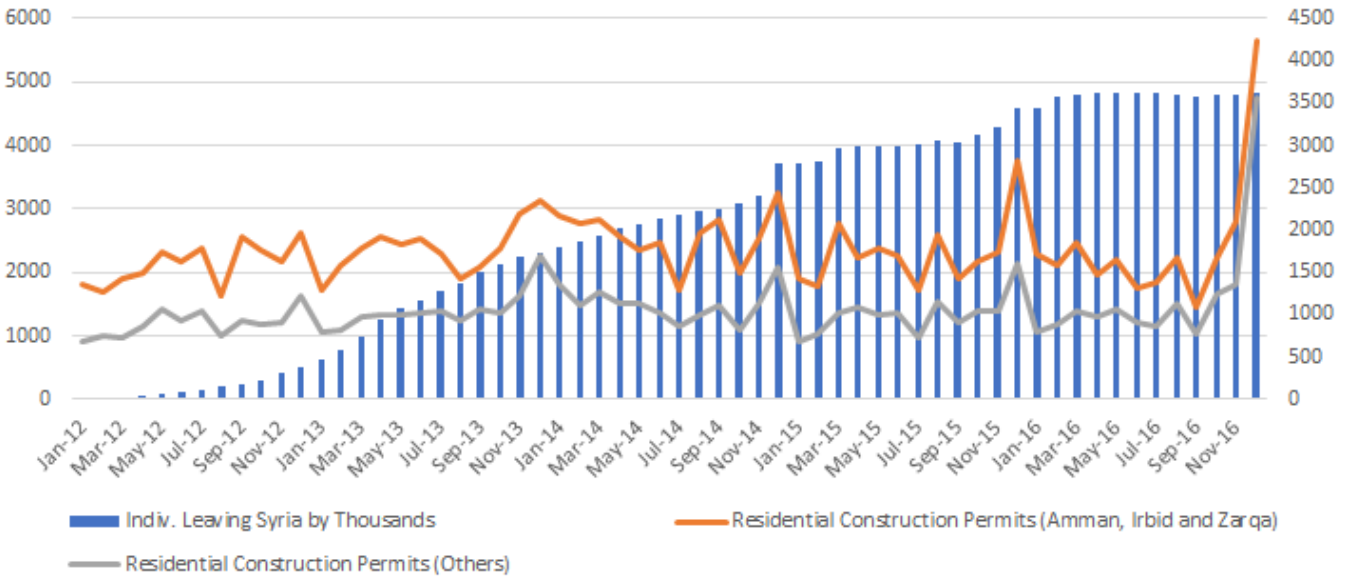
Panel B: Log [Dwelling area (squared meters)]



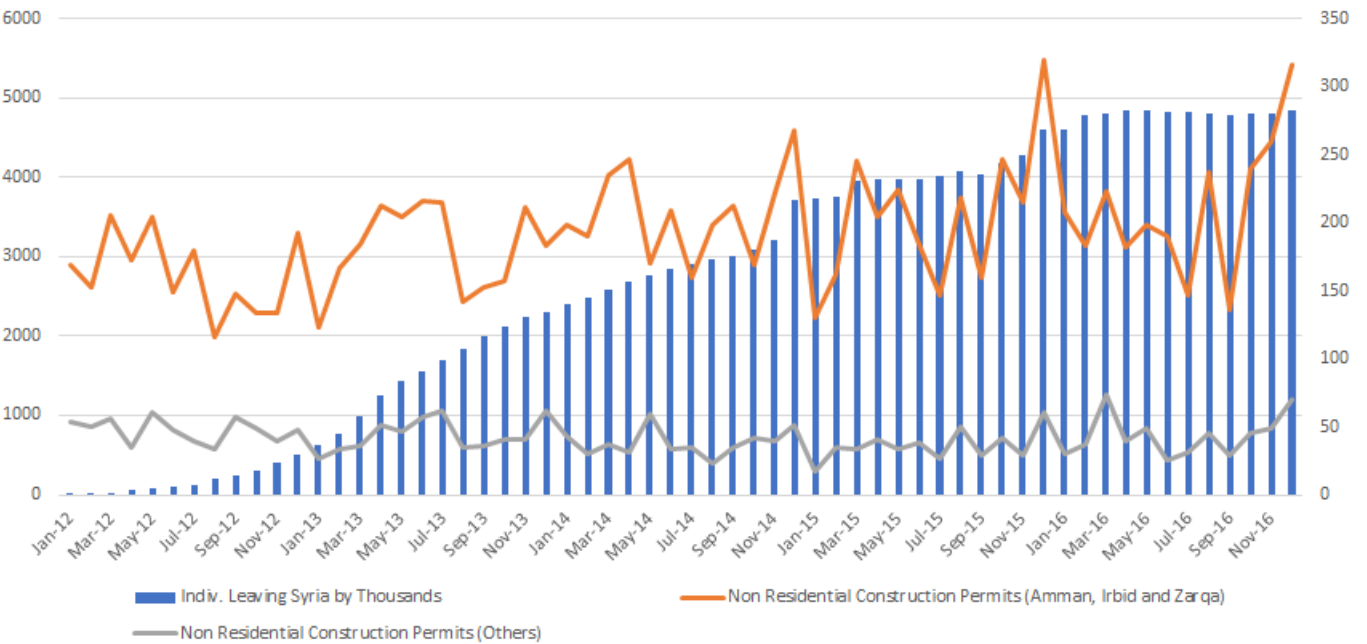
Panel C: Probability of adequate floor materials (=1 if Tile/Ceramic)

Notes: Each coefficient corresponds to a separate regression. The complete sample includes approximately 3,978,366 observations. The sample only includes Jordan nationals ages 15 to 64. Each regression includes fixed effects by individual, year, and controls for age, years of education, marital status, gender, urban or rural location, mother and father level of education. Standard errors were clustered at the subdistrict level. There are 86 subdistricts in the sample. Bars show 10% confidence intervals. *Data Source:* JLMPS 2010 and 2016.

Figure (X) Refugees leaving Syria and Jordan building permits (monthly figures)



Panel A: Residential permits



Panel B: Non-residential permits

Figure (XI) Percentage change in rental prices (2004 to 2015) and SID Camps

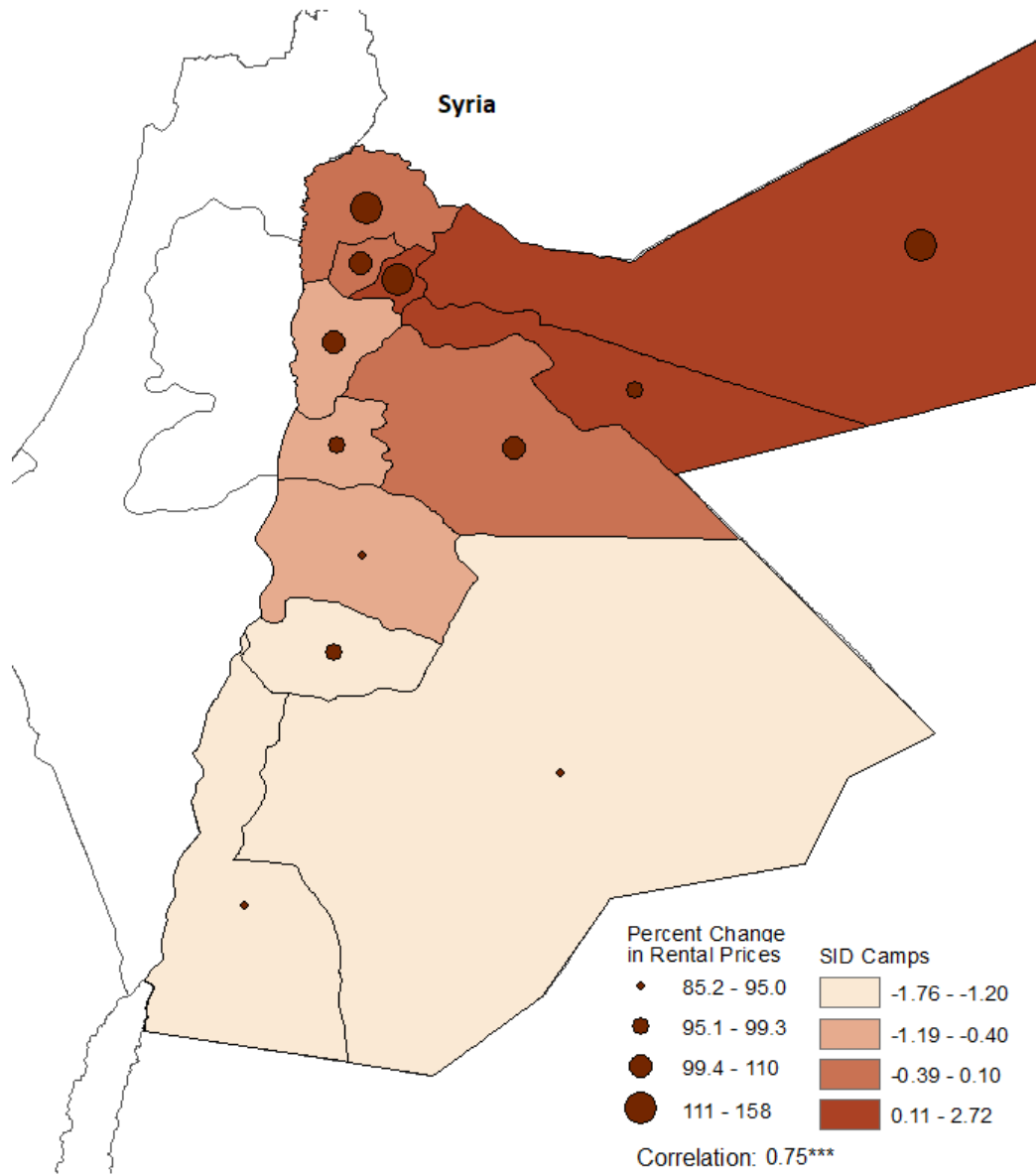
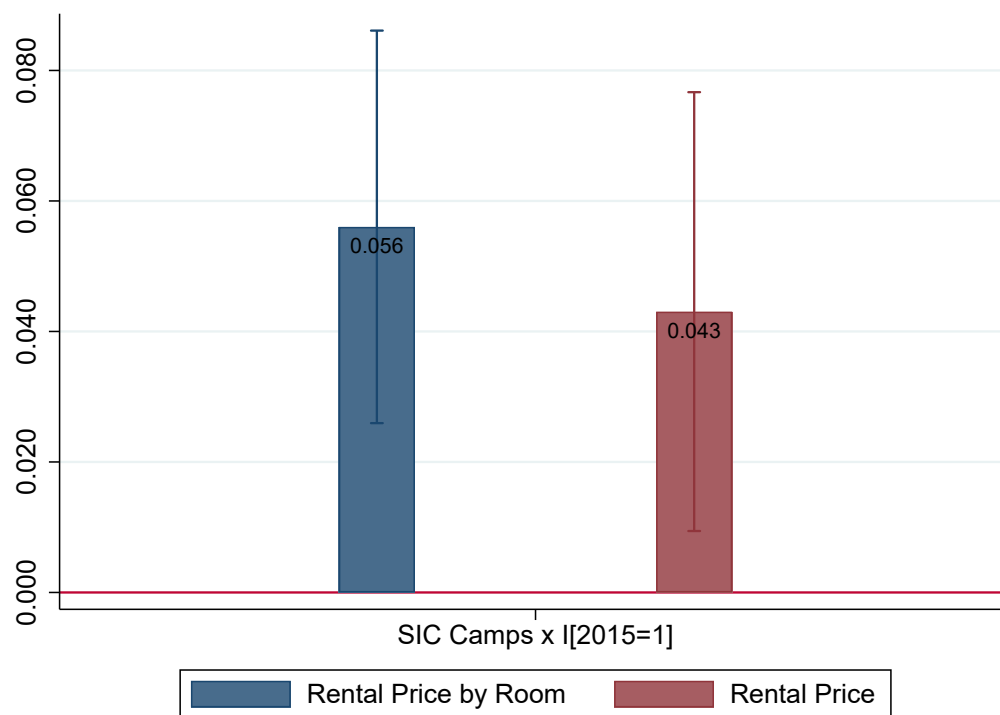


Figure (XII) Rental prices and refugee arrival in Jordan



Notes: Each coefficient corresponds to a separate regression. Each regression includes fixed effects by governorate and year. Robust standard errors were used to construct the confidence intervals. Bars show 10% confidence intervals.
Data Source: Housing and Population Census 2004 and 2015.

Table (A.1) Summary Statistics JMPLS Survey, 2010 and 2016

	2010		2016			
	Observations	Average	St. Deviation	Observations	Average	St. Deviation
Panel A: Local Labor Markets						
Wages	2,165,211	337.74	3504.66	2,390,045	328.09	981.14
Wages*	2,165,211	1.82	3.20	2,390,045	1.95	3.35
Hours Worked	2,165,211	12.68	21.51	2,390,045	13.01	22.93
Hours Worked*	2,165,211	1.25	2.01	2,390,045	1.28	2.00
Pr. Employment	2,155,766	0.28	0.45	2,346,566	0.33	0.47
Panel B: Education and Health Access						
Pr. Education Enrollment	2,158,948	0.40	0.49	2,390,045	0.18	0.39
Pr. Health Insurance	607,446	0.55	0.50	681,632	0.55	0.50
Panel C: Wealth Index						
Aggregate Wealth Index	2,165,211	0.07	0.87	2,385,306	0.33	0.788
Number of Assets	2,161,285	13.46	3.88	2,385,306	12.63	3.661
Necessary Assets	2,161,285	8.15	1.57	2,385,306	7.99	1.47
Luxury Assets	2,161,285	5.31	2.63	2,385,306	4.65	2.56
Rooms in Dwelling	2,161,867	3.69	1.22	2,385,676	3.59	1.102
Housing Area mt2	2,165,211	134.22	53.82	2,385,676	132.69	59.442
Pr. Good Quality Material for Floor	2,165,211	0.94	0.24	2,385,676	0.94	0.243
Panel D: Fertility and Marriage Decisions						
Age of First Marriage	940,837	22.15	4.94	1,365,568	23.70	5.45
Marriage Before 18 Years	940,837	0.25	0.43	1,365,568	0.17	0.37
Age of First Child Born	490,672	59.67	545.17	628,771	32.68	280.53
Number of Children	491,795	4.79	2.69	628,908	4.21	2.25
Panel E: Controls						
Age	2,165,211	33.52	13.87	2,390,045	33.80	13.94
Year of Education	2,158,948	9.22	4.22	2,389,383	10.99	3.86
Marital Status (Single)	2,165,211	0.31	0.46	2,390,045	0.43	0.49
Gender (Male)	2,165,211	0.50	0.50	2,390,045	0.51	0.50
Urban	2,165,211	0.76	0.43	2,390,045	0.89	0.31
Mother Level of Education	2,162,471	2.27	1.43	2,355,684	2.25	1.43
Father Level of Education	2,162,859	2.67	1.51	2,366,083	2.61	1.53

Notes:* hours worked and wages were transformed using the inverse hyperbolic sine transformation.

Table (A.2) Summary Statistics Household Expenditure and Income Survey, 2006 and 2008

	2006			2008		
	Obs.	Average	St. Deviation	Obs.	Average	St. Deviation
Panel A: Expenditures						
Food	899,416	2424.79	2000.66	990,297	3210.85	1852.15
Non-Food	899,416	3652.78	3014.32	990,297	3808.29	3239.45
Durables	527,594	710.39	2455.39	602,579	571.16	1979.18
Housing	899,416	1091.55	1918.27	990,297	1265.46	1078.10
Health	824,591	222.42	678.23	956,586	166.60	512.41
Education	656,010	621.11	1399.00	682,786	572.37	1228.26
Communication	885,628	830.34	786.63	983,111	1078.61	1010.15
Transport	400,798	784.41	2344.67	458,310	696.82	2189.54
Total	899,416	7417.77	5953.37	990,297	8447.26	5961.08
Panel B: Income						
Gross Wages	656,066	3824.42	3403.12	733,999	4795.39	4082.04
Gross Wages*	656,066	8.69	0.75	733,999	8.93	0.71
Net Wages	656,066	3553.49	3081.69	733,999	4445.50	3780.33
Net Wages*	656,066	8.62	0.73	733,999	8.86	0.69
Self-Employment	313,848	2803.42	11985.86	343,127	3726.46	11113.35
Rental and Property	899,416	1168.66	3512.31	990,297	1285.68	4082.80
Transfers	899,416	1378.79	1777.78	990,297	1606.80	1984.90
Total	899,416	6278.09	9848.92	990,297	7694.17	9369.91
Panel C: Controls						
N. Household Member	899,416	5.80	2.48	990,297	5.60	2.43
N. Males in the HH.	899,416	2.96	1.69	990,297	2.83	1.63
N. Females in the HH.	899,416	2.84	1.56	990,297	2.77	1.53
N. Individuals under 14	899,416	1.99	1.80	990,297	1.86	1.76
N. Individuals higher 65	899,416	0.22	0.51	990,297	0.22	0.51
Urban	899,416	0.84	0.37	990,297	0.83	0.38
N. Income Earners	899,416	1.32	0.96	990,297	1.30	0.94
Age	899,416	48.19	14.05	990,297	47.99	14.11
Gender (Male)	899,416	0.89	0.32	990,297	0.88	0.32
Marital Status	899,416	2.29	0.90	990,297	2.28	0.90
Education Level	899,416	2.53	1.33	990,297	2.61	1.38
Source of Income	899,416	22.26	7.56	990,297	23.07	7.77
Main Activity of HH. Head	899,416	2.34	1.94	990,297	2.32	1.91

Notes: * hours worked and wages were transformed using the inverse hyperbolic sine transformation.

Table (A.3) Summary Statistics Household Expenditure and Income Survey, 2010 and 2013

=	2010			2013		
	Obs.	Average	St. Deviation	Obs.	Average	St. Deviation
Panel A: Expenditures						
Food	1,088,392	3584.81	2181.03	1,172,605	3548.28	2044.82
Non-Food	1,087,652	4458.86	4477.25	1,172,605	4820.81	3544.71
Durables	665,201	959.05	6979.35	608,313	744.15	1901.61
Housing	1,088,392	1493.99	1411.29	1,172,605	1869.14	1369.11
Health	1,067,516	242.37	958.06	1,108,584	199.61	552.55
Education	724,266	767.25	1519.77	762,653	900.23	1695.15
Communication	1,083,581	1076.84	937.45	1,167,732	328.33	259.16
Transport	602,027	1121.75	6998.65	1,128,771	1563.69	1884.01
Total	1,088,392	9858.98	10422.95	1,172,605	10333.54	6090.59
Panel B: Income						
Gross Wages	772,090	5295.50	4201.20	855,586	6203.05	5038.43
Gross Wages*	772,090	9.00	0.81	855,586	9.17	0.75
Net Wages	772,090	4868.13	3776.60	855,586	5777.08	4647.31
Net Wages*	772,090	8.93	0.79	855,586	9.10	0.74
Self-Employment	393,065	3989.32	13741.25	290,245	3176.41	6289.19
Rental and Property	1,088,392	1671.91	3734.70	1,172,605	1798.59	2713.64
Transfers	1,088,392	1918.62	2833.18	1,172,605	2200.71	2848.73
Total	1,088,392	8736.55	11059.21	1,172,605	9268.54	7376.53
Panel C: Controls						
N. Household Member	1,088,392	5.39	2.30	1,172,605	5.08	2.14
N. Males in the HH.	1,088,392	2.66	1.53	1,172,605	2.55	1.47
N. Females in the HH.	1,088,392	2.74	1.46	1,172,605	2.53	1.39
N. Individuals under 14	1,088,392	1.75	1.70	1,172,605	1.60	1.62
N. Individuals higher 65	1,088,392	0.28	0.56	1,172,605	0.26	0.54
Urban	1,088,392	0.83	0.37	1,172,605	0.82	0.38
N. Income Earners	1,088,392	2.78	1.51	1,172,605	2.39	1.16
Age	1,088,392	49.22	14.57	1,172,605	49.26	14.48
Gender (Male)	1,088,392	0.86	0.35	1,172,605	0.86	0.34
Marital Status	1,088,392	2.31	0.95	1,172,605	2.33	0.97
Education Level	1,088,392	2.51	1.32	1,172,605	2.70	1.41
Source of Income	1,088,392	23.04	8.31	1,172,605	23.04	8.14
Main Activity of HH. Head	1,088,392	2.51	1.99	1,172,605	2.38	1.89
Panel D: Additional Controls - 2010						
Population Density	1,088,392	363.55	229.35	n/a	n/a	n/a
Night Light Density	1,088,392	14.90	11.17	n/a	n/a	n/a
Index of Econ. Conditions	1,088,392	2.09	0.15	n/a	n/a	n/a
Index of Education	1,088,392	1.91	0.09	n/a	n/a	n/a
Index of Housing Quality	1,088,392	2.25	0.18	n/a	n/a	n/a
Index of Service Coverage	1,088,392	2.32	0.17	n/a	n/a	n/a

Notes: * hours worked and wages were transformed using the inverse hyperbolic sine transformation.

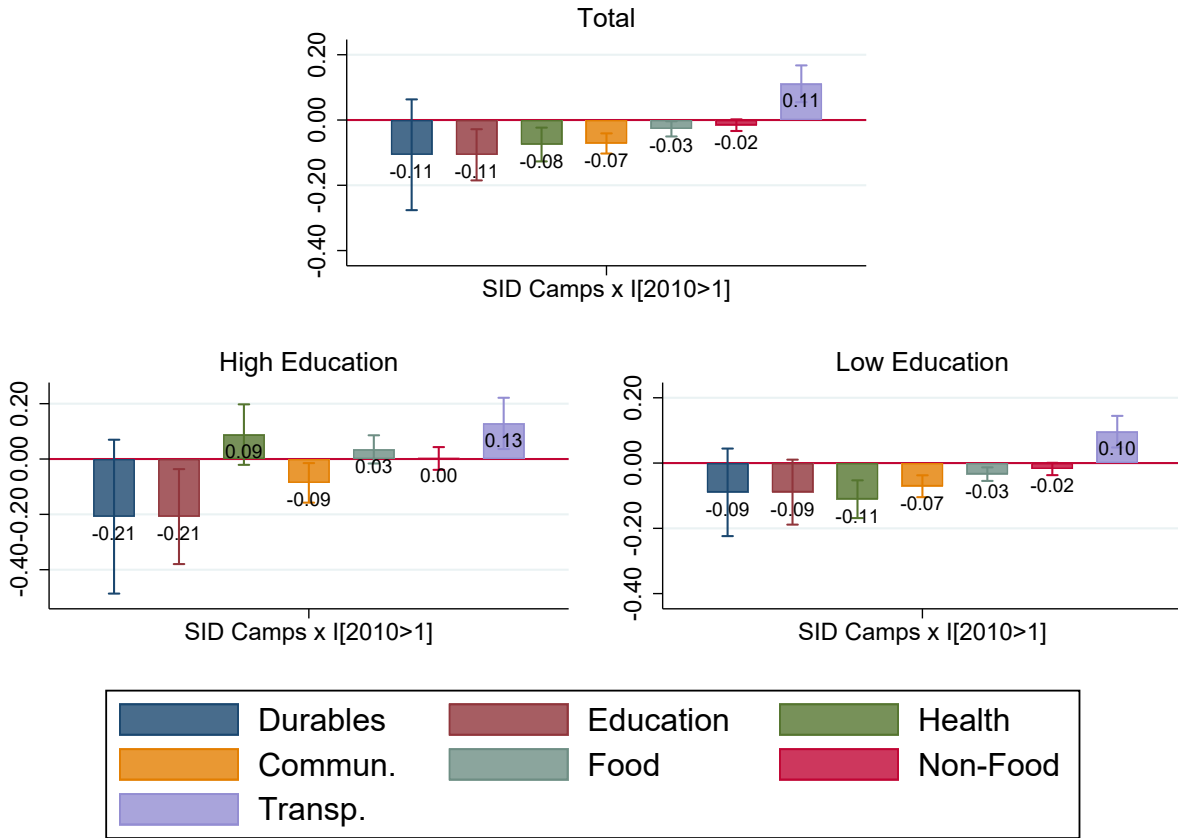
Table (A.4) Summary Statistics Child's Health Outcomes, DHS 1997, 2002 and 2007

	1997			2002			2007		
	Obs.	Average	St. Deviation	Obs.	Average	St. Deviation	Obs.	Average	St. Deviation
Height for Age	5,676	1.18	12.97	4,904	0.45	9.73	5,152	14.73	35.86
Weight for Age	5,676	1.29	12.95	4,904	0.59	9.71	5,152	14.80	35.81
Weight for Height	5,676	1.63	12.91	4,905	0.94	9.67	5,152	15.01	35.73
Controls									
Child Age	6,260	2.00	1.40	5,698	1.98	1.42	5,168	2.00	1.42
Child Gender (Male)	6,466	0.52	0.50	5,851	0.51	0.50	5,259	0.50	0.50
Mother's Age	6,466	29.82	6.14	5,851	30.28	5.91	5,259	30.49	6.24
Mother's Education Level	6,466	1.98	0.79	5,851	2.08	0.70	5,259	2.17	0.65
Household Size	6,466	7.36	3.48	5,851	6.78	2.93	5,259	6.27	2.57
N. Children (5 or Less)	6,466	2.24	1.11	5,851	1.96	0.98	5,259	1.92	0.93
Total Children Ever Born	6,466	4.41	2.73	5,851	4.05	2.35	5,259	3.75	2.16

Table (A.5) Summary Statistics Child's Health Outcomes, DHS 2009 and 2012

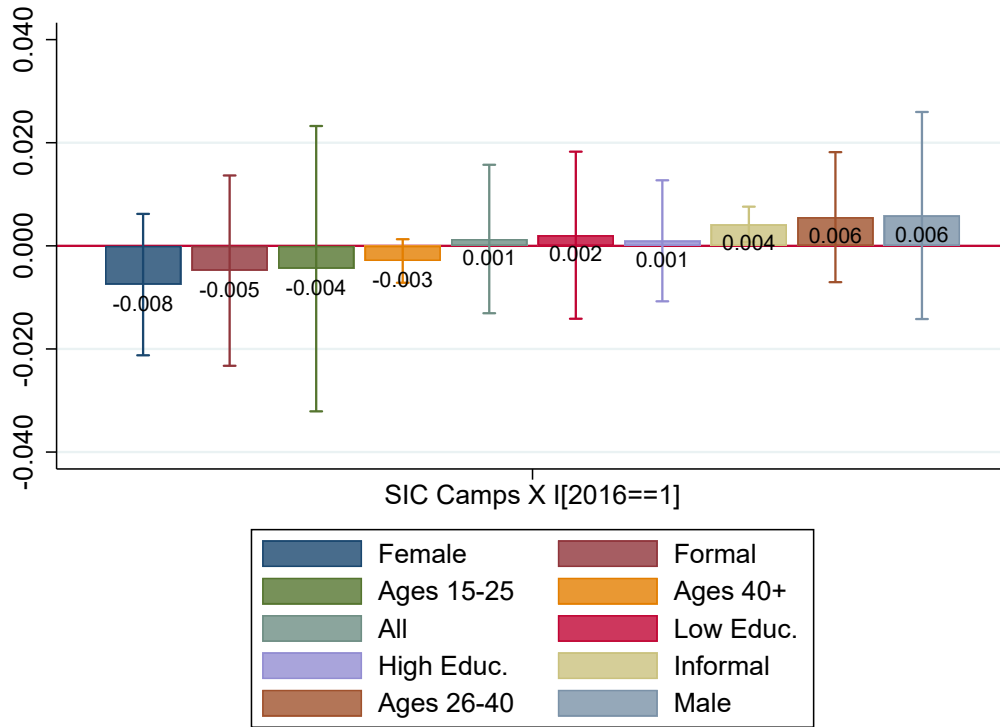
	2009			2012		
	Obs.	Average	St. Deviation	Obs.	Average	St. Deviation
Height for Age	4,710	8.66	28.55	6,357	0.93	10.83
Weight for Age	4,710	8.81	28.50	6,357	0.93	10.83
Weight for Height	4,710	9.01	28.43	6,357	1.13	10.80
Controls						
Child Age	4,723	1.96	1.39	6,668	2.08	1.40
Child Gender (Male)	4,830	0.53	0.50	6,825	0.51	0.50
Mother's Age	4,830	30.58	6.15	6,825	30.89	6.24
Mother's Education Level	4,830	2.23	0.64	6,825	2.21	0.63
Household Size	4,830	6.01	2.20	6,825	6.26	2.68
N. Children (5 or Less)	4,830	1.91	0.89	6,825	1.94	1.03
Total Children Ever Born	4,830	3.66	2.02	6,825	3.65	2.04

Figure (B.1) Impacts of refugee inflows on other categories of expenditures (dependent variables in logs)

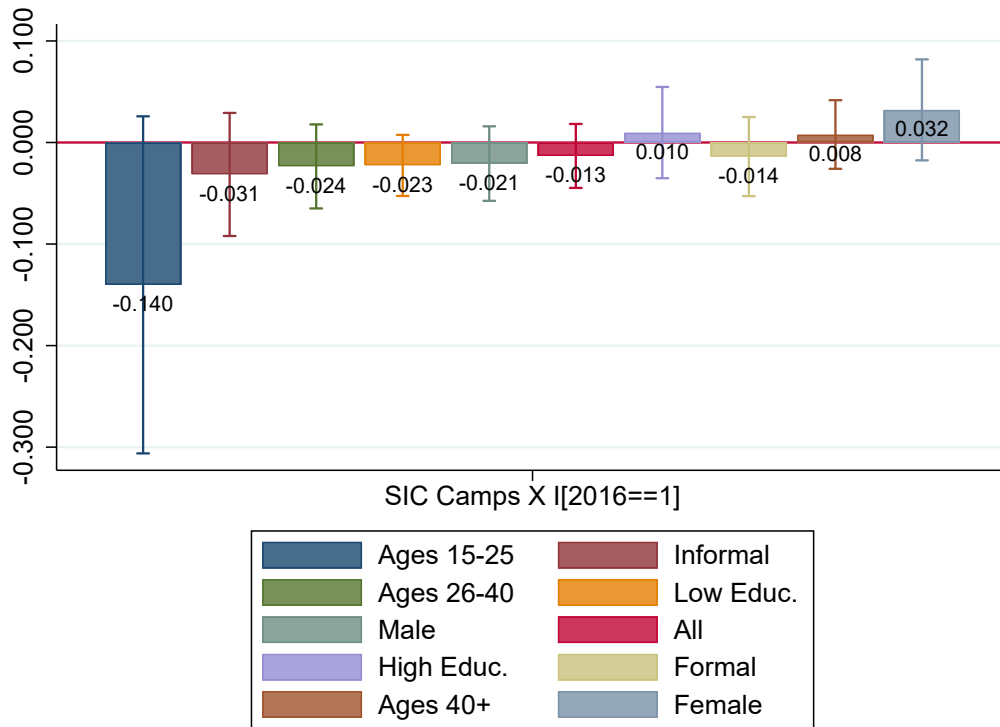


Notes: Each coefficient corresponds to a separate regression and includes approximately 4,150,710 observations. The sample only includes Jordan households. Each regression includes fixed effects by year, governorate, and controls for the urban or rural location, number of household members, number of male household members, number of female household members, number of individuals below 14 years of age, number of individuals higher than 65 years of age, number of income earners in household, age of head of household, marital status of head of household, education level of head of household, source of income of head of households, and main activity of head of household. It also controls for population density and night light density at the governorate-year level and controls for full interactions of year and a governorate-level index of living standards for 2010. Standard errors were clustered at the region-year level. Bars show 10% confidence intervals. Wages were transformed using the inverse hyperbolic sine transformation (see [Burdige et al., 1988](#) and [MacKinnon and Magee, 1990](#) for details). The coefficients can be interpreted as a log transformation on the dependent variable. *Data Source:* HEIS 2006, 2008, 2010, and 2013.

Figure (B.2) Impact on refugee inflows on education and health access



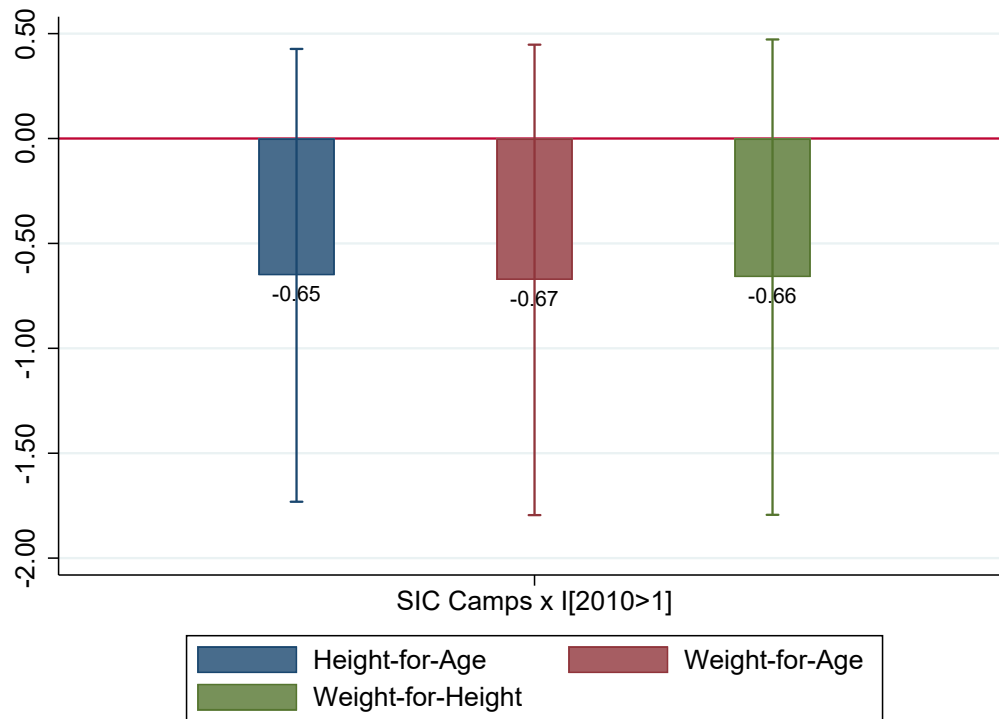
Panel A: Probability education enrollment



Panel B: Probability of having health insurance

Notes: Each coefficient corresponds to a separate regression. The sample only includes Jordan nationals ages 15 to 64. Each regression includes fixed effects by individual, year, and controls for age, years of education, marital status, gender, urban or rural location, mother and father level of education. Standard errors were clustered at the subdistrict level. There are 86 subdistricts in the sample. Bars show 10% confidence intervals. *Data Source:* JLMPS 2010 and 2016.

Figure (B.3) Impact on feefugee inflows on children's health



Notes: Each coefficient corresponds to a separate regression. The sample only includes Jordan children younger than 5 years of age. Additional controls include child's age and gender, mother's age and education level, household size, total number of children ever born, and number of children under 5 in each household. Standard errors clustered at the region-year level are presented in parentheses. *Data Source:* DHS 1997, 2002, 2007, 2009 and 2012.

Figure (C.1) Share of Syrian pre-settlements (% Pop, 2004 Census), governorate variation

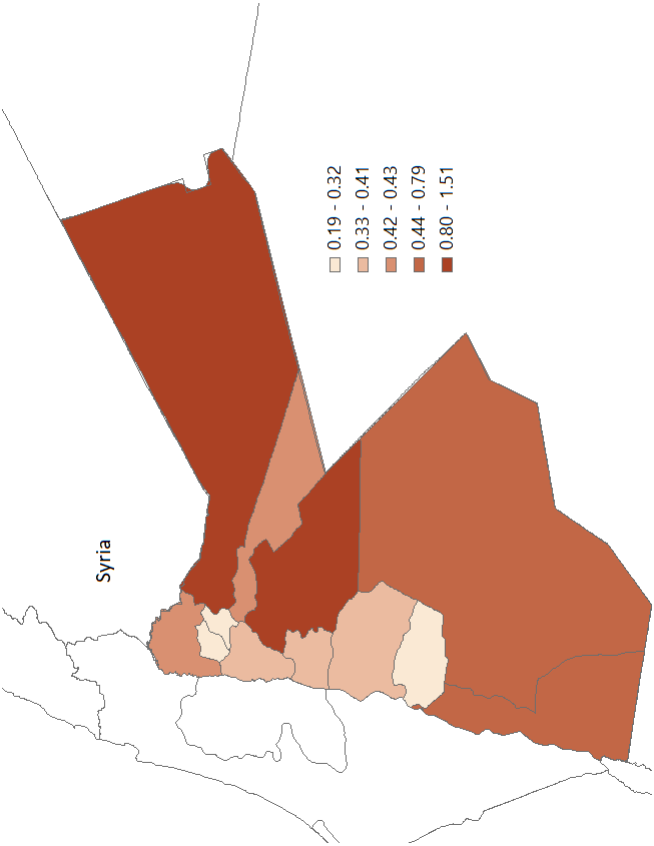
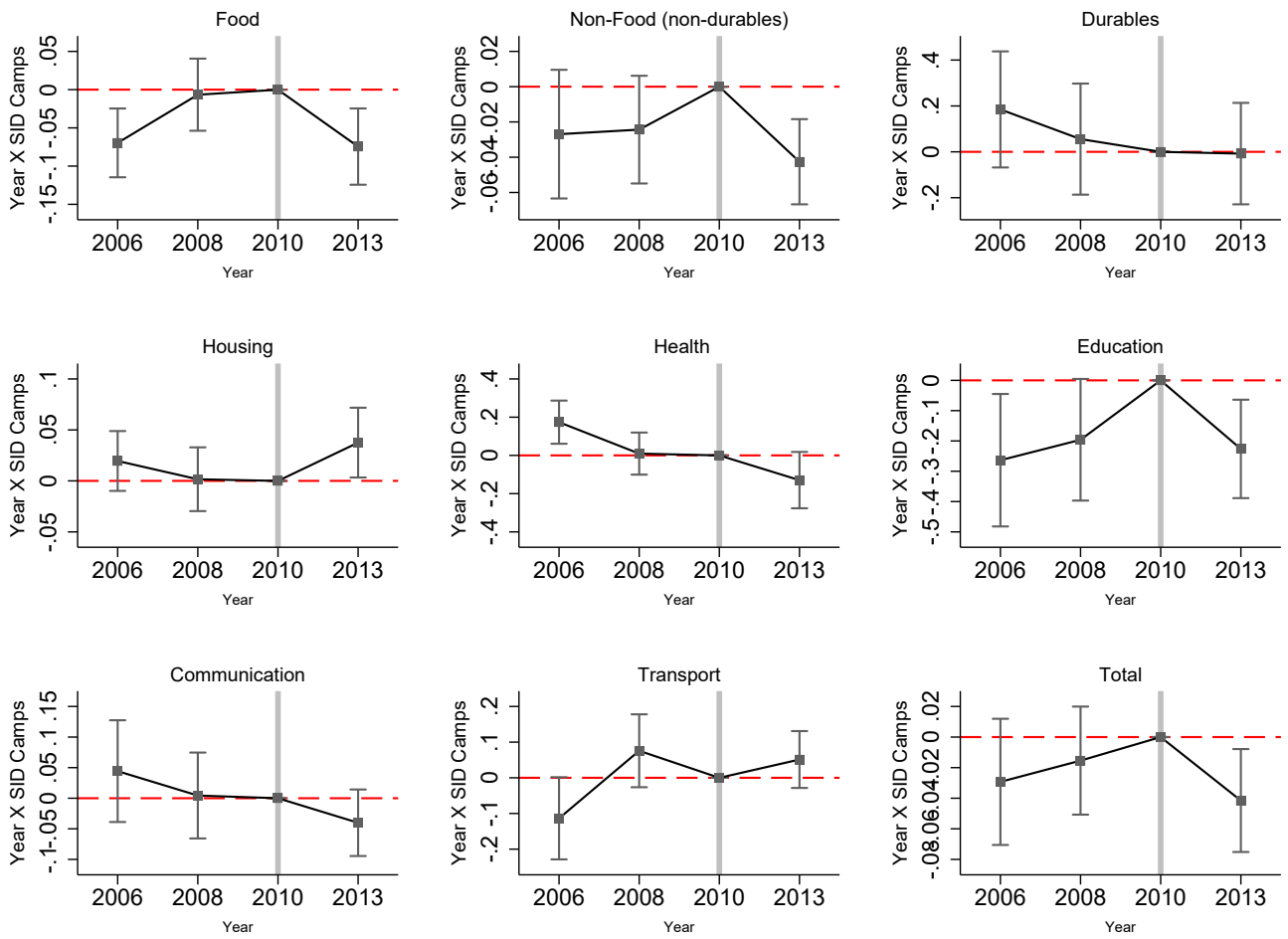


Table (C.1) Effects of Refugee Inflows in Consumer Expenditures and Income

Dependent Variable in <i>l</i> ogs	Food (1)	Non-Food (non-durables) (2)	Durables (3)	Housing (4)	Health (5)	Education (6)	Commun. (7)	Transp. (8)	Total (9)
Syrian Pre-settl. \times I[2010>1]	-0.014 (0.076)	-0.040 (0.036)	-0.747*** (0.221)	0.132*** (0.042)	-0.020 (0.152)	-0.061 (0.167)	-0.191*** (0.059)	0.266*** (0.079)	-0.015 (0.053)
R-squared	.319	.435	.0606	.48	.124	.275	.483	.235	.429
Observations	4,150,710	4,149,970	2,403,687	4,150,710	3,957,277	2,825,715	4,120,052	2,589,906	4,150,710
Variables in <i>l</i> ogs	Gross Wages* (1)	Net Wages* (2)	Self-Employ. (3)	Rental/ Prop. (4)	Transfers (5)	Total (6)			
Syrian Pre-settl. \times I[2010>1]	-0.013 (0.054)	-0.026 (0.047)	-0.213 (0.180)	0.169*** (0.049)	-0.101 (0.094)	-0.036 (0.027)			
R-squared	.444	.443	.272	.504	.448	.455			
Observations	3017741	3017741	1336909	3086145	4089236	4150710			
Controls for all Panels									
Governorate FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:* hours worked and wages were transformed using the inverse hyperbolic sine transformation.

Figure (D.1) Event study: Impacts of refugee inflows in consumer expenditures



Note: 2010 - Conflict Onset

Figure (D.2) Event study: Impacts of refugee inflows in satellite night light. Dependent variable: Log(Night Light)

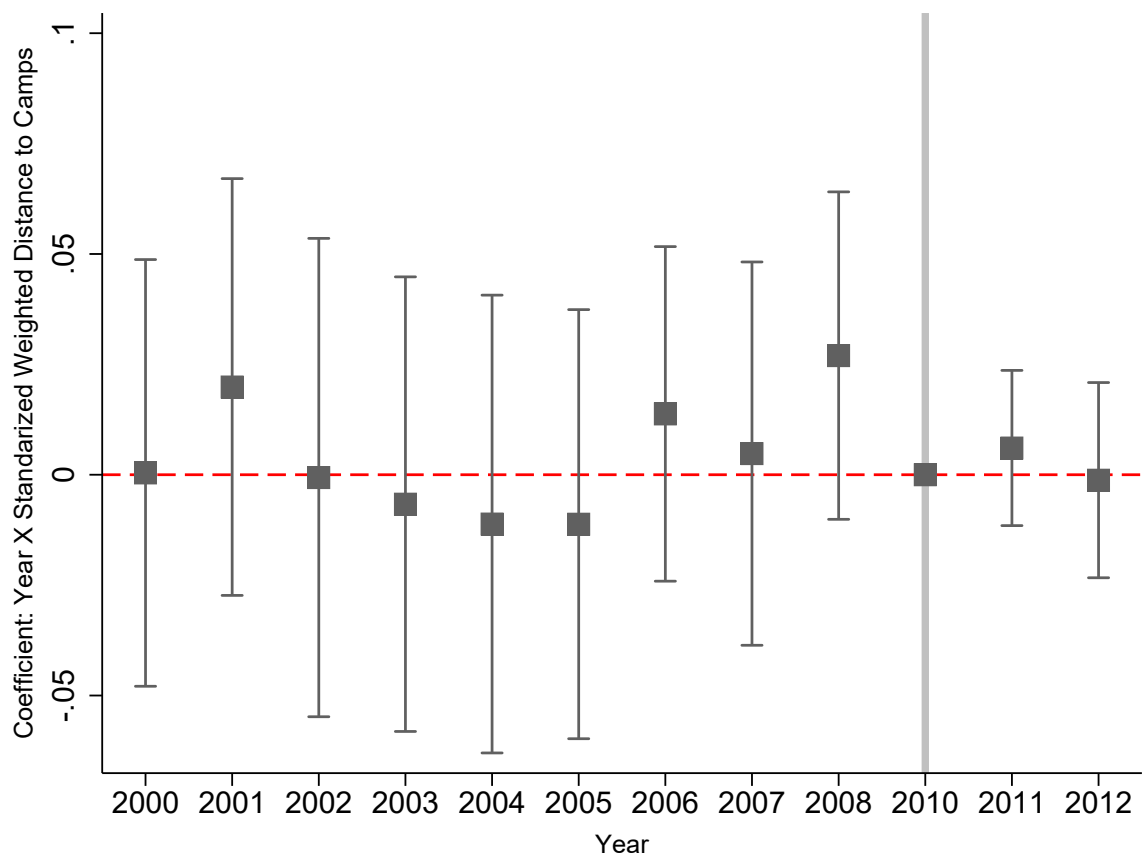
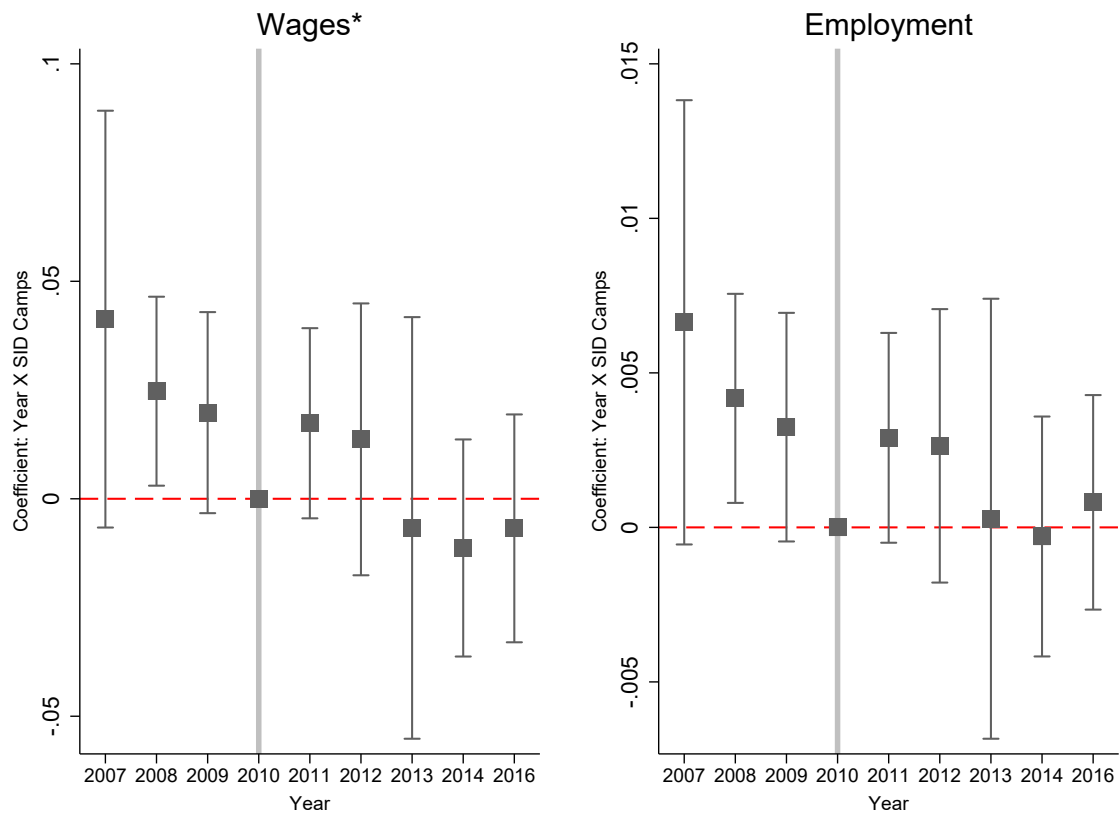


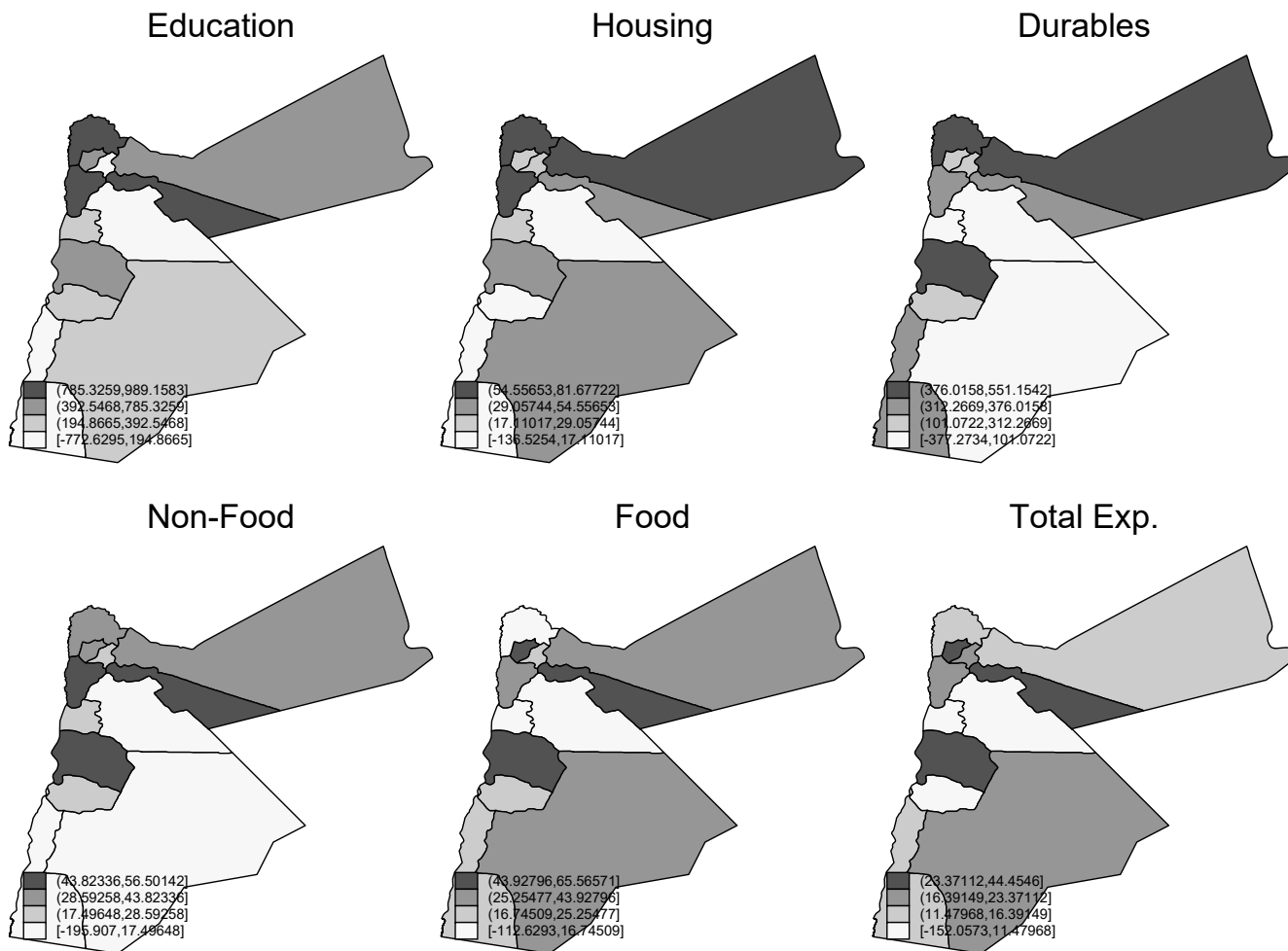
Figure (D.3) Event study: Impacts of refugee inflows in labor markets



Note: 2010 - Conflict Onset

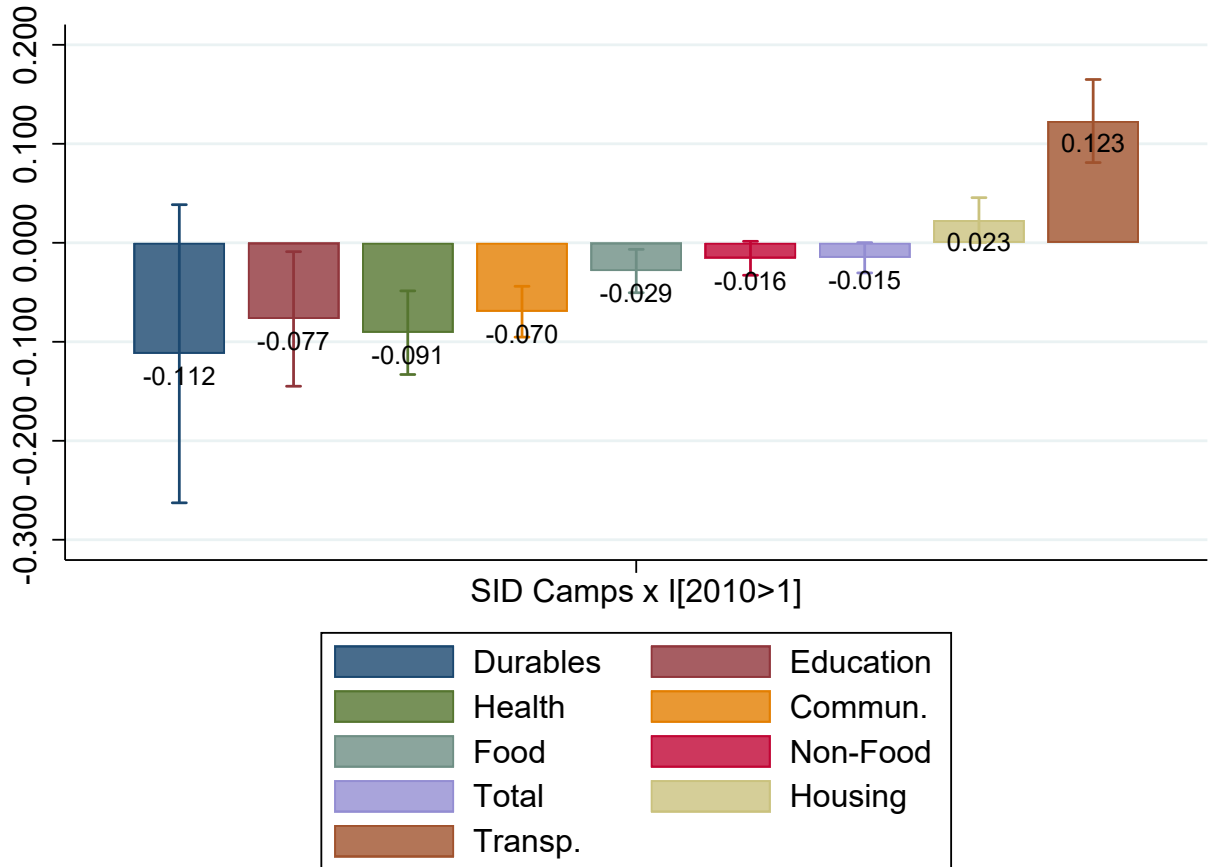
Notes: *: wages were transformed using the inverse hyperbolic sine transformation (see [Burbidge et al., 1988](#) and [MacKinnon and Magee, 1990](#) for details). The coefficients can be interpreted as a log transformation on the dependent variable.

Figure (E.1) Predicted Residuals Change between 2013 and 2006 - Consumer Expenditures Estimates



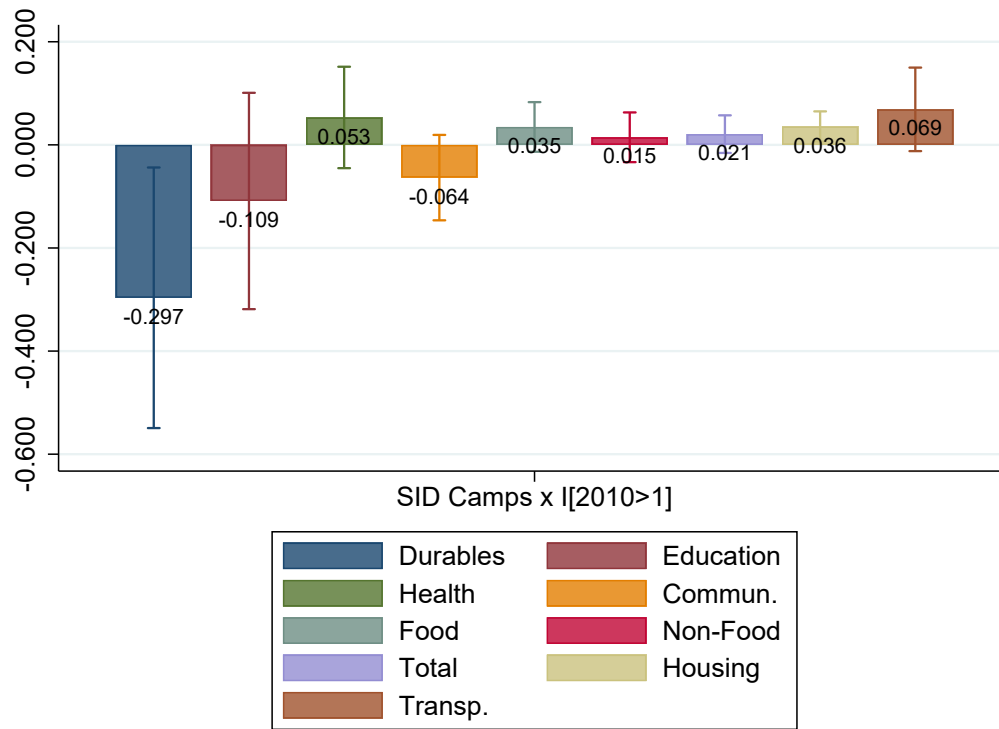
Notes: The maps were constructed by estimating the residuals of the 2SLS regression of consumer expenditures on refugee inflows. The residuals were squared and added by year and governorate and differentiated between 2013 and 2006.

Figure (E.2) Impacts of refugee inflows on consumer expenditures (dependent variable in logs)
Including spatial correction of SE

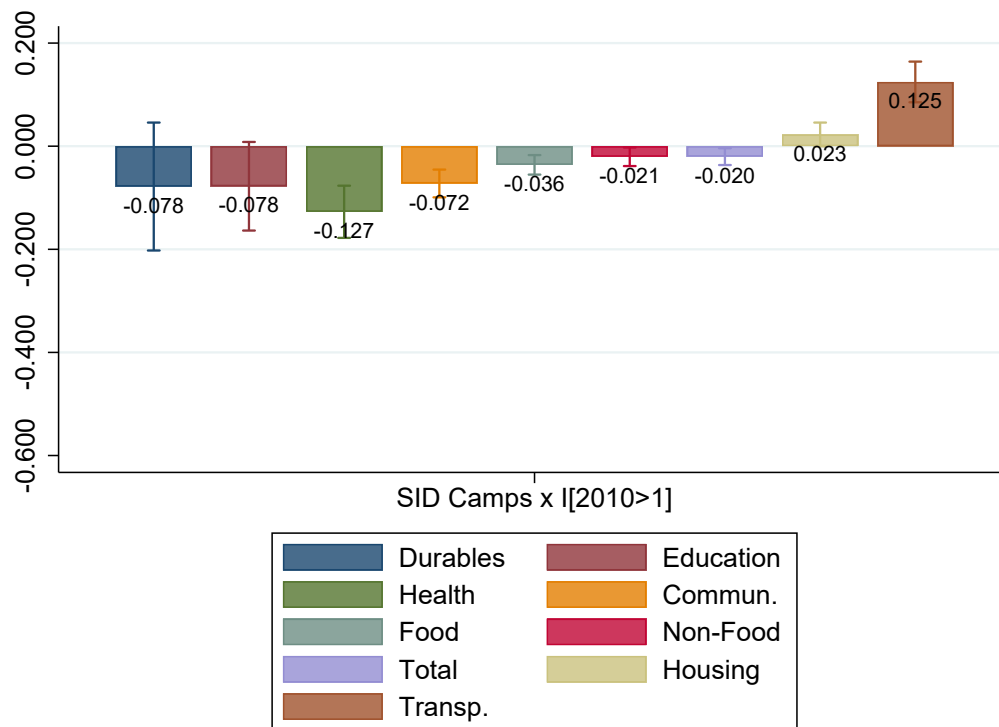


Notes: Each coefficient corresponds to a separate regression and includes approximately 4,150,710 observations. The sample only includes Jordan households. Each regression includes fixed effects by year, governorate, and controls for the urban or rural location, number of household members, number of male household members, number of female household members, number of individuals below 14 years of age, number of individuals higher than 65 years of age, number of income earners in household, age of head of household, marital status of head of household, education level of head of household, source of income of head of households, and main activity of head of household. It also controls for population density and night light density at the governorate-year level and controls for full interactions of year and a governorate-level index of living standards for 2010. Standard errors were corrected for spatial correlation using the methodology proposed by [Conley \(1999\)](#). Bars show 10% confidence intervals. *Data Source:* HEIS 2006, 2008, 2010, and 2013.

Figure (E.3) Impacts of refugee inflows on expenditures by education level (dep. var. in logs)
Including spatial correction of SE



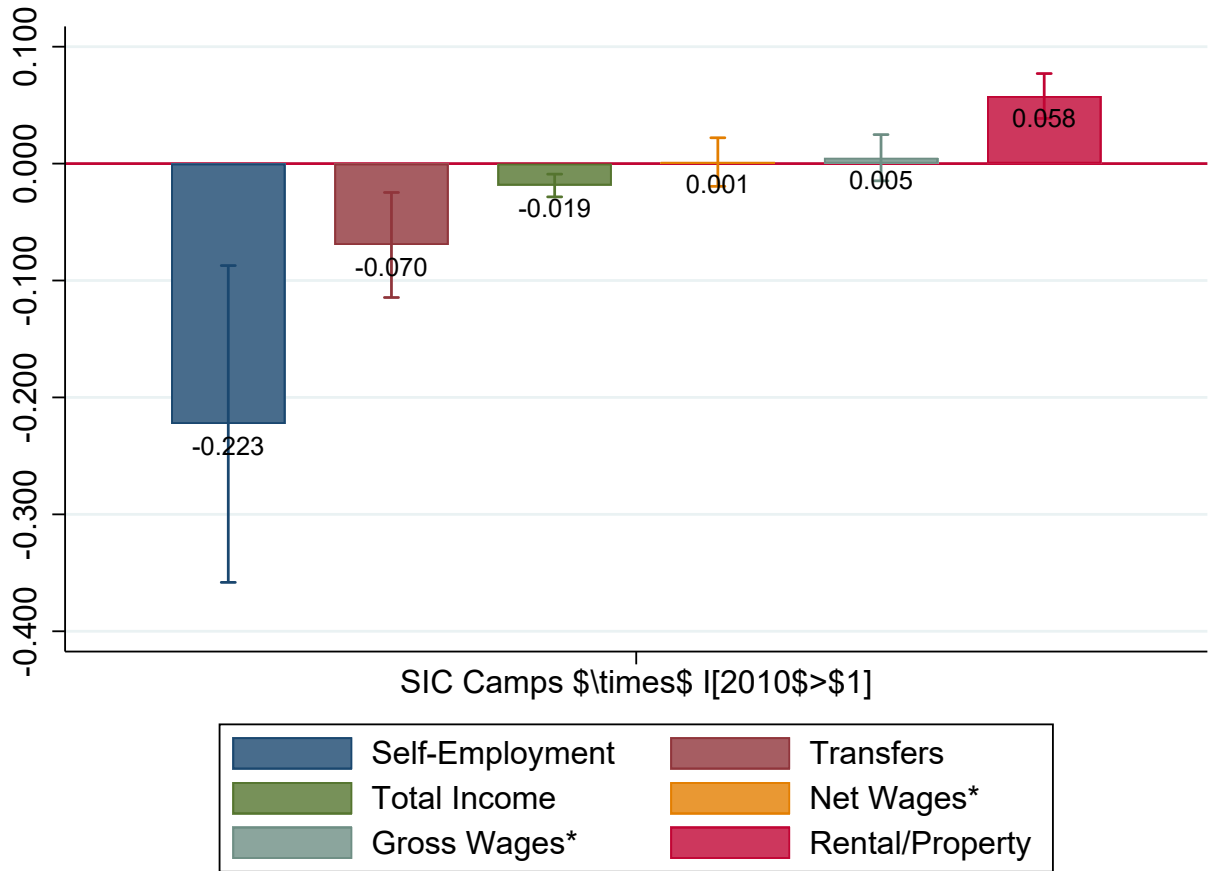
Panel A: Individuals with high education (more than high school)



Panel B: Individuals with low education (high school or less)

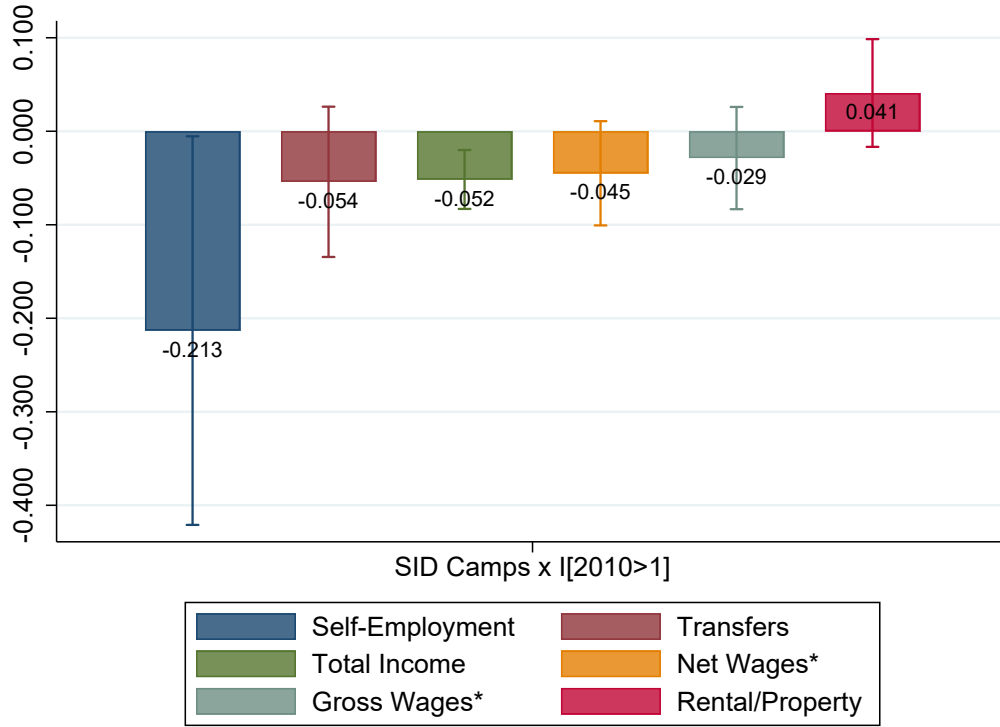
Notes: All details are the same as in Table E.2.

Figure (E.4) Impacts of refugee inflows on income (dependent variables in logs)
Including spatial correction of SE

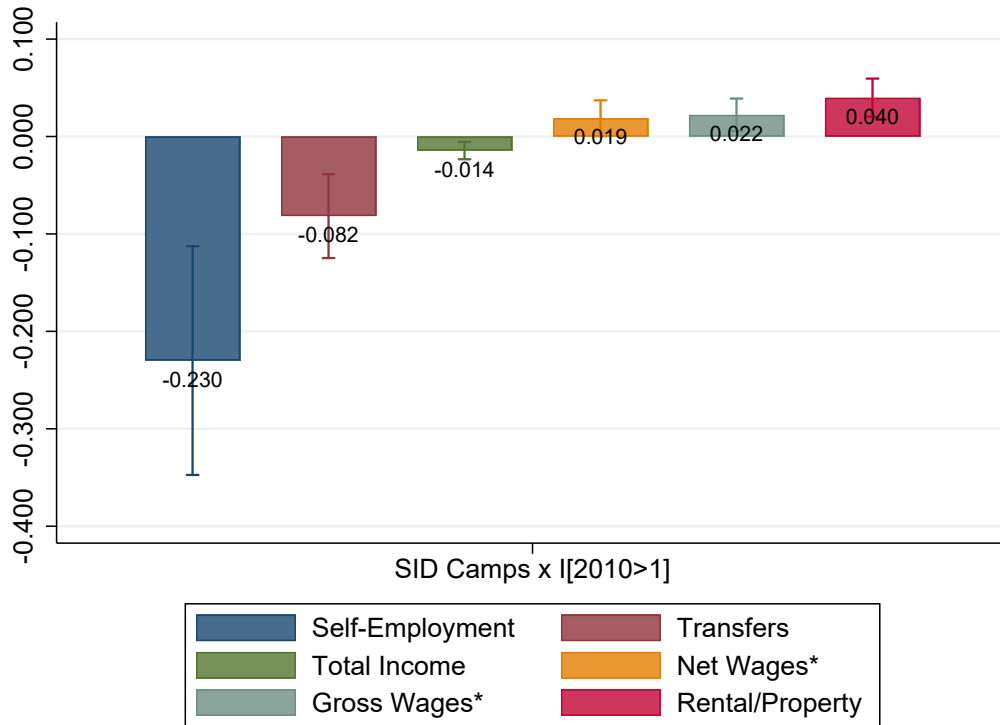


Notes: Each coefficient corresponds to a separate regression and includes approximately 4,150,710 observations. The sample only includes Jordan households. Each regression includes fixed effects by year, governorate, and controls for the urban or rural location, number of household members, number of male household members, number of female household members, number of individuals below 14 years of age, number of individuals higher than 65 years of age, number of income earners in household, age of head of household, marital status of head of household, education level of head of household, source of income of head of households, and main activity of head of household. It also controls for population density and night light density at the governorate-year level and controls for full interactions of year and a governorate-level index of living standards for 2010. Standard errors were corrected for spatial correlation using the methodology proposed by [Conley \(1999\)](#). Bars show 10% confidence intervals. Wages were transformed using the inverse hyperbolic sine transformation (see [Burbidge et al., 1988](#) and [MacKinnon and Magee, 1990](#) for details). The coefficients can be interpreted as a log transformation on the dependent variable. *Data Source:* HEIS 2006, 2008, 2010, and 2013.

Figure (E.5) Impacts of refugee inflows in income by education level (dep. var. in logs)
Including spatial correction of SE



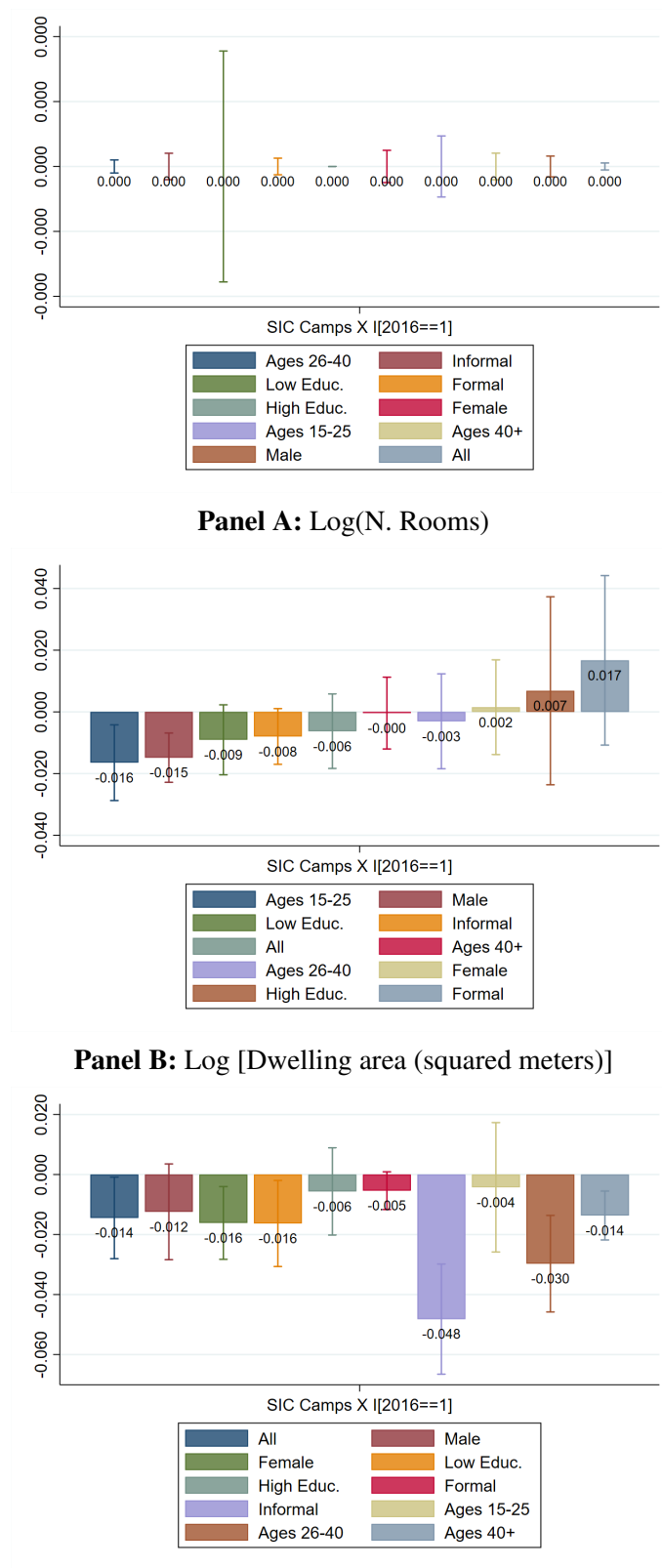
Panel A: Individuals with high education (more than high school)



Panel B: Individuals with low education (high school or less)

Notes: All details are the same as in Figure E.4.

Figure (E.6) Impact on refugee inflows on housing quality
Including spatial correction of SE



Panel C: Probability of adequate floor materials (=1 if Tile/Ceramic)