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The Effect of Mass Migration on Economic Development

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Abstract

The Syrian refugee crisis is one of the significant humanitarian challenges of the 21st century, and Turkey is among the countries significantly impacted. This study analyzes the impact of the approximately 3.65 million Syrian refugees residing in Turkey on economic development proxied by GDP per capita. Since Turkish provinces faced distinctive rises in refugee numbers after the Syrian Civil War, I exploit the differences in the proportion of refugees across different Turkish provinces to estimate refugees' impact on economic development using a difference-in-differences methodology. To address the potential selection bias arising from the refugees' settlement patterns, I employ a two-stage least squares (2SLS) method. Results offer suggestive evidence of a positive medium-term effect and a negative long-term effect of the arrival of refugees on economic development, while the short-term effect is unclear. However, none of the impacts are statistically significant.

JEL Codes: J15, F22, O15, O17

Keywords: Refugees, Economic Development, Regional Variation, Difference-in Differences, Instrumental Variable, GDP per capita

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1 Introduction

The worldwide refugee number reached 26 million at the end of 2019 (UNHCR, 2020)[1]. The Syrian Civil War, which occurred on the southern border of Turkey, is one of the major conflicts contributing to the boost in the refugee population. As of June 2020, there were 5,543,746 registered Syrian refugees in nearby countries such as Turkey, Egypt, Iraq, Jordan, and Lebanon[2]. Of these, 3.65 million were registered by the Turkish Government, making Turkey the nation hosting the largest number of refugees globally[3]. Figure 1 illustrates the rise in the registered Syrian refugees in Turkey from 2013 to 2019. This extreme refugee flow to Turkey has brought about concerns, including their impact on the Turkish economy. This paper focuses on the effect of immigration on per capita GDP, which is used as a proxy for economic development similar to Elgin and Oztunali (2014). Existing studies investigating this relationship yield mixed results (Morley, 2006; Boubtane et al., 2013; Feridun et al., 2005; Felbermayr et al., 2010; Jeffrey and Romer, 1999), with most studies focusing on developed countries. Little is known about the impact of migrants on per capita GDP in developing countries, and even less is known about the impact of refugees compared to labor migrants. However, it is crucial to evaluate the economic effect of refugees separately from that of labor migration due to the unique circumstances of forced migration. This paper aims to address this research gap.

This study investigates the impact of refugees on per capita GDP in Turkey using provincial-level data on GDP per capita and refugee numbers from 2006 to 2019, in addition to multiple complementary datasets. To measure this impact, the study adopts a difference-in-differences (DID) framework that considers variations in per capita GDP and refugee proportions across Turkish provinces over time. Two crucial concerns require attention when conducting the empirical investigation of this relationship. Firstly, it is essential to address compliance with the main identification assumption of the DID methodology.

[1]See https://www.unhcr.org/data.html

[2]While Syrians in Turkey are referred to as "refugees" or "asylum-seekers", they can be divided into four categories. The first and largest group has "temporary protection" status, and the second group is Syrians with a "residence permit." The third group consists of those who have not been registered yet. And the last group is the Syrians who have become citizens of Turkey. The Syrian refugees referred to in this paper are those under temporary protection, as this group constitutes the majority of Syrians in Turkey, and publicly available data for other groups is not available. Although the Syrians in Turkey, who are the focus of this article, do not have official refugee status, I use the term "refugee" (or migrant) for these Syrians throughout the article for simplicity.

[3]See https://data.unhcr.org/en/situations/syria

This assumption requires that, in the absence of the treatment, the treatment and control groups (provinces affected by the refugee influx and non-affected provinces) would have shown similar trends over time. Secondly, the endogeneity issue poses another significant concern that could undermine the validity of the empirical analysis. There is a possibility that the provinces where Syrian refugees have settled were selected by the refugees based on economic opportunities. This potential issue could lead to biased estimation results. To address these concerns, this study includes 5 region[4] and NUTS1(12 region)-year interaction terms in the estimations to relax the common/parallel trend assumption, and employs an instrumental variable that relies on an exogenous distance variable[5].

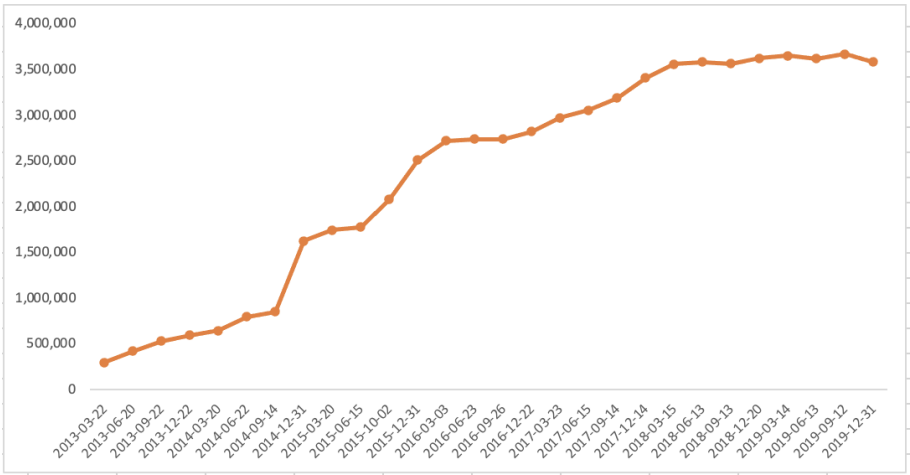

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Figure 1: Syrian Refugee Numbers by Year

Note: The information is sourced from the UNHCR (2020). See https://www.unhcr.org/data.html

The OLS estimation[6] indicates the positive effect of the refugee shock in the short, medium, and long run. However, statistical significance is only observed in the medium term. On the other hand, when employing 2SLS estimations using the same specifications, the results differ. The estimates are unclear in the short term, positive in the medium term, and negative in the long term. Notably, none of the 2SLS estimates are statistically

[4]I borrow this 5 region argument from Aygün et al. (2020) and these 5 regions are namely Central (comprising of NUTS-1 regions 5 and 7), East (comprising of NUTS-1 regions 10 to 12), West (consisting of NUTS-1 regions 1 to 4), North (made up of NUTS-1 regions 8 and 9), and South (which includes NUTS-1 region 6).

[5]Detailed explanations on the potential issues related the empirical analysis and how I address these are given in Section 3.

[6]I refer to the OLS estimations with the preferred specification, the results in Column 3 of Table 2, which control for the year, province fixed effects, province-specific controls, and the 5 region-year interaction term.

significant. Since the difference between the 2SLS and OLS estimates indicates the presence of endogeneity in the settlement patterns of refugees across provinces, the results obtained from 2SLS are the preferred ones. From the results, we observe an intricate scenario wherein the negative and positive effects of refugees are intertwined. One potential explanation for the negative estimates could be the demographics of Syrians in Turkey. They are, on average, less educated than the native population[7]. Additionally, Syrian refugees have a substantial proportion (70.9%)[8] of women and children, who are predominantly dependent and unable to participate in the workforce. These factors may lead to a decline in the GDP-per-capita level in provinces where refugees settle. However, there are also potential explanations for the positive estimates. For instance, refugees can stimulate trade and investment by creating new business opportunities and increasing the demand for goods and services. Additionally, they can contribute to the labor force and attract humanitarian aid and investments, which can provide funding for essential services and infrastructure development in the host country. Overall, we see the multifaceted impact of accommodating refugees on the Turkish economy.

This study contributes to the increasing body of literature on the impacts of massive refugee shocks on host economies. To the best of my knowledge, this study is one of the first to explore the short-, medium-, and long-term impact of refugees on per-capita GDP using a difference-in-differences IV methodology. While the impact of refugees on a host country's GDP per capita is typically considered a macro issue, this study adopts a novel approach by examining the impact from a less macro perspective using variations in per capita GDP and refugee proportions across Turkish provinces over time. Exploring this relationship is particularly important now since the refugee crisis is a global issue and an ongoing phenomenon[9], concerning not only neighboring countries but also other countries, especially those in Europe since better labor market opportunities and higher living standards make Europe more attractive for refugees. Therefore, a better understanding of the effect of refugees on the host country would help to initiate better solutions regarding their integration and settlement.

This study complements several bodies of literature. First, this study adds to the growing body of literature examining the impact of migrants on the GDP per capita of the host country. While some studies indicate a positive effect of immigration on economic growth,

[7]For more detailed information on the demographics of Syrians in Turkey, refer to Section 2.

[8]See https://multeciler.org.tr/turkiyedeki-suriyeli-sayisi/

[9]Following the Syrian refugee crisis, a new refugee crisis has emerged with Russia's invasion of Ukraine, which gives us the signals that the refugee crisis will continue in the future.

others report either no causal effect or a negative effect. For example, Morley (2006) utilizes data from the United States, Canada, and Australia from 1930 to 2002 to examine this relationship and finds that while there is a causal relationship running from per capita GDP to immigration, the reverse does not true. Similarly, Boubtane et al. (2013) conduct a study on 22 OECD countries using annual data from 1980 to 2005 and reveal that immigration does not cause growth, rather growth has a positive influence on immigration. On the other hand, several empirical studies find evidence of the positive impact of immigration on GDP per capita. Kane and Rutledge (2018) use the fifty US states with similar institutional frameworks that experienced different rises in immigration since 1980 to evaluate the effect of immigration on per capita GDP and find a positive relationship between immigration and economic growth. Likewise, Feridun et al. (2005) employ the Granger causality test to explore the causal link between economic development and immigration in Norway, finding a positive effect of immigration on per capita GDP. Felbermayr et al. (2010) also utilize the IV approach of Jeffrey and Romer (1999) on a sample of countries to demonstrate a non-negative causal effect of immigration on per capita GDP in the host nation. Despite these studies conducted in developed economies, research is limited on the impact of refugees on per capita GDP in developing economies.

This paper also adds to the existing literature on the economic effects of Syrian refugees in neighboring countries. One of the studies in this literature examines the impact of Syrian refugees on Jordan and finds a negative effect on the country's economic growth (Alshoubaki, 2017). Another study investigating the effect of refugees on the overall economy in Lebanon shows that the large influx of Syrian refugees has a negative impact (ILO, 2014). In Turkey, although there are studies examining the impact of Syrians on a variety of topics like labor market outcomes (Del Carpio and Wagner, 2015; Tumen, 2016; Bahcekapili and Cetin, 2015; Ceritoglu et al., 2017; Aksu et al., 2022; Akgündüz et al., 2015), inflation (Bahcekapili and Cetin, 2015), prices (Akgündüz et al., 2015; Balkan and Tumen, 2016) and firm's economic performance (Altındağ et al., 2020), there is no research on the effect of refugees on per capita GDP[10]. Therefore, this study aims to address the void in the current literature regarding the economic effects of Syrian refugees in neighboring nations, thereby supplementing the existing body of research.

The rest of the paper's structure is organized as follows: Section 2 provides contextual

[10]Except these studies, Vural (2020) measures the impact of Syrian refugees on macroeconomic variables which are unemployment, inflation, and production.

information, Section 3 describes the data and presents the identification and estimation methods. Section 4 presents the primary results and sensitivity analyses, and Section 5 provides a discussion and conclusion.

2 Contextual Information

The Syrian uprising in 2011 initially started as a protest against Bashar al-Assad's regime; however, it rapidly escalated into a devastating civil war. This conflict caused immense destruction across the country and forced millions of Syrians to abandon their homes. Consequently, more than 6.1 million Syrians were internally displaced, while an additional 5.6 million sought refuge in other countries, making it one of the most significant refugee crises in recent history[11]. According to the United Nations, Syria's neighboring countries were hosting 5,600,039 registered Syrian refugees in April 2021, with Turkey serving as the top hosting country with over 3.65 million Syrians[12].

In April 2011, the first group of Syrian refugees started arriving in Turkey when the Turkish government was still maintaining diplomatic relations with the Syrian government. However, when the Syrian government began committing atrocities against civilians, the relationship between the two governments quickly deteriorated. From the outset of the Syrian war, Turkey has implemented an "open door" policy, allowing Syrians fleeing the violence to seek refuge in Turkey. However, due to the geographical limitations of the 1951 Geneva Convention[13], which serves as the foundation for refugee laws in Turkey, Syrian refugees who first arrived in Turkey were referred to as "guests" rather than refugees. This classification has two main consequences: firstly, guests are not eligible to seek asylum in another country, limiting their migration prospects, and secondly, guest status allows the Turkish authorities to relocate them without following constitutional procedures, unlike refugee status (Akgündüz et al., 2018)[14]. In October 2014, the Turkish government provided

[11]Since Syria had a population of 22 million before the war, more than half of the population was forcibly displaced due to the Civil War.

[12]See https://data.unhcr.org/en/situations/syria

[13]People who meet the refugee criteria outlined in the 1951 Convention come from a European country of origin.

[14]Although Syrians in Turkey are not refugees in the legal framework, in daily use we call them refugees. Therefore, I use the refugee, migrant, and Syrian interchangeably throughout the article for ease of use.

temporary protection status to Syrians in Turkey, which gives them a clearer legal status[15].

Upon the arrival of Syrians in Turkey, the Turkish government initially tasked the Turkish Disaster and Emergency Management Presidency (TDEMA) with the duty of providing immediate humanitarian aid and setting up refugee camps. As a result, 21 camps were set up in 10 provinces. However, the number of refugees grew, as depicted in Figure 1, causing them to move from camps to cities[16]. As they move out of camps, finding work becomes crucial for sustaining their lives. Consequently, many Syrians started seeking work opportunities in the informal sector. In response to this trend, the Turkish government passed the enactment of Law 8375 on January 15, 2016, granting Syrians under Temporary Protection the right to work [17]. Although this was a significant attempt at integrating Syrians into the Turkish labor market and providing them with formal employment opportunities, it did not produce the expected results, and the number of officially employed refugees remained low. As Caro (2020) reported, out of 813,000 Syrian refugees who were employed in 2017, 97 percent worked informally[18]. Since the majority of Syrian refugees work informally as cheap labor, they are, on average, poorer than natives[19]. Moreover, their demographic characteristics are also different than natives in several ways. Firstly, Syrians are younger, with a lower median age of 21 years old, in comparison to natives who have a median age of 31 years old (Eryurt, 2017). Secondly, there is a notable disparity in education levels between Syrians and natives. Among Syrians, 29.2% have received less than primary school education, while

[15]Temporary protection is a response by governments to address the influx of people seeking protection in a country. This measure is used when it becomes challenging to review each individual's situation during high volumes of arrivals. To meet the criteria of temporary protection, governments should undertake three key actions. Firstly, they should adopt an open-door policy, allowing entry to individuals seeking protection. Secondly, they should refrain from returning these individuals to their countries of origin, adhering to the principle of non-return. Lastly, they should ensure that these individuals have access to essential needs such as housing, food, and medical assistance. This guarantees their protection and upholds their basic human rights. This legal framework also grants them the opportunity to access public health services, educational facilities, and social protection.

[16]In 2013, recognizing that TDEMA would be unable to handle the growing influx of refugees, the Turkish government founded the General Directorate of Migration Management (TDGMM) which is responsible for registering and coordinating activities related to refugees.

[17]According to this law, Syrians who have been registered in Turkey for a minimum of 6 months are allowed to work in a workplace at a ratio of one Syrian to ten Turkish employees, depending on the employer's request, and provided that the Syrians earn at least the minimum wage (Erdogan, 2014).

[18]This fact implies that even though these refugees are actively contributing to the economy through informal employment, conventional GDP measurements may not fully account for their contributions. Official labor data for Syrian refugees is not available, but Aksu et al. (2022) show that approximately 50% of working-age refugees are part of the labor force, with a 30-40% employment rate based on survey findings.

[19]Dayıoğlu et al. (2021) show that 79 percent of Syrian households belong to the lowest quintile in the wealth index, which they created, encompassing both natives and refugees, utilizing 21 household assets.

only 10.9% of natives fall into this category. Similarly, university graduates make up only 9.9% of Syrians compared to 16.5% of natives[20]. Additionally, Syrian families tend to be larger, with an average family size of 5.8, whereas natives have an average family size of 3.35 in 2019[21]. Given these demographic disparities and their potential influence on GDP per capita, it is reasonable to think that the arrival of Syrian refugees to Turkey could have an impact on the country's per capita GDP.

Turkey became a refuge for many Syrians fleeing the civil war due to its convenient transportation links, making it an attractive transit point. For many, Turkey was just a temporary stop, and they hoped to move on to Europe for better living conditions and employment prospects. Some achieved this goal through irregular migration. To address the challenges posed by irregular migration to Europe and assist Turkey in dealing with the refugee crisis, the European Union (EU) agreed with Turkey to provide financial aid[22] to refugees. The agreement was summarized by the Commissioner for Neighbourhood Policy and Enlargement Negotiation, Johannes Hahn, as "Turkey now hosts one of the world's largest refugee communities and has committed to significantly reducing the numbers of migrants crossing into the EU. The facility for refugees in Turkey will go straight to the refugees, providing them with education, health, and food." (European Commission, 2016)[23]. As a result of this agreement, the EU founded the Emergency Social Safety Net (ESSN), regarded as one of the biggest humanitarian initiatives in EU history. The program is run in collaboration with the Turkish Red Crescent Society, the International Federation of Red Cross and Red Crescent Societies (IFRC) to provide financial aid to Syrian refugees residing in Turkey until mid-2023[24]. This is one of the most significant humanitarian aid attracted to Turkey by the influx of Syrian refugees. However, Syrians' presence in Turkey has not

[20]The data regarding Turkish citizens is sourced from the 2015 Turkish Household Labor Force Survey, whereas information on Syrians obtained from a survey conducted in December 2015 by the Disaster and Management Authority of Turkey and the World Health Organization (WHO).

[21]It is widely acknowledged that large family size and high fertility are linked to poverty (Barro, 1991, 1996; Bank, 2010). The data for natives is obtained from TURKSTAT (2019), while data for Syrians is sourced from the Turkish Red Crescent and World Food Programme (2019).

[22]The financial support provided to households is substantial. As per the calculations by Aygün et al. (2020), the monthly payment for an average household comprising six members amounted to 36% of the average monthly consumption expenses for refugee households in 2018. It is important to note that eligibility for ESSN benefits is forfeited if household members secure formal employment.

[23]See https://ec.europa.eu/commission/presscorner/detail/it/IP_16_225

[24]In July 2023, the programme handed over to the EU's Directorate-General for Neighbourhood and Enlargement Negotiation. A new EU initiative named Social Safety Net (SNN) will still provide aid to refugees in Turkey.

been without its challenges since it has also resulted in significant costs for the Turkish government. President Erdogan reported that the Turkish government spent $37 billion on Syrian refugees until 2019[25]. These together highlight the multifaceted impact of the refugees on the country's economy. Hence, conducting a comprehensive empirical analysis is necessary to gain a thorough understanding of the impacts of refugees on the Turkish economy.

3 Data and Empirical Method

3.1 Data

This study uses provincial GDP per capita data in 2009 prices sourced from the Turkish Statistical Institute (TurkStat), which calculates GDP using the "production approach[26]". The dataset is a province-level panel design, spanning from 2006 to 2019, except for the year 2012[27]. The dataset consists of 1,053 observations spanning 13 years across 81 provinces. Data on Syrian refugees in Turkey come from various sources. The Disaster and Emergency Management Presidency of Turkey (AFAD) reports the number of refugees for 2013, and data for 2014 is sourced from Erdogan (2014). The Directorate General of Migration Management, which operates under the Ministry of Interior, provided information on the number of Syrian refugees from 2015 to 2019. To calculate the proportion of Syrian refugees in each province across time, I use these refugee numbers and provincial citizen numbers obtained from TurkStat.

I also utilize supplementary datasets at the province level to create control variables from 2008 to 2019[28]. TurkStat (2021a) provides data on the population categorized by age, which I use to create five age groups, namely 15-24, 25-34, 35-44, 46-54, and 55-64. To construct education categories, I rely on data from TurkStat (2021b) that pertains to the education levels attained by individuals who are 15 years old or older. These education categories include (i) individuals who cannot read or write, (ii) those who can read and write

[25] See http://www.kamubulteni.com/turkiye/cumhurbaskani-erdogan-suriyeliler-icin-37-milyar-dolar-harcadik-h11496.html

[26] Appendix C explains the production approach used by TurkStat.

[27] Provincial data on the Syrian refugee number for 2012 is unavailable and therefore excluded from the analysis.

[28] Data on province-level control variables is unavailable for 2006 and 2007.

but do not hold a diploma, (iii) graduates of primary school or equivalent, (iv) graduates of junior high school, vocational school, or equivalent, (v) graduates of high school or equivalent vocational schools, and (vi) graduates of university or higher education institutions. I also use information on the age dependency ratio (TurkStat, 2021c), which is calculated by dividing the number of individuals in the "0-14" and "65 and over" age groups by the number of individuals in the "15-65" age group, and average household size (TurkStat, 2021d). Lastly, I obtain data on the share of the three GDP sectors: services, industry, and agriculture, from TurkStat (2021e), which represent the distribution of these sectors in the economy[29].

Table 1 presents the descriptive statistics for the dependent and control variables. The average GDP per capita across provinces and years is approximately 20,000, with a significant variation from 3,406 to 86,723[30]. The control variables also demonstrate significant variation among provinces, indicating socioeconomic disparities across Turkey's provinces. Therefore, it is important to consider these variables in the regression analysis.

Figure 2 displays the density of Syrian refugees in provinces of Turkey from 2013 to 2019. The darkness of the shade increases as the refugee concentration goes up. Initially, Syrian refugees were mainly located near the Syrian border as the government set up camps there. Later, they spread out to other provinces, especially industrialized ones such as Istanbul, Bursa, Izmir, and Kocaeli. However, even in 2019, the concentration of refugees is highest in regions near the Syrian border. That may be because they prefer to stay close to their family members who still reside in those areas [31].

3.2 Empirical Method

To evaluate the effect of Syrian refugees on per-capita GDP in Turkey, this study employs a difference-in-differences (DID) approach. Specifically, the comparison is made between provinces with a high concentration of refugees and those with a low concentration of refugees

[29]It is important to emphasize that none of these datasets contain refugee observation.

[30]In addition to the default GDP per capita (GDP/number of citizens), an alternative measure, GDP per capita*, is provided. This measure additionally considers the population of registered refugees in each province. To calculate GDP per capita*, the GDP of a province is divided by the total population, including refugees and citizens. The average value of this measure across provinces and years is approximately 19,000, with a significant variation between 2,900 and 82,632. Appendix E presents the estimation results using this alternative outcome variable, and Section 5 gives the reason for using this alternative outcome variable.

[31]Additionally, Table B1 provides the refugee shares, which represent the proportion of refugees to the total population (refugees + citizens), for the provinces where the share exceeds 5%.

Table 1: Descriptive Statistics

	Mean	SD	Min.	Max.	No Obs.
Dependent Variables					
GDP percapita	19725	12414	3406	86723	1053
GDP percapita*	19326	12150	2900	82633	1053
Control Variables					
Age Dependenty Ratio*100	51.69	10.37	35.93	93.69	972
Average Household Size	3.85	1.07	2.60	8.40	891
Shares of Sectors in GDP					
Agriculture	0.17	0.09	0.00	0.47	972
Industry	0.27	0.11	0.05	0.62	972
Services	0.56	0.09	0.34	0.81	972
Shares of Education Groups					
Illiterate	0.07	0.05	0.01	0.31	891
No degree	0.07	0.04	0.02	0.24	891
Primary School	0.44	0.08	0.14	0.61	891
Middle School	0.09	0.05	0.01	0.34	891
High School	0.21	0.04	0.11	0.32	891
University	0.11	0.04	0.02	0.28	891
Shares of Age Groups					
Age: 15-24	0.26	0.05	0.18	0.44	891
Age: 25-34	0.23	0.03	0.18	0.30	891
Age: 35-44	0.20	0.02	0.13	0.25	891
Age: 45-54	0.17	0.03	0.08	0.22	891
Age: 55-64	0.13	0.04	0.05	0.22	891

Note: The dataset comprises data on dependent variables for 81 Turkish provinces from 2006 to 2019, except for 2012. In addition, it includes information on control variables for the years 2008 to 2019, excluding 2012. GDP per capita* is the constructed variable by adding the province-level Syrian refugee numbers to the denominator. The default GDP per capita obtained from TURKSTAT divides the GDP by the number of citizens. The data of control variables come from the Turkish Household Labor Force Surveys (THLFS). The target population of THLFS is the registered residents of Turkey.

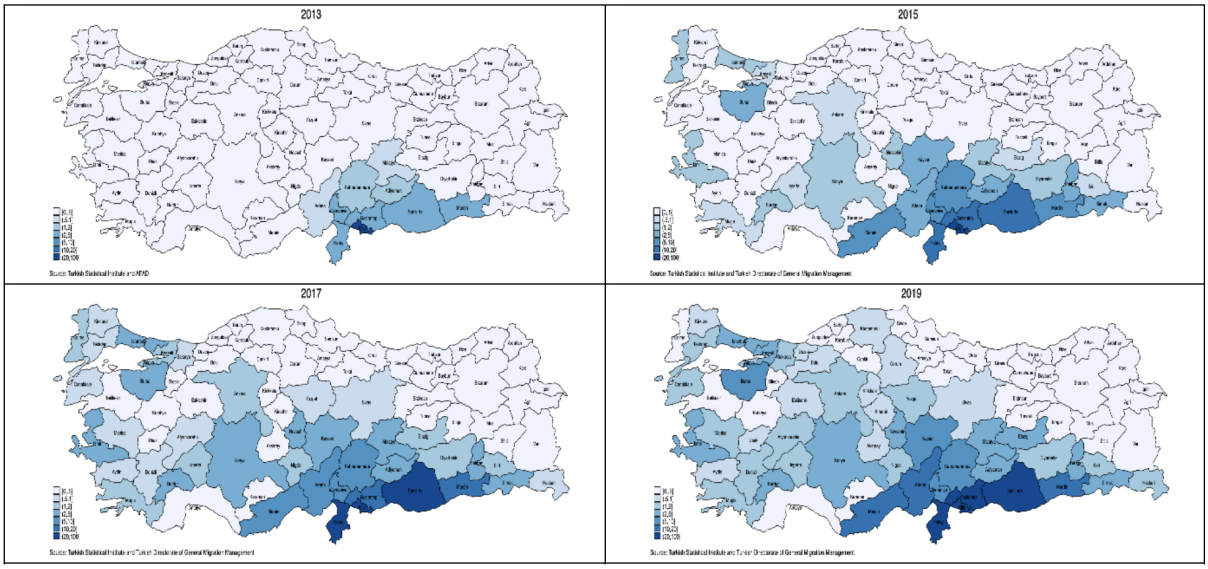

Figure 2: Syrian Refugee Densities in Turkey across Provinces by Year

Note: The data for the number of Syrians in 2013 is obtained from the Disaster and Emergency Management Presidency of Turkey (AFAD), whereas the data for 2015 to 2019 are provided by the Ministry of Interior Directorate General of Migration Management. The percentage of Syrian refugees in each province over time is calculated using the number of Syrians at the provincial level and the provincial population obtained from TurkStat.

prior to and following the refugees' arrival. The estimating equation utilized in this study is as follows:

$$\text{GDPpercapita}_{p,t} = \alpha + \beta \text{R}_{\text{p,t}} + X'\theta_{p,t} + \mu_p + \tau_t + \gamma_{p,t} + \epsilon_{p,t} \tag{1}$$

where $\text{GDPpercapita}_{\text{p,t}}$ denotes the per-capita GDP in province p during year t. $\text{R}_{\text{p,t}}$ represents the proportion of refugees relative to the overall population (refugees + citizens) in province p at time t. Additional province-level characteristics at time t are denoted by X, which are presented in Table 1. μ_p and τ_t are the fixed effects for province and year, respectively. To address regional variations in pre-existing trends, fixed effects for region-year interactions $\gamma_{p,t}$ are introduced, allowing time effects to differ across regions. These fixed effects for interactions comprise (i) five regions with years and (ii) NUTS1(12) regions with years. Finally, the error term is represented by $\epsilon_{p,t}$, and the intercept term is denoted by α. The primary focus of this equation is the parameter β, which quantifies the change in per-capita GDP resulting from variation in the percentage of Syrian refugees in province p during year t [32].

This analysis derives identification from the variation in refugee shares across 81 Turkish provinces. The key identifying assumption for the internal validity of the DID method to estimate the causal effect of refugee density on per capita GDP is the parallel/common trend assumption. This assumption requires that the distinction between the outcomes of the treatment and control groups remains constant over time in the absence of treatment. Specifically, for this study, one needs to ensure that there are similar trends in per capita GDP between the treatment group (provinces with high refugee intensity) and the control group (provinces with low refugee intensity) before the arrival of refugees. However, fulfilling this assumption can be very challenging (Angrist and Pischke, 2014). To relax this assumption, I incorporate year-region interaction terms in the model, as suggested by Stephens Jr and Yang (2014) and Aksu et al. (2022), to account for potential variations in per-capita GDP trends among different regions.

The validity of this empirical strategy is also threatened by the self-selection issue. This problem arises because refugees might choose their settlement locations based on economic

[32]The primary variable of interest in this study is $\text{R}_{\text{p,t}}$. Its value is null before 2013 because of the unavailability of provincial data for the number of Syrians in 2012, and the figures before that year are insignificant. Consequently, I categorize the years preceding 2012 as pre-treatment years and the years from 2013 to 2019 as treatment.

factors linked to the per capita GDP of the provinces. As a result, the estimates obtained from this approach may be biased. Tumen (2016) identifies the influx of Syrian refugees to Turkey as a natural experiment, as their movement was sudden and mainly driven by the conflicts in Syria, which were beyond their control. At the outset of their arrival, by placing them in camps, the Turkish government made their initial settlement mainly exogenous. Therefore, Tumen (2016) was able to leverage this forced immigration as a natural experiment to evaluate the short-term economic effects of refugees. Even though refugees have been in Turkey for a significant duration and they had chances to relocate to other areas, a high density remains in the border regions as shown in Figure 2[33]. This suggests that the main factor influencing their settlement patterns is the distance from the borders. Therefore, I employ an instrumental variable that relies on an exogenous distance factor to address the potential self-selection issue. The instrument for the refugee number in province p and year t is defined as follows:

$$I_{p,t} = \sum_{s=1}^{13} \frac{(\frac{1}{d_{s,T}})\pi_s}{(\frac{1}{d_{s,T}} + \frac{1}{d_{s,L}} + \frac{1}{d_{s,J}} + \frac{1}{d_{s,I}})} \frac{T_t}{d_{p,s}}, \tag{2}$$

where $I_{p,t}$ is the instrumental variable representing the expected refugee numbers at time t in province p. The distance between Syrian provinces and the nearest border crossing points in Turkey, Iraq, Jordan, and Lebanon are denoted by $d_{s,T}$, $d_{s,L}$, $d_{s,J}$, and $d_{s,I}$, respectively. π_s refers to the proportion of the population residing in Syrian province s before the war, whereas $d_{p,s}$ represents the distance between Turkish province p and Syrian province s. Additionally, T_t denotes the total Syrian refugee number in the four neighboring countries. Basically, this formula involves two stages of distribution. Firstly, it uses the pre-war population shares of Syrian provinces to allocate the total number of Syrian refugees among the four neighboring countries at time t based on their proximity to these Syrian provinces. In the second stage, it distributes the total number of Syrians in Turkey at time t to Turkish provinces, taking into account their proximity to Syrian provinces.

Many other studies, such as Kırdar et al. (2022), Aksu et al. (2022), Akgündüz et al. (2018), and Aygün et al. (2020), have utilized this distance-based instrument, which is an

[33]This is because the border area serves as the entry point for refugees, where they are immediately placed in camps upon arrival. As the government perceived their stay as temporary, the camps were located near the border. Despite their departure from these camps, a significant number of refugees decided to remain in the provinces that were in close proximity to their original place of residence, possibly because they still have family members residing in those areas in Syria or because the Turkish government requires that Syrian refugees utilize education and health services in the province where they are officially registered.

updated version of the instrument developed by (Del Carpio and Wagner, 2015). The del Carpio-Wagner instrument distributes the Syrian refugee population in Turkey to Turkish provinces based on the distance between Turkish and Syrian provinces, as well as the population proportions of Syrian provinces before the war[34]. The instrument I employ additionally takes into account the distance between Syrian provinces and neighboring countries of Syria, including Iraq, Lebanon, and Jordan, as Syrians also fled to these countries[35].

The validity of this instrument depends on the assumption that the trends in GDP per capita, are independent of the distance-based instrument, after accounting for the province and year-fixed effects and province-specific controls, in the absence of refugees' arrival. If there is a relationship between the instrument and the unobserved fluctuations in economic conditions, then this assumption cannot hold. However, the instrument depends on a weaker independence assumption when I include time-region interaction in the regression analysis. Through these interactions, I assume that the distance does not correlate with the unobserved variations in GDP per capita within the given region of the country.

4 Results

This section conveys the findings of the empirical investigation of the impact of the refugee shock on GDP per capita. Subsection 4.1 provides the findings of the OLS and 2SLS estimations in Table 2 and Table 3, respectively. Subsection 4.2 reports the results of placebo tests. Subsection 4.3 presents a variety of robustness checks. Here, I firstly reproduce the main results employing the instrument of del Carpio and Wagner. Next, I use alternative specifications for the key variable of interest, namely the lagged values, and the dummy treatment. Lastly, I evaluate the robustness of the results by examining their sensitivity to different regional constraints.

4.1 Main Results

This section provides estimates of the effect of Syrian refugee inflow on the level of economic development, proxied by GDP per capita. Tables 2 and 3 show the findings of the OLS

[34]To obtain further details regarding this instrument, see Del Carpio and Wagner (2015).

[35]For more information on this instrument, see Kırdar et al. (2022), Aksu et al. (2022), Akgündüz et al. (2018), or Aygün et al. (2020).

and 2SLS estimations, respectively, with three panels in each table. Panels A, B, and C present the short-, medium-, and long-term effects of the shock on GDP per capita from 2006 to 2015, 2006 to 2017, and 2006 to 2019 (excluding 2012), respectively[36]. The tables exhibit four distinct specifications, with column 1 accounting for the province and year-fixed effects and column 2 incorporating further controls for province-specific variables, including age categories, education categories, household size, age dependency ratio and GDP sector shares. In column 3, fixed effects for 5 region-year interactions are added, while column 4 includes fixed effects for NUTS1-year interactions.

Table 2 Panel A shows mixed short-term (S-T) OLS results, with the negative estimate in the first column and positive estimates in the remaining columns. Quantitatively, for instance, column 3[37], which controls fixed effects for the province and year, province-specific controls, and 5 region-year fixed effects, indicates that a 10-point increase in the proportion of refugees in the population increases the GDP per capita by 396 from the baseline level of 14,171. However, this increase ($\sim 2.8\%$) is not statistically significant. Panel B presents the medium-term (M-T) results, where the coefficients of the GDP per capita across all specifications are almost identical to those in Panel A. The only difference emerges in column 3, where we observe positive and statistically significant estimates. The long-term (L-T) estimates in Panel C also exhibit mixed results. However, it is worth noting that in the preferred specifications, the estimates appear to be positive, although they are not statistically significant. In short, the OLS estimations, using the preferred specifications, indicate an overall positive effect of the refugee shock. However, statistical significance is observed for both of the preferred specifications only in the medium term.

[36]There are several reasons behind these thresholds. The threshold for the short-term impact is set at 2015 because Turkey witnessed a 33 percent nominal rise in the minimum wage in 2016, which made it challenging to establish new firms and sustain existing ones, resulting in a reduction in the number of registered firms in the economy (Bossavie et al., 2019). For the medium term, the threshold is set at 2017 due to the increasing currency fluctuations that began in 2018.

[37]It is one of the preferred specifications since it passes the placebo tests along with the specification in column 4. See the subsection 4.2 for detail.

Table 2: Refugee Shock on GDP per Capita, OLS

Panel A: The Short-Term Effect of the Migrant Shock on GDP per Capita (Until 2015), OLS					
Dependent Variable	(1)	(2)	(3)	(4)	Mean
GDP percapita	-9,977.38*	2,048.46	3,956.71	7,025.52**	14,171.14
	(5,592.27)	(1,950.64)	(3,332.78)	(2,690.62)	
Observations	729	567	567	567	
Panel B: The Medium-Term Effect (Until 2017)					
GDP percapita	-9,648.46*	3,199.48	6,431.03**	7,645.26***	16,557.91
	(5,023.62)	(2,662.97)	(3,176.90)	(2,682.83)	
Observations	891	729	729	729	
Panel C: The Long-Term Effect (Until 2019)					
GDP percapita	-11,846.56*	-5,254.70	6,421.27	5,874.26	19,724.78
	(6,253.06)	(4,821.39)	(5,323.99)	(3,768.09)	
Observations	1,053	891	891	891	
Controls					
Year Fixed Effects	Yes	Yes	Yes	Yes	
Province Fixed Effects	Yes	Yes	Yes	Yes	
Province-specific Controls	No	Yes	Yes	Yes	
5 Region-Year Fixed Effects	No	No	Yes	No	
NUTS1-Year Fixed Effects	No	No	No	Yes	

Note: The dataset consists of 81 Turkish provinces from 2006 to 2015 (except 2012) in Panel A, 2006 to 2017 (except 2012) in Panel B, and 2006 to 2019 (except 2012) in Panel C. Each cell presents the OLS regression estimates for the proportion of refugees to the population with different specifications. The first column provides the results of the regressions controlling for year and province-fixed effects. The second column additionally controls for province-specific variables, which are age and education groups, age dependency ratio, average household size, and GDP sector shares (services, industry, and agriculture). Due to the unavailability of data for the years 2006 and 2007, the inclusion of province-specific controls results in a reduced number of observations. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table 3 offers the 2SLS counterpart of the OLS results, which display noteworthy differences from the corresponding OLS findings. For example, column 3 gives that the 2SLS coefficient for GDP per capita is negative but not statistically significant at conventional levels in the S-T and L-T. Quantitatively, the GDP per capita coefficient shows that a 10-point increase in the percentage of refugees in the population reduces GDP per capita by 71 from a baseline level of 14,171 in the S-T, indicating a 0.5 percent drop. Similarly, in the L-T, the GDP per capita falls by 671 from a baseline level of 19,725, implying a 3.4 percent decline. In the M-T, column 3 provides positive, but not statistically significant estimates. Column 4, which also passes the placebo tests, aligns with the results in column 3 for M-T and L-T. However, it differs from column 3 regarding S-T outcomes, displaying positive estimates in contrast to those in column 3. In conclusion, using the preferred specifications, 2SLS estimates indicate that the refugee shock has an unclear impact in S-T, a positive impact in the M-T, and a negative impact in the L-T. However, these estimates lack

statistical significance[38].

Table 3: Refugee Shock on GDP per Capita, 2SLS

Panel A: The Short-Term Effect of the Migrant Shock on GDP per Capita (Until 2015), 2SLS					
Dependent Variable	(1)	(2)	(3)	(4)	Mean
GDP percapita	-24,460.562*	-6,738.095	-713.887	2,067.712	14,171.14
	(12,835.134)	(6,343.547)	(5,416.576)	(5,209.866)	
First-stage regression	3.015***	3.121***	3.059***	3.232***	
	(0.795)	(0.856)	(0.915)	(0.888)	
Partial R-squared	0.697	0.662	0.626	0.683	
Observations	729	567	567	567	
Panel B: The Medium-Term Effect(Until 2017)					
GDP percapita	-25,007.266**	-7,905.702	1,790.686	1,911.696	16,557.91
	(11,995.852)	(7,470.039)	(4,522.318)	(4,625.292)	
First-stage regression	3.006***	3.112***	3.063***	3.269***	
	(0.946)	(0.984)	(1.023)	(1.002)	
Partial R-squared	0.733	0.685	0.648	0.698	
Observations	891	729	729	729	
Panel C: The Long-Term Effect(Until 2019)					
GDP percapita	-33,969.080**	-26,998.077*	-6,712.651	-6,958.304	19,724.78
	(15,049.297)	(14,235.890)	(8,543.619)	(8,203.186)	
First-stage regression	2.898***	2.908***	2.867***	3.032***	
	(0.670)	(0.687)	(0.764)	(0.733)	
Partial R-squared	0.747	0.704	0.646	0.700	
Observations	1,053	891	891	891	
Controls					
Year Fixed Effects	Yes	Yes	Yes	Yes	
Province Fixed Effects	Yes	Yes	Yes	Yes	
Province-specific Controls	No	Yes	Yes	Yes	
5 Region-Year Fixed Effects	No	No	Yes	No	
NUTS1-Year Fixed Effects	No	No	No	Yes	

Notes: The dataset includes 81 Turkish provinces from 2006 to 2015 (except 2012) in Panel A, 2006 to 2017 (except 2012) in Panel B, and 2006 to 2019 (except 2012) in Panel C. Each cell presents the 2SLS regression estimates for the proportion of refugees to population with different specifications. The instrument relies on multiple factors, including the combined count of Syrian refugees in Turkey, Iraq, Jordan, and Lebanon in each year. Additionally, it considers the pre-war population distribution of Syrian provinces, the proximity of each province to the nearest border crossing of neighboring countries, and the distance between each Syrian province and each Turkish province. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables, which are age and education groups, age dependency ratio, average household size, and GDP sector shares (services, industry, and agriculture). Due to the unavailability of data for the years 2006 and 2007, the inclusion of province-specific controls results in a reduced number of observations. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Lastly, it is worth addressing a potential concern regarding the cumulative nature of the long-term and medium-term regression analyses. Specifically, why do these analyses incorporate all available data up to a specific year? To investigate this matter and assess

[38]It is important to highlight that the first-stage regression results are critical for the 2SLS approach. In each panel's bottom section, the coefficients of the instrument in the first stage are statistically significant at the 1% level in all specifications, with each of them showing a high partial R-squared of around 0.7. These results support the validity of the instrument used in the 2SLS estimations.

how results may differ with a noncumulative approach, I carry out an additional analysis of the medium-term and long-term scenarios. In this analysis, I exclusively employ data from 2016 and 2017 as the treatment years for the medium-term assessment and data from 2018 and 2019 for the long-term evaluation. The results stemming from this noncumulative approach, presented in Table D1, are in accordance with the primary findings in Table 3 with regard to statistical significance. However, the coefficients exhibit a larger magnitude in absolute terms

4.2 Placebo Results

This subsection presents the findings of placebo regressions in Table 4. Panel A provides estimates based on the assumption that Syrians in 2019 came in 2011. In particular, I restrict the sample to 2006-2011 and run 2SLS, after assigning 2019 values of the instrumental variable and the refugee share to corresponding values in 2011. Since there are no statistically significant coefficients in columns 3 and 4, these specifications support the main identification assumption of this study—the instrument is uncorrelated with unobserved shocks in GDP per capita. In other words, with placebo regressions, I measure the effect of refugee shock at a time when there should be no effect. Indeed, I observe no effect of refugees on economic development with two specifications: (1) controlling for year, province fixed effect, province-specific controls, and 5-region-year fixed effect; (2) controlling for year, province fixed effect, province-specific controls, and NUTS1-year fixed effect. To check the sensitivity of the results, I also assume that the refugees in 2017 and 2015 arrived in 2011, in panels B and C of Table 4, respectively. Consistent with panel A, Columns 3 and 4 do not exhibit any unobserved pre-shock trends in economic development in panels B and C. Hence, the preferred specifications for all results are columns 3 and 4 across all tables.

Table 4: Placebo Regressions on Refugee Impact on Economic Development, 2SLS Estimates

	(1)	(2)	(3)	(4)
Panel A: Instrument of 2019 are Assigned to 2011				
GDP percapita	-8,776.85***	-4,952.03**	-1,969.40	-1,846.26
	(2,431.81)	(2,116.81)	(1,740.75)	(1,547.40)
Panel B: Instrument of 2017 are Assigned to 2011				
GDP percapita	-8,970.55***	-5,059.33**	-1,984.60	-1,864.88
	(2,718.88)	(2,282.52)	(1,780.32)	(1,594.10)
Panel C: Instrument of 2015 are Assigned to 2011				
GDP percapita	-10,757.94***	-6,099.70**	-2,358.49	-2,201.00
	(3,607.18)	(2,935.14)	(2,174.01)	(1,931.35)
Observations	486	324	324	324
Controls				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
NUTS1-Year Fixed Effects	No	No	No	Yes

Note: The dataset consists of 81 Turkish provinces from 2006 to 2011(before the arrival of Syrians) for dependent variable, and from 2008 to 2011 for control variables. For the placebo analysis, the key variable of interest, which is the proportion of refugees to the overall population (refugees+citizens), and instrumental variable values for 2019, 2017, and 2015 are assigned to the related values for 2011 in Panel A, Panel B, and Panel C, respectively. The instrumental variable and the key variable of interest are valued at zero for the duration of 2006-2010. Each cell presents the 2SLS regression estimates for the proportion of refugees to population, with different specifications. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. The third and fourth columns control for 5-Region-year fixed effects and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

4.3 Robustness Checks

4.3.1 Alternative Instrument

To test the robustness of my findings, I employed an alternative instrument –Del Carpio and Wagner (2015)'s instrument. One main distinction between the instrument employed in this study and that of del Carpio and Wagner pertains to the allocation of refugee numbers. In contrast to their approach, where refugee numbers are exclusively assigned to Turkey, my methodology involves the distribution of the overall refugee population among the four neighboring nations. This approach aligns with several other studies (Kırdar et al., 2022; Aksu et al., 2022; Akgündüz et al., 2018; Aygün et al., 2020). This methodology acknowledges the possibility of endogeneity in the timing and extent of Syrian refugee inflows into Turkey, given that potential refugees have various country options. As elucidated by Aksu et al. (2022), if Syrian refugees had no choice but to seek refuge in Turkey, the population

distribution of Syrian provinces prior to the war and their proximity to the Turkish border would determine the distribution of refugee shares in Turkish provinces. However, since other neighboring countries such as Iraq, Lebanon, and Jordan also received substantial numbers of Syrian refugees, it is important to account for these potential destinations.

Table 5 replicates the results presented in Panel B of Table 3 by employing the del Carpio-Wagner instrument. These replicated results indicate that the utilization of the del Carpio-Wagner instrument does not substantially differ from the main findings. The replicated results show that when using the del Carpio-Wagner instrument, the main findings remain largely consistent. Although there are some changes in the magnitudes of the coefficients, the significance levels and the signs of the coefficients remain the same. Therefore, the conclusions derived from these different instruments align with each other[39].

Table 5: The Impact of Refugees on the Economic Development with an Alternative Instrument

	(1)	(2)	(3)	(4)
GDP percapita	-19,927.41**	-4,466.42	5,244.57	4,372.53
	(9,483.90)	(6,143.83)	(3,985.70)	(3,986.81)
First-stage regression	1.07***	1.04***	1.00***	1.06***
	(0.24)	(0.23)	(0.25)	(0.24)
Partial R-squared	0.751	0.695	0.659	0.694
Observations	891	729	729	729
Controls				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
NUTS1-Year Fixed Effects	No	No	No	Yes

Note: The dataset cover 81 provinces of Turkey over the years 2006 to 2017 (except 2012) for dependent variable; the years 2008 to 2017 (except 2012) for control variables. Each cell shows the estimates for the share of refugees. The 2SLS regression instruments the key variable of interest using the del Carpio-Wagner distance-based instrument. The regressions controls for year, province fixed effects, province specific variables, 5-Region linear time trend and NUTS1-year fixed effects in different columns as shown above. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

4.3.2 Alternative Specifications

Lagged Value of the Key Variable of Interest

It is reasonable to expect that the effect of the refugee shock on economic development may take some time to appear, and expecting an immediate and simultaneous relationship

[39]The analysis encompasses the years 2006 to 2017, excluding 2012, and is thus compared with the results presented in Panel B of Table 3.

between the two may not be realistic. To address this, I utilize lagged values of the key variable of interest in 2SLS regressions as an alternative approach. Table 6 replicates the analysis carried out in Panel C Table 3, but this time using the one-year and two-year lagged values of the main variable of interest in panels A and B, correspondingly.

Panel A and B, whether employing one-lagged or two-lagged values of refugee share, produce comparable results. Furthermore, these estimates exhibit a high similarity (with only slight variations in absolute value) to those presented in Panel C Table 3, thus confirming the main empirical approach.

Table 6: The Impact of Refugees on the Economic Development with Lagged Value of Refugee Ratio: 2SLS Estimates

Panel A: With One-Period Lagged Value of Refugee Share				
	(1)	(2)	(3)	(4)
GDP percapita	-36,468.70**	-29,960.21*	-8,015.78	-8,695.15
	(16,474.72)	(15,627.47)	(9,423.62)	(9,089.54)
Observations	891	810	810	810
Panel B: With Two-Period Lagged Value of Refugee Share				
GDP percapita	-38,732.90**	-33,068.58**	-9,725.87	-11,178.87
	(17,761.71)	(16,738.00)	(10,043.57)	(9,811.09)
Observations	810	810	810	810
Controls				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
NUTS1-Year Fixed Effects	No	No	No	Yes

Note: The dataset covers 81 Turkish provinces from 2006 to 2015 (except 2012) for dependent variable, and from 2008 to 2019 (except 2012) for control variables. Each cell presents the 2SLS regression estimates of the lagged values of the key variable of interest, the proportion of refugees to population with different specifications. The regressions use one-period lagged values and two-period lagged values, and the estimates are presented in Panel A and Panel B, respectively. The instrument relies on multiple factors, including the combined count of Syrian refugees in Turkey, Iraq, Jordan, and Lebanon in each year. Additionally, it considers the pre-war population distribution of Syrian provinces, the proximity of each province to the nearest border crossing of neighboring countries, and the distance between each Syrian province and each Turkish province. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Dummy Treatment for the Key Variable of Interest

In addition to relying on differences in refugee intensity among provinces, I also use a dummy treatment status to examine the sensitivity of the results[40] The rationale behind us-

[40]This alternative definition of the key variable of interest employed by researchers such as Ceritoglu et al. (2017) and Aksu et al. (2022) to evaluate the impacts of migrants on the labor market.

ing this alternative approach is the possibility of measurement issues associated with refugees not residing in the provinces where they are registered, resulting in measurement error in the main variable of interest—the share of refugees. To mitigate the likely impact of such measurement error, I generate a binary variable for the treatment condition that is assigned the value of one if the proportion of refugees exceeds a certain threshold, namely 0.03, 0.05, or 0.08. The estimates of these regressions are presented in Table 7, which replicates the analysis in panel C Table 3 (the long-term effects of the migrant shock on economic development). Although the magnitudes are smaller in absolute terms than those in Table 3, the main findings remain consistent, showing an adverse effect of the migrant shock on GDP per capita that is not statistically significant in the L-T.

Table 7: The Impact of Refugees on the Economic Development with Dummy Treatment Variable: 2SLS Estimates

Panel A: For the Treatment Dummy, Threshold= 0.03				
	(1)	(2)	(3)	(4)
GDP percapita	-7,612.756***	-7,381.495***	-2,994.349	-2,325.300
	(2,199.048)	(2,179.038)	(3,128.593)	(2,324.990)
First-stage regression	12.93***	10.64***	6.43**	9.07***
	(2.19)	(2.00)	(2.50)	(2.23)
Panel B: For the Treatment Dummy, Threshold= 0.05				
GDP percapita	-7,430.208***	-6,520.451***	-1,966.705	-1,972.700
	(2,277.460)	(2,068.926)	(2,212.334)	(2,028.062)
First-stage regression	13.25***	12.04***	9.79***	10.69***
	(1.91)	(1.79	(2.75)	(2.17)
Panel C: For the Treatment Dummy, Threshold= 0.08				
GDP percapita	-9,025.567***	-7,491.206**	-2,200.558	-2,107.670
	(3,270.292)	(3,013.859)	(2,580.319)	(2,253.861)
First-stage regression	10.91***	10.48***	8.75***	10.01***
	(1.17)	(1.22)	(1.86)	(1.33)
Observations	1,053	891	891	891
Controls				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
NUTS1-Year Fixed Effects	No	No	No	Yes

Note: The dataset consists of 81 Turkish provinces from 2006 to 2019 (except 2012) for dependent variable, and from 2008 to 2019 (except 2012) for control variables. Each cell demonstrates the 2SLS regression estimates of the key variable of interest, a treatment dummy taking the value of one when the share of refugees exceeds 0.03 in Panel A (0.05 in Panel B, and 0.08 in Panel C) and zero otherwise) with different specifications. The instrument relies on multiple factors, including the combined count of Syrian refugees in Turkey, Iraq, Jordan, and Lebanon in each year. Additionally, it considers the pre-war population distribution of Syrian provinces, the proximity of each province to the nearest border crossing of neighboring countries, and the distance between each Syrian province and each Turkish province. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

4.3.3 Alternative Regions

Like Aygün et al. (2020), I assess the impact of varying regional restrictions on my results. I implement four distinct constraints: (1) excluding Istanbul (NUTS-1 region 1), the most populous region, (2) excluding the more developed regions (NUTS-1 regions 1-4), (3) only including regions with higher refugee percentages (NUTS-1 regions 6, 10, 11, and 12), and (4) only including the regions with the highest Syrian proportions, namely the Mediterranean and Southeastern regions (NUTS-1 regions 6 and 12)[41]. Table 8 reports the results of these regional restrictions. The findings align with the previous results demonstrating a negative but not statistically significant effect of the refugee shock on GDP per capita in the L-T, as seen in Panel C Table 3.

Table 8: The Impact of Refugees on the Economic Development with Alternative Subsamples, 2SLS Estimates

	A:Excludes Istanbul Region			B: Exclude Western Turkey		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP percapita	-23,369.92*	-6,712.65	-6,526.32	-6,663.93	-2,525.50	-3,388.77
	(12,303.45)	(8,543.62)	(7,643.65)	(5,065.86)	(6,577.87)	(6,436.96)
First-stage regression	2.93***	2.87***	3.03***	3.14***	2.89***	3.07***
	(0.69)	(0.76)	(0.73)	(0.72)	(0.75)	(0.73)
Observations	880	880	880	649	649	649
	C:Includes nuts1= 6,10,11, and 12			D:Includes nuts1= 6 and 12		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP percapita	-1,588.40	-1,310.33	-2,106.85	-6,876.31	-7,018.87	-7,018.87
	(5,785.60)	(6,485.27)	(6,585.01)	(5,142.37)	(6,163.97)	(6,163.97)
First-stage regression	3.00***	2.90***	2.99***	2.81***	2.70***	2.70***
	(0.62)	(0.66)	(0.63)	(0.51)	(0.47)	(0.47)
Observations	352	352	352	187	187	187
Controls						
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province-specific Controls	Yes	Yes	Yes	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
NUTS1-Year Fixed Effects	No	No	Yes	No	No	Yes

Note: Each cell in the table presents the 2SLS regression estimates of the proportion of refugees to population with different specifications. The first (fourth) column provides the results of the regressions controlling for year and province fixed effects, and province-specific variables. The second (fifth) and third (sixth) columns control for 5-Region-year and NUTS1-year fixed effects, respectively. The results are presented in separate panels, each with distinct regional restrictions. In Panel (A), Istanbul (NUTS1 region 1) is excluded, while in Panel (B), western Turkey (NUTS1 regions 1-4) is excluded. On the other hand, Panel (C) involves NUTS1 region 6 (the Mediterranean Region) and NUTS1 regions 10-12 (eastern Turkey), whereas Panel (D) only includes NUTS1 region 6 and NUTS1 region 12.

[41]Information about the share of refugees is presented in Figure 2. I adapted some of these regional constraints from Aygün et al. (2020).

5 Conclusion and Discussion

The influx of Syrian refugees to Turkey has sparked a debate on their economic impact. This study investigates the causal relationship between refugee inflow and economic development in Turkey. Using the spatial distribution of Syrians across Turkish provinces within a difference-in-differences (DID) approach, I estimate the impact of the migrant shock on GDP per capita. The empirical analysis, using 2SLS provides suggestive evidence that the migrant shock decreases GDP per capita in the L-T, increases it in the M-T, and has an unclear influence in the S-T. However, none of these effects are statistically significant.

Data limitations hinder the provision of direct evidence for the underlying mechanism. Nevertheless, several potential explanations can be offered for the results presented. Firstly, the unclear impact of refugee shock in the S-T may stem from conflicting channels. On the one hand, Turkey was unprepared for such a massive influx of Syrian refugees, and hosting them came at a significant cost to Turkey. In general, because they were the victims of forced migration and the Turkish government was taking care of their necessities, they were unable to contribute to the economy immediately. However, their legal framework gives them the right to access public education, healthcare, and social protection. Hence, they may lead to negative economic impacts. But they also draw humanitarian aid and often enter Turkey with some financial resources, which stimulate consumption and trigger a supply response. These channels can represent some of the driving forces behind their effect on the economy, but it is uncertain which channels are more potent in the short term. This observation underscores the complexity of the situation, where risks and opportunities are are intertwined.

One potential explanatory mechanism for the positive impact of the refugee influx in the M-T (until the end of 2017) is humanitarian aid, particularly the ESSN. This initiative, funded by the European Union (EU), offers cash assistance to refugees residing in Turkey. Furthermore, a significant portion of humanitarian aid directed at Syrian refugees in camps and inside Syria is supplied by local Turkish companies, notably in the textile and food sectors, as highlighted by Oytun and Gündoğar (2015). Additionally, companies located in border provinces handle the delivery of aid materials sent to Syria from other countries. Consequently, this scenario has created business opportunities within these industries. Syrian refugees also contribute to production and trade through entrepreneurial activities. TEPAV (2018) states that the number of companies in Turkey with Syrian shareholders rose from

30 in 2010 to 1,599 in 2015. Kirişci et al. (2016) show that exports from Turkish provinces bordering Syria increased by over 200% from 2011 to 2014, while Turkey's overall exports to Syria grew by 11%. They attribute this export surge to the establishment of businesses by Syrians with ties to their home country.

There can be several explanations for the Syrian's adverse effects on the Turkish economic development in the L-T. One of the potential factors contributing to the negative impact is the decline in humanitarian aid in the region, particularly in the L-T compared to the earlier stages of the conflict. Additionally, the increase in the minimum wage, which saw a 33 percent nominal rise in 2016, made it challenging for businesses to launch or maintain operations, leading to a decrease in the number of registered firms in the economy. With many Syrians seeking employment opportunities in Turkey, the minimum wage increase may have deterred potential employers from hiring refugees, at least formally leading to a further decline in accountable economic activity. Another channel to explain the negative impact of the refugee shock on the per capita GDP is the educational and demographic characteristics of refugees[42]. Syrians are, on average, less educated than natives, limiting their ability to contribute to GDP. Furthermore, a significant portion of the refugees are women and children who are more likely to be dependent, further hindering economic growth. Although Syrians have tools to contribute to the Turkish economy, the nonpositive effect of the migrant shock in the L-T suggests that their negative impact may outweigh their contributions in the long run.

This study provides some insights into the impacts of refugees on a host country's economy, but further research is necessary for several reasons. First, Syrian refugees mostly work in the informal sector; therefore, the extent to which the GDP per capita variable obtained from TurkStat captures their contribution is ambiguous. Additionally, the GDP per capita variable obtained from TurkStat only accounts for the citizens of Turkey, not the refugees under temporary protection[43]. To address this, I create a new GDP per capita* variable that uses both citizens and Syrian refugees in each province[44]. This new calculation of the independent variable (GDP per capita) increases only its denominator, causing a decrease in GDP per capita, particularly in the provinces with a high Syrian refugee population. A reevaluation of all regressions utilizing this GDP per capita* variable is presented in Ap-

[42]This is also explained in Appendix A using the standard augmented neoclassical Solow-Swan model.

[43]In other words, only citizens are included in the GDP per capita variable's denominator.

[44]This variable is created by dividing the GDP by the total population (migrants+citizens) for each province.

pendix E, revealing that the effect of the refugee shock on GDP per capita is negative and statistically significant across all time categories[45]. While the main findings presented lack robust statistical significance in demonstrating the impact of Syrian refugees on the Turkish economy in the long run, the joint assessment of the results of the two GDP per capita variables, one indicating a non-significant negative effect with the default outcome variable and the other revealing a negative and statistically significant impact with the constructed outcome variable in the L-T, brings forth concerns. Together these results, signal the potential negative effect of accommodating Syrians in the future. Therefore, these disconcerting results underscore the need for further research.

This study contributes to a new field of research on the influence of refugees on economic development in developing nations by using Syrian refugees in Turkey as a case study. The significance of this study extends beyond Turkish borders, as the refugee crisis is a global issue and an ongoing phenomenon concerning many countries, particularly those in Europe. Since better labor market opportunities and higher living standards make Europe more appealing to refugees [46]. Therefore, gaining a better understanding of the impact of refugees on the host country's economy is crucial in developing effective solutions for their integration and settlement.

[45]The choice of which GDP per capita variable to utilize in this analysis remains a matter of uncertainty. Nonetheless, considering that the initial findings using the default GDP per capita essentially imply the second set of results due to the nature of the adjustment made (which involves increasing the denominator), I find it more suitable to present the results based on the default GDP per capita variable as the primary outcomes.

[46]Many refugees have passed or trying to pass to Europe for these opportunities.

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6 Appendix

Appendix A: Conceptual Framework

A common apprehension is that refugees result in a net cost on the economy of the host country. In the short run, refugees might have adverse impacts since they may harm the local workers who are operating informally and competing in the same market (Aksu et al., 2022). However, refugees can also imply economic opportunities and economic growth. The inflow of refugees can contribute to receiving countries via attracting aid and humanitarian investment, stimulating trade and investment, and generating employment opportunities (Khoudour and Andersson, 2017).

According to the standard augmented neoclassical growth model developed by Mankiw et al. (1992), an increase in the permanent inflow of migrants can have a detrimental effect on economic growth in the long-run. However, this negative impact may be counteracted by the positive contribution of new migrants to the accumulation of human capital, as suggested by (Sala-i Martin, 1995). Therefore, the effect of migration on host countries depends on a variety of elements, including the features of the receiving country and the educational and demographic characteristics of immigrants. To evaluate the effect of refugees on economic development from a theoretical framework, this study introduces the refugee inflow in the standard augmented neoclassical Solow-Swan model.

Theoretical Model

In this part, I present a basic theoretical framework to examine the effect of refugees on economic growth. I introduce the refugee inflow in the standard augmented neoclassical Solow-Swan model. I follow the setting of Juchem Neto et al. (2009) with enhancing their production function with human capital. In this version of the Solow model, the output is produced by physical capital K, human capital H, labor force L, and constant factor A, denoting the technological level of the economy.

$$Y = f(H, K, L, A) \qquad \text{with } K, L, H, A > 0 \tag{3}$$

In the Solow model, the production function needs to satisfy the following conditions: i) f(.) is increasing function of human capital, physical capital and labor force, ii) f(.) needs to satisfy Inada condition, iii) f(.) needs to satisfy constant return to scale. Because Cobb-Douglas function satisfies all these conditions, I choose Cobb-Douglas production function

following the literature.

$$Y = K^{\alpha} H^{\beta} (AL)^{1-\alpha-\beta} \tag{4}$$

where $\alpha + \beta < 1$ and A is labor-augmenting technological progress which raises at rate g. Labor force follows,

$$\dot{L} = nL + R \iff \frac{\dot{L}}{L} = n + r \tag{5}$$

where R is the net number of new refugees, $r = \frac{R}{L}$ is the net refugee inflow rate and $\frac{\dot{L}}{L}$ is the working population growth rate. Here I assume that the refugees of time t-1 is counted in the native population (more accurately, they seen as citizens) of time t. The physical capital grows as in the standard Solow model,

$$\dot{K} = \phi Y - \delta K \tag{6}$$

where ϕ is the proportion of output that is allocated to the accumulation of physical capital, while δ refers to the rate at which physical capital depreciates. The human capital grows as,

$$\dot{H} = \theta Y - \delta H + R h^{R} = \theta Y - (\delta - r\tilde{h}) H \tag{7}$$

where θ is the proportion of output invested in human capital accumulation, δ is the depreciation rate of human capital and similar to Boubtane et al. (2013) $\tilde{h} = \frac{h^R}{\hat{h}}$ is the ratio of human capital of refugees to average human capital in the host country. For simplicity, as Mankiw et al. (1992), I equated the rate of human capital depreciation with that of physical capital depreciation.

Per effective labor unit, we can define the followings,

$$y = k^{\alpha} h^{\beta}; \quad y = \frac{Y}{AL} \quad k = \frac{K}{AL} \quad h = \frac{H}{AL} \tag{8}$$

By using equation 5,6 and 7;

$$\dot{h} = \theta y - (n + \delta + g - r\tilde{h}) h \tag{9}$$

$$\dot{k} = \phi y - (n + \delta + g) k \tag{10}$$

The steady state of this economy;

$$h^* = \left(\frac{\theta}{n+\delta+g-\tilde{h}r}\right)^{\frac{\alpha}{1-\alpha-\beta}} \left(\frac{\phi}{n+\delta+g}\right)^{\frac{1-\alpha}{1-\alpha-\beta}} \tag{11}$$

$$k^* = \left(\frac{\theta}{n+\delta+g-\tilde{h}r}\right)^{\frac{1-\beta}{1-\alpha-\beta}} \left(\frac{\phi}{n+\delta+g}\right)^{\frac{\beta}{1-\alpha-\beta}} \tag{12}$$

By using equation 11 and 12 in the production function and using the fact that $\frac{\partial lny}{\partial t} = \frac{\dot{y}}{y}$,

$$\frac{\dot{y}}{y} = -(1-\alpha-\beta(n+\delta+g))(lny(t) - lny^*) \tag{13}$$

where

$$\begin{aligned} \ln y^* = & \frac{\beta}{1-\alpha-\beta}\ln\phi + \frac{\alpha}{1-\alpha-\beta}\ln\theta - \frac{\beta}{1-\alpha-\beta}\ln\left(n+\delta+g-\tilde{h}\right) \\ & - \frac{\alpha}{1-\alpha-\beta}\ln\left(n+\delta+g\right) \end{aligned} \tag{14}$$

From equation 13 and 14, for a given constant parameters, the economic growth is positively related to $\tilde{h}$, which means if new refugees have higher human capital than the resident population on average, then they can contribute to the growth of the economy by compensated the negative effect of net refugee flows due to capital dilution (Boubtane et al., 2013; Sala-i Martin, 1995).

To be able to see the economic growth from provincial perspective, I simply take the log of equation 4 and differentiate the log of equation 4 with respect to time and redefine at province level,

$$\text{logY} = \alpha + \beta\text{logH} + (1-\alpha-\beta)\text{logA} + (1-\alpha-\beta)\text{logL} \tag{15}$$

$$(\frac{\dot{Y}}{Y})_p = \alpha(\frac{\dot{K}}{K})_p + \beta(\frac{\dot{H}}{H})_p + (1-\alpha-\beta)(\frac{\dot{L}}{L})_p + g_p \tag{16}$$

where p denotes province, g_p the annual rate of technical progress in province p. Equation 16 illustrates the elements of economic growth. These are growth in labor, growth in human capital, growth in physical capital and technological progress. By assuming that refugees do not bring significant amount of physical capital to the hosting country, the main source of refugee effect comes from the human capital of refugees.

Consequently, in this setting, whether or not refugees positively impact per-capita GDP significantly depend on the demographic and the educational characteristics of the refugees. The educational attainment of natives is higher than the Syrian refugees and more than 50% of the Syrian refugees are children under the age of 18 and women in Turkey.[47] Therefore, in this theoretical setting, the significant positive effect of Syrian refugees on per capita GDP is not much likely. However, this model leaves out some important components through which refugees may contribute to the economy. For instance, on the one hand, refugees can promote trade and investment, attract humanitarian aids, and generate job opportunities. On the other hand, they stimulate consumption and trigger a supply response, therefore, result in a boost in GDP (Errighi and Griesse, 2016). To be able to better understand the impact of Syrian refugees on per-capita GDP, we might need a more comprehensive theoretical model, however, with using the variation in the share of refugees across Turkish provinces in Turkey over time, we have power to evaluate the impact of Syrian refugees on per-capita GDP in Turkey empirically.

[47]Source: Ministry of Interior, Directorate General of Migration Management

Appendix B

Table B1: The Provinces that Hosted more Refugees Than 5% of their Population in 2019

Province	Population	Refugee Share (%)
Kayseri	1,407,409	5.248
Bursa	3,056,120	5.338
Kahramanmaras	1,154,102	7.369
Osmaniye	538,759	8.479
Mardin	838,778	9.562
Adana	2,237,940	9.727
Mersin	1,840,425	10.054
Sanliurfa	2,073,614	17.455
Gaziantep	2,069,364	17.660
Hatay	1,628,894	21.314
Kilis	142,490	44.892
Turkey	83,154,997	4.193

Note: The refugee shares, the proportion of migrants to the total population (refugees + natives), are shown in this table for the provinces where the share is greater than 5%, along with Turkey's population.

Appendix C

This section simply gives how the GDP by provinces is calculated using the "production approach"[48].

Production – Intermediate consumption = Gross Value Added(GVA)

where production is the outcome of economic activities in the form of goods and services, while intermediate consumption is the goods and services used in the production process.

GVA + Net taxes = GDP

where net taxes are taxes on the product minus subsidies.

[48]Source is TurkStat.

Appendix D

Table D1: Noncumulative vs Cumulative Approach, 2SLS

Panel A: The Medium-Term Effect (Noncumulative:2016-2017)				
Dependent Variable	(1)	(2)	(3)	(4)
GDP percapita	-25,638.647**	-7,267.013	3,545.616	2,338.296
	(11,916.885)	(7,851.549)	(4,701.192)	(5,025.364)
Observations	648	486	486	486
Panel B: The Medium-Term Effect (Cumulative: Until 2017)				
GDP percapita	-25,007.266**	-7,905.702	1,790.686	1,911.696
	(11,995.852)	(7,470.039)	(4,522.318)	(4,625.292)
Observations	891	729	729	729
Panel C: The Long-Term Effect (Noncumulative: 2018-2019)				
GDP percapita	-43,157**	-41,271**	-16,822	-18,728
	(18,070)	(17,690)	(12,606)	(12,233)
Observations	648	486	486	486
Panel D: The Long-Term Effect (Cumulative: Until 2019)				
GDP percapita	-33,969.080**	-26,998.077*	-6,712.651	-6,958.304
	(15,049.297)	(14,235.890)	(8,543.619)	(8,203.186)
Observations	1,053	891	891	891
Controls				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
NUTS1-Year Fixed Effects	No	No	No	Yes

Note: This table compares the 2SLS results using the noncumulative (panels A and C) and cumulative approach (panels B and D) in the medium and long-term analysis. Specifically, the dataset includes 81 Turkish provinces from 2006 to 2017 (except 2012, 2013, 2014, and 2015) in Panel A, 2006 to 2017 (except 2012) in Panel B, 2006 to 2019 (except 2012, 2013, 2014, 2015, 2016, and 2017) in Panel C, and 2006 to 2019 (except 2012) in Panel D. Each cell presents the 2SLS regression estimates for the proportion of refugees to population with different specifications. The first column provides the results of the regressions controlling for year and province-fixed effects. The second column additionally controls for province-specific variables, which are age and education groups, age dependency ratio, average household size, and GDP sector shares (services, industry, and agriculture). Due to the unavailability of data for the years 2006 and 2007, the inclusion of province-specific controls results in a reduced number of observations. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Appendix E

Table E1: Refugee Shock on GDP per Capita*, OLS

Panel A: The Short-Term Effect of the Migrant Shock on GDP per Capita (Until 2015), OLS					
Dependent Variable	(1)	(2)	(3)	(4)	Mean
GDP percapita*	-25,875.87***	-11,935.99***	-10,573.80***	-7,769.70**	14031.02
	(5,489.72)	(2,823.06)	(3,706.31)	(3,314.84)	
Observations	729	567	567	567	
Panel B: The Medium-Term Effect (Until 2017)					
GDP percapita*	-28,631.72***	-15,885.00***	-12,835.25***	-11,884.26***	16296.99
	(4,807.85)	(3,140.91)	(3,245.60)	(2,873.91)	
Observations	891	729	729	729	
Panel C: The Long-Term Effect (Until 2019)					
GDP percapita*	-34,963.89***	-27,577.79***	-17,124.14***	-17,403.20***	19326.44
	(5,900.04)	(5,472.88)	(5,547.21)	(4,082.76)	
Observations	1,053	891	891	891	
Controls for					
Year Fixed Effects	Yes	Yes	Yes	Yes	
Province Fixed Effects	Yes	Yes	Yes	Yes	
Province-specific Controls	No	Yes	Yes	Yes	
5 Region-Year Fixed Effects	No	No	Yes	No	
Nuts1-Year Fixed Effects	No	No	No	Yes	

Note: The dataset consists of 81 Turkish provinces from 2006 to 2015 (except 2012) in Panel A, 2006 to 2017 (except 2012) in Panel B, and 2006 to 2019 (except 2012) in Panel C. Each cell presents the OLS regression estimates for the proportion of refugees to population with different specifications, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. Due to the unavailability of data for the years 2006 and 2007, the inclusion of province-specific controls results in a reduced number of observations. The third and fourth columns control for 5-Region-year fixed effects and NUTS1-year fixed effects, respectively.Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E2: Refugee Shock on GDP per Capita*, 2SLS

Panel A: The Short-Term Effect of the Migrant Shock on GDP per Capita (Until 2015), 2SLS					
Dependent Variable	(1)	(2)	(3)	(4)	Mean
GDP percapita*	-40,526.592***	-19,626.325***	-13,059.072**	-11,068.824**	14031.02
	(13,112.405)	(6,301.072)	(5,944.705)	(5,645.773)	
First-stage regression	3.015***	3.121***	3.059***	3.232***	
	(0.795)	(0.856)	(0.915)	(0.888)	
Partial R-squared	0.697	0.662	0.626	0.683	
Observations	729	567	567	567	
Panel B: The Medium-Term Effect(Until 2017)					
GDP percapita*	-44,119.788***	-26,869.824***	-16,824.298***	-17,185.104***	16296.99
	(11,934.993)	(7,469.661)	(4,422.178)	(4,565.750)	
First-stage regression	3.006***	3.112***	3.063***	3.269***	
	(0.946)	(0.984)	(1.023)	(1.002)	
Partial R-squared	0.733	0.685	0.648	0.698	
Observations	891	729	729	729	
Panel C: The Long-Term Effect(Until 2019)					
GDP percapita*	-57,328.499***	-49,294.562***	-30,395.045***	-30,549.808***	19326.44
	(14,852.358)	(13,874.908)	(8,343.210)	(8,055.224)	
First-stage regression	2.898***	2.908***	2.867***	3.032***	
	(0.670)	(0.687)	(0.764)	(0.733)	
Partial R-squared	0.747	0.704	0.646	0.700	
Observations	1,053	891	891	891	
Controls for					
Year Fixed Effects	Yes	Yes	Yes	Yes	
Province Fixed Effects	Yes	Yes	Yes	Yes	
Province-specific Controls	No	Yes	Yes	Yes	
5 Region-Year Fixed Effects	No	No	Yes	No	
Nuts1-Year Fixed Effects	No	No	No	Yes	

Note: The dataset includes 81 Turkish provinces from 2006 to 2015 (except 2012) in Panel A, 2006 to 2017 (except 2012) in Panel B, and 2006 to 2019 (except 2012) in Panel C. Each cell presents the 2SLS regression estimates for the proportion of refugees to population with different specifications, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The instrument relies on multiple factors, including the combined count of Syrian refugees in Turkey, Iraq, Jordan, and Lebanon in each year. Additionally, it considers the pre-war population distribution of Syrian provinces, the proximity of each province to the nearest border crossing of neighboring countries, and the distance between each Syrian province and each Turkish province. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. Due to the unavailability of data for the years 2006 and 2007, the inclusion of province-specific controls results in a reduced number of observations. The third and fourth columns control for 5-Region-year fixed effects and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E3: Noncumulative vs Cumulative 2SLS, GDP percapita*

Panel A: The Medium-Term Effect (Noncumulative:2016-2017)				
Dependent Variable	(1)	(2)	(3)	(4)
GDP percapita	-45,815.604***	-27,867.177***	-16,830.572***	-18,573.695***
	(11,738.257)	(7,979.778)	(4,507.883)	(4,955.563)
Observations	648	486	486	486
Panel B: The Medium-Term Effect (Cumulative: Until 2017)				
GDP percapita	-44,119.788***	-26,869.824***	-16,824.298***	-17,185.104***
	(11,934.993)	(7,469.661)	(4,422.178)	(4,565.750)
Observations	891	729	729	729
Panel C: The Long-Term Effect (Noncumulative: 2018-2019)				
GDP percapita	-70,381.947***	-67,713.198***	-45,273.936***	-46,405.007***
	(17,712.662)	(17,627.239)	(12,737.064)	(12,273.320)
Observations	648	486	486	486
Panel D: The Long-Term Effect (Cumulative: Until 2019)				
GDP percapita	-57,328.499***	-49,294.562***	-30,395.045***	-30,549.808***
	(14,852.358)	(13,874.908)	(8,343.210)	(8,055.224)
Observations	1,053	891	891	891
Controls				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
NUTS1-Year Fixed Effects	No	No	No	Yes

Note: This table compares the 2SLS results using the noncumulative (panels A and C) and cumulative approach (panels B and D) in the medium and long-term analysis. Specifically, the dataset includes 81 Turkish provinces from 2006 to 2017 (except 2012, 2013, 2014, and 2015) in Panel A, 2006 to 2017 (except 2012) in Panel B, 2006 to 2019 (except 2012, 2013, 2014, 2015, 2016, and 2017) in Panel C, and 2006 to 2019 (except 2012) in Panel D. Each cell presents the 2SLS regression estimates for the proportion of refugees to population with different specifications, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The first column provides the results of the regressions controlling for year and province-fixed effects. The second column additionally controls for province-specific variables, which are age and education groups, age dependency ratio, average household size, and GDP sector shares (services, industry, and agriculture). Due to the unavailability of data for the years 2006 and 2007, the inclusion of province-specific controls results in a reduced number of observations. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E4: Placebo Regressions on Refugee Impact on GDP per Capita*, 2SLS Estimates

Panel A: Instrument for 2019 are Assigned to the Corresponding Values for 2011				
	(1)	(2)	(3)	(4)
GDP percapita*	-8,928.58***	-5,210.88**	-2,371.94	-2,152.51
	(2,530.52)	(2,231.73)	(1,841.85)	(1,676.48)
Panel B: Instrument for 2017 are Assigned to the Corresponding Values for 2011				
GDP percapita*	-9,125.38***	-5,323.62**	-2,389.93	-2,174.05
	(2,825.31)	(2,417.51)	(1,896.39)	(1,738.63)
Panel C: Instrument for 2015 are Assigned to the Corresponding Values for 2011				
GDP percapita*	-10,943.89***	-6,418.58**	-2,840.56	-2,566.18
	(3,726.84)	(3,119.86)	(2,336.00)	(2,118.91)
Observations	486	324	324	324
Controls for				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
Nuts1-Year Fixed Effects	No	No	No	Yes

Note: The dataset consists of 81 Turkish provinces from 2006 to 2011(before the arrival of Syrians) for dependent variable, and from 2008 to 2011 for control variables. For the placebo analysis, the key variable of interest, which is the proportion of refugees to the overall population (refugees+natives), and instrumental variable values for 2019, 2017, and 2015 are assigned to the related values for 2011 in Panel A, Panel B, and Panel C, respectively. The instrumental variable and the key variable of interest are valued at zero for the duration of 2006-2010. Each cell presents the 2SLS regression estimates for the proportion of refugees to population with different specifications, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E5: The Impact of Refugees on GDP per Capita* with an Alternative Instrument

	(1)	(2)	(3)	(4)
GDP percapita*	-39,877.66***	-25,018.67***	-15,087.62***	-16,263.57***
	(9,430.80)	(6,278.10)	(3,905.68)	(3,939.55)
First-stage regression	1.07***	1.04***	1.00***	1.06***
	(0.24)	(0.23)	(0.25)	(0.24)
Partial R-squared	0.751	0.695	0.659	0.694
Observations	891	729	729	729
Controls for				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
Nuts1-Year Fixed Effects	No	No	No	Yes

Note: The dataset cover 81 provinces of Turkey over the years 2006 to 2017 (except 2012) for dependent variable; the years 2008 to 2017 (except 2012) for control variables. Each cell shows the estimates for the share of refugees, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The 2SLS regression instruments the key variable of interest using the del Carpio-Wagner distance-based instrument. The regressions controls for year, province fixed effects, province specific variables, 5-Region-year and NUTS1-year fixed effects in different columns as shown above. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E6: The Impact of Refugees on GDP per Capita* with Lagged Value of Refugee Ratio: 2SLS Estimates

Panel A: With One-Period Lagged Value of Refugee Share				
	(1)	(2)	(3)	(4)
GDP percapita*	-62,143.26***	-54,441.40***	-33,632.96***	-34,340.64***
	(16,584.07)	(15,719.98)	(9,512.67)	(9,169.49)
Observations	891	810	810	810
Panel B: With Two-Period Lagged Value of Refugee Share				
GDP percapita*	-65,873.25***	-58,810.60***	-36,036.10***	-37,805.02***
	(18,335.98)	(17,541.72)	(10,820.31)	(10,533.86)
Observations	810	810	810	810
Controls for				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
Nuts1-Year Fixed Effects	No	No	No	Yes

Note: The dataset covers 81 Turkish provinces from 2006 to 2015 (except 2012) for dependent variable, and from 2008 to 2019 (except 2012) for control variables. Each cell presents the 2SLS regression estimates of the lagged values of the key variable of interest, the proportion of refugees to population with different specifications, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The regressions use one-period lagged values and two-period lagged values, and the estimates are presented in Panel A and Panel B, respectively. The instrument relies on multiple factors, including the combined count of Syrian refugees in Turkey, Iraq, Jordan, and Lebanon in each year. Additionally, it considers the pre-war population distribution of Syrian provinces, the proximity of each province to the nearest border crossing of neighboring countries, and the distance between each Syrian province and each Turkish province. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E7: The Impact of Refugees on GDP per Capita* with Dummy Treatment Variable: 2SLS Estimates

Panel A: For the Treatment Dummy, Threshold= 0.03				
	(1)	(2)	(3)	(4)
GDP percapita*	-12,847.798***	-13,477.536***	-13,558.485***	-10,209.022***
	(2,499.661)	(1,935.013)	(4,013.312)	(2,187.451)
First-stage regression	12.93***	10.64***	6.43**	9.07***
	(2.19)	(2.00)	(2.50)	(2.23)
Panel B: For the Treatment Dummy, Threshold= 0.05				
GDP percapita*	-12,539.718***	-11,905.396***	-8,905.287***	-8,660.964***
	(2,537.592)	(1,928.474)	(2,559.780)	(2,090.754)
First-stage regression	13.25***	12.04***	9.79***	10.69***
	(1.91)	(1.79	(2.75)	(2.17)
Panel C: For the Treatment Dummy, Threshold= 0.08				
GDP percapita*	-15,232.152***	-13,677.853***	-9,964.181***	-9,253.536***
	(3,459.310)	(3,133.702)	(3,290.063)	(2,526.129)
First-stage regression	10.91***	10.48***	8.75***	10.01***
	(1.17)	(1.22)	(1.86)	(1.33)
Observations	1,053	891	891	891
Controls for				
Year Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Province-specific Controls	No	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	No	Yes	No
Nuts1-Year Fixed Effects	No	No	No	Yes

Note: The dataset consists of 81 Turkish provinces from 2006 to 2019 (except 2012) for dependent variable, and from 2008 to 2019 (except 2012) for control variables. Each cell demonstrates the 2SLS regression estimates of the key variable of interest with different specification, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The key variable of interest is the treatment dummy taking the value of one where the share of refugees is greater than 0.03 in Panel A (0.05 in Panel B, and 0.08 in Panel C) and zero otherwise.The instrument relies on multiple factors, including the combined count of Syrian refugees in Turkey, Iraq, Jordan, and Lebanon in each year. Additionally, it considers the pre-war population distribution of Syrian provinces, the proximity of each province to the nearest border crossing of neighboring countries, and the distance between each Syrian province and each Turkish province. The first column provides the results of the regressions controlling for year and province fixed effects. The second column additionally controls for province-specific variables. The third and fourth columns control for 5-Region-year and NUTS1-year fixed effects, respectively. Standard errors are clustered at the province level and asterisks show that the estimate is statistically significant at 1% ***, 5% **, and 10% * levels.

Table E8: The Impact of Refugees on GDP per Capita* with Alternative Subsamples, 2SLS Estimates

	A:Excludes Istanbul Region			B: Exclude Western Turkey		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP percapita*	-45,938.27***	-30,395.04***	-30,165.60***	-30,302.19***	-27,540.27***	-27,985.84***
	(12,096.45)	(8,343.21)	(7,543.78)	(4,921.34)	(6,570.01)	(6,359.42)
First-stage regression	2.93***	2.87***	3.03***	3.14***	2.89***	3.07***
	(0.69)	(0.76)	(0.73)	(0.72)	(0.75)	(0.73)
Observations	880	880	880	649	649	649
	C:Includes nuts1= 6,10,11, and 12			D:Includes nuts1= 6 and 12		
	(1)	(2)	(3)	(4)	(5)	(6)
GDP percapita*	-26,599.24***	-26,564.28***	-26,916.07***	-32,214.19***	-32,631.83***	-32,631.83***
	(5,593.39)	(6,271.21)	(6,347.08)	(5,004.50)	(5,827.66)	(5,827.66)
First-stage regression	3.00***	2.90***	2.99***	2.81***	2.70***	2.70***
	(0.62)	(0.66)	(0.63)	(0.51)	(0.47)	(0.47)
Observations	352	352	352	187	187	187
Controls for						
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province-specific Controls	Yes	Yes	Yes	Yes	Yes	Yes
5 Region-Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
Nuts1-Year Fixed Effects	No	No	Yes	No	No	Yes

Note: Each cell in the table presents the 2SLS regression estimates of the proportion of refugees to population, with different specifications, where dependent variable is GDP percapita* (TL) constructed by dividing the GDP by the total population of each province(refugees and citizens combined). The first (fourth) column provides the results of the regressions controlling for year and province fixed effects, and province-specific variables. The second (fifth) and third (sixth) columns control for 5-Region-year and NUTS1-year fixed effects, respectively. The results are presented in separate panels, each with distinct regional restrictions. In Panel (A), Istanbul (NUTS1 region 1) is excluded, while in Panel (B), western Turkey (NUTS1 regions 1-4) is excluded. On the other hand, Panel (C) involves NUTS1 region 6 (the Mediterranean Region) and NUTS1 regions 10-12 (eastern Turkey), whereas Panel (D) only includes NUTS1 region 6 and NUTS1 region 12.