CENTER FOR GLOBAL DEVELOPMENT

Refugees and the Education of Host Populations: Evidence from the Syrian Inflow to Jordan

Ragui Assaad, Thomas Ginn, and Mohamed Saleh

Abstract

While labor market impacts of refugees in low- and middle-income countries are commonly studied, public services like education could also be affected by mass arrivals. This paper examines the impact of Syrian refugees on the educational outcomes of Jordanians. Combining detailed household surveys with school-level records on the density of Syrians, we study both the quantity and quality of education using a difference-in-differences design across refugee prevalence and schooling cohort. We find no evidence that Syrians significantly affected the educational outcomes of Jordanians. We show that the government's response of establishing second shifts in existing public schools and opening new schools in camps mitigated potential overcrowding.

KEYWORDS
Education;
Refugees;
Forced Migration;
Middle East

JEL CODE
I21; J61; N35; R23

This paper is published in the Journal of Development Economics *and can be accessed here.*
This version is the preprint.

Refugees and the Education of Host Populations: Evidence from the Syrian Inflow to Jordan

Ragui Assaad
University of Minnesota, Humphrey School of Public Affairs; assaad@umn.edu

Thomas Ginn
Center for Global Development; tginn@cgdev.org

Mohamed Saleh
London School of Economics; m.saleh@lse.ac.uk

We are grateful to Ran Abramitzky, Shelby Carvalho, Gaurav Chiplunkar, Michael Clemens, Pascaline Dupas, Saumitra Jha, Ben Klemens, Melanie Morten, Semih Tumen, Jeremy Weinstein, participants at the American Economic Association's annual meetings, the Sustainability and Development Conference at the University of Michigan, the Midwest International Economic Development Conference, and the Economic Research Forum Policy Conference on Employment, Education and Housing in Jordan: The Impacts of the Syrian Refugee Influx. Funding from the British Academy through the Economic Research Forum is gratefully acknowledged. The views presented are those of the authors and not of CGD, ERF, the British Academy, or any other institution. This paper was previously circulated under the title "Impact of Syrian Refugees in Jordan on Education Outcomes for Jordanian Youth." All errors are our own.

Ragui Assaad, Thomas Ginn, and Mohamed Saleh. 2024. "Refugees and the Education of Host Populations: Evidence from the Syrian Inflow to Jordan." CGD Working Paper 679. Washington, DC: Center for Global Development. https://www.cgdev.org/publication/refugees-and-education-host-populations-evidence-syrian-inflow-jordan

CENTER FOR GLOBAL DEVELOPMENT

2055 L Street, NW Fifth Floor
Washington, DC 20036
202.416.4000

1 Abbey Gardens
Great College Street
London
SW1P 3SE

www.cgdev.org

1 Introduction

Host countries often worry that refugees will negatively affect local populations, especially if they adopt more inclusive policies. With 108.4 million people displaced by conflict worldwide and 76% living in low- and middle-income countries, these host populations are, like the displaced, oftentimes large and vulnerable (UNHCR, 2023). The academic literature has primarily focused on impacts of refugee arrivals on the labor market, where refugees represent both supply and demand shocks, and the average measured effects have been small (see Verme and Schuettler (2021) for a review). The impacts on public services, however, could differ substantially as supply is controlled by governments. With 29% of the displaced between the ages of 5 and 17, the education sector can be particularly affected when refugees arrive (UNHCR, 2021).

We study the impact of Syrian refugees in Jordan on the educational outcomes of Jordanian students. The majority of refugees arrived in Jordan in early 2013, and the government allowed most school-age Syrians to attend public schools in short order. In one year, between the 2012 and 2013 school years, Syrian enrollment in public schools increased from 558 to 108,913 students according to the Jordanian Ministry of Education.[1] Since the 2013 school year, Syrian students have comprised approximately 7% of the total population in Jordanian public schools, which equals the prevalence of Syrian refugees in Jordan overall based on figures from the United Nations High Commissioner for Refugees (UNHCR) (Krafft et al., 2019b).[2]

Refugees could impact local students through multiple channels. First, refugee students could directly crowd out local students by dividing educational inputs like teachers and classrooms. Schooling inputs could expand to meet this need, depending on politics, bureaucratic hurdles, public finances, and aid programs. Conversely, if high-prevalence areas receive additional resources to address the needs, the refugee presence could also crowd in critical inputs. Second, refugee students could have positive or negative peer effects on host students in a shared classroom due to different educational backgrounds or cultural norms, for example.[3] Third, refugees' presence in the labor market may affect the perceived returns to education and induce a response from host students.

There are multiple challenges to identifying the effect of refugee arrivals on educational outcomes. First, Syrians did not settle randomly in Jordan; if they chose areas with worse

1. The Jordanian school year runs from August until June. We will reference school years by the calendar year when it starts, i.e. the 2013 school year is the 2013/14 school year.

2. The 2015 Population Census reported 1.3 million Syrians in Jordan, roughly twice the UNHCR figures (Salemi et al., 2018). However, Krafft et al. (2019a) estimate that 86% of Syrians aged 15-59 in Jordan are refugees based on registration status. If the definition is expanded to include those who report leaving Syria due to violence, conflict or lack of security, the estimate goes up to 93% (Krafft et al., 2019a). See Krafft et al. (2019b) for a multi-source analysis of the number and distribution of Syrian refugees in Jordan.

3. Barron et al. (2021), however, find little discrimination among 9 and 10 year old Syrian and Jordanian students in this context.

outcomes among Jordanian students, for instance, a negative correlation between refugee prevalence and Jordanian outcomes ex post would partially include these pre-existing differences. Second, the refugee inflow was not the only major change over this time period, as macroeconomic growth slowed dramatically. This was partially caused by the Syrian conflict disrupting trade routes, tourism flows, and foreign investments and was also the result of a fiscal crisis that pre-dates the Syrian conflict (World Bank, 2017).

To identify the causal effect of refugee inflows on education at the local level, we employ a difference-in-differences methodology across time and location. We compare students who attended school with a high prevalence of Syrians to students from the same school who finished just before Syrians arrived, and then control for any national time trends using the outcomes of students in schools with a low prevalence of Syrians. Rather than using pre- and post-treatment periods based on calendar years, we use cohorts of the year students started school to define exposed and unexposed cohorts of Jordanians. We measure Jordanians' educational outcomes using the 2016 wave of the Jordan Labor Market Panel Survey (JLMPS 2016) that was carried out by the Economic Research Forum in cooperation with the Jordanian Department of Statistics. This survey contains retrospective information on educational attainment for all individuals in the sample, including school entry, attainment, and test scores. We measure the intensity of the exposure to Syrians by the proportion of Syrian students in an individual's school from the Education Management Information System (EMIS) administrative data for the 2016 school year.

Overall, we do not find evidence that Syrian refugees affected the educational attainment and learning outcomes of Jordanians. We do not detect any meaningful effect of the Syrian inflow on a battery of outcomes at the basic and secondary education levels, including grade completion at various levels, final exam scores, grade repetition, and entry to secondary and tertiary education. While a few point estimates are statistically significant, their signs and magnitudes are inconsistent with any interpretation of causality. Our results are generally precisely estimated, allowing us to rule out large negative effects of Syrian arrivals on Jordanians' educational outcomes.

Our methodology enables us to measure the equilibrium effects of the Syrian inflow on the educational outcomes of Jordanians; we are not able to isolate the demand and supply responses separately. To provide evidence on the supply response, we first employ school shift-level data and a similar difference-in-differences strategy that compares the evolution of school supply outcomes across schools or localities before and after the Syrian arrival. We document that the government responded to the refugee inflow by opening evening shifts that enrolled Syrians and by opening new schools in Syrian refugee camps, suggesting that the Jordanian government mitigated any potentially adverse effects of the inflow by insulating Jordanian students from Syrian exposure. Much of the cost to expand the supply of education was borne by international donors (Bataineh, 2019).

Results from the limited literature on forced migrants and host populations' education in low- and middle-income countries are mixed. Tumen (2018, 2021) examines the impact of Syrian refugees on hosts' education in Turkey and finds that refugee arrivals *increased* host enrollment and test scores, which he attributes to an increase in the returns to education. He finds the increase in enrollment comes from males with poorer parental backgrounds, which is the demographic crowded out in the Turkish labor market. As he points out, our results are not inconsistent, because similar crowd out in the labor market has not been found for Jordanians, for instance by Fallah et al. (2019).[4] In Latin America, Martínez and Heredia (2022) find that Peruvians switch schools in response to the arrival of Venezuelans, while Contreras and Gallardo (2022) find that Venezuelans and Haitians lower natives' test scores in Chile. Baez (2011) examines the arrival of Burundian and Rwandan refugees to Tanzania in 1994; he finds the inflow negatively affected the schooling and literacy of Tanzanians. One of the ways the contexts differ, however, is the degree of assistance to the host community schools; while assistance to Tanzanian schools was limited, assistance to affected schools in Jordan was significant.[5]

Finally, Rozo and Sviatschi (2021) and Elmallakh and Wahba (2021) study the effect of the Syrian refugee inflow on housing rents and the internal migration of Jordanians, respectively. They address educational outcomes in supplementary results.[6] Rozo and Sviatschi (2021) find no significant effects on the probability that Jordanians are enrolled in school. Elmallakh and Wahba (2021), on the other hand, argue that crowd out in schools is one of the mechanisms leading Jordanians to move away from high-Syrian areas. They show that the proportion of Syrian students in schools is correlated with the proportion of Syrians living in the sub-district and that there are larger class sizes and slightly fewer teachers per student in higher-Syrian areas. We argue, however, that these results are not sufficient to show crowd-out of Jordanian students. The larger average class sizes and fewer teachers per student at the sub-district level are due to the second shifts and additional schools that are predominantly Syrians. When restricting to Jordanian students' schools and shifts, we instead find a small reduction in over-crowding in the high-Syrian areas. In other words, we show that averaging across all students at the sub-district level misses the heterogeneity by nationality and the expansion of school supply specifically for Jordanians.

Since our paper is focused on education, we expand on these supplementary results in

4. Malaeb and Wahba (2018) finds that the labor market impact of the Syrian influx is mainly confined to other migrant workers, such as Egyptians.

5. Another set of papers examines the effects of immigrants and refugees on students in high-income countries, mostly finding null or small positive effects (McHenry, 2015; Hunt, 2017; van der Werf, 2019; Figlio and Özek, 2019; N Morales, 2020; Figlio et al., 2021). Green and Iversen (2021), in contrast, finds negative effects on Norwegians' test scores.

6. Using a difference-in-differences methodology on a small sample of schools in northern Jordan, Bataineh and Montalbano (2019) find a negative impact of exposure to Syrians on Jordanian students' test scores, but their impacts are small in size (0.5 to 1.5 percentage points on male students' scores that average in excess of 70 percent), and they do not provide standard errors for these effects.

multiple ways. First, we analyze a larger set of outcomes, including attainment, repetition, and test scores at different levels, as well as school supply. We also measure variation at the school and shift levels instead of the sub-district level; given that refugees are not uniformly distributed through sub-districts, effects could be concentrated at a lower level that is difficult to capture in a wider area. Finally, we exploit different variation for identification.[7] Our paper is one in a series of papers that examines the impact of the Syrian refugee inflow on a range of outcomes, including employment and wages (Fallah et al., 2019), internal migration (Elmallakh and Wahba, 2021), migrant workers in Jordan (Malaeb and Wahba, 2018), and housing outcomes (Al-Hawarin et al., 2021).

2 Background

2.1 Jordan as a Destination for Refugees

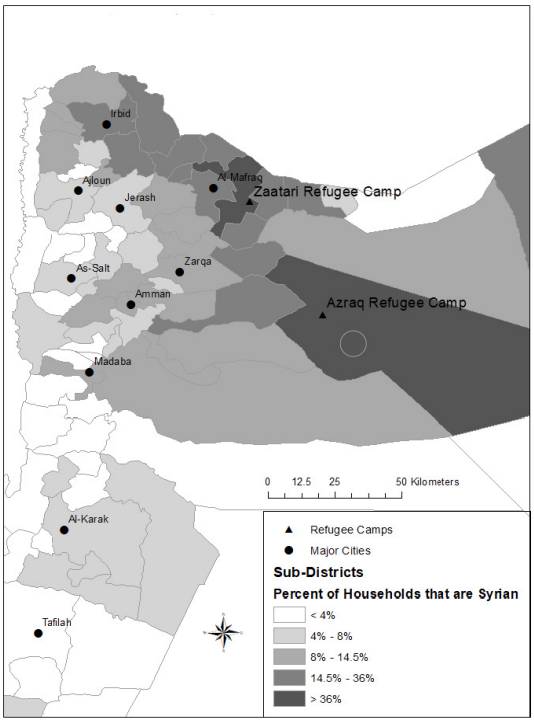
Jordan has a long history as a country of refuge for populations displaced by conflict in neighboring countries. It welcomed large numbers of Palestinian refugees after the 1948 and 1967 Arab-Israeli wars and after the first Gulf War of 1991. It also hosted a large number of Iraqi refugees after the United States invasion of Iraq in 2003 and the conflicts that ensued. The response to the Palestinian refugee inflow was partially met by assistance from the United Nations Relief and Works Agency (UNRWA), an agency that was explicitly established to assist Palestinian refugees in neighboring countries. UNRWA set up its own schools in Jordan and elsewhere, some of which are still operating.[8] However, these schools only admitted Palestinians with official refugee status and were limited to basic schools. The Jordanian government was left with the responsibility of meeting the schooling needs of Palestinians not officially registered as refugees and all secondary level schooling (Lughod, 1973). Subsequent refugee inflows were absorbed in Jordan's public schooling system, with varying degrees of assistance from the international community.

In the latest of these large-scale refugee inflows — the subject of this paper — Jordan is hosting about 665,000 Syrians. Syrian refugees contain a disproportionate number of children, with 48% being under the age of 15 compared to 34% of Jordanians. Prior to mid-2012, the settlement process of refugees was somewhat haphazard, and many were able to directly locate in host communities. Since then, the process was tightened and required refugees to start in one of three official refugee camps: Za'atari in Mafraq goverorate, and Azraq and the Emirati-Jordanian camp, both in Zarqa governorate. Refugees could seek permission to leave the camps by obtaining formal sponsorship by a relative already living

7. Rozo and Sviatschi (2021) use the distance from the three refugee camps for identification; it is reassuring that we find similar results using different variation.

8. The Ministry of Education's EMIS database puts the number of UNRWA schools in 2016 at 176, serving a total of 66,000 students.

Figure 1 – **Percentage of Resident Households that are Syrian, 2015**



Source: Salemi et al. (2018) based on data from Department of Statistics (2015).

outside the camps. Many who were unable to obtain such sponsorships left the camps without authorization, but that prevented them from being able to obtain the Ministry of Interior (MOI) service card and the UNHCR asylum-seeker certificates, which were necessary to access public services. Specifically, prior to the 2017 school year, parents wishing to register their children in school needed to have both the MOI service card and the asylum seeker certificate to do so (Salemi et al., 2018). In JLMPS 2016, 18% of refugees said they were living in camps, 18% said they had previously lived in a camp, and 64% said they were never in a camp (Krafft et al., 2019a).

Furthermore, 92% of the registered Syrian refugees in Jordan resided in four of the twelve governorates according to the 2015 Population Census (Department of Statistics, 2015). Twenty-nine percent were in the capital Amman, which contains 42% of the population of Jordan. Another twenty-nine percent are in Irbid governorate, which is close to the Syrian border and has 18% of the country's population. Mafraq and Zarqa governorates host 19% and 15%, respectively, including the three official refugee camps. The two sub-districts with the highest Syrian prevalence (indicated by the darkest color in Figure 1) contain the two large refugee camps: al-Badia al-Shamalia al-Gharbiya sub-district, which contains the Za'atari camp, has a Syrian prevalence of 81%, and Azraq sub-district, which contains the Azraq camp, has a prevalence of 76%.

Overall, Syrian refugees have mostly located in proximity to the official refugee camps

and close to the Syrian border. A substantial fraction is also located in Amman, where much of the population and economic activity of the country is concentrated, and a few are located in Aqaba, where Jordan's main port is located.

2.2 Jordan's Education System and Syrian Refugees

Jordan's pre-university education system is comprised of a pre-school stage, which is almost entirely private, a basic compulsory schooling stage, which spans first grade to tenth grade, and a secondary stage, which includes the eleventh and twelfth grades, and is split into academic and vocational tracks.[9] We focus on public schools which enroll 89% of Syrian students in Jordan.

The Jordanian government took a number of steps to accommodate Syrian children into the Jordanian public school system, where education was provided free of charge.[10] First, with the assistance of UNICEF, some schools were established in refugee camps (Salemi et al., 2018).[11] Second, a number of schools were converted into double-shift schools to accommodate Syrian students, a policy that was supported by donor funds (Hashemite Kingdom of Jordan Ministry of Planning and International Cooperation and United Nations, 2013; Bataineh, 2019). As a result, more than half of Syrian students were accommodated in the evening shift of double-shift schools. Nearly four-fifths of Jordanian students remained in single-shift schools in which about 4% of students were Syrian. Only 5% of Jordanians ended up in the evening shift of double-shift schools, where most of the Syrians were concentrated. We explore these responses as potential mechanisms for the null findings after we present the main results.

Jordan's official policy was to integrate most Syrian children into public schools, but any restrictions could contribute to the null effects we estimate among Jordanian students. First, enrollment priority was given to Jordanians; Sieverding et al. (2018) report interviews with Syrians who were denied enrollment at the closest school due to lack of space. Before 2016, Syrians were also required to have a service card documenting their refugee status in order to enroll. In addition, Syrians who were more than three years behind the expected age-at-grade-level progression were not allowed to enroll in the main formal system. Despite these barriers, Sieverding et al. (2018)'s mixed method analysis presents evidence that the magnitudes were likely small. They write "many respondents said the [enrollement] process was easy and quick and did not experience any challenges

9. Prior to 1994, there was a primary stage comprising of the first six grades, a preparatory stage that went from 7th grade to 9th grade, and a secondary stage that comprised 10th grade to 12th grade. Together the primary and preparatory stages comprised the compulsory schooling stage. When compulsory schooling was extended to the 10th grade in 1994, the primary and preparatory stages were merged and together with the tenth grade formed the basic schooling stage. The remaining two years comprised the secondary stage (UNESCO, 2018).

10. Fees on textbook and tuition were assessed until 2017 (Sieverding et al., 2018).

11. Thirty-nine schools in the EMIS data for 2016 have only Syrian students and are presumed to be located in refugee camps.

enrolling in the school" and show that enrollment levels among Syrians had recovered to pre-conflict levels by 2016. They document that approximately 75% of Syrians between the ages of 6 and 17 were enrolled in Jordanian schools in 2016, according to the JLMPS, with higher proportions for children in the age range of basic school. [12]

3 Data

The paper draws on two main data sources. The first is the Jordan Labor Market Panel Survey of 2016 (JLMPS 2016), the second wave in the JLMPS series after the 2010 wave. The JLMPS 2016 is administered to a nationally representative sample of households residing in Jordan. It is a rich individual-level data source on the Jordanian labor market, containing retrospective information on a wide range of educational outcomes for all individuals in the sample. We restrict the JLMPS sample to Jordanians born in Jordan with non-missing date and locality of birth who enrolled in public schools. In most specifications, we further restrict the sample to students who listed school codes that could be matched to the EMIS school database discussed below. [13] Throughout the empirical analysis, we employ individual weights according to the sampling design of the JLMPS 2016. For an in-depth discussion of the data, see Krafft and Assaad (2021).

We focus on 10 educational outcomes: (1) completed basic school, including passing the final, (2) ever repeating a grade in basic school, (3) self-reported score on basic school examination among those who passed, standardized within the year of examination, (4) ever enrolled in secondary school, (5) ever enrolled in secondary school, conditional on completing basic school, (6) ever enrolled in vocational secondary school, conditional on entering secondary school, (7) ever repeated a grade in secondary school, (8) completed secondary school, including passing the final and conditional on entering, (9) self-reported score in secondary school examination, known as Tawjihi, among those who passed, standardized within the year of examination, and (10) ever enrolled in tertiary education. All outcomes except test scores are binary variables. The outcomes capture both educational attainment, in terms of enrollment and completion of grades, and learning outcomes, in terms of grade repetition, type of track in secondary school, and test scores.

The second main data source is the Education Management Information System (EMIS) database from the Ministry of Education. The EMIS is an annual school census at the school shift level enumerating all pre-higher education institutions in Jordan from 2009 to 2019. We have EMIS data for all school years except for 2011. We use the annual data for our analysis of the school supply response and link the JLMPS survey data with

12. According to Sieverding et al. (2018)'s analysis of the JLMPS, 91% of Syrian boys and 87% of Syrian girls in Jordan between the ages of 6 and 11 were enrolled in 2016. Between the ages of 12 and 17, 49% of boys and 67% of girls were enrolled. Sieverding et al. (2018) furthermore show that these results are mostly consistent with other representative surveys of Syrians in Jordan.

13. 91% of individuals' schools were matched across the JLMPS and EMIS datasets.

the concurrent EMIS data for the 2016/17 academic year using the unique national school code of the students' schools.

EMIS contains a wide range of information, including geographic location, period type (first shift in a double-shift school, second shift in a double-shift school, single-shift school), sector (public, private, UNRWA), level (kindergarten, basic, secondary), the number of classrooms, the number of teachers, and the number of students broken down by gender and nationality. Reporting of students' nationalities varies across years. While we observe the number of Jordanian and non-Jordanian students in all years, we observe the number of Syrian students specifically starting from 2012 only.

We restrict the EMIS universe to public non-UNRWA basic and secondary schools (i.e., we exclude private and UNRWA schools and kindergartens). Two remarks are in order. First, EMIS includes in all years a unique shift identifier that enables us to trace shifts from 2009 to 2019. In 2016, it also reports a school identifier that enables us to identify shifts that belong to the same double-shift school. We use both identifiers to create panel datasets at both the shift level and the school level. Second, EMIS reports in all years the geographic location at the province, district, and sub-district levels. In 2015, it also reports the locality, the fourth administrative level. We are thus able to infer the locality of every shift in all years if the shift is observed in 2015.

4 Impact on Jordanians' Educational Outcomes

4.1 Empirical Strategy

We employ a difference-in-differences strategy to identify the local effect of the inflow of Syrian refugees on the educational outcomes of Jordanians. We exploit the variation in exposure to Syrian refugees across schooling cohorts — the year they report starting school — and locations. The basic idea is to compare educational outcomes of cohorts who were in school during the Syrian conflict and older cohorts who would have finished the relevant range of school when Syrians entered Jordanian schools. We compare these young and old cohorts within locations with a high density of Syrians and use the comparison across cohorts in low-prevalence areas to control for national-level time trends. If educational trends in high-density areas would have been parallel over time to trends in low-density areas if not for the arrival of Syrians, then this strategy identifies the effect of living in a high-Syrian area on educational outcomes.

Specifically, we estimate the following ordinary least squares regression:

$$y_{ijc} = \beta(Syrians_j \times Young_c) + \alpha_j + \gamma_c + \epsilon_{ijc}$$

where y_{ijc} is the educational outcome of individual i in location j in cohort c, $Young_c$ is

a dummy variable for being in the "treated" cohort (potentially affected by the Syrian arrivals), $Syrians_j$ is the intensity of the Syrian inflow, which is measured at the location level, α_j and γ_c are two full sets of location and cohort fixed effects that account for time-invariant heterogeneity in educational outcomes across locations, and aggregate macroeconomic shocks to educational outcomes, respectively, and ϵ_{ijc} is an error term. [14] We cluster standard errors at the location level, the level of aggregation of our measure of exposure to Syrians. The main regressor of interest is the interaction of $Young_c$ and $Syrians_j$.

We use two levels of location. Our main specifications are at the school level, and we calculate Syrian prevalence in school from the EMIS data matched to the individual's school recorded in the JLMPS. We also examine effects at the locality level using the prevalence of Syrians according to the 2015 Jordanian population census at an individual's locality of birth. [15] We report both levels in Table 1 examining the effect on completed basic schooling. For the remaining outcomes, we report only the school-level results; the locality-level specifications produce similar results.

We also specify the intensity of exposure to refugees, $Syrians_j$, in multiple ways. For all outcomes, we report a set of binary variables indicating whether a location has 0-2%, 2-5%, 5-10%, and above 10% Syrians as a proportion of the population. [16] This reflects the skewed distribution of exposure to Syrians presented in Figure 2. The median Jordanian student in 2016 attends a school where Syrians are only 1.8% of the student population. While effects at this level of exposure are possible, we would anticipate any effect sizes to increase as exposure increases, especially to the 13% of Jordanian students in schools of 5-10% Syrians and the 12% of students in schools that are more than 10% Syrian. However, the statistical power to measure an effect decreases at higher levels of exposure with fewer Jordanian students enrolled and surveyed. We therefore specify the exposure variable in multiple additional ways, including the continuous proportion variable and a binary variable for above or below 5% prevalence, to evaluate the robustness of our results. These specifications are presented in Table 1 and Appendix Table 7.

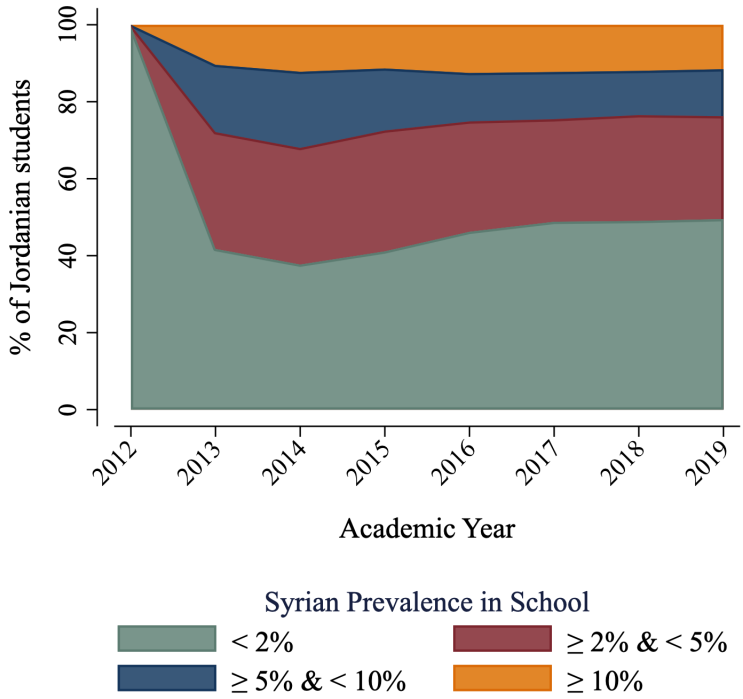
For each educational outcome, we compare an exposed, "young" cohort ($Young_c = 1$) that was potentially affected by the inflow of Syrian refugees, to an unexposed, "old" cohort ($Young_c = 0$) that was too old to be affected when Syrian enrollment spiked in 2013. Because the relevant age range varies for each outcome, the definition of the exposed and unexposed cohorts varies accordingly. We construct the age ranges as follows: for each outcome, we first specify the youngest schooling cohort that was too old to be

14. We estimate a linear probability model rather than a logit or a probit, because including a large number of fixed effects for location and cohort fixed effects may cause the incidental parameters problem.

15. There are 243 localities of birth in our sample, relative to 1,027 matched basic schools and 638 matched secondary schools.

16. For school-level specifications, the denominator is the total number of students. For locality-level specifications, the denominator is the total population in the 2015 census.

Figure 2 – **Exposure to Syrians**



Source: Education Management Information System (EMIS) database

affected by the inflow. For instance, students who entered basic school in 2003 completed the 10 years of basic education in the year before Syrians enrolled, so we would not expect this cohort to be affected.[17] The exposed group is then the next three younger cohorts; these are students who attended school during the Syrian inflow and whose outcomes (completed basic education, passed the exam, entered secondary, etc.) would be captured in the 2016 JLMPS data.[18] The oldest cohort in the unexposed group is then chosen to balance the number of exposed and unexposed cohorts in the sample.[19]

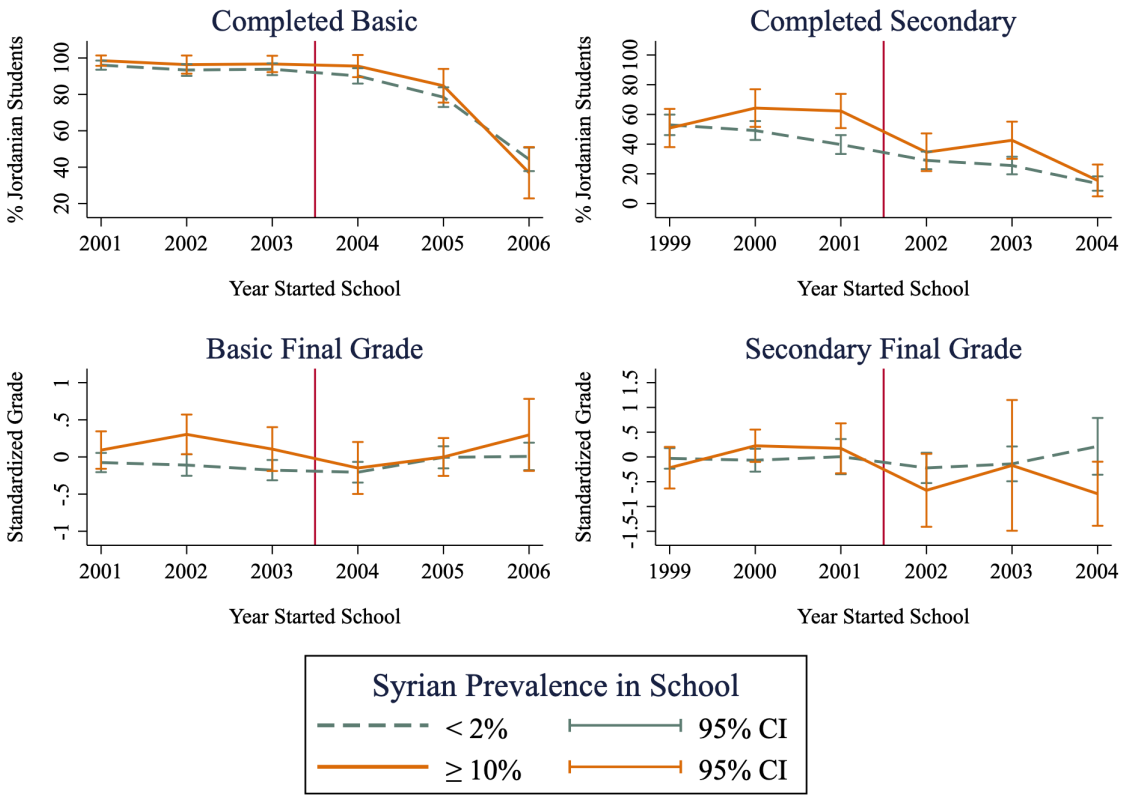
The coefficient of interest is β which measures the difference in outcomes between the old and young cohorts across high-Syrian and low-Syrian locations. If the inflow adversely affected the educational outcomes of Jordanians — if individuals in high-Syrian locations experience a larger decrease (or a smaller increase) across cohorts in their outcomes, in comparison to those in low-Syrian locations — β would be negative. In our main specifications, we have a set of three β coefficients that correspond to the 2-5%, 5-10%, and above 10% prevalence, interpreted relative to the omitted category of 0-2% prevalence.

17. Students who spend more than 10 years in basic education — due to repeating grades or pausing their education — are potentially affected. The results are the same when looking at the total years in each level of school and allowing a one year gap between young and old cohorts.

18. The JLMPS 2016 was conducted in December of 2016 and January through April of 2017. This falls in the middle of the 2016 school year, which begins in August and ends in June in Jordan.

19. The results are robust to restricting the window to two years of young and old cohorts as well.

Figure 3 – **Outcomes Over Time By Syrian Prevalence**



Source: 2016 Jordan Labor Market Panel Survey and 2016 Education Management Information System Database. The vertical red line separates the "young" cohorts who were exposed to Syrians and the "old" cohorts who were out of school when Syrians arrived. An expanded set of graphs, including additional "old" cohorts, additional outcomes, and all four prevalence categories, is in the Appendix.

For identification, we assume that in the absence of the Syrian refugee inflow, high-Syrian and low-Syrian locations would have experienced similar trends of the outcome of interest across the old and young cohorts. To evaluate this parallel trends assumption, we plot the evolution of the mean of each outcome for Jordanian students before and after the Syrian inflow in the schools with greater or equal than 10% Syrians to those in schools with less than 2% Syrians. We show these trends in Figure 3. [20] For all outcomes, we do not observe different trends across locations before the Syrians were displaced, which increases our confidence in this identification assumption.

Our underlying treatment, the prevalence of Syrians, is continuous. Callaway et al. (2021) study difference-in-differences with continuous treatments and show that the parallel trends assumption is sufficient to identify one parameter: the average treatment effect on the treated, at the level of the "dose" (Syrian prevalence in our case) that was actually received. It is the average of the treatment effects across the schools that hosted

20. We examine the parallel trends assumption for all outcome variables in all four bins of exposure in our regressions in Figures 8, 9 and 10 in the Appendix.

Syrians, comparing each school with Syrians to schools without Syrians.[21] However, to establish the "dose response" — that is, the marginal effect of each school receiving a few more Syrians — an additional assumption is necessary if there are heterogeneous effects across schools. This "strong" parallel trends assumption, following the terminology of Callaway et al. (2021), requires that if schools that received few Syrians had received many Syrians, the effect of receiving Syrians would have been the same as in the schools that actually received many Syrians.[22, 23]

The difference-in-differences methodology measures the average treatment effect on the treated of additional Syrian refugees in the schools or localities that received Syrian refugees. This estimate bundles the potential effects from crowding out or crowding in if additional aid programs accompanied the Syrians, peer effects, and changes in the returns to education. It is important to note that refugees could also have a national-level effect on public services like education, for instance if a fixed public budget is divided among more students nationally, or if the additional foreign assistance has net positive effects. In other words, refugees could have an impact that affects students in high and low-prevalence areas equally, which would not be captured by our empirical strategy. We discuss this possibility in the closing section.

4.2 Findings

We do not find evidence of significant effects of Syrian refugees on the educational outcomes of Jordanians. Across many tests — outcomes, location levels, and specifications — we reject few null hypotheses of zero at standard levels of statistical significance. In the cases of statistical significance, the effects are often non-monotonic across prevalence bins or even differing signs. We therefore attribute these statistically significant coefficients to Type I errors and the testing of multiple hypotheses, rather than a true positive or negative effect of Syrians on Jordanians' educational attainment.

We start by examining the effect of Syrians on the probability of completing basic school. In Table 1, columns 1-3 and 4-6 show the results at the school and locality of birth levels, respectively. Columns 1 and 4 show our preferred specification that bins the prevalence of Syrians, while columns 2 and 5 use an indicator for above or below 5% prevalence, and columns 3 and 6 use the continuous proportion. In five of our six specifications, we fail to reject the null hypothesis of zero correlation between the prevalence

21. In our specification, this is comparing each of the bins with 2% or greater to the bin with less than 2%.

22. Our setup is similar to Lindo et al. (2020), who also specify the continuous variable in the difference-in-differences into four bins. Cunningham (2022) explains that study in the framework of Callaway et al. (2021) and further describes the necessary assumptions in difference-in-differences with continuous treatments.

23. Other concerns raised by recent literature on difference-in-differences are avoided in our setup because the treatment is simultaneous (no variation in the timing of the treatment), consistent over time (no switching out of the treatment), and the specifications do not include controls.

Table 1 – **Completed Basic Education**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	School-Level			Locality-Level		
Prop. Syrians $\in [0.02, 0.05) \times$ Young	0.098**			0.063		
	(0.045)			(0.054)		
Prop. Syrians $\in [0.05, 0.1) \times$ Young	0.025			-0.031		
	(0.067)			(0.044)		
Prop. Syrians $\geq 0.1 \times$ Young	0.103*			-0.009		
	(0.054)			(0.043)		
Prop. Syrians $\geq 0.05 \times$ Young		0.024			-0.045	
		(0.045)			(0.034)	
Proportion Syrians in 2016 $\times$ Young			0.292			-0.184
			(0.187)			(0.276)
Observations	2,333	2,333	2,333	2,714	2,714	2,714
R-squared	0.516	0.513	0.513	0.338	0.337	0.337
School Cohort FEs	Yes	Yes	Yes	Yes	Yes	Yes
School or Locality of Birth FEs	Yes	Yes	Yes	Yes	Yes	Yes
Number of Schools or Localities	615	615	615	212	212	212
Dep. Var. Mean (Young, Schools $< 2\%$)	0.71	0.71	0.71	0.74	0.74	0.74
Dep. Var. Mean (Old, Schools $< 2\%$)	0.96	0.96	0.96	0.96	0.96	0.96

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed basic school codes that matched with the EMIS data and who started public school between 2001 and 2006. The "young" cohort started school between 2004 and 2006 and was in basic school when Syrians arrived in 2013. The outcome equals 1 if the student passed the basic final exam by the time of the survey and 0 otherwise. The omitted categories in columns 1 and 4 are areas of less than 2% Syrians. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level in specifications 1-3 and locality of birth level in specifications 4-6. *** p<0.01, ** p<0.05, * p<0.1.

of Syrians and completing basic school at standard significance levels. In column 1, the coefficient for schools between 2 and 5% prevalence and above 10% prevalence are positive and significant at the 5% and 10% levels, respectively. However, we do not believe the evidence viewed in full supports a causal interpretation.

The failure to reject the null hypothesis is not equivalent to estimating an effect of zero. For instance, larger samples could lead to more precise estimates and smaller detectable effects. However, the results can be informative to reject magnitudes of effect sizes of interest. Effects below -0.3 percentage points fall outside the 95% confidence intervals for schools with prevalence greater than 10%, for instance, relative to a mean of 71% completion in the schools with the lowest prevalence. In sum, while there is little evidence supporting a positive or negative effect, the data do refute large, negative effects on the probability of completing basic school even among Jordanians that were most exposed to Syrians.

Table 2 explores additional outcomes that could have been affected by Syrians attending the same basic schools. We present the binned specifications, but we also run the continuous and above 5% prevalence specifications, as well as specifications with governorate by school cohort fixed effects, which would capture any governorate-specific trends.

Table 2 – **Additional Outcomes from Exposure During Basic Education**

VARIABLES	(1) Repeated Basic	(2) Basic Final Grade	(3) Entered Secondary	(4) Entered Secondary (Who Completed Basic)	(5) Vocational Secondary
Prop. Syrians $\in [0.02, 0.05) \times$ Young	0.020	-0.077	0.080	0.026	-0.096
	(0.023)	(0.162)	(0.067)	(0.071)	(0.077)
Prop. Syrians $\in [0.05, 0.1) \times$ Young	-0.020	-0.141	-0.064	-0.062	0.026
	(0.020)	(0.162)	(0.095)	(0.097)	(0.069)
Prop. Syrians $\geq 0.1 \times$ Young	0.012	-0.159	0.165**	0.110	-0.027
	(0.027)	(0.156)	(0.072)	(0.068)	(0.081)
Observations	2,310	1,784	2,333	1,867	1,430
R-squared	0.338	0.495	0.514	0.509	0.423
School Cohort FEs	Yes	Yes	Yes	Yes	Yes
School FEs	Yes	Yes	Yes	Yes	Yes
Number of Schools	613	500	615	518	435
Dep. Var. Mean (Young, Schools $< 2\%$)	0.02	-0.05	0.56	0.78	0.14
Dep. Var. Mean (Old, Schools $< 2\%$)	0.02	-0.10	0.75	0.78	0.18

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed basic school codes that matched with the EMIS data and started public school between 2001 and 2006. The "young" cohort started school in 2004 or later and was in basic school when Syrians arrived. The outcome in column 1 equals 1 if a student repeated a level at any time during basic education. The outcome in column 2 is the final grade among students who passed, standardized within the year of the exam. The outcome in column 3 equals 1 if the student entered secondary. The outcome in column 4 is the same, and the sample is restricted only to those who completed basic school. The outcome in column 5 equals 1 if the student entered vocational secondary, among those who entered all types of secondary. The omitted categories are schools of less than 2% Syrians. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1.

The results for these specifications across all outcomes and both location levels reflect the same pattern as the main specification. Table 2 estimates the effects on repeating any grade during basic education, the standardized final grade received at the end of the basic stage, and the probability of entering secondary, both for the whole sample and restricting to those who completed basic education, where an effect is more likely to be detected, and the probability of entering vocational secondary school among those entering secondary. The estimates show no consistent pattern, as there are both positive and negative effects, and the magnitudes are generally small relative to the means. Column 2, the effect on the final exam score, shows monotonically decreasing point estimates, although each are insignificant, and the continuous measures are also insignificant (shown in Appendix Table 7). The estimate for the propensity to enter secondary in the highest-prevalence bin is positive and significant at the 5% level. We again do not believe this represents a positive effect in practice, but it does rule out negative effects, since the lower bound of the 95% confidence interval is +2 percentage points. Overall, we argue that there is little evidence of either a positive or negative average effect on basic schooling for Jordanians from the marginal Syrian student entering the school.

Table 3 – **Outcomes from Exposure During Secondary Education**

VARIABLES	(1) Repeated Secondary	(2) Completed Secondary (Who Entered)	(3) Secondary Final Grade	(4) Entered Tertiary (Who Completed Secondary)
Prop. Syrians $\in [0.02, 0.05) \times$ Young	-0.141**	0.021	0.332	0.160*
	(0.064)	(0.088)	(0.308)	(0.086)
Prop. Syrians $\in [0.05, 0.1) \times$ Young	-0.035	0.247*	-0.262	0.224**
	(0.083)	(0.142)	(0.256)	(0.093)
Prop. Syrians $\geq 0.1 \times$ Young	-0.264*	0.140	-0.041	-0.206
	(0.148)	(0.106)	(0.648)	(0.272)
Observations	1,754	1,754	313	806
R-squared	0.432	0.490	0.507	0.540
School Cohort FEs	Yes	Yes	Yes	Yes
School FEs	Yes	Yes	Yes	Yes
Number of Schools	432	432	432	248
Dep. Var. Mean (Young, Schools $< 2\%$)	0.32	0.33	0.01	0.68
Dep. Var. Mean (Old, Schools $< 2\%$)	0.23	0.60	-0.02	0.85

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed secondary school codes that matched with the EMIS data and started public school between 1999 and 2004. The "young" cohort started school in 2002 or later and was in secondary school after Syrians arrived. The outcome in column 1 equals 1 if a student repeated a level at any time during secondary education. The outcome in column 2 equals 1 if a student passed the secondary exam before the time of the survey. The outcome in column 3 is the final grade among students who passed, standardized within the year of the exam. The outcome in column 4 equals 1 if the student entered tertiary school, including Intermediate Diploma, Bachelor's, Post-Graduate Diploma, Masters, or PhD. The omitted categories are schools of less than 2% Syrians. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 presents four additional outcomes that are plausibly affected by Syrians attending secondary schools. We assess the likelihood of repeating a grade during secondary school, completing secondary school, entering any tertiary school, and the secondary school final exam grade. The points estimates are again small and do not emit a clear narrative. The estimates for repeating secondary are all negative and the coefficients for entering tertiary are all positive — suggesting that, if anything, refugees potentially had a small positive effect locally. However, the above 5% prevalence, higher-powered estimates (not shown) are still insignificant, leading to an overall lack of evidence for effects of exposure during secondary school as well.

We run additional tests examining potentially heterogeneous effects by gender, household wealth, and whether the school opened a second shift since 2012. The results are presented in Appendix Tables 8, 9 and 10, respectively. We fail to find evidence of significant effects on any of these sub-groups as well. Overall, we do not find evidence of negative effects of the Syrian refugee inflow on the educational outcomes of Jordanians, for both educational attainment (enrollment and completion of grades) and learning outcomes (grade repetition, vocational track, and test scores).

5 Impact on School Supply

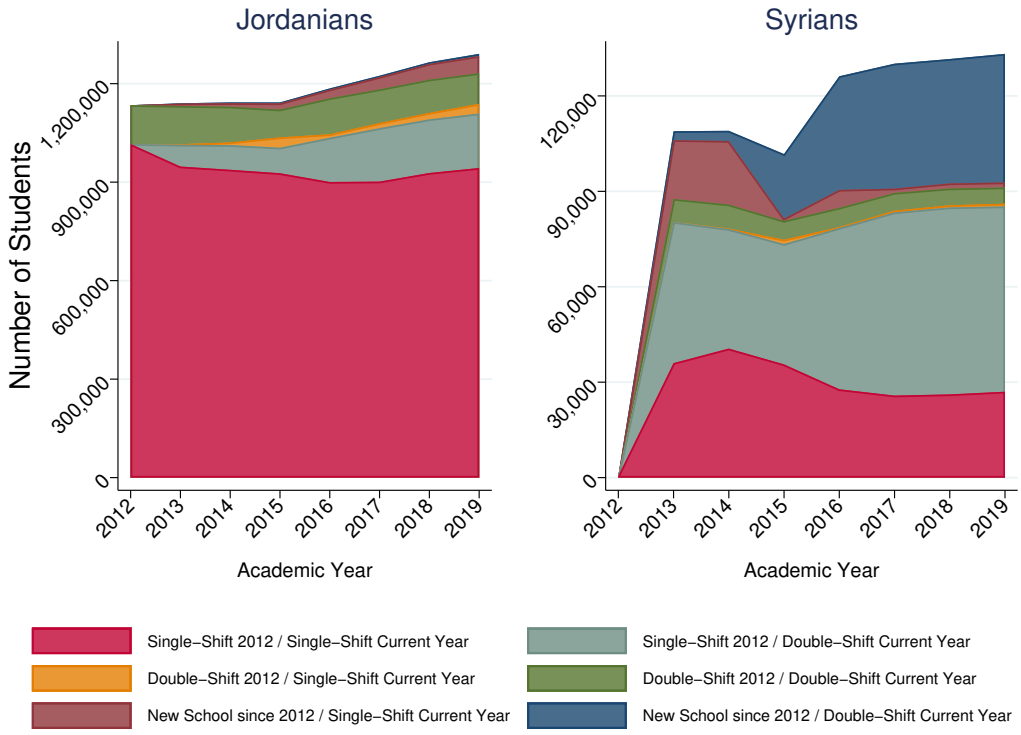
The findings in the previous section suggest that there are negligible effects of the Syrian refugee inflow on Jordanians' educational outcomes. We hypothesize that the Jordanian government's public school supply response contributed to mitigating any (potentially adverse) impact of Syrian arrivals. In order to examine the measures undertaken by the Jordanian government to accommodate Syrian students, we draw on fine-grained administrative data from the Education Management Information System (EMIS) spanning the period from 2009 to 2019. In this section, we first introduce descriptive evidence on the school supply response based on the distribution of Jordanian and Syrian students across the number of shifts, the proportion of Syrian students, the student-teacher ratio, and the classroom density. We then present a regression analysis of the impact of the Syrian arrivals on a number of school-supply outcomes.

5.1 Distribution of Students by School Characteristics

To assess the school supply response, we show in Figures 4–6 the evolution between 2009 and 2019 of Jordanian and Syrian students in public non-UNRWA basic and secondary schools by a host of school characteristics. We first note that the total number of Jordanian students increased, rising from 1.12 million in 2010 to 1.29 million in 2019. The number of Syrian students, which was negligible (558 students) in 2012, grew to 109,000 in 2013 due to the Syrian conflict. It then remained stable in 2014, declined slightly to 102,000 in 2015, before it grew to 126,000 in 2016. The Syrian student population increased only slightly afterwards, reaching 133,000 in 2019. This setting therefore offers a clean separation of "before" and "after" periods with the treatment starting in 2013, with little variation within the "after" period.

Figure 4 traces the growth of single- and double-shift schools for Jordanian and Syrian students. To construct this figure, we employ the school-level panel data to distinguish between (1) schools that were single-shift in both 2012 and the current year, (2) schools that were single-shift in 2012 and are double-shift in the current year (shift opening), (3) schools that were double-shift in 2012 and are single-shift in the current year (shift closure), (4) schools that were double-shift in both 2012 and the current year, (5) new schools that did not exist in 2012 and were single-shift in the current year (new single-shift schools), and (6) new schools that did not exist in 2012 and were double-shift in the current year (new double-shift schools). The figure shows that the large majority of Jordanian students in all years were enrolled in single-shift schools. However, the proportion of Jordanian students enrolled in double-shift schools increased from 10% in 2012 to 21% in 2019. This is largely driven by two waves of adding an evening shift to single-shift schools that occurred in 2013 and 2016 when 6% and 5%, respectively, of

Figure 4 – **Distribution of Jordanian and Syrian Students by the School's Number of Shifts Relative to 2012**



Source: EMIS 2012 to 2019 restricted to public non-UNRWA basic and secondary schools.

Jordanian students' schools moved from one shift to two shifts. Finally, 5% of Jordanian students in 2019 attended schools built since 2012.

When Syrians entered the school system in 2013, 81% enrolled in pre-existing schools: 33% attended single-shift schools, 7% attended double-shift schools that already had two shifts before they arrived, and 41% attended schools that opened a second shift to accommodate them. The remaining 19% attended new schools, which were mostly single-shift schools located in the Za'atari and Azraq camps. When the number of Syrian students grew in 2016, most entered schools that had been built since 2012, and by then, almost all of these new schools had opened a second shift. By 2019, 31% of Syrian students attended schools that opened since 2012. A larger share (43%) still attended pre-existing schools that opened a second shift since 2012, and overall 78% of Syrians attended double-shift schools by 2019.

Figure 5 shows the distribution of Jordanian and Syrian students by the proportion of Syrian students. According to panel (a), which shows the distribution of students by the proportion of Syrians at the school level, Jordanians' exposure to Syrians increased in 2013 but remained modest throughout the period. In 2016, only 13% of Jordanians were in schools with 10% or more Syrians and almost all Jordanian students were in schools with less than 50% Syrians. Panel (b), which shows the distribution by the proportion

of Syrians at the shift level, indicates that Jordanians' exposure to Syrians was further mitigated by segregating Syrians and Jordanians by shift within schools. In 2016, only 4% of Jordanians were in shifts with more than 10% Syrians.

For Syrians, panel (a) shows that 78% of Syrians in 2016 were in schools with 10% or more Syrians, with 31% enrolled in schools with 90% or more Syrians. Panel (b) shows stronger segregation by shift within schools: 77% of Syrians in 2016 were in shifts with 10% or more Syrians, and 66% were enrolled in shifts with 90% or more Syrians.

Figure 6 suggests that the distribution of Jordanian students by both the student-teacher ratio and the classroom density was not adversely affected by the Syrian arrivals in 2013. In 2016, 4% of Jordanians were in shifts that had at least 30 students per teacher, and 42% were in shifts with at least 30 students per classroom. This actually represents a slight improvement since 2012, when 3% of Jordanians were in shifts with at least 30 students per teacher, and 51% were in shifts with at least 30 students per classroom. For Syrians, however, schooling was of lower quality. In 2016, 17% were in shifts that had at least 30 students per teacher, and 59% were in shifts that had at least 30 students per classroom.

To summarize, the Jordanian government responded to Syrian students arrivals in 2013 by adding evening shifts to single-shift schools and enrolling Syrians in preexisting single-shift schools and opening new schools in Syrian camps. The government further mitigated the exposure of Jordanian students to Syrians, by segregating Syrians and Jordanians across shifts within double-shift schools. This may explain why the student-teacher ratio and the classroom density for Jordanian students were largely unaffected by the arrival of Syrians.

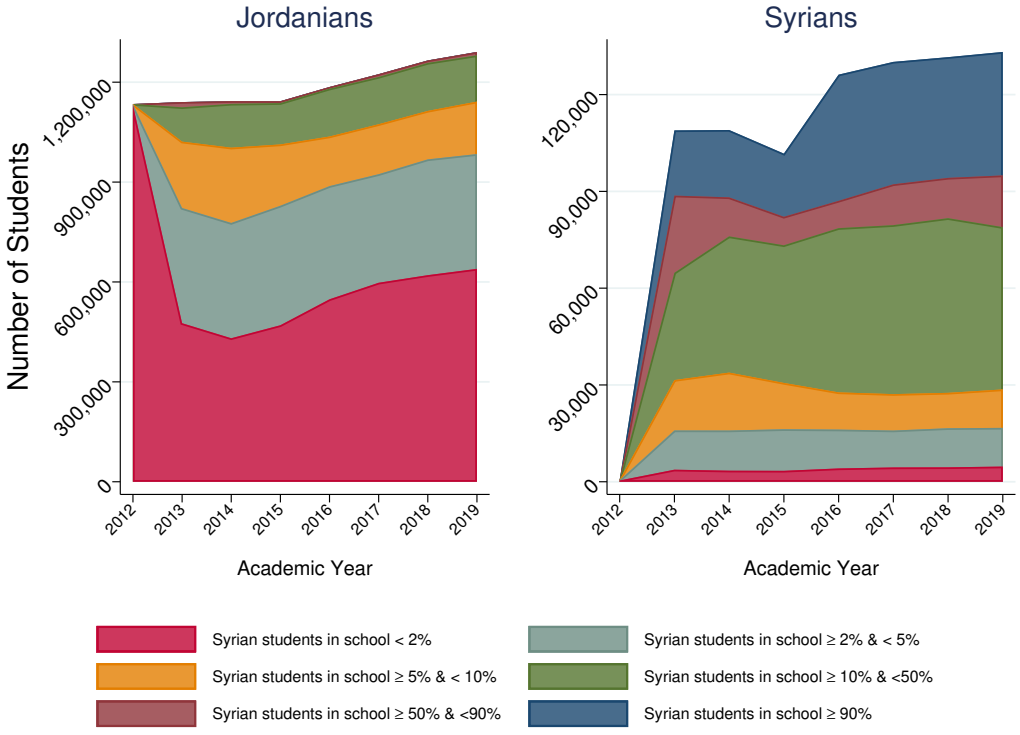
5.2 Regression Analysis

We now turn to the regression evidence on the impact of the Syrian arrival in 2013 on school supply in Jordan. To this end, we create two datasets based on the EMIS, restricted to public non-UNRWA schools. The first is a yearly panel dataset at the locality level that traces localities from 2009 to 2019.[24] The second is a yearly panel dataset at the school level that traces public non-UNRWA basic and secondary schools that remained open throughout the same period. In both cases, we estimate the following regression

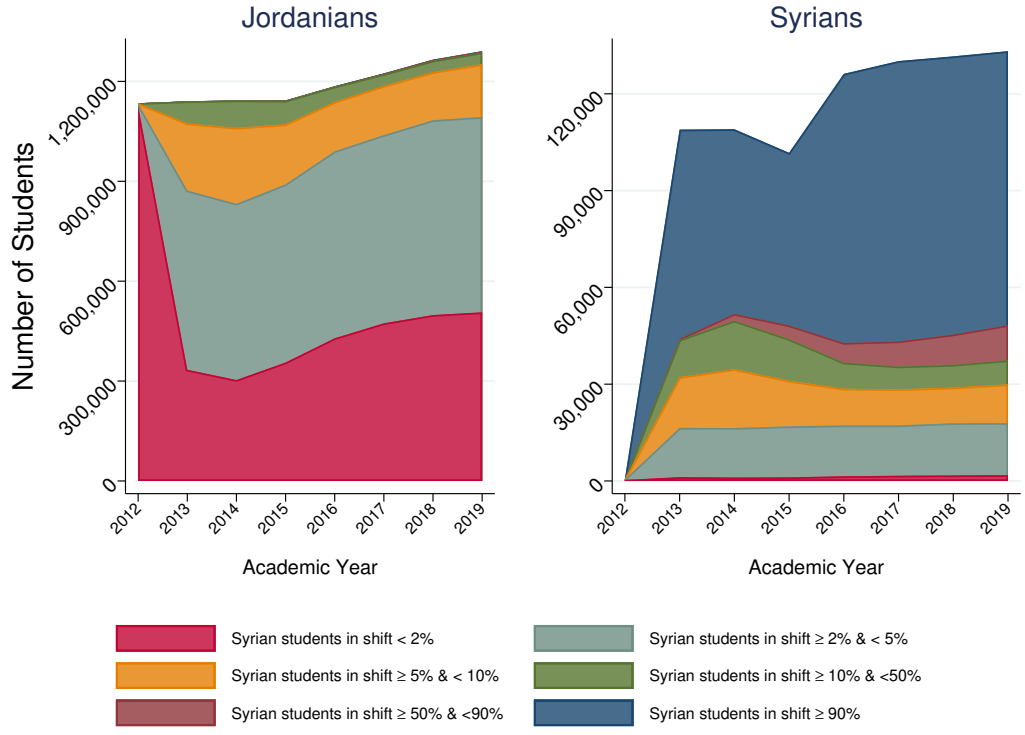
24. We are able to identify the locality (as of 2015) for 92% of Jordanian students in public schools in 2019.

Figure 5 – **Distribution of Jordanian and Syrian Students by the Proportion of Syrian Students from 2012 to 2019**

(a) Proportion of Syrian Students: School-level



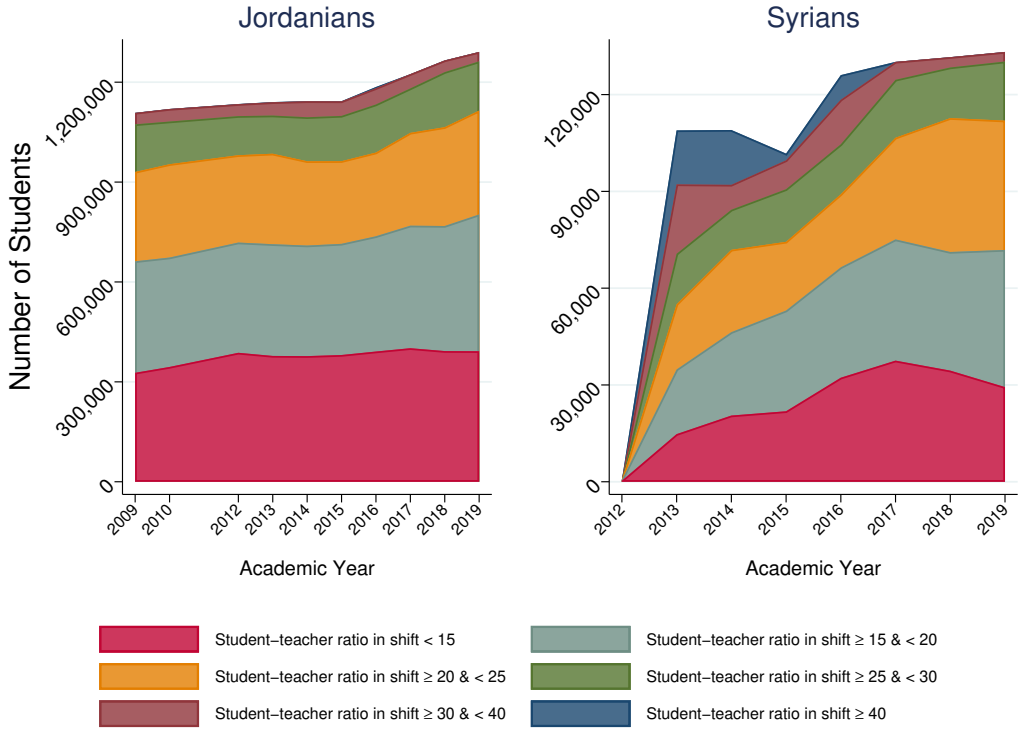
(b) Proportion of Syrian Students: Shift-level



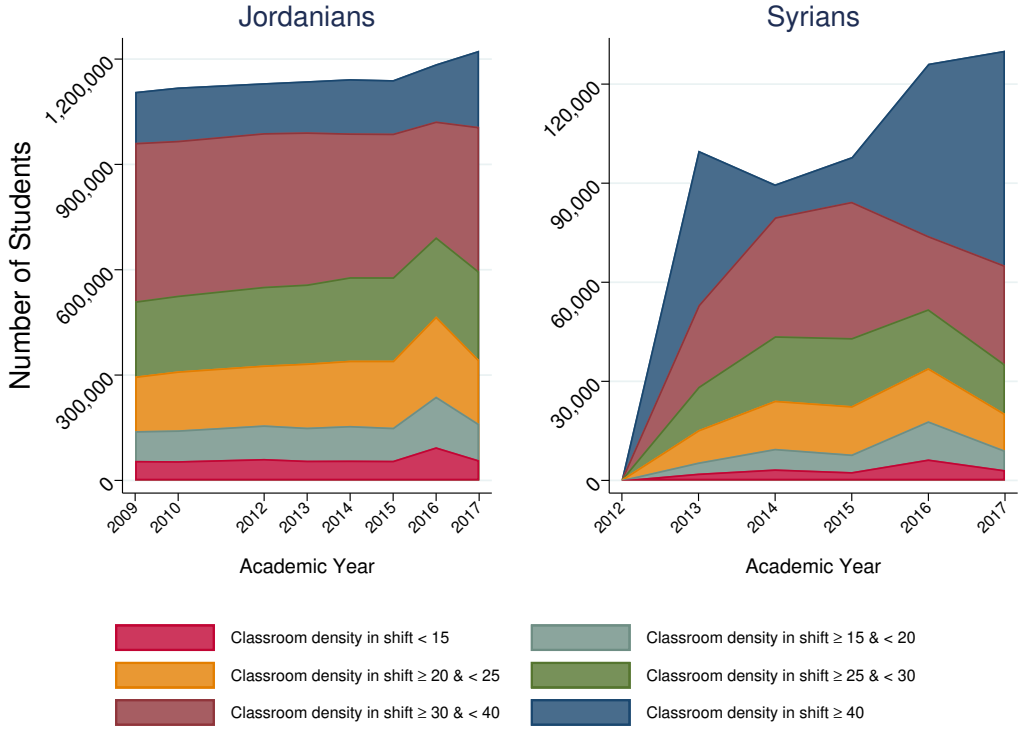
Source: EMIS 2012 to 2019 restricted to public non-UNRWA basic and secondary schools.

Figure 6 – **Distribution of Jordanian and Syrian Students by Student-Teacher Ratio and Classroom Density from 2009 to 2019**

(a) Student-Teacher Ratio



(b) Classroom Density



Notes: Student-teacher ratio and classroom density are measured at the shift level. Source: EMIS 2009 to 2019 restricted to public (non-UNRWA) basic and secondary schools. 2018 and 2019 have significant missing data on classroom densities and are omitted.

that resembles the individual-level difference-in-differences specification that we used for the JLMPS data:

$$y_{jt} = \beta(Syrians_j \times Post_t) + \alpha_j + \gamma_t + \epsilon_{jt}$$

where y_{jt} is the outcome of locality or school j in school year t. For the locality-level regressions, we examine the following outcomes: (1) the number of public non-UNRWA basic and secondary schools in the locality, (2) the number of double-shift public non-UNRWA basic and secondary schools in the locality, (3) the proportion of Jordanian students in shifts that have at least 30 students per classroom out of the total number of Jordanian students in the locality, and (4) the proportion of Jordanian students in shifts that have at least 30 students per teacher out of the total number of Jordanian students in the locality. For the school-level regressions, we examine the following outcomes: (5) whether a school is a double-shift school, (6) the proportion of Jordanian students in shifts that have at least 30 students per classroom, and (7) the proportion of Jordanian students in shifts that have at least 30 students per teacher.

The variable $Syrians_j$ is specified as a set of dummy variables that take the value 1 if the proportion of Syrian students in locality or school j in 2016 is between 2% and 5%, between 5% and 10%, and greater than 10%, respectively, with the omitted group being localities or schools where the proportion of Syrian students is less than 2%, as in the individual-level regressions. The variable $Post_t$ is a dummy variable that equals 1 for all school years starting from 2013. The interaction term thus captures the impact of Syrian arrivals on school supply outcomes. We control for a full set of locality or school fixed effects in α_j and a full set of school year fixed effects in γ_t. Standard errors are clustered at the locality or school level, and the regressions are weighted by the number of Jordanian students in public non-UNRWA basic and secondary schools, measured at the locality or school level in each year.

The results are shown in Table 4. The locality-level regressions in columns 1 and 2 indicate that the Syrian inflow had a positive and statistically significant effect on the number of schools and on the number of double-shift schools in the locality. For both outcomes, the effects are observed among Jordanian students in localities where Syrian students constitute at least 5% of students. In terms of magnitude, we observe that, in comparison to Jordanian students in localities with less than 2% Syrian students, those in localities with 10% or more Syrian students had 1.7 more new schools on average after Syrians arrived, which corresponds to 5% of the average number of schools per Jordanian student in locality in 2012. For Jordanian students in high-Syrian localities, the number of double-shift schools rose by 9.45 schools after 2012 in comparison to students in low-Syrian localities, which is about twice the average number of double-shift schools per Jordanian student in locality in 2012. The effect is supported in the school-level regression

Table 4 – **Impact of Syrian Students on Jordanian School Supply**

	Locality-Level Regressions (1)–(4)				School-Level Regressions (5)–(7)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	No. Schools	No. Double-Shift Schools	Prop. Jordanian Students in Shifts $\geq$ 30 Students per Classroom	Prop. Jordanian Students in Shifts $\geq$ 30 Students per Teacher	=1 if Double-Shift	Prop. Jordanian Students in Shifts $\geq$ 30 Students per Classroom	Prop. Jordanian Students in Shifts $\geq$ 30 Students per Teacher
Prop. Syrians $\in [0.02, 0.05) \times$ Post-2012	0.064	0.421	-0.025	-0.002	0.000	-0.025*	-0.004
	(0.349)	(0.378)	(0.021)	(0.016)	(0.013)	(0.014)	(0.010)
Prop. Syrians $\in [0.05, 0.1) \times$ Post-2012	1.408***	3.315**	-0.023	-0.007	0.047***	-0.014	-0.003
	(0.509)	(1.369)	(0.022)	(0.009)	(0.017)	(0.018)	(0.014)
Prop. Syrians $\geq 0.1 \times$ Post-2012	1.711***	9.447***	-0.090***	-0.003	0.574***	-0.035*	0.003
	(0.534)	(2.822)	(0.024)	(0.011)	(0.027)	(0.018)	(0.011)
Observations	7,024	7,024	7,024	7,024	31,107	31,057	31,057
R-squared	0.999	0.975	0.899	0.730	0.791	0.700	0.494
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Locality or School FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Localities or Schools	707	707	707	707	3,111	3,106	3,106
Dep. Var. Mean (2012)	32.10	4.76	0.51	0.03	0.11	0.52	0.03

Notes: The data source is the EMIS administrative data from 2009 to 2019. In columns 1, 2, 3, and 4, the outcomes are restricted to public, non-UNRWA basic and secondary schools that have a locality identifier in 2015. In columns 5–7, the universe of schools is restricted to public non-UNRWA basic and secondary schools that remained open throughout the period from 2009 to 2019. The proportion of Syrian students is measured in 2016 and at the locality level in columns 1–4 and at the school level in columns 5–7. Standard errors clustered at the locality or school level are in parentheses. Regressions are weighted by the number of Jordanian students in public non-UNRWA basic and secondary schools in each year at the locality or school levels. $*p < 0.10, **p < 0.05, ***p < 0.01$.

in column 5, which shows that Jordanian students in high-Syrian schools were more likely to be enrolled in double-shift schools after 2012. Furthermore, these effects are consistent with Figure 4 which shows that 17% of Syrians in 2013 were enrolled in newly-constructed single-shift schools (in camps) and that 50% were enrolled in double-shift schools.

Consistent with Figure 6, we fail to detect a (positive) effect on the proportion of Jordanian students in shifts with 30 or more students per teacher or with 30 or more students per classroom, presented in columns 3, 4, 6, and 7. If anything, we observe a negative effect on the prevalence of high classroom density among Jordanian students in high-Syrian localities and schools. [25]

To summarize, the regression analysis shows that the Jordanian government reacted to the Syrian inflow by enrolling Syrians in evening shifts, and to a lesser extent, by opening new schools in camps. This policy apparently mitigated the exposure of Jordanian students to Syrians and left the student-teacher ratio and the classroom density among Jordanian students largely unaffected.

6 What if the Supply Response Had Not Happened: A Simulation

In this section, we aim to estimate the potential magnitude of over-crowding for Jordanian students that was avoided by the policy response of opening second shifts to accommodate Syrian students. We explore the effect of the Syrian inflow on classroom densities and student-teacher ratios among Jordanian students under the environment where Syrians enroll in the same schools, but no second shifts or additional teachers or classrooms are added in 2013 or later. For this simulation, we add the number of students in post-inflow second shifts to the school's first shift and use the number of teachers and classrooms from the school's first shift to calculate the classroom densities and student-teacher ratios. [26] This simulates what would have happened to classroom densities and student-teacher ratios by 2016 in all non-UNRWA public schools if the Syrian students had joined the school's first (and, before Syrians arrived, only) shift without the expansion of teachers and classrooms made possible by the second shift. For schools that were single-shift in 2016 and schools that had two shifts before 2013, the actual densities are the same as the simulated densities. To present the results, we bin

25. We have also investigated the impact of Syrian presence at the locality level on the proportion of Jordanian students in private schools out of the total number of Jordanian students in public, private, and UNRWA schools in the locality. We failed to detect any effect, which suggests that Jordanians did not respond to the Syrian inflow by switching to private schools. However, we take this evidence as only suggestive because the 2015 locality is missing for one third of Jordanian students in private schools, compared to only 8% of Jordanian students in public schools, and the incidence of missing locality could be correlated with Syrian presence.

26. We refer to second shifts added from 2013 onward as "post-inflow" second shifts.

Table 5 – **Distribution of Jordanian Students by School Shift Type and the Proportion of Syrian Students in 2016**

Type of Shift	**Percent Syrians in Locality**				
	<2	2- <5	5- <10	≥10	Total
Single shift	97.5	86.3	87.0	50.2	87.3
First shift of double shift	1.5	6.5	6.9	45.9	8.7
Second shift of double shift	1.0	7.1	6.1	3.9	4.0
Total	100.0	100.0	100.0	100.0	100.0
Row percent	42.8	30.8	15.6	10.8	100.0

Notes: The data source is the EMIS administrative data for 2016 restricted to public (non-UNRWA) basic and secondary schools.

schools by their level of exposure to Syrian students.

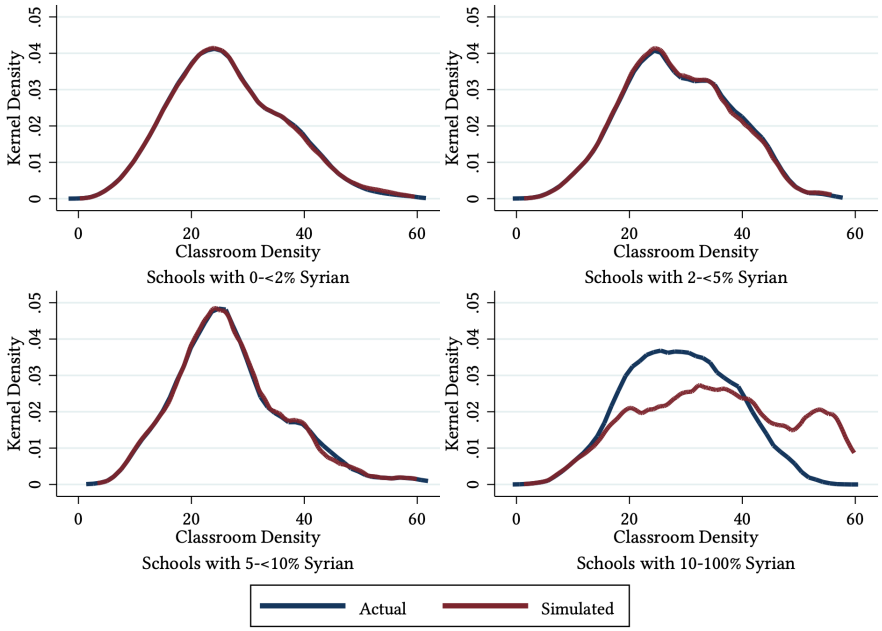
By 2016, 225 schools had added a second shift since Syrians arrived. These schools contained 144,000 Jordanian students (11% of all Jordanians) and 58,000 Syrian students (44% of all Syrians). As shown in Table 5, the proportion of Jordanians in double-shift schools increases as the percentage of Syrians in the school increases, but at the highest percent Syrian category (10-100 percent), the proportion of Jordanian students in the first shift increases substantially, but the proportion of those in the second shift declines relative to more intermediate levels of exposure to Syrians. Because there are too few Jordanian students in double-shift schools in the high-exposure group (about 5 percent of the total) for us to detect direct effects on them, we resort to a simulation to determine what would have happened to them had the second shifts not been created.

Our simulation, presented in Figure 7a, indicates that only Jordanian students in schools with a high exposure to Syrians (greater than 10%) would have experienced substantial changes in classroom densities or student-teacher ratios had these post-inflow second shifts not been added.

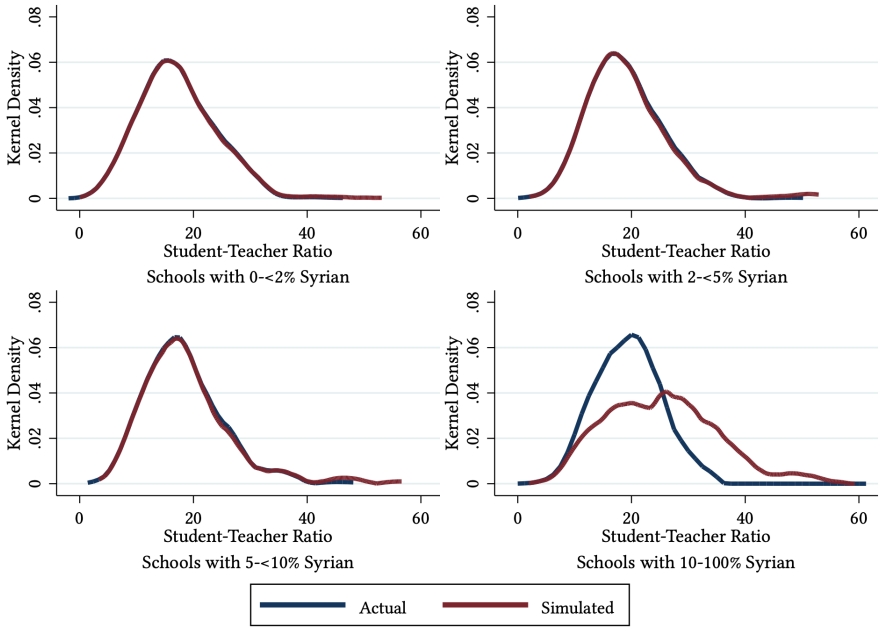
We also examine in Table 6 the proportion of Jordanian students that cross certain thresholds of classroom density and student-teacher ratios in the actual and simulated data. Based on the literature that examines the effects of class size on education outcomes, we selected thresholds of 20 and 30 for student-teacher ratios and 30 and 40 students for classroom density. The threshold of 40 derives from the so-called Maimonides rule, a rule proposed by the twelfth century rabbinic scholar who proposed a maximum class size of 40 for one teacher. This is the threshold that is used to trigger the addition of a new class in Israeli schools (Angrist and Lavy, 1999; Angrist et al., 2019). In Bolivia, a threshold of 30 is used as a teacher allocation rule, which Urquiola (2006) uses to show negative effects

Figure 7 – **Distributions of Classroom Densities and Student-Teacher Ratios for Jordanian Students: Actual and Simulated**

(a) Classroom Densities



(b) Student-Teacher Ratios



Notes: The data source is the EMIS adminstrative data between 2013 to 2016 restricted to public (non-UNRWA) basic and secondary schools. The vertical axis is the density of Jordanian students estimated by the Epanechnikov kernel. The horizontal axis in the top panel is the number of students divided by the number of classrooms, and the horizontal axis in the bottom panel is the number of students divided by the number of teachers. The actual density represents the shift-level distributions in the 2016 school year. The simulation densities are created by adding students from second shifts created after the 2012 school year to the first shifts and using the teachers and classrooms from the first shifts only to create simulated classroom densities and student-teacher ratios. This simulates the classroom densities and student-teacher ratios if a second shift (and the accompanying classrooms and teachers) had not been added. The half-width of the kernels for actual and simulated densities is 2.

Table 6 – **Classroom Densities and Student-Teacher Ratios for Jordanian Students Above Common Thresholds: Actual and Simulated**

Outcome	Cutoff	Actual vs Simulations	Percent Syrians in Locality <2%	2- <5%	5- <10%	≥10%	All
Classroom Density	>30	Actual	34.2	43.7	32.0	47.5	38.2
		Simulation	34.6	43.9	33.2	67.3	41.0
	>40	Actual	11.5	14.5	11.4	15.8	12.9
		Simulation	12.0	15.6	11.9	42.7	16.7
Student-Teacher Ratio	>20	Actual	3.2	5.5	4.8	4.6	4.2
		Simulation	3.9	7.2	6.8	29.9	8.4
	>30	Actual	0.3	0.3	0.6	0.4	0.3
		Simulation	0.8	2.0	2.5	6.5	2.0
Number of Jordanian Students in 000s			624	370	162	158	1,314
Row %			47.5	28.1	12.4	12.0	100.0

Notes: The data source is the EMIS adminstrative data between 2013 to 2016 restricted to public (non-UNRWA) basic and secondary schools. The cells of the table show the percentage of Jordanian students above common thresholds of classroom densities and student-teacher ratios in the school shift they are. "Actual" shows the existing percentages in 2016. "Simulation" allocates Syrian students in second shifts created after the 2012 school year to the first shifts and using the teachers and classrooms from the first shifts only to create simulated classroom densities and student-teacher ratios.

of larger class sizes. While these thresholds seem appropriate for classroom density in our context, we use lower thresholds for student-teacher ratios per shift since teachers are not in class the whole time students are in school. Thus dividing the number of students in a shift by the number of teachers understates the number of students taught by one teacher in a typical class session.

As shown in Table 6, 38% of Jordanian students in basic schools in 2016 were in schools with an average classroom density greater than 30 students, and 13% were in schools with classroom densities of more than 40. The simulated results are within one percentage point of the actual results except in schools with 10% Syrian students or more. In these high-prevalence schools, adding an additional shift meant that 20% of these Jordanian students (47 vs 67%, roughly 31,000 students) were able to stay in shifts below 30 students per teacher and 27% (42,500) were able to stay below 40 students per teacher. This is one metric for how Jordanian students in schools of at least 10% Syrians, who make up about 12% of Jordanian students in public schools, would have been adversely affected had the second shifts not been created to accommodate the arrival of Syrians.

Simulation results on student-teacher ratios show somewhat larger effects and at lower levels of exposure to Syrians. The proportion of Jordanians in shifts of more than 30 students per teacher is quite low, but it would have increased nearly six-fold had the second shifts not been established for schools with at least 10% Syrians. The proportion above the 30 threshold increases by 2 percentage points (or 42%) even in schools with 5-10% Syrian exposure. Very few Jordanian public school students were in shifts where

student-teacher ratios exceeded 40. However, if the post-inflow second shifts were not created, nearly 6.5% of students in high exposure schools (10,000 students) would have been in shifts that exceeded this threshold.

7 Discussion

In the preceding analysis, we use a difference-in-differences methodology to argue that the education outcomes of Jordanian students in public schools were not significantly affected by exposure to the mass arrival of Syrian refugees. We examine a broad range of outcomes related to attainment and to achievement at basic and secondary levels. Our methodology identifies the effect by comparing various education outcomes across individuals whose schools, localities of birth, and age cohorts experienced different levels of exposure to the refugee arrivals. Our identification strategy depends on the assumption that high and low exposure schools (and localities) would have had similar trends in these outcomes in the absence of the refugee inflow, and we show that the trends, as well as the outcomes, were similar in the areas with high and low exposure to Syrians prior to the inflow.

We discuss one reason for these null findings: the school supply response pursued by the Jordanian government with the assistance of international donors. This response consisted primarily of adding evening shifts to public schools to accommodate Syrian students. These second shifts were added in two major waves, one in 2013, the year when Syrian students began enrolling in Jordanian public schools, and one in 2016, the year when we are able to measure impact using our data. By doing this, the Jordanian government was able to insulate Jordanian students from high levels of exposure to Syrians in the same school shift. By 2016, only 4 percent of Jordanian students were in shifts with 10 percent or more Syrian students, whereas 66 percent of Syrian students were in shifts that were greater than 90 percent Syrian.

We analyze the supply response at the school and locality level using a similar difference-in-differences methodology. We find that the government responded by establishing some new schools in high exposure localities (mostly in camps) and substantially increased the number of schools with two shifts. This essentially protected Jordanian students in these localities from attending shifts with classroom densities or student-teacher ratios of 30 or more students. At the school level, we find a substantial increase in the probability of adding a second shift in high-exposure schools, and no significant effects on the proportion of Jordanian students in large classrooms.

As discussed in the introduction, there are three channels through which Syrian arrivals could affect the educational outcomes of Jordanians: (1) changes in resources per student, (2) peer effects, and (3) changes in the returns to education due to changes in the labor market. Our findings suggest that peer effects were largely irrelevant due to

the segregation of Syrian students in evening shifts, which minimized the exposure of Jordanian students to their Syrian peers. Fallah et al. (2019)'s findings demonstrate that Syrian arrivals had minimal effects on Jordanian labor outcomes, and therefore perceived changes in the returns to education for Jordanians are unlikely. The main potential channel in our context, then, is the net change in resources, accounting for an increased student population and changes in foreign and domestic public spending. The supply response mitigated potential competition over resources at the school level, and we find no evidence of effects on Jordanians' educational outcomes.

Our findings on education relate closely to the work of Rozo and Sviatschi (2021) on the housing market in Jordan. They find that the arrival of Syrians increased housing expenditures for Jordanians because the supply of housing did not sufficiently respond. In the education sector, however, we find that supply did respond, and the effects of Syrians on Jordanian outcomes are minimal. These two cases illustrate a broader point: that the effects of immigration depend on many factors, including — often critically — on the policy response (Clemens et al., 2018).

The fact that we find null results from local exposure to Syrians does not mean that Jordanian students were totally unaffected. First, we are of course not able to measure all possible outcomes. Second, Jordanian students could have been affected in the aggregate as a result of overall competition for scarce budgetary and human resources dedicated to pre-university education in Jordan. According to the UNESCO Institute of Statistics (UIS) data, expenditure per student in Jordan declined in real terms for both basic and secondary schooling by 3.5% per annum from 2011 to 2018 (UNESCO, 2020). However, if total expenditures were divided only among Jordanian students in the public education system, it would have still declined by 2.3% per annum over the same period, suggesting that the reduction of resources flowing to public education has broader roots than the arrival of Syrian refugees.

Much of the additional cost to educate Syrians was borne by foreign assistance instead of the Jordanian taxpayer (Bataineh, 2019). In the 2017-2019 period, international donors provided 1.58 billion USD to the Jordan Response Plan to the Syrian Crisis out of 2.48 billion USD requested (JORISS, 2020). 285 million USD went to education, out of which 189 million (or 66 percent) went directly to the Jordanian Ministry of Education (JORISS, 2020). Donors covered costs of fee waivers for Syrians in basic schools, teacher salaries and textbook costs for second shifts, new schools in camps, and additional classrooms in existing schools among other expenses to include Syrians in the public system (Nasser and Symansky, 2014; UNICEF and JESC, 2019). [27]

The policy of assigning the majority of Syrian students to evening shifts in existing public schools may have shielded Jordanian students from over-crowding and other possible consequences of exposure to Syrians, but this is only one component of welfare. The

27. See Plant (2018) for an additional discussion on Jordan's government expenditures on Syrians.

policy has essentially created a segregated education system, and we do not study the effect of it or alternatives on outcomes for Syrian students.[28] The Jordanian response has effectively absorbed a large number of Syrians, but the quality of schooling for the displaced remains an open, critical question.

28. See Sieverding et al. (2018) for an analysis of Syrians' educational outcomes in Jordan.

References

Al-Hawarin, Ibrahim, Ragui Assaad, and Ahmed Elsayed, "Migration Shocks and Housing: Short-Run Impact of the Syrian Refugee Crisis in Jordan," *Journal of Housing Economics*, 2021, *53:101761.*

Angrist, Joshua D and Victor Lavy, "Using Maimonides' rule to estimate the effect of class size on scholastic achievement," *The Quarterly Journal of Economics*, 1999, *114* (2), 533–575.

_ , _ , Jetson Leder-Luis, and Adi Shany, "Maimonides' Rule Redux," *American Economic Review: Insights*, 2019, *1* (3), 309–24.

Baez, Javier E., "Civil Wars beyond Their Borders: The Human Capital and Health Consequences of Hosting Refugees," *Journal of Development Economics*, November 2011, *96* (2), 391–408.

Barron, Kai, Heike Harmgart, Steffen Huck, Sebastian Schneider, and Matthias Sutter, "Discrimination, Narratives and Family History: An Experiment with Jordanian Host and Syrian Refugee Children," *The Review of Economics and Statistics*, 2021.

Bataineh, Abdullah and Pierluigi Montalbano, "The Syrian Crisis Impact on Quality of Education in Jordan: A Quantitative and Qualitative Assessment," *International Journal of Liberal Arts and Social Science*, 2019, *7* (6).

Bataineh, Dr. Abdullah, "The International Role in Mitigating the Syrian Crisis Impact on Education Quality in Jordan," *Journal of Social Sciences (COES&RJ-JSS)*, July 2019, *8* (3), 434–455.

Callaway, Brantly, Andrew Goodman-Bacon, and Pedro HC Sant'Anna, "Difference-in-Differences with a Continuous Treatment," *arXiv preprint arXiv:2107.02637*, 2021.

Clemens, Michael, Cindy Huang, Jimmy Graham, and Kate Gough, "Migration is What You Make It: Seven Policy Decisions that Turned Challenges into Opportunities," 2018.

Contreras, Dante and Sebastián Gallardo, "The effects of mass migration on the academic performance of native students. Evidence from Chile," *Economics of Education Review*, 2022, *91*, 102314.

Cunningham, Scott, "Continuous treatment DiD," 2022.

Department of Statistics, "Population and Housing 2015 – Department of Statistics. Table 7.2," 2015.

Elmallakh, Nelly and Jackline Wahba, "Syrian Refugees and the Migration Dynamics of Jordanians: Moving in or Moving out?," *Economic Development and Cultural Change*, 2021, (forthcoming).

Fallah, Belal, Caroline Krafft, and Jackline Wahba, "The impact of refugees on employment and wages in Jordan," *Journal of Development Economics*, 2019, *139*, 203–216.

Figlio, David and Umut Özek, "Unwelcome guests? The effects of refugees on the educational outcomes of incumbent students," *Journal of Labor Economics*, 2019, *37* (4), 1061–1096.

Figlio, David N, Paola Giuliano, Riccardo Marchingiglio, Umut Özek, and Paola Sapienza, "Diversity in Schools: Immigrants and the Educational Performance of US Born Students," Working Paper, National Bureau of Economic Research 2021.

Green, Colin P and Jon Marius Vaag Iversen, "Refugees and the Educational Attainment of Natives," CEPEO Working Paper Series 21-07, Centre for Education Policy and Equalising Opportunities, UCL Institute of Education 2021.

Hashemite Kingdom of Jordan Ministry of Planning and International Cooperation and United Nations, "Host Community Support Platform: Needs Assessment Review of the Impact of the Syrian Crisis on Jordan.," Accessed September 22, 2021. 2013.

Hunt, Jennifer, "The Impact of Immigration on the Educational Attainment of Natives," *Journal of Human Resources*, 2017, *52* (4), 1060–1118.

JORISS, "Jordan Response Platform for the Syrian Crisis," 2020.

Krafft, Caroline and Ragui Assaad, "Introducing the Jordan Labor Market Panel Survey 2016," *IZA Journal of Development and Migration*, 2021, *12* (1).

_ , Maia Sieverding, Colette Salemi, and Caitlyn Keo, "Syrian Refugees in Jordan: Demographics, Livelihoods, Education, and Health," in Caroline Krafft and Ragui Assaad, eds., *The Jordanian Labor Market between Fragility and Resilience*, Oxford, UK: Oxford University Press, 2019, pp. 141–172.

_ , Susan Razzaz, Caitlyn Keo, and Ragui Assaad, "The Number and Characteristics of Syrians in Jordan: A Multi-Source Analysis," in Caroline Krafft and Ragui Assaad, eds., *The Jordanian Labor Market between Fragility and Resilience*, Oxford University Press., 2019, pp. 173–199.

Lindo, Jason M, Caitlin Knowles Myers, Andrea Schlosser, and Scott Cunningham, "How far is too far? New evidence on abortion clinic closures, access, and abortions," *Journal of Human Resources*, 2020, *55* (4), 1137–1160.

Lughod, Ibrahim Abu, "Educating a Community in Exile: The Palestinian Experience," *Journal of Palestine Studies*, 1973, *2* (3), 94–111.

Malaeb, Bilal and Jackline Wahba, "Impact of Refugees on Immigrants' Labor Market Outcomes," Economic Research Forum Working Paper No 1194 2018.

Martínez, María Adelaida and Diana Martínez Heredia, "How Does Immigration Affect Incumbent Students? Evidence from Venezuelan Migration to Peru," 2022.

McHenry, Peter, "Immigration and the human capital of natives," *Journal of Human Resources*, 2015, *50* (1), 34–71.

Morales, Camila N, "Do Refugee Students Affect the Academic Achievement of Peers? Evidence from a Large Urban School District," 2020.

Nasser, Razan and Steven Symansky, "The Fiscal Impact of the Refugee Crisis on Jordan," 2014.

Plant, Mark, "Refugee Spending and the Macroeconomic Program in Jordan," Center for Global Development Note 2018.

Rozo, Sandra V and Micaela Sviatschi, "Is a refugee crisis a housing crisis? Only if housing supply is unresponsive," *Journal of Development Economics*, 2021, *148*, 102563.

Salemi, Colette, Jay Bowman, and Jennifer Compton, "Services for Syrian Refugee Children and Youth in Jordan: Forced Displacement, Foreign Aid, and Vulnerability," Economic Research Forum Working Paper Series 2018.

Sieverding, Maia, Caroline Krafft, Nasma Berri, Caitlyn Keo, Mariam Sharpless et al., "Education interrupted: Enrollment, attainment, and dropout of Syrian refugees in Jordan," 2018.

Tumen, Semih, "The Impact of Low-Skill Refugees on Youth Education," 2018.

_ , "The effect of refugees on native adolescents' test scores: Quasi-experimental evidence from PISA," *Journal of Development Economics*, 2021, *150*, 102633.

UNESCO, "World Data on Education," Accessed September 8, 2021. 2018.

_ , "UNESCO Institute for Statistics," Accessed April 19, 2020. 2020.

UNHCR, "UNHCR Global Trends 2020," Accessed September 8, 2021. 2021.

_ , "UNHCR Global Trends 2022," Accessed February 2, 2024. 2023.

UNICEF and JESC, "Budget Brief: 2019 Public Education Sector in Jordan," Accessed November 15, 2021. 2019.

Urquiola, Miguel, "Identifying class size effects in developing countries: Evidence from rural Bolivia," *Review of Economics and statistics*, 2006, *88* (1), 171–177.

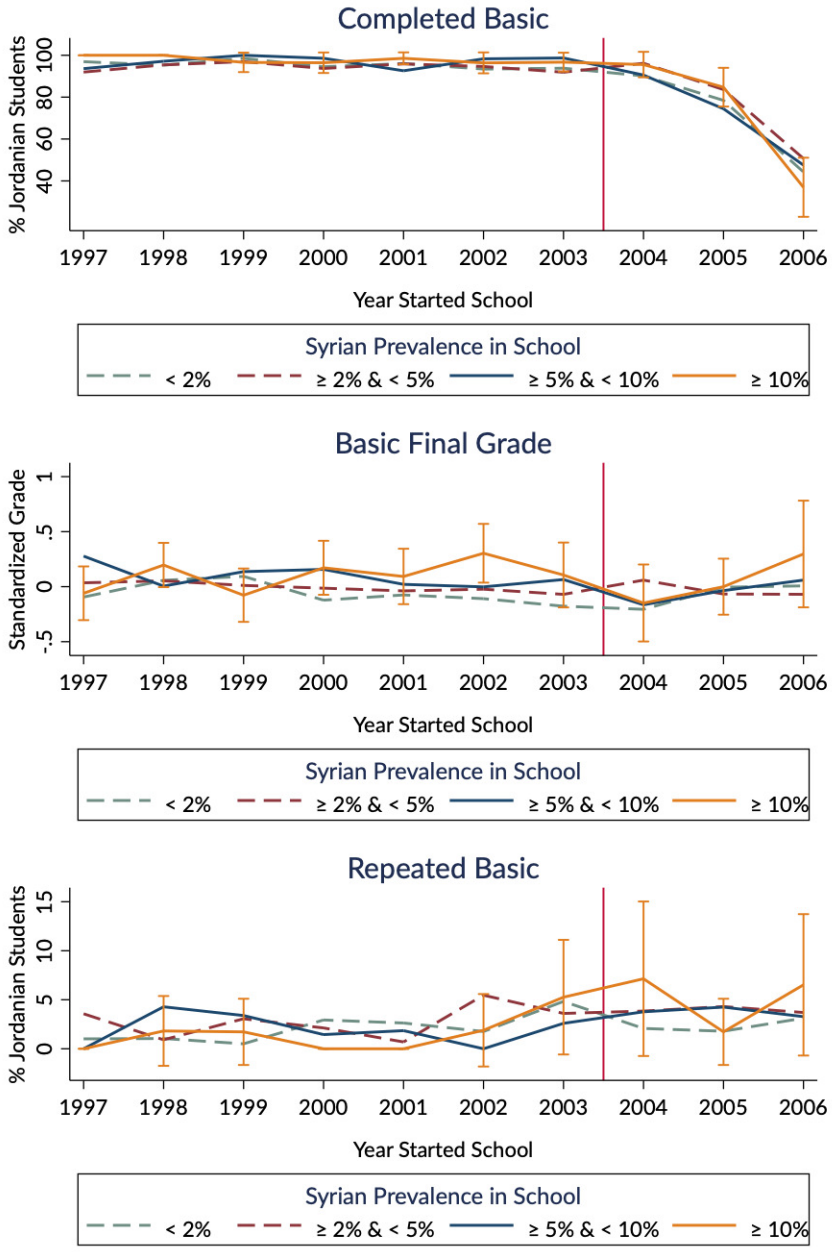
van der Werf, Cynthia, "The Impact of Refugees on Native Students' Academic Achievement," 2019.

Verme, Paolo and Kirsten Schuettler, "The Impact of Forced Displacement on Host Communities: A Review of the Empirical Literature in Economics," *Journal of Development Economics*, 2021, *150*, 102606.

World Bank, "Jordan Economic Monitor Fall 2017: Towards Stronger External Trade Performance," Technical Report, The World Bank, Washington DC 2017.

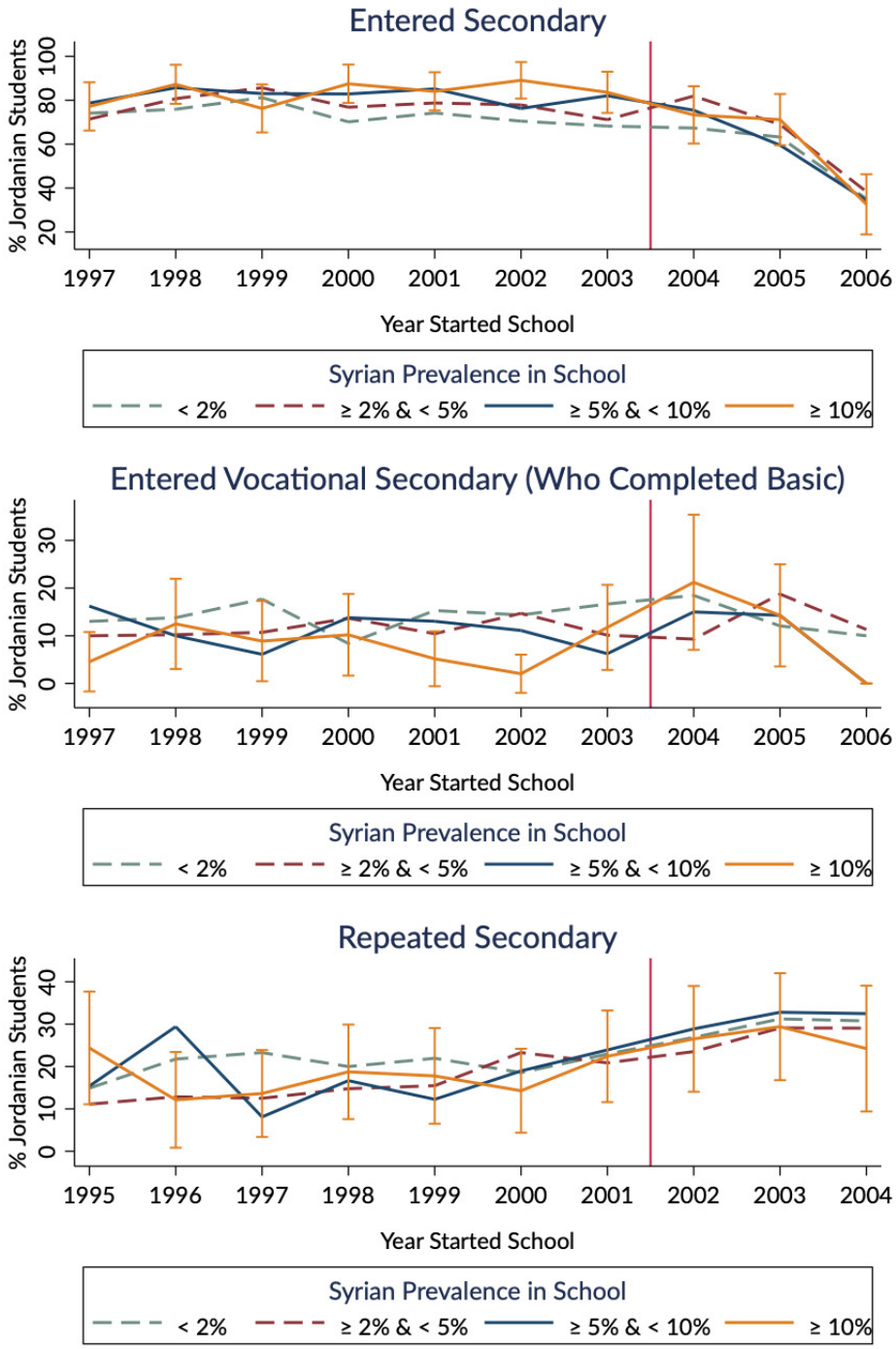
Appendix

Figure 8 – Completed Basic, Basic Final Grade, Repeated Basic



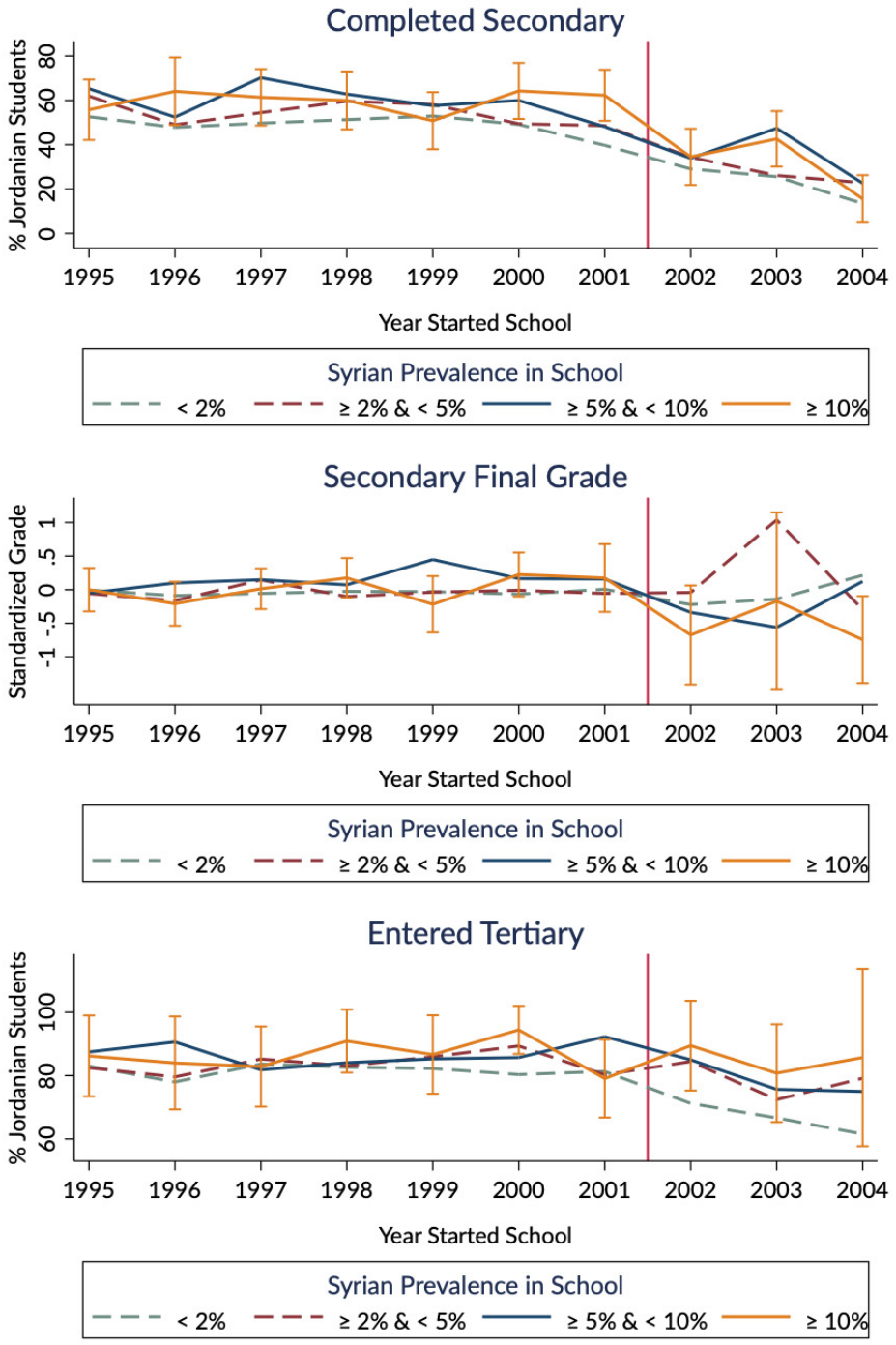
Source: JLMPS. Confidence intervals shown for schools with $\geq 10\%$ prevalence. The sample is Jordanians born in Jordan who listed codes for basic public schools that matched with the EMIS data. The top panel plots the percentage passing the basic final exam. The middle panel plots the final grade among students who passed, standardized within the year of the exam. The bottom panel plots the percentage who repeated a level at any time during basic education.

Figure 9 – Entered Secondary, Entered Vocational Secondary, Repeated Secondary



Source: JLMPS. Confidence intervals shown for schools with $\geq 10\%$ prevalence. The sample is Jordanians born in Jordan who listed codes for basic public schools (top two panels) or secondary public schools (bottom panel) that matched with the EMIS data. The top panel plots the percentage ever entering secondary school. The middle panel plots the percentage ever entering vocational secondary school. The bottom panel plots the percentage who repeated a level at any time during secondary education, among those who entered secondary.

Figure 10 – Completed Secondary, Secondary Final Grade, Entered Tertiary



Source: JLMPS. Confidence intervals shown for schools with $\geq 10\%$ prevalence. The sample is Jordanians born in Jordan who listed codes for secondary public schools that matched with the EMIS data. The top panel plots the percentage passing the secondary final exam. The middle panel plots the final grade among students who passed, standardized within the year of the exam. The bottom panel plots the percentage who repeated a level at any time during secondary education, among those who started secondary.

Table 7 – **Additional Outcomes from Exposure During Basic Education: Linear Specification**

VARIABLES	(1) Repeated Basic	(2) Basic Final Grade	(3) Entered Secondary (Who Completed Basic)	(4) Vocational Secondary
Proportion Syrians in 2016 × Young	-0.028	-0.268	0.215	-0.169
	(0.070)	(0.629)	(0.190)	(0.249)
Observations	2,310	1,784	1,867	1,430
R-squared	0.337	0.494	0.507	0.421
School Cohort FEs	Yes	Yes	Yes	Yes
School FEs	Yes	Yes	Yes	Yes
Number of Schools	613	500	518	435
Dep. Var. Mean (Young, Schools < 2%)	0.02	-0.05	0.78	0.14
Dep. Var. Mean (Old, Schools < 2%)	0.02	-0.10	0.78	0.18

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed basic school codes that matched with the EMIS data and started public school between 2001 and 2006. The outcome in column 1 equals 1 if a student repeated a level at any time during basic education. The outcome in column 2 is the final grade among students who passed, standardized within the year of the exam. The outcome in column 3 equals 1 if the student entered secondary, restricted to those who completed basic school. The outcome in column 4 equals 1 if the student entered vocational secondary, among those who entered all types of secondary. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1.

Table 8 – **Outcomes from Exposure During Basic Education: Heterogeneity by Gender**

VARIABLES	(1) Completed Basic	(2) Repeated Basic	(3) Basic Final Grade	(4) Entered Secondary (Who Completed Basic)	(5) Vocational Secondary
Prop. Syrians $\geq 0.05 \times$ Young $\times$ Female	0.016	0.015	-0.266	-0.084	0.078
	(0.077)	(0.020)	(0.219)	(0.111)	(0.085)
Prop. Syrians $\geq 0.05 \times$ Young	0.010	-0.023	0.046	0.081	-0.013
	(0.069)	(0.015)	(0.204)	(0.095)	(0.084)
Female	0.023	-0.002	0.446***	0.050	-0.133**
	(0.038)	(0.025)	(0.116)	(0.044)	(0.066)
Observations	2,333	2,310	1,784	1,867	1,430
R-squared	0.513	0.337	0.502	0.508	0.426
School Cohort FEs	Yes	Yes	Yes	Yes	Yes
School FEs	Yes	Yes	Yes	Yes	Yes
Number of Schools	615	613	500	518	435
Dep. Var. Mean (Young, Schools $< 5\%$): Girls	0.76	0.01	0.15	0.85	0.09
Dep. Var. Mean (Young, Schools $< 5\%$): Boys	0.72	0.04	-0.20	0.75	0.17

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed basic school codes that matched with the EMIS data and who started public school between 2001 and 2006. The "young" cohort started school between 2004 and 2006 and was in basic school when Syrians arrived. The outcome equals 1 if the student passed the basic final exam by the time of the survey and 0 otherwise. The outcome in column 2 equals 1 if a student repeated a level at any time during basic education. The outcome in column 3 is the final grade among students who passed, standardized within the year of the exam. The outcome in column 4 equals 1 if the student entered secondary, restricted to those who completed basic school. The outcome in column 5 equals 1 if the student entered vocational secondary, among those who entered all types of secondary. The omitted category is schools with less than 5% Syrians. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1.

Table 9 – **Outcomes from Exposure During Basic Education: Heterogeneity by Household Wealth**

VARIABLES	(1) Completed Basic	(2) Repeated Basic	(3) Basic Final Grade	(4) Entered Secondary (Who Completed Basic)	(5) Vocational Secondary
Prop. Syrians $\geq 0.05 \times$ Young $\times \geq$ Med. Wealth	0.020	-0.023	-0.012	-0.013	0.099
	(0.070)	(0.020)	(0.233)	(0.130)	(0.067)
Prop. Syrians $\geq 0.05 \times$ Young	0.011	0.004	-0.105	0.032	-0.042
	(0.061)	(0.014)	(0.213)	(0.146)	(0.061)
$\geq$ Med. Wealth	0.058**	0.006	0.299***	0.120***	0.006
	(0.027)	(0.012)	(0.092)	(0.037)	(0.032)
Observations	2,330	2,307	1,784	1,866	1,429
R-squared	0.511	0.337	0.504	0.516	0.423
School Cohort FEs	Yes	Yes	Yes	Yes	Yes
School FEs	Yes	Yes	Yes	Yes	Yes
Number of Schools	615	613	500	518	435
Dep. Var. Mean (Young, Schools $< 5\%$): $\geq$ Median Wealth	0.78	0.03	0.15	0.85	0.11
Dep. Var. Mean (Young, Schools $< 5\%$): $<$ Median Wealth	0.67	0.02	-0.38	0.69	0.16

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed basic school codes that matched with the EMIS data and who started public school between 2001 and 2006. The "young" cohort started school between 2004 and 2006 and was in basic school when Syrians arrived. The outcome equals 1 if the student passed the basic final exam by the time of the survey and 0 otherwise. The outcome in column 2 equals 1 if a student repeated a level at any time during basic education. The outcome in column 3 is the final grade among students who passed, standardized within the year of the exam. The outcome in column 4 equals 1 if the student entered secondary, restricted to those who completed basic school. The outcome in column 5 equals 1 if the student entered vocational secondary, among those who entered all types of secondary. The omitted category is schools with less than 5% Syrians. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1.

Table 10 – **Outcomes from Exposure During Basic Education: Heterogeneity by Shift**

VARIABLES	(1) Completed Basic	(2) Repeated Basic	(3) Basic Final Grade	(4) Entered Secondary (Who Completed Basic)	(5) Vocational Secondary
Prop. Syrians $\geq 0.05 \times$ Young $\times$ Added Shift	0.058	-0.005	0.212	0.227**	-0.102
	(0.074)	(0.032)	(0.187)	(0.105)	(0.095)
Prop. Syrians $\geq 0.05 \times$ Young	0.028	-0.009	-0.205	-0.105	0.039
	(0.056)	(0.025)	(0.141)	(0.083)	(0.055)
Observations	2,180	2,160	1,672	1,748	1,340
R-squared	0.506	0.344	0.504	0.521	0.428
School Cohort FEs	Yes	Yes	Yes	Yes	Yes
School FEs	Yes	Yes	Yes	Yes	Yes
Number of Schools	572	571	467	483	403
Dep. Var. Mean (Young, Schools $< 5\%$): Added Shift	0.76	0.00	0.30	0.62	0.04
Dep. Var. Mean (Young, Schools $< 5\%$): One Shift	0.74	0.03	-0.02	0.81	0.13

Sources: Authors' calculations based on data from 2016 Jordan Labor Market Panel Survey. Observations are Jordanians born in Jordan who listed basic school codes that matched with the EMIS data with one shift in 2010 and who started public school between 2001 and 2006. The "young" cohort started school between 2004 and 2006 and was in basic school when Syrians arrived. The outcome equals 1 if the student passed the basic final exam by the time of the survey and 0 otherwise. The outcome in column 2 equals 1 if a student repeated a level at any time during basic education. The outcome in column 3 is the final grade among students who passed, standardized within the year of the exam. The outcome in column 4 equals 1 if the student entered secondary, restricted to those who completed basic school. The outcome in column 5 equals 1 if the student entered vocational secondary, among those who entered all types of secondary. The omitted category is schools with less than 5% Syrians. The regressions are weighted according to the sampling design. Standard errors in parentheses are clustered at the school level. *** p<0.01, ** p<0.05, * p<0.1.