Refugees' Right to Work: Efficiency and Equity in Host Country Labor Markets

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October 20, 2025

Job Market Paper

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Abstract

One out of every 200 people in the world is a refugee. In most host countries, refugees face legal barriers to work, confining them to informal work or unemployment. This paper studies how granting refugees the right to work reshapes the allocation of both refugee and host labor across occupations. I leverage a unique natural experiment – a large-scale work permit scheme for Syrian refugees in Jordan – and assemble a novel dataset to study how the policy impacted the labor market outcomes of both refugees and hosts. Using a shift–share measure of exposure to refugee competition, I document three effects on Jordanian workers. First, Jordanians exit occupations highly exposed to refugees, re-sorting elsewhere. Second, consistent with a standard sorting model, exit coincides with an increase in the average wage of the Jordanians who remain in exposed occupations. Third, re-sorting leads to occupational upgrading, as college-educated Jordanians enter into less exposed, higher-paying jobs. To formalize sorting as a mechanism, I then build a model of occupational choice nested in general equilibrium. The estimated model implies Jordanians experience modest wage gains and a small rise in unemployment from the policy. Distributionally, the poorest Jordanian workers benefit the most from the work permit scheme, despite being the ones to lose in a benchmark without re-sorting. Unsurprisingly, refugees see large wage gains from the work permit scheme and the corresponding improvement in refugee labor utilization increases total output by nearly 11%. Work permits unlock aggregate efficiency gains and, through re-sorting, reduce host country income inequality.

JEL CLASSIFICATION: F22, O15, J24, J70

KEYWORDS: refugees, refugee integration, occupational choice, misallocation

*London School of Economics, s.l.winton@lse.ac.uk. I am indebted to Gharad Bryan, Oriana Bandiera, Nava Ashraf, Arun Chandrasekhar, and Robin Burgess for their insightful advice and support. I also benefited from comments by Ran Abramitzky, Sree Ayyar, Clare Balboni, Gaetano Basso, Michael Callen, Gabriela Deschamps-Ochoa, Dennis Egger, Betsenat Gebrewold, Tom Glinnan, Ahmet Gulek, Nilmini Herath, Chad Jones, Pete Klenow, Caroline Krafft, Alan Manning, Gabriel Leite-Mariante, Vivian Liu, Johannes Matt, Melanie Morten, Canishk Naik, Michelle Rao, and Sandra Sequeira, as well as seminar participants at LSE and Stanford University. For granting data access, I gratefully acknowledge the Jordanian Department of Statistics, the Fafo Institute for Labour and Social Research, and the Economic Research Forum. Funding was graciously provided by STICERD and the IKEA Foundation, awarded by J-PAL through the Displaced Livelihoods Initiative.

1 Introduction

One out of every 200 people in the world is a refugee.[1] The number of refugees has more than tripled since 2010 and is expected to rise with the onset of climate change (UNHCR, 2025). Displacement has also become increasingly protracted – most refugees are now displaced between 10 and 26 years on average (UNHCR, 2021; (IOM), 2024). Despite these trends, most governments maintain policies that restrict refugees' right to work. Ginn et al. (2022) estimate that 74% of refugees live in host countries where they face substantial legal barriers to work.[2]

Policymakers in low- and middle-income countries – where 73% of the world's refugees reside – typically justify these restrictions on the grounds that allowing refugees to work will push down local wages or displace local workers (Clemens et al., 2018; Bahar et al., 2024). Empirically, these restrictions successfully deter some refugees from entering employment while many others resort to working illegally wherever opportunities arise, namely in highly informal occupations (Fasani et al., 2021; Bahar et al., 2021; Ahrens et al., 2023; Bahar et al., 2024).[3] These policies likely generate substantial inefficiencies in the allocation of refugee labor, as refugees are either clustered in a narrow set of highly informal occupations, that rarely match their skills, or relegated to unemployment. Given the magnitude of displaced populations, these distortions have the potential to affect the broader local labor market in general equilibrium.

This paper examines how granting refugees the right to work reshapes the allocation of both refugee and local labor, using a large-scale work permit scheme for Syrian refugees in Jordan. To do this, I collect and harmonize labor-force surveys from the Jordanian government and international organizations to construct a dataset that covers Syrian refugees and Jordanians before and after the policy. The first half of the paper presents empirical evidence on how the work permit scheme affected the labor market outcomes of Syrian refugees and Jordanians. First, I document stylized facts for how the work permit scheme reduced labor market barriers for Syrian refugees, increasing entry into employment and access to a broader, less informal set of occupations. Second, using a shift-share measure of exposure, I provide causal evidence of Jordanians re-sorting across occupations in response to Syrians' reallocation. Jordanians exit occupations most exposed to Syrian entry, while average wages rise for those Jordanians that remain, consistent with exit being assortative. Re-sorting results in occupational upgrading, as highly exposed occupations were lower-skill and lower-paying than less exposed destination occupations. Finally, leveraging two-period panel data, I show that overly-educated Jordanians drive the re-sorting, moving to occupations that better matched their qualifications.

[1] Statistic computed by author based on UNHCR's estimation that the global population of refugees was 42.7 million at the end of 2024 (UNHCR, 2025).

[2] These barriers often include restricted access to work permits and/or business licenses and limitations on freedom of movement (such as mandatory interment in refugee camps or mandated settlement locations). Barriers may be *de jure* or *de facto*.

[3] In high income countries, there are often temporary bans on employment after initial settlement.

To quantify the respective roles of refugee and local reallocation in shaping aggregate and distributional outcomes, I develop a general equilibrium model of occupational choice. The model introduces homophily – the tendency of individuals to interact within socially or ethnically similar groups – as a key force, alongside wages, in determining occupational sorting in settings of refugee integration. Estimating the model on my data, I find that work permits reduced the misallocation of Syrian refugee labor, creating large aggregate output gains. Jordanians experience modest average wage gains and a small rise in unemployment. By accounting for the role of re-sorting, I find profound distributional implications. Instead of Jordanians who compete with refugees experiencing wage losses, which is the standard finding, re-sorting enables these workers to benefit. Two mechanisms drive these gains – (i) occupational upgrading by workers in highly exposed, low-skill occupations re-sorting into higher-paying occupations jobs and (ii) the relative scarcity of those remaining in these occupations after others exit, pushing wages up. The model implies that re-sorting increases wages most for the poorest quintile of Jordanians. By enabling both refugees and hosts to re-sort to a more efficient allocation, the work permit scheme generates simultaneous efficiency and equity gains.

I begin the paper by describing the natural experiment: an internationally-brokered policy that granted Syrian refugees in Jordan the legal right to work. The Syrian Civil War, which began in 2011, created one of the largest displaced populations in modern history and increased the population of Jordan by 11.1% (Jordanian Department of Statistics, 2015). Syrian refugees settled among the local population, rather than in camps, forced to support themselves with limited humanitarian aid or the legal right to work (UNHCR Jordan, 2015). In 2016, under pressure from the European Union and the broader international community, Jordan agreed to launch a large-scale work permit scheme to provide Syrian refugees a legal pathway to work. The combination of a discrete arrival of a large population of refugees followed by an exogenous policy that sharply reduced refugees' legal barriers to work offers the ideal setting to identify the causal and general equilibrium effects of granting refugees the right to work.

I then present a set of stylized facts, documenting how work permits reduced Syrian refugees' labor market barriers, both in terms of entry into employment and access to occupations that better match their skills. Following the introduction of work permits, the employment rate among working-age Syrian men rose by 31 percentage points.[4] Refugees also became less concentrated in highly informal occupations and more dispersed across a broader range of occupations. Finally, the wage gap between observationally equivalent Syrians and Jordanians narrows from 31.2 percent to 10.5 percent, consistent with a more efficient allocation of refugee labor across occupations after the work permit scheme. Together, this descriptive evidence suggests work permits alleviated a binding constraint on refugees' labor market decisions, resulting in a more efficient allocation of refugee labor post-permits.

[4] All analyses are restricted to working-age men due to low female participation among both groups. During the period, employment rates for Jordanian and Syrian refugee women stood at 7% and 9% respectively.

Using an event-study design and variation in labor-market exposure to Syrian refugees, I find that Jordanians re-sort across occupations in response to refugee entry. Exposure is defined using a shift–share measure that combines the spatial distribution of Syrian refugees across Jordan and their pre-displacement distribution across occupations (while in Syria). A one–standard-deviation increase in exposure reduces the share of Jordanians working in an exposed occupation by 9.6%. An additional standard deviation in exposure results in average wages among Jordanians in those occupations rising by 4.2%. Together, these results indicate exit is assortative – Jordanians that are less productive in these occupations leave, and the remaining workers are positively selected on ability. This re-sorting corresponds to upgrading from low-paid, highly exposed occupations into better-paid, less-exposed ones. Using a two-period panel (2010–2017) that links Jordanian individuals before and after the reform, I show that occupational upgrading is driven by Jordanians with tertiary education moving out of highly exposed occupations that under-utilize their educational qualifications.[5]

To formalize how work permits spurred reallocation of both Syrian and Jordanian labor through occupational sorting, I build a general equilibrium model of occupational choice. I extend the canonical Hsieh et al. (2019) model of labor misallocation by adding homophilic preferences – a preference for working with others from their own group – as an additional driver of sorting. This addition allows the model to replicate the social segmentation observed between Syrian refugees and Jordanians, a common phenomenon observed across refugee contexts (Beaman, 2012; Schuettler and Caron, 2020). In the model, individuals choose the occupation (or unemployment) that maximizes their indirect utility, a composite of their effective wage, determined by their ability draw and the occupation-specific wage per efficiency unit, and their group-level preference for the occupation. Syrian refugees will face additional occupation-specific frictions, modeled as taxes on their effective wages, which will include not having the right to work. The work permit scheme will then reduce these wedges, relaxing a binding constraint for refugees' occupational choice, thus prompting a reallocation of refugee labor toward a more efficient allocation.

Under reasonable parameter values, the model can generate a strong enough re-sorting response from Jordanians to reverse the downward pressure on wages caused by Syrian entry after the introduction of work permits. In equilibrium, refugee entry raises the labor supply and lowers the wage per efficiency unit in exposed occupations, which correspond to those that see the largest reduction in frictions under the work permit scheme. Jordanians will re-sort in response to both lower wages and increased refugee presence. Relative to wage-only sorting, homophilic preferences will amplify Jordanians' exit. If the *re-sorting effect* by Jordanians outweighs the *direct supply effect* of refugee entry, the wage per efficiency unit in exposed occupations will actually increase. Additionally, re-sorting will have a compositional effect on the quality of the labor supplied, as

[5]The panel data observes individuals in 2010 (pre-refugee arrival) and 2017 (post-work permits). I assume effects estimated in the panel data are driven by the introduction of work permits, as there is no evidence of an effect from refugee arrival in the event study, which uses my main dataset of repeated cross-sections.

lower ability Jordanians will be the ones to re-sort, leading to an the remaining Jordanian workers in exposed occupations to be positively selected.

To quantify the magnitudes of these two forces as well as aggregate impacts, I estimate the model using a bootstrapped efficient Generalized Methods of Moments (GMM) procedure, matching moments from the model's log-linearized equilibrium equations to data before and after the introduction of work permits. This approach identifies the wedge, preference, and productivity parameters that rationalize observed changes in employment and wages across occupations. The estimated model implies that work permits increased total output by nearly 11%, driven primarily by an improved allocation of refugee labor. Syrian wages increase by 20% and their employment rate rises by 36.8 percentage points. Jordanian wages rise modestly by 0.9%, accompanied by a small 0.6-percentage-point increase in unemployment. The work permits also reduces inequality among the host community, as the poorest quantile of Jordanians gain a 3% wage increase on average.

Accounting for re-sorting fundamentally alters the distributional effects of the work permit scheme. Without re-sorting, simulated by holding Jordanians' occupational choices fixed, Jordanians who compete with refugees experience wage losses. Given that Syrian refugees enter into lower-skilled occupations, the negative wage effects are concentrated among lower-paid Jordanians, while Jordanians in high-paying occupations benefit from increased relative scarcity. Allowing Jordanians to re-sort reverses this pattern, turning the traditional "losers" of refugee integration – the poorest Jordanians – into "winners." These re-sorting gains materialize from two channels. The first is occupational upgrading – some Jordanians exit the occupations most affected, switching to higher-paying occupations. Second, the re-sorting effect is large enough to reverse the refugees' relative labor supply shock in these low-skill occupations, increasing the wage per efficiency unit. By accounting for both refugee and local reallocation, my estimates show that expanding refugees' right to work improves both efficiency and equity, enhancing total output while reducing inequality within the host community.

Contributions to the Literature: The labor market outcomes of refugees and the communities that host them are inexorably linked. A large body of work studies how refugee inflows affect local labor markets, beginning with the seminal work of Card (1990) on the Mariel Boatlift. Meta-analyses identify several common patterns across contexts (Ruiz and Vargas-Silva, 2018; Becker and Ferrara, 2019; Verme and Schuettler, 2021; Rozo and Grossman, 2025). First, the average employment and wage effects are typically nulls.[6] Second, when negative effects are found, they concentrate among workers that are substitutable with refugees, typically those in low-skill or informal jobs.[7] Finally, in the less common case of positive effects, gains accrue to complementary

[6]Notable examples of average null effects include Glitz (2012) and Fallah et al. (2019), which studies the arrival effects of Syrian refugees in Jordan.

[7]Notable examples of such negative effects include Ottaviano and Peri (2012); Maystadt and Verwimp (2014); Calderón-Mejía and Ibáñez (2016); Tumen (2016); Morales (2018); Borjas and Monras (2017); Altindag et al.

workers, namely those in high-skill or formal jobs.[8]

I extend the literature by considering occupational re-sorting by local workers in response to refugees' entry and quantifying its importance in general equilibrium.[9] By eliminating occupational re-sorting of local workers, I replicate the canonical pattern – locals in high-skill jobs gain and locals in low-skill jobs lose. However, with re-sorting, the distribution of winners and losers reverses. Those that were initially in the low-skilled occupations now gain through two mechanisms tied to re-sorting. First, locals upgrade into higher-paying occupations, consistent with the small body of work highlighting occupational mobility as a response margin to migration shocks (Foged and Peri, 2016; Lebow, 2024; Caiumi and Peri, 2024). Second, when re-sorting outweighs the effect of refugee entry, there is a relative-scarcity effect – the local workers who remain in low-skill occupations benefit from the relative scarcity in the labor supply caused by others exiting, which pushes up equilibrium wages. My paper emphasizes the importance of accounting for general equilibrium forces in determining the effects of labor market policy.

Second, I contribute to a growing body of work, demonstrating that that large refugee and migration waves can catalyze aggregate gains through productivity growth. Using historical migration episodes in developed countries, Peters (2022); Tabellini (2020) and Sequeira et al. (2020) link economic growth, through mechanisms of innovation and industrialization, to the influx of migrants. In contemporary settings, Galaasen et al. (2025) and Alix-Garcia et al. (2018) provide evidence that migrant or refugee arrival specifically can generate growth and employment opportunities through increased demand. I add an additional mechanism that fuels migration-driven growth – improvements in the utilization of refugee labor and the resulting productivity gains.

Third, I contribute to the emerging literature studying the impacts of reducing refugees' legal barriers to work. Existing work, which primarily focuses on developed countries, has shown that right to work policies improve refugees' employment and wage outcomes (Fasani et al., 2021; Foged et al., 2022; Ahrens et al., 2023; Schuettler and Caron, 2020; Ibáñez et al., 2024).[10] While I also find positive impacts on employment and wages, my primary contribution is embedding refugees' labor market decisions into a structural model, which allows me to quanitfy how the right to work improves the allocation of refugees across occupations, and the aggregate implications this has for productivity.[11] Most similar to my paper are Bahar et al. (2021) and Bahar et al. (2024),

(2020); Caruso et al. (2021); Fasani et al. (2021).

[8] Notable examples of such positive effects include Foged and Peri (2016); Dustmann et al. (2016); Peri and Yasenov (2019).

[9] While I study the introduction of the right to work for refugees already residing in a country, a substantial share of Syrian refugees in Jordan were deterred from working by legal barriers. This allows my results to speak directly to the literature on the local impacts of refugee arrivals.

[10] There is a corresponding literature on regularizing undocumeneted immigrants, which holds some parallels. Devillanova et al. (2018) and Amuedo-Dorantes and Bansak (2011) demonstrate that amnesty programs for undcoumented migrants positively impact the recipients.

[11] In the literature on regularizing undocumented migrants, Elias et al. (2025) and Borjas and Edo (2023) consider how these policies impact the local workers and aggregate outcomes such as tax revenues and GDP.

which study the spillover effects of a regularization program for undocumented forcibly displaced Venezuelan migrants onto local Colombians.[12] [13] These papers focus on how the formalization of refugees affects local employment across the formal and informal segments of the economy. I, instead, focus on how refugees' right to work impacts the allocation of refugee and local labor across occupations through sorting.

Finally, I contribute to the literature on the misallocation of labor in three key ways (Hsieh et al., 2019; Bryan and Morten, 2019; Birinci et al., 2024). First, I extend the Hsieh et al. (2019) canonical model for labor misallocation by introducing homophilic preferences, which amplify wage-based sorting patterns. Homophily can account for the persistence of occupation-based segregation of groups, documented in the literature on social networks (Calvó-Armengol and Jackson, 2004; Charles and Guryan, 2008; Currarini et al., 2009; Patacchini and Zenou, 2012; Bolte et al., 2020; Jackson, 2021), even when frictions are reduced for the marginalized community. Second, I extend the analysis of the model, going beyond the aggregate productivity effects of reducing frictions, to understand how barriers faced by one group (refugees) indirectly distort the allocation of another (locals). Third, rather than relying solely on counterfactuals to quantify effects, I am able to leverage a natural experiment that exogenously relaxed refugees' legal barriers to work, which allows me to estimate changes in misallocation directly and to decompose the resulting welfare gains into two channels: the direct supply effect from refugee entry and the local re-sorting effect.

Outline: The remainder of the paper is organized as follows. In Section 2, I describe the study setting – the arrival of Syrian refugees and the subsequent introduction of work permits – and the dataset I construct. Section 3 presents stylized facts documenting how work permits reduced Syrian refugees' labor market frictions. In Section 4, I layout my event-study design and shift-share measure for exposure to present causal evidence of Jordanians re-sorting in response to Syrian refugees. I present my model in Section 5 and its subsequent identification and estimation in Section 6. Section 7 evaluates the aggregate and distributional effects of the work permit scheme and quantifies the relative importance of the *direct supply effect* and the *re-sorting effect* on Jordanian wages. Finally, Section 8 concludes.

[12] Colombia's regularization program extended the right to work but also gave forced Venezuelan migrants access to a host of public services, including social protection, education, subsidized healthcare, and financial services. Comparatively, I study a work permits policy change alone, allowing me to isolate the impact of reducing legal barriers to work on refugees' labor market outcomes.

[13] Venezuelan migrants largely fall under UNHCR's classification of "others in need of international protection," which is distinct from refugees and asylum-seekers. They are still considered forcibly displaced and eligible for UNHCR aid and protection, but for political reasons, do not have the same international rights as refugees (UNHCR, 2025).

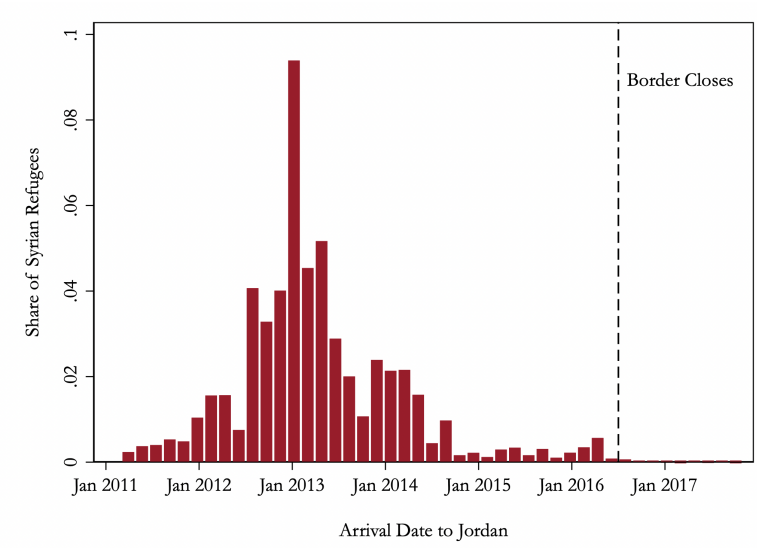
2 Setting and Data

2.1 The Arrival of Syrian Refugees

Since the outbreak of the Syrian Civil War in March 2011, over 62% of Syria's pre-war population has been internally or externally displaced. Of the 5.5 million Syrian refugees outside the country's borders, UNHCR estimates 670,000 sought refuge in Jordan (UNHCR, 2018). Jordan's 2015 census found the Syrian refugee population to be closer to 950,000 (Jordanian Department of Statistics, 2015). Using Jordanian census data, the Syrian refugee crisis represented a 11.1% increase to Jordan's total population of 8.55 million. If only including Jordanian citizens in the population, the population increase is closer to 14.3%.[14]

Beyond the magnitude of the Syrian refugee wave relative to Jordan's existing population, the crisis was exacerbated by the speed of refugees' arrival. The majority of Syrian refugees arrived to Jordan in the two-year period between 2012 and the end of 2013. By the end of 2014, 95% of refugees would arrive (as illustrated in Figure 1). Following an ISIS car bomb in June 2016, Jordan closed its border with Syria to all new refugee arrivals, effectively ending the flow (Sweis, 2016).

Figure 1: Distribution of Syrian Refugee Arrivals to Jordan



Note: Distribution constructed from refugees' self-reported arrival dates in Fafo/DoS 2018 survey data. (Observations: 32,881)

[14] Using the more conservative estimate of UNHCR-registered Syrian refugees, the population increase was 7.7% and 10.2% respectively. For comparison of scale, Venezuelan refugees in Colombia increased the host population by 5.7%, Syrian refugees in Turkey by 3.9%, and all refugees in Germany by 3.0% (UNHCR, 2024). (These figures are calculated using the UNHCR-estimated refugee population hosted by that country as the percent change in the total population.)

Syrian refugees settled primarily among the host community in Jordan's urban and peri-urban areas. 85.6% reside outside of refugee camps. Out-of-camp refugees were expected to find housing and economically support themselves with insufficient humanitarian support or the right to work.[15] In 2015, UNHCR estimated that 86% of Syrian refugees were below the Jordanian poverty line of 68 JOD per capita per month and 67% below the abject poverty line of 28 JOD (UNHCR Jordan, 2015). Refugee households expenditures were largely financed by accumulating debt and engaging in negative coping strategies. Over 60% of Syrian refugee families had debt of at least 40 JOD per capita and more than a third had debt exceeding 100 JOD per capita; all refugees had spent their savings and sold household assets. 80% of Syrian refugee households engaged in at least one of the following negative coping strategies: selling productive assets, decreasing food intake, resorting to high-risk or socially degrading jobs, or sending family members to beg.

In terms of access to employment, only 1% of Syrian refugee households had a member with a work permit (UNHCR, 2014).[16] By 2015, it was estimated that 160,000 Syrian refugees had resorted to working illegally in Jordan's informal sector, despite the risk of detention, fines, and even deportation if caught (Stave and Hillesund, 2015; Tobin and Alahmed, 2019).[17]

2.2 The Policy Change: the Jordan Compact

Jordan has a long history of hosting refugees, including waves of Palestinian refugees (in 1948, 1967, 1991, 2000), Iraqi refugees (1991, 2003), and most recently Syrian refugees (Chatelard, 2010). Other than granting citizenship to Palestinians who arrived between 1948 and 1967, Jordan does not provided refugees with the legal right to work. However, under mounting pressure from the European Union and the broader international humanitarian community, the government of Jordan signed the Jordan Compact in February 2016, which committed Jordan to issuing 200,000 work permits to Syrian refugees.[18] The Compact represented a major shift in both Jordan's policy toward hosting refugees and represented one of the world's first efforts to change right to work policy for refugees.[19]

[15] Since the onset of the crisis, only 20% of out-of-camp Syrian refugees received cash assistance from UNHCR. The majority received minimal support in the form of food vouchers from the World Food Program (World Food Programme, 2015). Based on level of food insecurity, qualifying refugee households received vouchers valuing between 10 and 20 JOD per capita per month (both in and out of camps).

[16] In rare cases, some Syrian refugees were able to obtain work permits intended for migrant workers, which required documentation that most refugees lacked and for employers to complete an extensive application process to hire the employee at the cost of 500 to 800 JOD per application. The cost of work permits often far exceeded what a Syrian refugee or employer would be willing to pay (Jordan Ministry of Labor, 2012; Tobin and Alahmed, 2019).

[17] Often Syrian refugees would be detained in a designated area of Azraq refugee camp, which served as a de facto prison for refugees

[18] The 2015-2016 refugee crisis in Europe fueled the political impetus behind the Compact. It was largely thought that improving conditions for Syrian refugees in their existing host countries would make them less likely to migrate to Europe. Notably, this policy did not extend to other refugee communities in Jordan, such as Iraqis (Huang and Gough, 2019).

[19] In many ways, the Compact heralded in a new approach to refugee integration in cases of protracted displacement, with the goal of transitioning refugees from dependence on humanitarian aid into economic self-sufficiency

In return for Jordan's efforts, the European Union committed to extensive foreign grants and loans as well as trade concessions that facilitated Jordanian manufacturing exports to Europe (Hagen-Zanker et al., 2018; Kattaa et al., 2021). The intention of the Compact was that preferential trade deals would help Jordan to develop its existing economic zones and generate the labor demand needed to offset the labor supply arising from the work permits. As of 2018, the zones had failed to grow with located companies exporting negligible amounts to the EU and abroad more generally (Hagen-Zanker et al., 2018). Moreover, Syrian refugees did not take up the few jobs that existed in these zones. The zones are located far from the major cities and the jobs offer worse pay and longer hours than working in the informal economy (Hagen-Zanker et al., 2018). Despite the failure of the Compact to kick-start Jordanian manufacturing exports, it did lead to the issuance of over 430,000 work permits (including renewals) between 2016 and the end of 2023 (UNHCR, 2024). However, work permits are only valid for one year and must be renewed annually. Internal UNHCR estimates are that the number of permits issued correspond to roughly 60,000 workers having work permits each year.

The Jordan Compact did not contain an implementation plan for providing work permits to Syrian refugees. As a result, the Jordanian government enacted a series of changes to improve take-up of work permits. Initially, the Jordanian Ministry of Labor (MoL) extended the work permit scheme for migrant workers to include Syrian refugees. As with other non-Jordanian workers, Syrian refugees had to find an employer willing to apply and pay for a year-long work employer-specific work permit on their behalf (ILO, 2017). They were also restricted to the set of occupations open to foreign workers, which pre-existed the arrival of Syrian refugees (ILO, 2012; Jordan et al., 2023).[20]

Given the prohibitive cost of work permits, which often exceeded the wages refugees would earn, few permits were issued in the initial months after the Compact (Tobin and Alahmed, 2019). In response, MoL waived all work permit fees for Syrian refugees. To improve mobility across employers, particularly in sectors characterized by temporary or seasonal work, sector-wide work permits, called "flexible work permits," were introduced for agriculture in October 2016 and construction in June 2017. In late 2018 and the first reform to self-employment, MoL introduced permits for Syrian refugees to open home-based businesses in the sectors of food processing, handicrafts, and tailoring (Kattaa et al., 2021). In January 2019, Syrian refugees and employers became exempt from paying the fines associated with late renewals of work permits (Tobin and Alahmed, 2019). In July 2021, flexible work permits were extended to cover all open occupations.[21]

These policy reforms to the work permit scheme improved access for refugees. Prior to the Compact's introduction, a small share of Syrian refugees (10%) were able to obtain work permits designated for immigrants, similar to a work visa in other contexts, despite not being technically eligible. In the year following the enactment of the Compact in mid-2016, work permit coverage

(Huang and Gough, 2019).

[20] For a complete list of occupation closed to non-Jordanian workers, see Appendix **??**.

[21] For a complete list of policies enacted during this time period, see Appendix F.

expanded 25 percentage points. The subsequent years continued to see increased take-up with 53% of Syrian refugee workers holding a work permit in 2020. Appendix Figure A1 plots the share of employed working-aged Syrian refugee men who hold an active work permit over time.

2.3 The Data

A key contribution of this paper is the construction of a novel dataset, comprised of representative repeated cross-sections for the labor market outcomes of the Jordanian host community and Syrian refugees respectively. For the most part, these data sources are not publicly available and required substantial relationship-building with corresponding owners to gain access. For a more detailed description of the various data sources, construction of key variables, and descriptive tables of the result samples, see Appendix D.

For Jordanians, the dataset spans from 2005 to 2023, providing a sufficient number of pre-refugee arrival periods (2005-2011), post-refugee arrival but pre-work permit periods (2012-2015), and post-work permit periods (2016-2023). To construct it, I harmonize labor market survey data from several different sources, including the Economic Research Forum (ERF), the International Labor Organization (ILO), Fafo Institute, and the Government of Jordan's Department of Statistics (DoS) (OAMDI, 2017, 2018; Department of Statistics, 2024; Stave and Hillesund, 2015). Notably, all labor market surveys in Jordan are done through random sampling of households, then interviewing all household members (typically above age 15) about their labor market outcomes, which ensures coverage of both formal and informal workers. The resulting dataset contains over 950,111 individual observations of working-aged Jordanian men.

For Syrian refugees, the dataset spans both pre-work permits (2014) and post-work permits (2017-2022), but does not contain all years during the pre-period, unlike the dataset for Jordanians, due to limitations in data availability.[22] I harmonize labor market survey data from several different sources, including the International Labor Organization (ILO), Fafo Institute, and the Government of Jordan's Department of Statistics (DoS) (OAMDI, 2017; Department of Statistics, 2024; Stave and Hillesund, 2015; Tiltnes et al., 2019). Restricting the sample to working-aged men, the dataset has over 27,447 individual observations of working-aged Syrian refugee men. Importantly, the survey data from ILO and Fafo Institute in 2014 contains recall data on one's labor market outcomes in Syria in the beginning of 2011, prior to refugees' displacement.

Importantly, the sample for the harmonized dataset is restricted to only include working-aged men due to female labor force participation rates being among the lowest in the world at 18% for Jordanian women and 14% for Syrian refugee women in Jordan.[23] Due to high rates of struc-

[22] Until 2017, the Jordanian Department of Statistics did not collect representative data for Syrian refugees in their Employment and Unemployment Survey, as refugees were not legally allowed to work.

[23] Working age is defined as between be 18 and 60 years old, as 18 corresponds to the minimum age for full-time

tural unemployment, the actual share of working-aged women who are working is 9% and 7% for Jordanians and Syrian refugees respectively.

In addition to the labor market datasets for Syrian refugees and Jordanians, this paper also uses 2015 census data to construct the distribution of Syrian refugees and Jordanians across governorates (Jordanian Department of Statistics, 2015).

3 Stylized Facts – Syrian Refugees' Response to Work Permits

This section documents how Syrian refugees' integration into Jordan's labor market evolved before and after the introduction of work permits, to assess whether legal access to work constituted a binding constraint on their employment and occupational choices.[24]

The arrival of Syrian refugees expanded Jordan's labor force and reshaped the equilibrium allocation of workers across occupations. In principle, this new equilibrium could have been efficient if observed differences in employment or occupation reflected preferences and endowments rather than constraints. In practice, refugees face numerous potential frictions, including psychosocial and physical trauma (Ashraf et al., 2025), restricted spatial mobility (Fasani et al., 2021; Foged et al., 2022), social exclusion (Loiacono and Silva-Vargas, 2025), and legal barriers to employment (Ginn et al., 2022). Ex ante, it is not clear which constraints bind most tightly. The introduction of work permits isolates one such constraint: the legal barrier to work. If this constraint limited refugees' labor-market participation and occupational choice set, relaxing it should generate observable changes in their employment and occupational allocation.

Three stylized facts support this interpretation. First, Syrian refugee employment increased by roughly 30 percentage points following the reform. Second, refugees systematically exited the most informal occupations, and those employed in more formal sectors were far more likely to hold a work permit, indicating that permits served as the main channel to accessing employment in more formal occupations. Finally, the wage gap between observationally equivalent Syrian and Jordanian workers narrowed after the introduction of work permits.

Fact 1: Employment rates of Syrian refugees increased after work permits.

The majority of Syrian refugees who were working prior to displacement are pushed into unemployment or exit the labor force entirely, once they arrive in Jordan.[25] While this could be an

work and 60 is the retirement age in Jordan.

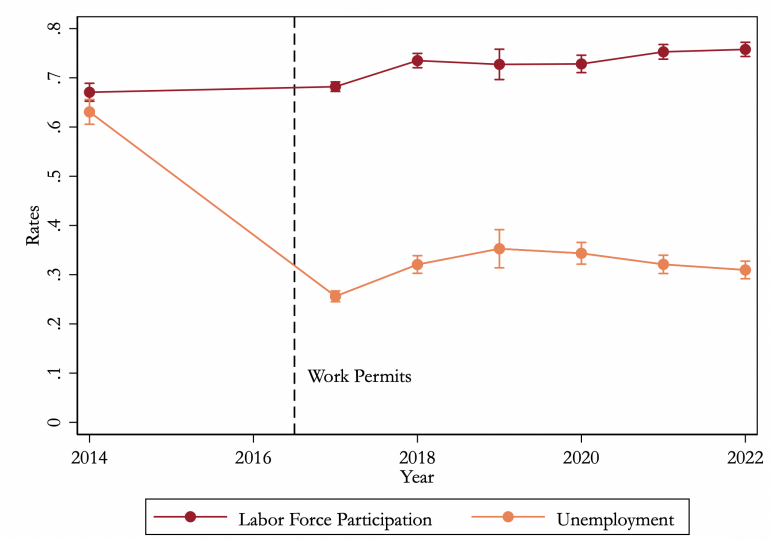
[24] Because the work-permit scheme was implemented nationally, I cannot causally identify its direct effects in reduced form. I instead recover them through the estimated structural model.

[25] To do this, I leverage a unique feature of my 2014 data – recall data for Syrian refugees' work in Syria in 2011 (prior to displacement). I then construct an artificial panel between 2011 and 2014. Only 25.4% of those employed in Syria in 2011, prior to displacement, were working in Jordan in 2014.

efficient employment rate for Syrian refugees in their new labor market, there is strong evidence that refugees' employment decisions were severely constrained by not having the right to work.

Syrian refugees faced high costs to taking up employment. If caught working illegally, refugees were at risk of being forcibly relocated to Azraq refugee camp or deported back to Syria. From the employer-side, hiring refugees illegally left firms vulnerable to paying high fines if caught (ILO, 2022; Tobin and Alahmed, 2019). In 2014, 52.6% of unemployed refugees cited the "lack of work permits" as the reason they were not working. Following the introduction of work permits, that share fell to only 8.8%.[26] I refer to these individuals who abstained from working due to potential legal repercussions as "Labor Law Compliers."

Figure 2: Labor Force Participation and Unemployment Rates for Syrian Refugees



Note: Sample restricted to male Syrian refugees of working age (18-60 years old). Labor force participation is the share of either employed or unemployed people relative to total population. Unemployment rate is the share of labor force participants that are unemployed. (Observations: 27,341)

Figure 2 underscores the decline in unemployment among Syrian refugees following the introduction of the work permit scheme. Unemployment drops 37.5 percentage points from 63.1% in 2014 to 25.6% in 2017 largely driven by "Labor Law Compliers" obtaining work permits and entering into employment. In terms of the effective employment rate among all working-aged Syrian refugee men, this is a 30 p.p. increase. In the following years (2018-2022), the unemployment rate among Syrian refugees increases to an average of 32.8%, which is largely offset by a corresponding increase in the labor force participation rate.[27] This is also consistent with broader macroeconomic trend in Jordan of rising unemployment, particularly among young people. Appendix Figure A2 compares

[26] See Appendix Figure A3.

[27] Using the common denominator of all working-aged men, the adjusted unemployment rate rose from 17.7% to 23.7% between 2017 and 2018 and remained relatively constant.

extensive margin labor market outcomes between Syrian refugees and Jordanians.

Fact 2: Syrian refugees move out of highly informal occupations after work permits.

Before the introduction of work permits, Syrian refugees were disproportionately concentrated in a few highly informal occupations -— construction, sales, and personal services – where enforcement of labor regulations is limited. In 2014, 57 percent of employed refugees worked in these three occupations alone. [28] In the post-period (2017-2019), that share had declined to 47 percent, a nearly 20 percent reduction. Consistent with legal barriers forcing refugees to work into a small subset of the economy – highly informal occupations, I also find that work permits correspond to an increased dispersion of Syrian refugees across occupations and entry into a wider set of occupations (see Appendix Figure A4). This corresponds to the average share of Syrian refugees working in a given occupation decreasing by 5 percentage points.[29]

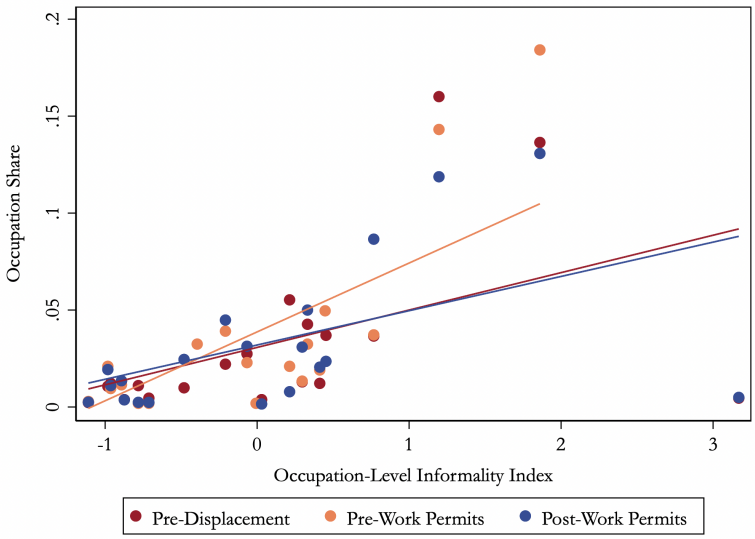
Figure 3 is the resulting binned-scatter plot of the share of all employed Syrian refugees working in a given two-digit ISCO occupation code relative to that occupation's informality index. Notably, the slope shifts sharply upward when Syrian refugees do not have the right to work. This is consistent with larger shares of Syrian refugees working in occupations with high levels of informality. Following the introduction of work permits, the allocation shifts away from these highly informal occupations, mirroring a distribution across occupations that is more inline with the one pre-displacement.

Work permits drive this shift. Refugees in more formal occupations were substantially more likely to hold a work permit, and permit coverage rose systematically with an occupation's formality. A one-standard-deviation increase in occupation informality is associated with a 4.8 percentage-point lower share of refugees holding a permit (Appendix Figure A5). Together, these patterns indicate that work permits operated as a gateway toward accessing a wider set of occupations, enabling refugees to move beyond the narrow, highly informal segment of the economy accessible to them prior to the reform.

[28] Occupations are classified using the 2-digit ISCO 08 codes from the ILO. For a full characterization of these codes and specific examples, see Appendix H.

[29] The skewness of the distribution nearly doubles, suggesting selection into occupations that were previously difficult to access. See Appendix Table A2 for the statistics governing the distribution across occupations pre- and post-work permits.

Figure 3: Occupation Shares vs. Occupation-Level Informality



Note: Binned scatter plot of the correlation between the share of Syrian refugee workers in a 2-digit ISCO occupation code and the z-scored index of informality for the occupation, based on informality of Jordanian workers in that occupation. (Observations: 13,052)

Fact 3: Wage gap narrows between observationally equivalent Syrian refugees and Jordanians

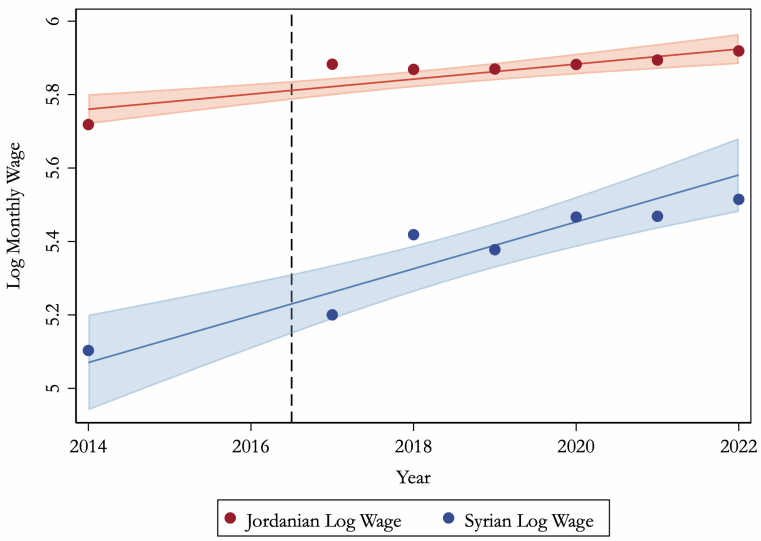
Figure 4 provides evidence that occupational reallocation, demonstrated in Fact 2, is assortative. For estimates of the wage gap over time, see Appendix Table A3, which contains the coefficient estimates for the wage penalty faced by Syrian refugees relative to Jordanians that are observationally equivalent – in that they work in the same occupation and industry, live in the same location (governorate), and have the same years of education and of work experience (age). Prior to the introduction of work permits, a Syrian refugee earned 31.18 percentage points less than a comparable Jordanian.[30] After work permits are introduced, the wage gap begins to close over the following years, reaching a low of a 10.5 percentage point difference in 2022.

These wage gain estimates cannot separately identify the selection effect of Syrians sorting into better matching occupations and other benefits to legalization, such as reducing the monopsony power of employers over refugees (Amior and Stuhler, 2023; Amior and Manning, 2024).[31] Both effects should positively impact wages, reducing the gap between Syrian refugees and their Jordanian counterparts. In the structural model, I will be able to isolate the role of reallocation for Syrian refugees in capturing a larger share of their marginal productive of labor and thus the evolution of the wage gap between Syrian refugees and Jordanians.

[30]Column 1 in Table A3 reports β, the difference in the log wage, which can be converted to percentages using the following transformation: $\left(e^{\beta}-1\right)\cdot 100$

[31]Intuitively, a greater degree of monopsony power allows employers to exploit and underpay refugee employees by exacting greater markdowns.

Figure 4: Wage Differences between Syrian Refugees and Jordanians



Note: Log monthly wage regressed on year x refugee status, includes human capital controls as well as governorate, occupation, and industry FEs. Standard errors clustered at the unit of 2-digit ISCO occupation codes. Points represent average log wage by group. Line corresponds to best fit from regression with 95% confidence bands. (Observations: 147,193)

Together, these stylized facts show substantial changes in Syrian refugees' labor market outcomes, following the introduction of work permits. First, this suggests that legal barriers to work comprised a binding constraint on Syrian refugees' labor supply optimization problem, yielding an inefficient allocation of refugee labor. Second, we should view the introduction of work permits as a relaxation of this constraint, potentially resulting in a better allocation, both along the extensive margin (employment vs. unemployment) and the intensive margin (across occupations).

4 Causal Evidence of Jordanians Re-sorting

Syrian refugees' entry into and reallocation across occupations under the work permit scheme created differential supply shocks by occupation. This section provides causal evidence on how Jordanians respond to these supply shocks, namely through re-sorting to less exposed occupations. I first present my shift-share measure for exposure and corresponding event-study design. Next, I report my main findings for how Jordanian occupation shares and average wages are affected by exposure to Syrian refugees. Given the upgrading pattern in Jordanians' occupation reallocation, I leverage my two-period panel data to better understand mechanisms. I find that Jordanians who are over-educated for the highly exposed occupations, where they work prior to work permits, are the most likely to upgrade.

4.1 Empirical Strategy

Consistent with the labor economics literature studying the impact of migration shocks, I estimate how the introduction of work permits for refugees affected local workers by exploiting variation in exposure to the resulting refugee labor-supply shock. I leverage two sources of exogenous variation to construct a shift–share measure of exposure at the occupation–governorate level that reflects both (i) the relative concentration of Syrian refugees across Jordan's governorates (the *shift*) and (ii) the pre-displacement occupational composition of Syrian workers (the *share*). Following Goldsmith-Pinkham et al. (2020) and Borusyak et al. (2021), identification requires that at least one component – either the shift or the share – to be exogenous. In my setting, both components are plausibly exogenous, and the two are orthogonal (Borusyak and Hull, 2023), as refugees do not sort spatially based on their pre-displacement occupation.

Shift Component: The "shift" captures the relative size of the refugee inflow to each local labor market, defined at the geographical unit of the governorate.[32] I measure geographical exposure using the ratio of Syrian refuess to the total population in each governorate, using the 2015 population census. As seen in Figure 5, there is substantial variation in the geographic distribution of Syrian refugees aross Jordan. The share of Syrians relative to a governorate's total population ranges from 1.3% in the southern governorate of Al-Tafileh to 35.7% in the northern governorate of Al-Mafraq. Consistent with most refugee populations, Syrian refugees predominantly settled in northern Jordan near the border of their country of origin.[33]

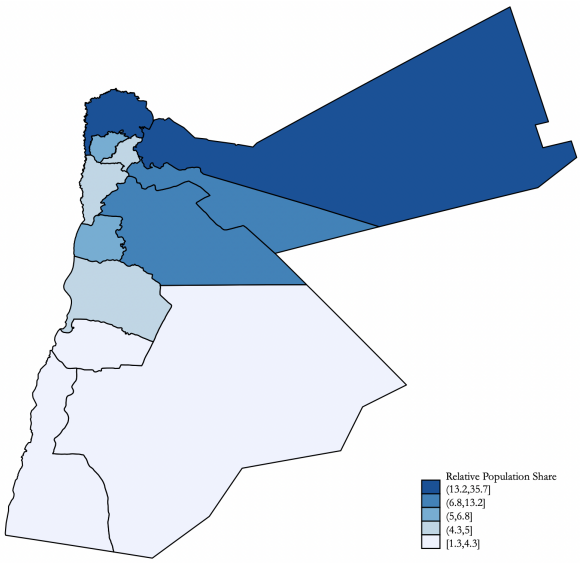
The key identifying assumption for the "shift" to be valid is that Syrian refugees do not strategically choose a location to settle based on local labor market conditions. Nearly 95% of Syrian refugees had arrived in Jordan by the end of 2014, before the announcement of the work-permit scheme and at a time when no right to work was expected, making it unlikely that settlement decisions were influenced by local employment opportunities. Furthermore, Jordan closed its border with Syria in June 2016, following an ISIS attack at Rukban (Sweis, 2016), fixing the stock of refugees shortly after the policy change. Thus, there is no concern of additional refugees arriving and then selecting locations based on local employment opportunities.

In the case of any strategic relocation in response to the introduction of work permits, I use the 2015 census distribution of refugees, which pre-dates the permit scheme, to measure geographic exposure. However, there is minimal evidence of refugee relocation within Jordan after initial arrival (Fallah et al., 2019).

[32] Due to data limitations, I can only disaggregate to the administrative unit of the governorate, of which there are twelve in Jordan.

[33] Distance-to-border is a standard proxy for geographic exposure to refugee inflows in the forced migration literature; see Angrist and Kugler (2003) and **?**.

Figure 5: Distribution of Syrian Refugees to Jordanian Population



Note: Relative population shares based on the Jordanian Department of Statistics population census conducted in 2015. For each population's distribution separately, see Appendix Figure A6.

Share Component: To capture exposure by occupation, I exploit a unique feature of my data: the occupations that Syrian refugees held in Syria in 2011, shortly before displacement, measured through recall. Appendix Figure A7 plots this pre-displacement occupation distribution for Syrian refugees.[34] I define the occupation-level share, Share_o, as the fraction of Syrian refugees who worked in occupation o in Syria before displacement. This share proxies for the relative likelihood that refugees will work in occupation o once they gain the legal right to work. To verify the relevance of this instrument, I show that pre-displacement occupation shares strongly predict refugees observed occupational distribution after the introduction of work permits, as reported in Appendix Figure A8. The exclusion restriction is that Jordanians' occupational outcomes are affected by these pre-displacement shares only through the occupations that refugees ultimately enter into once in Jordan.

Jordanians face substantial exposure to Syrian refugees, as there is substantial occupational overlap between the two populations. Appendix Figure A12 plots the Jordanian occupation distribution pre-work permits with quartiles of exposure to Syrian refugees. Jordanians in the middle to lower end of the skill distribution (based on the ISCO occupation codes ordering) are most exposed to Syrian refugee labor market competition.

[34] Given that this recall data comes from a representative sample of Syrian refugees in Jordan in 2014, I do not face the usual concerns about refugees being a selected sample from the general occupations distribution in the country of origin.

My shift-share measure of exposure can then be expressed as:

$$\text{Exposure}_{o,g} = \left(\frac{\text{Syrian Refugees}_g}{\text{Population}_g} \right) \cdot \text{Share}_o$$

where Share_o measures the share of Syrian refugees working in occupation o in Syria prior to displacement. Thus a Jordanian is more exposed to the Syrian refugee labor supply shock if they 1) live in a governorate with a higher concentration of Syrian refugees and 2) work in an occupation where more Syrian refugees have worked in prior to displacement. I then use z-scored version of the previously defined exposure measure in my main specification.[35]

Event Study Design: To estimate the effects of the work permit scheme on Jordanians, I use the following event study specification with two-way fixed effects and unstaggered continuous treatment (the shift-share):

$$Y_{o,g,t} = \sum_{t=-6}^{12} \beta_t \left(\text{Exposure}_{o,g} \times \mathbb{1} \left(\text{Year} = t \right) \right) + \gamma_{o,g} + \delta_t + \epsilon_{o,g,t} \tag{1}$$

where $Y_{o,g,t}$ denotes the outcome of interest (Jordanians' occupation share or occupation-average wage), $\gamma_{o,g}$ are occupation-by-governorate fixed effects, and δ_t are year fixed effects. The unit of observation is then an is an occupation–governorate–year cell, constructed by aggregating individual-level labor-force survey data. Standard errors are clustered at the unit of treatment: an occupation-governorate. Because the underlying surveys are repeated cross-sections rather than panels, changes in these aggregated outcomes reflect reallocation across occupations (and into unemployment) at the population level.

This specification identifies how local outcomes evolve differentially across occupations and local with greater exposure to refugees. The key identifying assumption is that, conditional on fixed effects, no unobserved factors correlated with both exposure and local labor-market dynamics evolve differentially around the introduction of work permits.

4.2 Main Results

My event study specification will cover three time periods: before Syrian refugees arrive (2005-2011), after Syrian refugees arrive but before work permits (2012-2016), and after work permits are introduced (2017-2023). This allows me to test for pre-trends in my outcome variables, the effect of Syrian refugees' arrival, and the subsequent effect of introducing work permits.

Occupational Shares: I am interested in capturing the effect of exposure to Syrian refugees on Jordanians' reallocation across occupations and exit into unemployment. To do so, I measure

[35] For a plot of z-scored exposure across the occupation distribution, see Appendix Figure A9.

reallocation across occupations by looking at changes in Jordanians' occupation shares over time. I construct occupation shares by location and measure them as the number of Jordanians working in a given occupation relative to the number of Jordanians participating in the labor market.

$$\text{Occ Share}_{o,t} = \frac{\text{Jordanian Workers}_{o,t}}{(\sum_o \text{Jordanian Workers}_{o,t}) \; + \; \text{Unemployed Jordanians}_t}$$

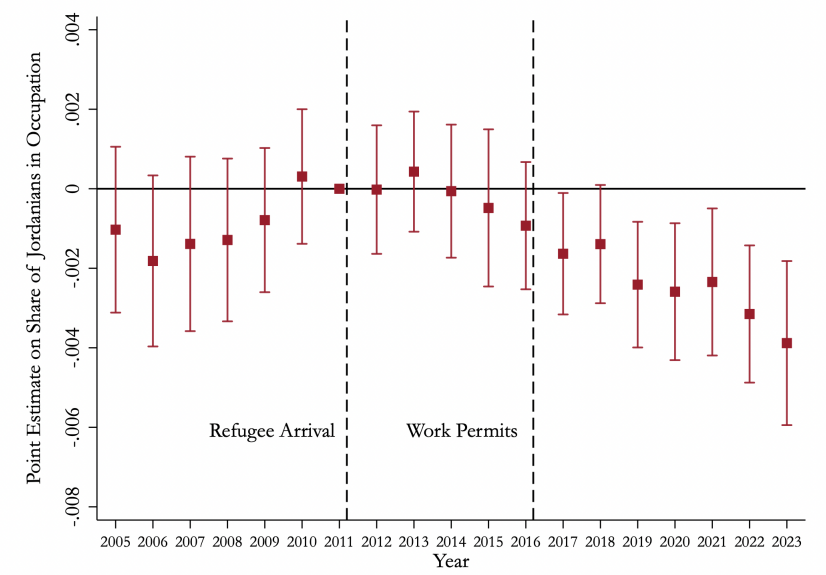
I include unemployed Jordanians in the denominator to construct occupation shares in my preferred specification to account possible exit into unemployment in addition to reallocating across occupations. The exclusion of unemployment results in a downward bias in the estimated coefficient on occupation shares in cases where there is exit into unemployment.[36]

Figure 6 plots the resulting coefficients, β_t, estimated from running my main event study specification on Jordanian occupational shares (including unemployment). The yearly estimates for the period of 2005 to 2011 shows no evidence of pre-trends. After Syrian refugees arrive to Jordan, I find that higher levels of exposure do not affect the occupation shares of Jordanians. Given my definition of exposure, this is not a surprising result. As previously detailed, Syrian refugees are disproportionately clustered in informal occupations prior to the introduction of work permits relative to where they worked pre-displacement. If Syrian refugees are mismatched relative to their occupations prior to displacement, then my exposure measure should not be a strong predictor of the competition Jordanians face in the labor market as a result of Syrian refugee entry. Additionally, only 20% of working-aged Syrian refugee men were working during this period, deterred by the lack of work permits, creating smaller labor supply shock.

However, once work permits are introduced, I find a strong persistent negative effect on share of Jordanians in occupations that are highly exposed to refugees' entry. An additional standard deviation of exposure corresponds to a 0.14 percentage point decrease in the share of the Jordanian labor force working in that occupation. Given the average occupation share size is 3.54%, this corresponds to an exit rate of 9.6% out of highly exposed occupations.

[36] This is caused by exit causing both the number in the occupation (the numerator) and the number of workers overall (the denominator) to fall simultaneously, resulting in a seemingly larger effect than when unemployment is included in the denominator, as only the numerator will change.

Figure 6: Effect of Exposure on Jordanian Occupational Shares Including Unemployment



Note: Point estimates from a regression of occupation shares, computed including unemployment from the denominator, for Jordanians on a z-scored shift-share measure of exposure to Syrian refugees, measured as share of refugees in that occupation x share of refugees in a given governorate. Regression includes year and occupation-by-governorate fixed effects. Standard errors are clustered at the unit of treatment: the occupation-governorate.(Observations: 6,696 occupation x governorates)

I report the estimated coefficients for my alternative measure of occupation shares (excluding unemployment from the denominator) in Appendix Figure A10. Absolute effect sizes are slightly smaller in this alternative specification, consistent with the main estimate of exit including transitions into unemployment as well as reallocation to other occupations. To decompose the relative importance of reallocation vs. unemployment in exit from highly exposed occupations, I compare the relative difference in the event-study coefficients with and without unemployment in the denominator.[37] Appendix Figure A11 plots the share of occupational exit accounted for by reallocation vs. unemployment in the post-permit period, showing that roughly 85–90% of adjustment occurs through reallocation while 10-15% can be attributed to exit into unemployment.[38] I will provide additional evidence that occupational exit is driven by reallocation, not unemployment, using my 2-period panel data (see Table 1).

Given exit is driven primarily by reallocation across occupations, I find a pattern of occupational upgrading – Jordanians leave highly exposed, lower-paying occupations for less exposed, higher-

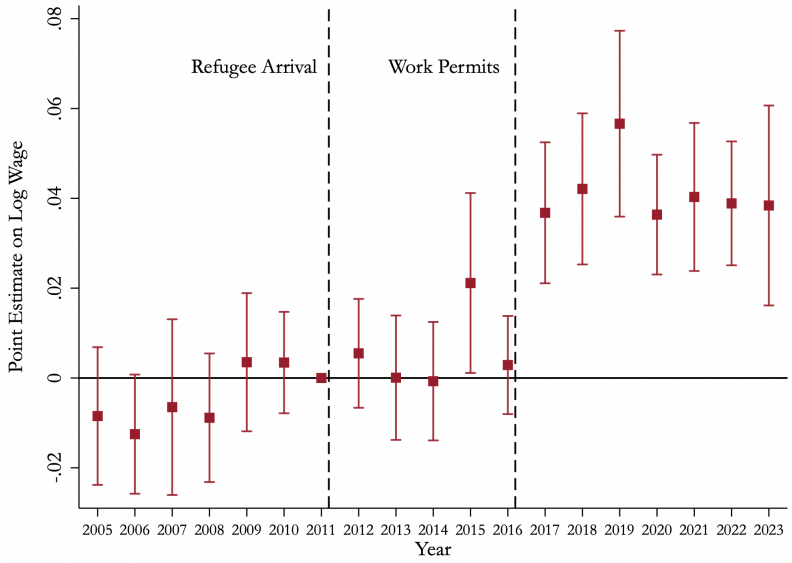
[37] As my data is repeated cross-sections and my exposure variable is defined using one's occupation, I cannot directly estimate unemployment using my main specification.

[38] Appendix Table A4 reports the full set of coefficients and corresponding decompositions for the entire study period. Decomposition values before 2016 are noisy because both specifications yield coefficients close to zero, mechanically inflating ratios. After 2016, the decomposition stabilizes, with less than 15 percent of exit reflecting unemployment.

paying occupations. As Appendix Figure A12 shows, Jordanians in the middle to lower end of the skill distribution are most exposed to labor market competition with Syrian refugees. By exiting these occupations, Jordanians re-sort to higher-skill jobs. Appendix Figure A14 documents average log wages by quartiles of exposure to show that these highly exposed, lower-skill occupations are in fact lower paying on average.

Occupation Average Wages: My regression results present strong evidence of Jordanians exiting high exposure occupations in response to Syrian refugees obtaining work permits. To affirm that this reallocation is assortative, thus indicative of selection, I estimate the the effect of exposure on the average wage of Jordanians by occupation. Figure 7 presents the effect of exposure on the logged average wage of Jordanians at the occupation-governorate level. Similarly to the event study for occupational shares, the yearly estimates for the period of 2005 to 2011 shows no evidence of pre-trends. After Syrian refugees arrive to Jordan, I find that exposure does not affect the occupation-level wages of Jordanians (consistent with the null for shares). Once work permits are introduced toward the end of 2016, a strong positive and persistent treatment effect emerges for Jordanians in occupations (in governorates) that are more exposed to Syrian refugees. A standard deviation increase in the exposure level increases occupation-level wages by an average of 4.2% for the period of 2017-2023.

Figure 7: Effect of Exposure on Occupation Average Wages for Jordanians



Note: Point estimates from a regression of log occupation-average wages for Jordanians on a z-scored shift-share measure of exposure to Syrian refugees, measured as share of refugees in that occupation x share of refugees in a given governorate. Regression includes year and occupation-by-governorate fixed effects. Standard errors are clustered at the unit of treatment: the occupation-governorate. (Observations: 6,696 occupation x governorates)

The event study coefficients estimate changes in the relative average wages between high- and

low-exposure occupations. Combined with the previous finding that Jordanian occupation shares fall in high-exposure occupations, these estimates provide causal evidence that Jordanians re-sorted across occupations following Syrians' gaining access to work permits.

In a standard sorting model, individuals sort to where to the occupation where they have comparative advantage, resulting in an inverse relationship between the share of workers in an occupation and the average ability (positive selection). The entry of Syrian refugees will drive the wage per efficiency unit (marginal product of labor) down in high exposure occupations and Jordanians with the lowest ability in these occupations will exit in response. As a result, the average ability of the remaining Jordanians in the high exposure occupation will increase, offsetting to some degree the wage reduction caused by Syrians' entry. Comparatively, the low exposure occupations will now receive a larger share of Jordanians, which will be lower in ability than the current stock of Jordanians in the occupation, thus lowering the average ability and, in turn, the occupation's average wage among Jordanians. In addition to this compositional effect induced by re-sorting, I will also use the model to test for whether the re-sorting of Jordanians can be large enough to offset the direct supply effect of refugee entry, amplifying these wage gains.

As additional evidence of positive selection in Jordanians' re-sorting, I compare the distribution of residuals from an individual-level wage regression across occupations in the first and fourth exposure quartiles. Following the introduction of work permits, the mean and upper quantiles of these occupation-average residuals rise systematically in high-exposure occupations relative to low-exposure ones. This pattern indicates that higher-ability Jordanians increasingly remain in high-exposure occupations, while lower-ability workers exit, consistent with assortative reallocation. See Appendix Subsection C for specification and results.

My estimates can only detect changes in the relative wage gap between occupations differentially exposed to Syrian refugees, which creates two limitations in my analysis. First, as with all shift-share estimates, I have a "missing intercept" problem.[39] The estimated coefficient on exposure estimates relative changes, but not whether aggregate wages have shifted up or down as a result of the policy. Second, I cannot assign the directionality of these relative wage effects by exposure, as the reduction in the wage gap could be driven by (i) increases in the average wages of highly exposed occupations, (ii) decreases in the average wages of less exposed occupations, or most likely, (iii) a combination of the two. I will use the estimated model to overcome both of these challenges, allowing me to speak to the general equilibrium level effects on aggregate wages as well as within exposure level wages that the reduced form cannot identify.

[39]The "missing intercept" problem arises for regression with a continuous treatment – such as exposure to refugees – to infer aggregate or level effects from relative coefficients. The regression estimates how outcomes vary with exposure but not the overall level shift in the economy, as there is no instrument for the intercept.

4.3 Mechanism: Occupational Upgrading from Re-Sorting

Jordanians are switching out of highly exposed occupations, which tend to be lower-paying and typically require less formal education, into less exposed occupations, which tend to be the opposite. To understand how this re-sorting to more education-intensive occupations occurs, I leverage my one source of panel data, the Jordan Labor Market Panel Survey (JLMPS), which contains observations on Jordanian individuals in 2010, prior to refugees' arrival, and again in 2017, after work permits are introduced. For comparability, I compute the same exposure measure as the main event study specification but based on an individual's occupation and location in 2010, prior to refugees' arrival. Moreover, since my event study does not detect an effect from exposure prior to the introduction of work permits, I interpret the effects found using this panel data to be attributed to the effect of work permits, not refugees' arrival. The panel data analysis has two main benefits: (i) I can explicitly test for the effect of exposure on exit into unemployment and (ii) I can look at *who* upgrades occupations or exits in response to being exposed to Syrian refugees after work permits are introduced.

As I am primarily interested in transitions – namely in reallocation across occupations and from employment to unemployment – I define my outcome variables as indicator variables that take the value of 1 if the transition occurred and zero if else. Importantly, since my exposure measure is defined in terms of one's occupation, the sample is restricted to those working-aged Jordanian men are employed in 2010, prior to the arrival of refugees. For the extensive margin, I define two measures: employment among the working-aged and unemployment among those still active in the labor force. For the intensive margin of occupational reallocation, I look at both occupational upgrading and downgrading. To do this, I rely on the occupation's corresponding ILO ISCO 1-digit code, which are ordered based on the occupation's educational requirement, such that higher numbers requires less formal education.[40] An individual has upgraded (downgraded) their occupation if they work in an occupation with a lower (higher) 1-digit ISCO code in 2017 than in 2010.[41]

With these outcome variables in mind, I implement the following regression for working-aged Jordanian men:

$$Y_{o,g,i} = \beta \cdot \text{Exposure}_{o,g,t=2010} + \gamma \cdot \text{Age}_{i,t=2010} + \epsilon_{o,g,i}$$

The regression includes baseline age as a control and use standard errors clustered at the unit of exposure (occupation x location).

[40] For example, ISCO Occupation Group 1 corresponds to "Managers", which typically require workers to have at least a bachelor's degree. Comparatively, ISCO Occupation Group 9 corresponds to "Elementary Occupations", which require no formal education.

[41] This definition further restricts the sample to those employed in both periods.

To understand *which* Jordanians change occupations or exit employment, I run the above regression specification and include a categorical variable for educational attainment, which is defined by the highest level of education individuals have completed at baseline (2010). Education levels are defined into the following mutually exclusive categories: primary education or less (up to 5th grade), lower secondary (up to 10th grade), secondary education, post-secondary diploma (associate's degree), and tertiary education (bachelor's or more).[42] In 2010, the education levels of the Jordanian workforce were distributed as follows: 15.7% had completed primary education or less, 41.1% had completed lower secondary, 21.1% had completed secondary education, 7.3% had completed a diploma, and 14.7% had completed some form of tertiary education. For a yearly distribution of educational attainment, please see Appendix Figure A16.

Table 1 presents the results from running these pair of regression specifications over different outcome variables. As evidenced by the coefficient in Columns (1), (3), (5), and (7), I find that the average treatment effect of an additional standard deviation of exposure does not increase the likelihood of being employed, unemployed, upgrading one's occupation, or downgrading one's occupation respectively.

However, there are important differential effects by level of education in terms of occupational change as seen in Column (6) and Column (8) of Table 1. While additional education (relative to the omitted category of "primary education or less") increases the likelihood of upgrading in response to higher levels of exposure, the effects are much larger among those with a tertiary education. For those with bachelor's degrees or post-graduate degrees, an additional standard deviation of exposure increases the likelihood of upgrading one's occupation by 26.6 p.p. relative to an average rate of occupational upgrading of 22%. Those with higher levels of education are also less likely to downgrade occupations in response to higher levels of exposure. These effects are generally smaller in magnitude relative to the coefficient estimates for the effect of exposure on occupational upgrading by education level.

For the extensive margin outcomes, I am also able to run a standard Difference-in-Differences (DiD) specification with individual fixed effects where the outcome variable is a dummy for the extensive margin labor market outcome in each period. This alternative specification does not change the results, as seen in Appendix Table A5.

[42] In Jordan, education up to grade 10 is considered basic education, making it a clear level for demarcation. The final two years of secondary education are defined by specializing in a specific academic track and culminates in a national exam called *Tawjihi*, which one must complete to attend university. This is similar structure to A-Levels in the United Kingdom.

Table 1: Effect of Exposure on Occupational Outcomes by Education

	Employed (All)	Employed (All)	Unemployed (Only LFPs)	Unemployed (Only LFPs)	Upgraded Occupation	Upgraded Occupation	Downgraded Occupation	Downgraded Occupation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure	0.003	-0.003	0.009	0.014	0.001	-0.027	-0.007	0.019
	[0.008]	[0.013]	[0.007]	[0.014]	[0.006]	[0.014]*	[0.012]	[0.018]
Exposure x Tertiary Educ		-0.056		0.017		0.266		-0.052
		[0.021]***		[0.037]		[0.076]***		[0.040]
Tertiary Education		0.119		-0.048		0.074		-0.022
		[0.033]***		[0.020]**		[0.059]		[0.035]
Exposure x Diploma		0.066		-0.021		0.096		-0.111
		[0.042]		[0.020]		[0.044]**		[0.032]***
Diploma		0.116		-0.051		0.114		0.069
		[0.039]***		[0.023]**		[0.050]**		[0.041]*
Exposure x Secondary Educ		0.005		-0.006		0.033		-0.038
		[0.017]		[0.018]		[0.030]		[0.024]
Secondary Education		0.055		-0.041		0.047		0.077
		[0.035]		[0.021]**		[0.040]		[0.031]**
Exposure x Lower Secondary		0.026		-0.012		0.042		-0.035
		[0.014]*		[0.013]		[0.015]***		[0.017]**
Lower Secondary		0.033		-0.029		-0.062		0.074
		[0.030]		[0.019]		[0.032]*		[0.028]**
Var Mean	.71	.71	.11	.11	.22	.22	.17	.17
Obs	2417	2417	1922	1922	1704	1704	1704	1704

Notes: Reported regressions regress different dummy variables for labor force outcomes in 2016 on a measure of exposure, constructed at the level of the ISCO 2-digit occupation code x governorate, that accounts for both the share of refugees in a given location and the share of refugees that have experience working in a given occupation. Columns (1) and (2) look at the probability of being employed in 2017, conditional on being employed in 2010. The outcome variable takes a 1 if the individual is still employed in 2017 and 0 if they have either become unemployed or exited the labor force entirely. Columns (3) and (4) next consider transition to unemployment where the variable takes the value 1 if the individual is unemployment in 2017 and restricts the sample to exclude those that exit the labor force. Column (5) and (6) look at whether an individual has upgraded occupations, which is defined as switching into an occupation that has a lower 1-digit ISCO code. Column (7) and (8) look at whether an individual has downgraded occupations, which is defined as switching into an occupation that has a higher 1-digit ISCO code. Regressions control for age and are restricted to working-aged men. "Primary education or less" is the excluded category in the set of education dummies included in the regression. Standard errors are clustered at the unit of exposure - the ISCO 2-digit occupation x governorate.

5 The Model

In the first half of the paper, I have provided empirical evidence of occupational reallocation by Syrian refugees once work permits were introduced, and subsequent re-sorting by Jordanians in response. However, without some additional structure, I cannot assess either aggregate effects of the policy or the distributional implications. By then estimating the corresponding model, I can quantify the reduction in misallocation caused by the work permit scheme and, in turn, the distribution of these gains across Syrians and refugees. I can further decompose the effects on Jordanians, to understand the relative importance of the *direct supply effect* of Syrians' entry vs. the *re-sorting effect* of Jordanians, in determining in what cases Jordanians can aggregately benefit from refugees' obtaining the right to work.

To do this, I utilize an adaptation of the model developed in Hsieh et al. (2019), which nests an occupational choice model in a general equilibrium framework. Such a model is ideal for my setting. The presence of frictions faced in the occupational choice of one group has the potential to not only distort the allocation of that group's labor but, through general equilibrium wages, the allocation of other groups. These group-specific occupation-level frictions in the model map clearly to the introduction of the work permit scheme, which reduced barriers overall and differentially across occupations.

This section outlines the defining features of my model and provides intuition, through the lens of the model, for how the introduction of work permits can reduce misallocation, improving aggregate labor productivity.

5.1 Individual's Occupational Choice

Human Capital

I begin with how the model assigns individuals occupation-specific productivities. Using the standard specification first outlined in McFadden (1974), individuals draw an iid occupation-specific ability draw $\epsilon_{i,o}$ from each occupation's Fréchet distribution with shape parameter θ:

$$F_o(\epsilon) = \exp\left(-\epsilon_{i,o}^{-\theta}\right) \tag{2}$$

Note that the ability draw does not depend on the individual's group – whether they are Syrian or Jordanian. This implies that, in the absence of any frictions or differences in preferences over occupations, Syrians and Jordanians are perfect substitutes. The Fréchet distribution is defined by a single shape parameter θ, which governs the dispersion of talent across occupations. A lower value of θ generate fatter-tailed distribution, which results in an individual's productivity in one

occupation is less predictive of their productivity in another.[43] In practical terms, this means that someone who is highly productive in one type of job (e.g., accounting) is not necessarily productive in another (e.g., carpentry), resulting individuals choosing occupations based on their comparative advantage. For very high values of θ, being productive in one occupation corresponds to being productive in all occupations, leading to sorting based on absolute advantage.

An individual i in occupation o from group g accumulates human capital stock $h_{i,o,g}$ through the following production function:

$$h_{i,o,g} = s_i^{\phi_o} \tag{3}$$

Human capital is thus a function of an individual's educational attainment s_i (measured in years of schooling). The term ϕ_o denotes the elasticity of human capital with respect to time invested and is occupation-specific.[44]

Finally, the human capital stock $h_{i,o,g}$ is scaled by one's ability draw $\epsilon_{i,o}$ to get their total skill for a given occupation.

Wages and Wedges

In the model, any frictions that Syrian refugees face relative to a Jordanian worker in that same occupation are captured in an occupation-specific wedge, denoted as $\tau_{o,\text{Syrian}}$. The wedge operates similar to a tax on the wage a Syrian refugee would have received given their individual productivity draw and human capital in absence of any frictions, which is equivalent to the wage a Jordanian with the same profile receives. In addition to refuges' not having the legal right to work, this wedge will also includes other labor market barriers faced by Syrian refugees such as discrimination, limited networks, higher search costs, etc. Since Syrians' wedges are measured in relative terms to Jordanians, I set $\tau_{o,\text{Jordanian}} = 0 \ \ \forall o$ without loss of generality. Thus $\tau_{o,\text{Syrian}}$ can be interpreted as the composite labor market frictions faced by Syrian refugees in each occupation relative to that of a local Jordanian worker.

An individual i in occupation o from group g will then be paid the following wage:

$$\text{wage}_{i,o,g} = (1 - \tau_{o,g}) w_o \cdot h_{i,o,g} \epsilon_{i,o}$$

Where w_o corresponds to the wage per efficiency unit of labor in that occupation, equivalent to the marginal product of an efficiency unit of labor. The individual's wage is then w_o scaled by

[43] Formally, when productivity draws are independent across occupations and follow an extreme value distribution (such as Fréchet), a lower θ implies greater dispersion in draws and weaker correlation in productivities across occupations.

[44] It can be interpreted as how useful a year of education is for generating skill in a given occupation. For example, attending higher-level education does not improve a worker's productivity in occupations where skills are learned primarily through on-the-job experience.

the individual's stock of human capital units and, in the case of Syrian refugees, discounted by the occupation-specific wedge.

Homophilic Preferences

Individuals also hold preferences over occupations, which affect their choices. I define preferences $z_{o,g}$ at the occupation-group level, which is then comprised of exogenous component, that is group-occupation specific but does not vary within group, and an endogenous component reflecting preferences for homophily. Let $N_g * p_{o,g}$ be the number of workers from one's own group in the occupation, where N_g is the total number of workers in each group g and $p_{o,g}$ is the share working in occupation o. Then the expression for preferences among a group for a given occupation is:

$$z_{o,g} = \alpha_{o,g} \cdot \left(\frac{N_g p_{o,g}}{\sum_g N_g p_{o,g}} \right)^{\lambda_g} \tag{4}$$

where $\alpha_{o,g}$ can be viewed as an exogenous amenity value of working in a given occupation (which I allow to vary by group to accommodate differential social norms around what jobs are acceptable).[45]

The second term captures group-specific preferences for homophily, which are based on the share of in-group workers relative to the total workers in an occupation (summed across both groups). For simplicity of notation, I define this compositional share $\delta_{o,g} = \left(\frac{N_g p_{o,g}}{\sum_g N_g p_{o,g}} \right)$. The relative importance of homophily compared to the amenity value of an occupation depends on the preference parameter λ_g. As λ_g approaches 0, individuals no longer care about the group-based composition of the workers in their occupation. Higher values of λ_g correspond to a greater taste for homophily, leading to more segregation of groups across occupations.

Homophily can be explained by numerous mechanisms. In this paper, I am agnostic to the precise force driving homophily. Instead, I present a few possible explanations from the literature that are most applicable to the context of refugee integration. Most obviously, it could be Becker (1957) taste-based discrimination, creating a disutility from interacting with others from the out-group, which would lead to exit from occupations that the out-group (refugees) enter (Charles and Guryan, 2008). This is particularly likely on the side of the Jordanian host community, which exhibits high-levels of discomfort toward interacting with Syrian refugees in a variety of settings, as evidenced by 2014 survey responses outlined in Appendix Figure A17. Aksoy et al. (2023) find that those workers who compete directly with refugees in the labor market hold the most prejudice against refugees, increasing the importance of homophilic preferences. While Becker modeled prejudice as a disutility from interactions with the out-group, affinity bias can be expressed symmetrically as a utility bonus from interacting with one's own group. From the side of refugees, discrimination by Jordanians can lead to avoidance, where refugees self-segregate to avoid bias or social-exclusion.

[45] The amenity term $\alpha_{o,g}$ captures unobservable variation in group's distributions across occupations that cannot be explained by the wedge or the distribution of individual's comparative advantages (as determined by θ). I allow to vary by group to accommodate differential social norms, which shape the valuation of amenities.

Alternatively, networks and referral hiring are another key driver of occupational homophily (Calvó-Armengol and Jackson, 2004; Bolte et al., 2020; Patacchini and Zenou, 2012; Jackson, 2021). This is particularly relevant in Jordan's labor market where individuals rely heavily on personal connections during the job search and matching process. Intuitively, individuals will find jobs in occupations where members of their network work, and since social networks are largely homophilic, this will induce homophilic sorting. Importantly, λ_g varies across groups. Consistent with models of network formation such as Currarini et al. (2009), minority groups will have more out-group ties than the majority group, reflected as a weaker preference for homophily.

Indirect Utility of a Choice

I define the indirect utility for choosing an occupation as a function depending on an individual's wage and their preferences. The indirect utility for individual i from group g in occupation o is given by:

$$U_{i,o,g} = z_{o,g}\left(1-\tau_{o,g}\right) w_o h_{i,o,g} \epsilon_{i,o} \tag{5}$$

Utility is determined by preferences over occupations, which vary by group, and the individual's realized wage, which is a function of the effective wage rate w_o, the wedge they face $\tau_{o,g}$, their human capital stock $h_{i,o,g}$, and their ability draw $\epsilon_{i,o}$. The term $z_{o,g}$ represent group-level preferences or amenity values over occupations. Individuals then choose occupation o^* that yields the highest indirect utility value.

I also include unemployment in the choice set of "occupations". In the model, unemployment will capture the effect of work permits on entry of Syrian refugees as well as potential exit of Jordanians. To measure the role of reservation wages, the unemployment sector will have a common wage rate w_u, which is then scaled by human capital $h_{i,u}$ to account for more educated individuals having higher reservation wages.

Aggregation of Choices

Leveraging the properties of the Fréchet distribution, the probability that individual i in group g chooses occupation o can be aggregated to compute the share of individuals i in group g in each occupation o, denoted as:[46]

$$p_{o,g} = \frac{\tilde{w}_{o,g}^{\theta}}{\sum_j \tilde{w}_{j,g}^{\theta}} \tag{6}$$

where $\tilde{w}_{o,g} = z_{o,g}\left(1-\tau_{o,g}\right) w_o \overline{h}_{o,g}$.[47] Equation 6 serves as the main sorting equation for workers over occupations. As is standard in occupational choice models, an individual's choice of occupation is

[46] See Appendix E.1 for a complete derivation.

[47] $\overline{h}_{o,g} = \overline{s}_o^{\phi_o}$ where $\overline{s}_o$ is the average schooling of workers in occupation o.

determined by the value of the chosen occupation relative to the sum of the value of all occupations. Thus, the distribution of individuals across occupations is determined by the occupation's relative preferences and realized wages, as opposed to its absolute value.

Using the occupational shares equation where workers sort based on their ability draw $\epsilon_{i,o}$, the average quality of workers in an occupation is then:

$$\mathbb{E}[\epsilon_{i,o} h_{i,o,g} | \text{ choose } o] = \overline{s}_o^{\phi_o} \left[\left(\frac{1}{p_{o,g}} \right)^{1/\theta} \tilde{\Gamma} \right] \tag{7}$$

where $\tilde{\Gamma} = \Gamma(1-(1/\theta))$ and $\Gamma(\cdot)$ refers to the Gamma function and $\overline{s}_o$ can is the occupation-specific average schooling level. Equation 7 relates average quality of workers in group g in occupation o inversely to the number of workers from group g in said occupation, which can be understood as the selection effect. Intuitively, for either group, the most productive individuals select into an occupation first. Thus, an increase in $p_{o,g}$, the share of group g in occupation o, can only be achieved by drawing down the ability distribution, resulting in a decline in the average ability of the workers in that occupation.

Let $\overline{\text{wage}}_{\text{o,g}}$ represent the average earnings in occupation o for group g, which is a function of frictions $\tau_{o,g}$, the efficiency wage w_o, and the average quality of workers in that occupation.

$$\begin{aligned} \overline{\text{wage}}_{o,g} &= (1-\tau_{o,g}) w_o \cdot \mathbb{E}[\epsilon_{i,o} h_{i,o,g} | \text{ choose } o] \\ &= (1-\tau_{o,g})\, w_o \overline{s}_o^{\phi_o} \left(\frac{1}{p_{o,g}} \right)^{1/\theta} \tilde{\Gamma} \end{aligned} \tag{8}$$

5.2 Production and General Equilibrium

The Firm's Problem

To close the model, I follow Hsieh et al. (2019). A representative perfectly competitive firm uses labor from each occupation to produce an aggregate good Y, using the following CES production function,

$$Y = \left[\sum_o (A_o H_o)^{\rho} \right]^{\frac{1}{\rho}} \quad \forall o \neq u \tag{9}$$

where H_o is the total efficiency units from labor in occupation o and A_o is an exogenous occupation-specific productivity parameter.

Note, the production function excludes unemployment as they do not generate any output. The inclusion of unemployment is a permutation on including home production as an occupation (often to account for female selection into the labor force), which is a typical extension of the Roy

Model for occupational choice. While the "wage" of both home production and unemployment are unobserved in the data, I deviate from the standard assumption that this sector contributes to the overall production function in the economy. Given my setting, where unemployment is characterized by idle labor, excluding unemployment from the firm's labor demand and thereby the production function is a more natural assumption.[48]

Importantly, the substitution parameter, ρ, governs how easily the firm can substitute labor across occupations.[49] Intuitively, when substitution across occupations is easier, the negative effects of labor being misallocated across occupations on aggregate production will be lessened.

Normalizing the price of good Y to 1, the firm's maximization problem can be written as:

$$\max_{\{H_o\}} \left(\sum_{o=1} (A_o H_o)^{\rho} \right)^{\frac{1}{\rho}} - \sum_{o=1} w_o H_o \quad \forall o \neq u$$

The first-order condition with respect to H_o implies the wage:

$$w_o = A_o^{\rho} \cdot \left(\sum_{k=1}^{n} (A_k H_k)^{\rho} \right)^{\frac{1-\rho}{\rho}} \cdot H_o^{-(1-\rho)} \tag{10}$$

Definition of Equilibrium

The set of components in the economy needed to characterize equilibrium are: an individual's occupational choice o^*, the total efficiency units of labor in each occupation H_o, final output Y, and efficiency wage w_o. A competitive equilibrium in this economy is therefore defined as:

I. Given education s_i and idiosyncratic ability draw $\epsilon_{i,o}$, each individual chooses occupation o^* that maximizes their utility, taking $\{\tau_{o,g}, w_o, \epsilon_{i,o}, z_o\}$ as given

$$o^* = \text{argmax} \max_{o} U\left(\tau_{o,g}, w_o, \epsilon_{i,o}, z_o\right)$$

II. A representative firm hires H_o^* in each occupation to maximize profits

$$\max_{\{H_o\}} \left(\sum_{o=1}^{n} (A_o H_o)^{\rho} \right)^{\frac{1}{\rho}} - \sum_{o=1}^{m} w_o H_o \quad \forall o \neq c$$

[48] This assumption does not affect the process of estimating the model but does impact the implementation of counterfactuals, which requires an additional assumption that the reservation wage in unemployment does not change relative to the equilibrium used as the starting point. These points will discussed more in Section 6 and Section 7.

[49] The elasticity of substitution is then $\sigma = \frac{1}{1-\rho}$. For $\rho > 0$ (i.e. $\sigma > 1$), occupations are substitutes in the production function. In the limit, as $\rho \leftarrow 1$, occupations become perfect substitutes.

III. The occupational wage w_o^* clears the labor market for each occupation

$$H_o = \sum_{g=1}^{G} q_g p_{o,g} \cdot \mathbb{E}[h_{o,g}\epsilon_{i,o} \mid \text{choose o}] \quad \forall o \neq u$$

IV. Total output Y is given by the firm's production function

$$Y = \left[\sum_{o=1}^{m} (A_o H_o)^{\rho}\right]^{\frac{1}{\rho}}$$

The general equilibrium solution of the model is then the set of vectors $\left\{p_{o,g}, H_o^S, H_o^D, w_o, Y\right\}$ such that the following hold:

I. The probability of an individual in group g working in occupation o, $p_{o,g}$, satisfies

$$p_{o,g} = \frac{\widetilde{w}_{o,g}^{\theta}}{\sum_{j=1}^{m} \tilde{w}_{j,g}^{\theta}} \quad \forall o \tag{11}$$

II. The supply of efficiency units of labor for occupation o, H_o^S, aggregates individual occupational choices such that

$$\begin{aligned} H_o^s &= \sum_{g=1}^{G} p_{o,g} \cdot \mathbb{E}[h_{o,g} \mid \text{choose o}] = \sum_{g=1}^{G} p_{o,g} \left[s^{\phi_o} \left(\frac{1}{p_{o,g}}\right)^{\frac{1}{\theta}} \tilde{\Gamma} \right] \\ &= s^{\phi_o} \tilde{\Gamma} \left(\sum_{g=1}^{G} \left[\frac{\tilde{w}_{o,g}^{\theta}}{\sum_j \tilde{w}_{j,g}^{\theta}} \right]^{\frac{\theta-1}{\theta}} \right) \end{aligned}$$

III. Demand for efficiency units of labor for occupation o, H_o^D, satisfies the firm's profit maximization problem such that

$$H_o^D = \left[\frac{A_o^{\rho}}{w_o}\right]^{\frac{1}{1-\rho}} \cdot Y \quad \forall o \neq u$$

IV. Pre-distortion efficiency wage, w_o, clears each occupational labor market such that

$$H_o^S = H_o^D \quad \forall o \neq u$$

V. Total output, Y, is equal to total wages plus "revenue" from wedges $\tau_{o,g}$

$$\left[\sum_{o=1}^{m} (A_o H_o)^{\rho}\right]^{\frac{1}{\rho}} = Y = \sum_{o,g} \left(\text{Pop.}_g \cdot p_{o,g}\right) \cdot \left(\overline{wage}_{o,g} + \tau_{o,g}\right)$$

By Walras' Law, if all occupational labor markets clear through matching the firm's labor demanded and the workers' labor supplied except for in unemployment then the market for them will also clear. The general equilibrium will be solved numerically.

5.3 Model Intuition for the Effect of Work Permits

To illustrate how the introduction of work permits impacts the allocation of labor, consider a simplified version of the model with only two occupations. To start, assume groups possess the same preferences over occupations and do not exhibit homophilic preferences. Individuals will then choose the occupation that yields the highest utility, $U_{i,o} = w_o \epsilon_{i,o}$ based on their own draws for $\epsilon_{i,o}$. Finally, I normalize the exogenous productivity parameters A_o in each occupation such that, in the absence of frictions, workers are evenly divided between occupations and $w_1^* = w_2^*$.[50]

Equilibrium Without Work Permits

Figure 8 shows the distribution of $\epsilon_{i,o}$, the ability draws of Syrian refugees and Jordanians, across Occupations 1 and 2.[51] Line A, a 45-degree line, represents the ratio of wages in the allocatively efficient equilibrium, where there are no wedges. The efficient allocation of labor is the one where all workers, Syrian and Jordanian, above Line A, work in Occupation 2, where they have a comparative advantage and thus will be paid more.[52] By symmetry, those below A sort into Occupation 1.

Without work permits, assume Syrian refugees face substantial frictions only in Occupation 2, denoted as the wedge τ.[53] Line B then represents the wage ratio experienced by Syrian refugees pre-work permits. The most talented Syrian refugees in Occupation 2, those in region I, still work in Occupation 2, as they did in the case without frictions. But Syrian refugees who are still comparatively better suited for Occupation 2, those in region II, now sort to Occupation 1, where they receive higher realized wages due to the friction-induced penalty on wages in Occupation 2. In terms of maximizing productivity, Syrian refugees in region II are thus misallocated. Syrian refugees in regions III and IV remain in Occupation 1.

In general equilibrium, the concentration of Syrian refugees in Occupation 1 causes w_1 to fall relative to w_2, as labor is now overly supplied to Occupation 1 relative to Occupation 2. [54] Line C represents the resulting wage ratio faced by Jordanians in the pre-work permit labor market. The

[50] It follows a 45°line as the sectors are assumed to be equally productive and w_o is equal to the marginal productivity of labor.

[51] For the purposes of building intuition, assume all individuals have the same amount of human capital up to the idiosyncratic ability draw. Moreover, Syrian refugees and Jordanians draw from the same ability distribution.

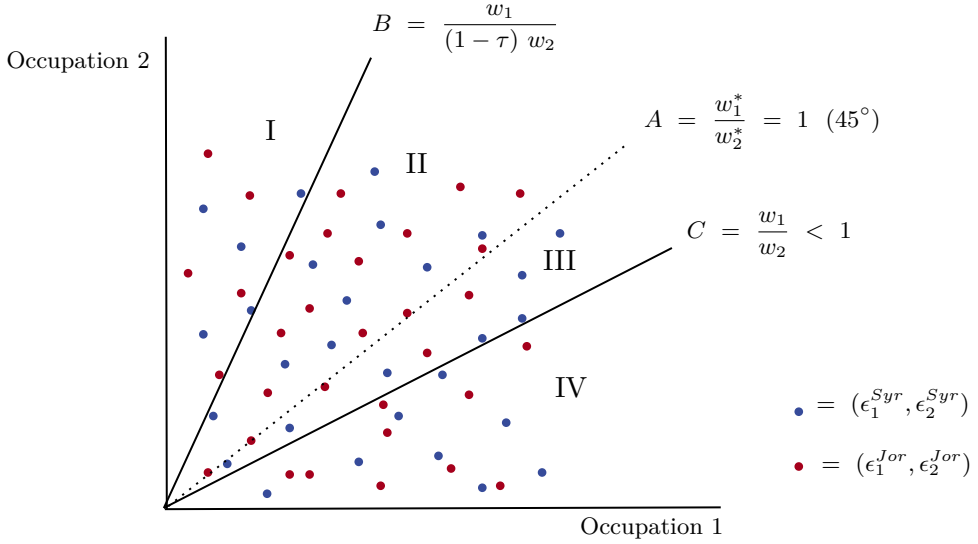
[52] This is because $\epsilon_{i,1} w_1 > \epsilon_{i,2} w_2 \iff w_1/w_2 > \epsilon_{i,2}/\epsilon_{i,1}$.

[53] Having a wedge in only one occupation is isomorphic to taking the relative wedge between both sectors in the case that both have frictions.

[54] Technically, under CES with constant-returns to scale, a supply shock to Occupation 1 will result in an absolute fall in Occupation 1's wage per efficiency unit (w_1) and Occupation 2 will experience a slight increase. For a proof of each result, see Appendix E.4.

most talented Jordanians in Occupation 1, those in region IV, stay in Occupation 1. However, the relative increase in w_2 causes Jordanians in region III to switch to Occupation 2. These Jordanians are those that have a comparative advantage in Occupation 1 in the absence of frictions and thus now misallocated. Jordanians in regions I and II remain in Occupation 2.

Figure 8: Allocation of Labor Pre-Work Permits



Thus, relative to the case of allocative efficiency, a labor market without work permits creates misallocation of Syrian refugee workers and, importantly, also creates misallocation among Jordanian workers. In the aggregate, this lowers the average skill of workers in both occupations, as Syrians in region II, formerly in Occupation 2, have been replaced with Jordanians in region III and vice versa.

$$\mathbb{E}[\epsilon_{\text{Syrian},2} \mid II] > \mathbb{E}[\epsilon_{\text{Jordanian},2} \mid III]$$
$$\mathbb{E}[\epsilon_{\text{Syrian},1} \mid II] < \mathbb{E}[\epsilon_{\text{Jordanian},1} \mid III]$$

Equilibrium With Work Permits

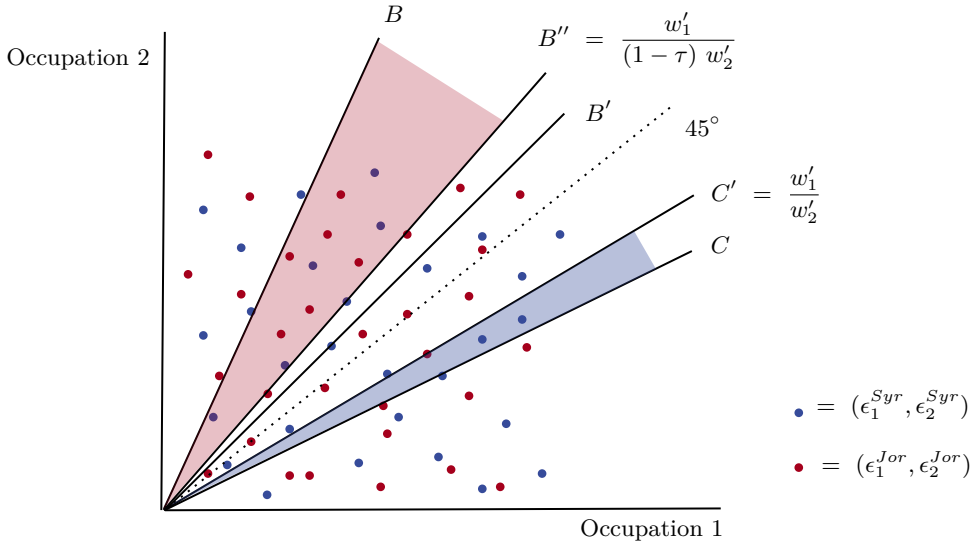
Now consider the introduction of work permits, which improves Syrian refugees' access to Occupation 2, modeled as a decrease in τ. In Figure 9, I visually decompose the impact of work permits on the misallocation of workers into the *direct supply effects* of Syrian entry into Occupation 2 and the *re-sorting effects* of Jordanians exiting.

Beginning with the Syrian refugees, when τ falls to τ', the effective wage Syrians receive in Occupation 2 increases, represented by the shift in the line of indifference between occupations from Line B down to Line B' (with slope $w_1/(1-\tau')w_2$). In turn, Syrian refugees between Lines B and B' will move into Occupation 2, reducing the misallocation of refugee skills. In general equilibrium, wages will adjust in response to the supply shock to Occupation 2, causing w_2 to fall

relative to w_1, which I refer to as the *direct supply effect* of Syrian entry. For completeness, this is denoted as the Line B'', which reflect the true line of indifference that Syrian refugees will face in general equilibrium.[55]

Comparatively, Jordanians will re-sort in response to the relative increase of w_1'/w_2', as reflected by their new line of indifference C'. Specifically, Jordanians between Lines C and C' will exit Occupation 2. This re-sorting will also have wage effects from (i) compositionally from selection (those left in occupation 2 will be relatively higher quality and increasing the occupation's average wage) and (ii) an increase in w_2' from the reduction of labor supplied to Occupation 2. I refer to this as the *re-sorting effect*.

Figure 9: Allocation of Labor Post-Work Permits



From this simple example, the overall effect on allocative efficiency from the work permit scheme becomes clear. The two shaded regions represent the reduction in each group's misallocation. Prior to the work permit scheme, refugees between Line B and the 45° line were misallocated. After work permits, Syrians in the red shaded region between B and B'' have switched from Occupation 1 to 2 and constitute a reduction in misallocation. For Jordanians, those between the 45° line and Line C were misallocated. After work permits, those in the blue shaded region between C and C'' have switched from Occupation 2 to 1 and similarly constitute a reduction in misallocation.

Homophily as an Amplifier of Sorting

To understand the role homophily plays in the allocation of labor, let κ be the premium on wages accrued on the occupation that has the higher share of workers from the in-group.[56] For the purposes of this example, I will assume that only Jordanians have strong preferences for ho-

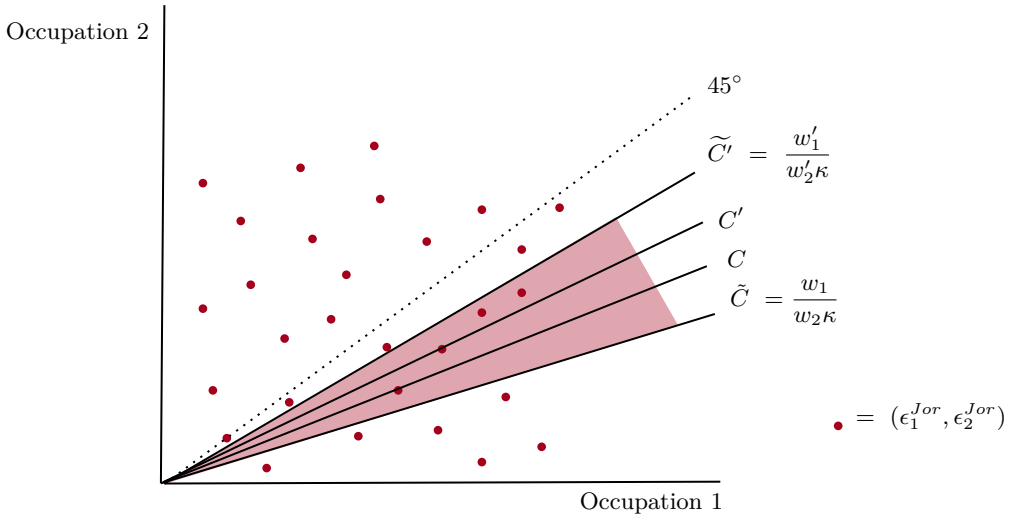
[55] Misallocation persists as long as $\tau' > 0$, such that lines B'' and A do not have the same slope.

[56] The line of allocative efficiency does not change under homophilic preferences as workers are evenly divided across occupations so neither occupation is preferrable on the basis of differences in the composition of the workers.

mophily.[57] As before, prior to the introduction of work permits, Syrians are overly concentrated in Occupation 1, due to high frictions in Occupation 2. With homophilic preferences, Jordanians will face an additional premium on the wages earned in Occupation 2, from working mostly with other Jordanians. This is represented in Figure 10, where the indifference line for Jordanians decreases from Line C (no homophily) to $\tilde{C}$ (homophily).

After work permits are introduced, Syrians will again respond to the reduction in frictions in Occupation 2 by entering. Jordanians will now re-sort in response to both the change in relative wages (as represented by Line C') as well as their preference for homophily. Since work permits increase the share of Syrians working in Occupation 2, Jordanians will derive less utility from working in Occupation 2, represented as a decrease in the value of κ to $kappa'$. As before Jordanians will exit Occupation 1, but the magnitude of the response will be much larger. Those Jordanians in the shaded red region between $\tilde{C}$ and $\tilde{C}'$ will re-sort to Occupation 2, as opposed to the base case where only those between C and C' switched. For a formal proof that homophily amplifies re-sorting relative to a case of wage-based sorting alone, see Appendix E.3.

Figure 10: Allocation of Jordanian Labor Under Homophilic Preferences



5.4 Mapping Model to Event Study - Comparative Statics for Wage Gaps

The model delivers a constant wage gap between groups (across all occupations) up to a relative difference in occupation-level preferences. From Equation 8, the expression for the occupation-

[57] If refugees have negligible preferences for homophily ($\lambda \approx 0$), which is consistent with the literature on minority groups, their sorting will be driven by changes in frictions and wages.

specific wage gap between Jordanians and Syrian refugees becomes:

$$\frac{\overline{wage}_{o,\text{Jordanian}}}{\overline{wage}_{o,\text{Syrian}}} = \frac{z_{o,\text{Syrian}}}{z_{o,\text{Jordanian}}} \cdot \left(\frac{\sum_j \tilde{w}^{\theta}_{j,\text{Jordanian}}}{\sum_j \tilde{w}^{\theta}_{j,\text{Syrian}}} \right)^{1/\theta}$$

If the relative value of all alternatives ($\sum_j \tilde{w}^{\theta}_{j,g}$) changes, such as reducing the wedges faced by Syrians as a result of the work permit scheme, this will also affect the relative wage gap across occupations.

The model pins down a relationship between occupation-average wages within a group. Without homophilic preferences, a change in w_o in one occupation (or more) is resolved via re-sorting, resulting in the equilibrium ratio of average wages between any two occupations invariant to changes in w_o. Substituting the definition for shares (Eq. 6) into the average wage equation (Eq. 8):

$$\overline{wage}_{o,g} = z_{o,g}^{-1} \tilde{\Gamma} \left(\sum_k \tilde{w}^{\theta}_{k,g} \right)^{1/\theta}$$

The average wage only depends on preferences, a scalar, and the total value of all occupations, which is a result of the Roy Model's multinominal discrete choice structure. Finally, taking the ratio between two occupations yields:

$$\frac{\overline{wage}_{o,g}}{\overline{wage}_{j,g}} = \frac{z_{j,g}}{z_{o,g}} = \frac{\alpha_{o,g} \cdot \delta_{o,g}^{\lambda_g}}{\alpha_{j,g} \cdot \delta_{j,g}^{\lambda_g}}$$

Thus, without homophilic preferences ($\lambda_g \neq 0$), the average wage gap would be constant between occupations, which contradicts the empirical fact outlined in Figure 7 – average wages in high exposure occupations increase relative to low exposure occupations, following the introduction of work permits. In practical terms, homophilic preferences induce more sorting in response to refugee entry than would occur if sorting was only based on wage changes alone.

6 Identification and Estimation

In this section, I discuss the identification and estimation procedures used to estimate the exogenous parameters of the model.

6.1 Identification

The model has the following parameters: $\{\theta, \rho, w_o, \alpha_{o,g}, \lambda_g, \tau_{o,g}, A_o\}$. For identification, I add the normalization of $\phi_o = 1 \ \forall o$, so that education has constant returns to scale across occupations. Finally, it is not necessary to pin down the substitution parameter ρ nor the exogeneous occupation-level productivity term A_o. Although, the estimates of these parameters will matter when implementing counterfactual analyses and will be discussed then.

Identifying Frechet shape parameter: $\{\theta\}$

As previously discussed in the model section, I follow the McFadden (1974) assumption that idiosyncratic ability ϵ is drawn from a single-parameter Frechet distribution, governed by shape parameter θ. This assumption is used to make the model tractable. To empirically estimate this parameter, I exploit the following relationship between an individual's observed wage and their ability draw.

$$wage_{i,o,g} = \tilde{w}_{i,o,g}\epsilon_i \quad \text{where} \quad \epsilon_i \sim F_i(\epsilon) = \exp\left(-\epsilon_i^{-\theta}\right)$$

Taking the log of both sides and plugging in for $\tilde{w}_{i,o,g}$ delivers:

$$ln(wage_{i,o,g}) = ln\left(z_{o,g}\right) + ln\left(1 - \tau_{o,g}\right) + ln\left(w_o\right) + \phi_o ln\left(s_i\right) + ln(\epsilon_i) \tag{12}$$

This equation can then by estimated by the regression of log wages on a set of occupation, occupation-group, and group dummy variables (which approximate the respective terms of $ln(\tilde{w}_{i,o,g})$). The resulting residuals can then be exponentiated to back out the distribution of ϵ_i, which should theoretically follow a Frechet distribution.

To then back out the Frechet shape parameter θ, I numerically estimate the following equation using the variance and mean of the observed distribution of the exponentiated ϵ_i in the data:[58]

$$\frac{\text{Variance}}{\text{Mean}^2} = \frac{\Gamma\left(1 - \frac{2}{\theta}\right)}{\left(\Gamma\left(1 - \frac{1}{\theta}\right)\right)^2} - 1 \tag{13}$$

Identifying parameters governing wages: $\{w_o, \tau_{o,g}\}$

Taking the log of Equation 8, I get the resulting log-linear equation for occupation-average

[58] This follows a similar to the procedure implemented in Hsieh et al. (2019) and Bryan and Morten (2019) to recover the value of the wage dispersion parameter.

wages:

$$ln\left(\overline{\text{wage}}_{o,g}\right) = \underbrace{ln\left(\tilde{\Gamma}\right) + ln\left(w_o\right)}_{\text{occupation fixed effect}} + \underbrace{ln\left(1-\tau_{o,g}\right)}_{\text{occ x group fixed effect}} + \phi_o\, ln\left(\overline{s}_o\right) - \frac{1}{\theta}\, ln\left(p_{o,g}\right) \tag{14}$$

Having separately identified θ, observing occupation average wages, shares by group, and average education, Equation 14 identifies the relative values of $\tau_{o,g}$ between groups. To use equation 14 to identify $\tau_{o,g}$ in levels, I require the additional assumption that $\tau_{o,\text{Jordanian}} = 0 \;\; \forall\; o$. As previously described in the introduction of the model, $\tau_{o,\text{Syrian}}$ captures the pecuniary wedge Syrians face in a given occupation relative to Jordanians. Intuitively, this is the difference in wages received by Syrians and Jordanians in the same occupation, after controlling for differences in human capital, $\overline{s}_o$, and its usefulness in a given occupation, ϕ_o.

Finally, I can use equation 14 to identify the wage per efficiency unit w_o in levels by parsing it from the occupation fixed effect using the previously estimated θ to compute $ln(\tilde{\Gamma})$.[59] Intuitively, after controlling for the role of selection through the inclusion of $p_{o,g}$, wedges faced by Syrian refugees through $\tau_{o,g}$, and human capital, the only difference in wages must be due to exogeneous productivity differences across occupations.

For interpretability, I assume the corresponding wedge for unemployment $\tau_{u,g} = 0 \;\; \forall g$. Barriers to entering employment for refugees can be measured by the average occupation-specific friction across the other occupations. Thus, when work permits change other occupation-specific wedges, the relative utility of unemployment will shift, inducing churn in and out of unemployment.

Identifying occupation-specific group-level preference terms: $\{\alpha_{o,g}, \lambda_g\}$

To estimate the occupation-specific preferences of each group, I rely on the log-linearized sorting equation (Equation 6):

$$ln\left(p_{o,g}\right) = \theta\; ln(w_o) + \theta\Big(\phi_o\; ln(\overline{s}_o)\Big) + \theta\; ln(1-\tau_{o,g}) + \theta\; \underbrace{ln\left(\alpha_{o,g}\cdot\delta_{o,g}^{\lambda_g}\right)}_{z_{o,g}} - \underbrace{ln\left(\sum_j \tilde{w}_{j,g}^{\theta}\right)}_{\text{group fixed effect}} \tag{15}$$

Having already estimated $\{\theta, w_o, \phi_o, \tau_{o,g}\}$, the above equation identifies the collective preference term $z_{o,g}$. To then separately identify the amenity and homophily components of preferences, I use

[59] Recall that $\tilde{\Gamma} = \Gamma\left(1-\frac{1}{\theta}\right)$.

the relative wage gap between Syrians and Jordanians for each occupation:

$$ln\left(\overline{wage}_{o,\text{Jor}}\right) - ln\left(\overline{wage}_{o,\text{Syr}}\right) = \left[ln\left(\alpha_{o,\text{Jor}}\right) + \lambda_{\text{Jor}} \cdot ln\left(\delta_{o,\text{Jor}}\right) - \left(\sum_j \tilde{w}^{\theta}_{j,\text{Jor}}\right)\right] - \left[ln\left(\alpha_{o,\text{Syr}}\right) + \lambda_{\text{Syr}} \cdot ln\left(\delta_{o,\text{Syr}}\right) - \left(\sum_j \tilde{w}^{\theta}_{j,\text{Syr}}\right)\right] \tag{16}$$

I directly observing the share of Jordanians (Syrians) relative to all workers in an occupation, which will determine $\delta_{o,g}$. Together with Equation 15, I can then separately identify $\alpha_{o,g}$ from λ_g.

Summary of identifying assumptions

I have to make several identifying assumption to estimate the model. Table 2 reviews each.

Table 2: Identifying Assumptions

Parameter	Definition	Value
$\tau_{o,\text{Jor.}}$	Labor market frictions for Jordanians	0
$\tau_{u,\text{Syr.}}$	Unemployment frictions for Syrians	0
ϕ_o	Returns to schooling by occupation	1

6.2 Estimation

I follow a static general equilibrium approach similar to Hsieh et al. (2019), estimating a separate equilibrium for each year of data. This allows me to recover the evolution of labor market distortions faced by Syrian refugees and occupational misallocation following the introduction of work permits.[60] While an alternative would be to use the yearly data to estimate a transition path model with exact hat algebra, such an approach would require additional structural assumptions about expectations and adjustment speeds (Dekle et al., 2008).[61] In my setting, work permits represent a discrete policy change with marginal adjustments over time, my estimation approach allows for a more flexible identification of time-varying frictions and more transparent evaluation of the policy's effects.

To estimate each year's static equilibrium, I first externally estimate θ separately for each year, using the procedure described in its identification (see Section 6.1). As is consistent in this type of model estimation, I then take the average value for each year to get a more robust estimate that has standard errors and is less sensitive to idiosyncrasies across years. The use of a common

[60] The resulting assumption is that each year corresponds to a unique static equilibrium in the model and that differences across years are driven by changes in fundamentals (such as the wedges, productivities, or wages) rather than transitional dynamics.

[61] These structural assumptions would be necessary to parse what changes are driven by changes in the model's fundamentals from the transition dynamics, adding an additional margin for error without clear returns.

θ parameter in the main estimation of the model, assumes that there is a constant distribution of ability draws over my time period, which implies that individuals only draw their occupation-specific abilities once and keep them over time. This assumption is reasonable from a modelling standpoint. Individuals are unlikely to experience frequent, random shifts in their comparative advantages across occupations over time. Additionally, there is minimal concern about compositional change in the labor force over the eight-year period covered by my data, which further supports the stability of the underlying distribution. Estimating a single θ improves statistical precision and facilitates counterfactual analysis by allowing a fixed population of simulated individuals to make occupational choices in each year, responding only to changing wedges and wages..[62]

I then implement an over-identified efficient Generalized Method of Moments (GMM) estimator that recovers the remaining structural parameters of the model by minimizing the distance between model-implied and observed moments. These moments are constructed from the model's equations that determine each group's occupation shares and occupation-average wages (Equations 14, 15, and 16) I use bootstrapping twice in the estimation procedure: first, to construct the weighting matrix for efficient GMM and, second, to estimate standard errors and confidence intervals for the final parameter estimates. [63]

For the purposes of estimation, I define an occupation o to be a one-digit ISCO code plus unemployment. The aggregation from the two-digit to one-digit serves two purposes: to avoid occupation cells with zero observations and to constrain the dimensionality of the parameter space. Given the small share of Syrian refugee workers in ISCO groups 1 (managers) and 2 (professionals) throughout the period, I combine the two into a single occupation group for the purposes of estimation, resulting in a final set of nine occupations (including unemployment). This addresses the concern that small sample sizes in a given cell might produce imprecise estimated wages. [64]

6.3 Estimation Results

I now present my parameter estimates from implementing the estimation procedure described above. The goal of this section is to understand how work permits affected the model's fundamental parameters – namely the wedges faced by Syrian refugees and the occupation-level wages per efficiency unit. As I can only estimate the model for periods that I have data for Syrian refugees

[62] However, I will also estimate a single θ through the alternative strategy of a pooled regression with year fixed effects, as a measure of robustness.

[63] The complete estimation procedure is as follows. First, I estimate an initial stage of GMM on the original data of a given year to recover an initial estimate of the parameters. Looping over each bootstrap sample, I then re-compute the distance between each model moment (as estimated in the first stage) and the observed moment in the bootstrapped sample. I then use the inverse diagonalized covariance matrix of these deviations to create the efficient weighting matrix. Next, I implement efficient GMM using this weighting matrix on the observed moments in the original data to get my final parameter estimates. Finally, I re-estimate efficient GMM on each bootstrapped sample to construct standard errors and confidence intervals for each parameter estimate.

[64] Under this definition, I am still left to estimate 36 parameters with GMM each period.

and Jordanians, I present results for the following years: 2014 (pre-work permits) and 2017-2022 (post-work permits).

Fréchet Parameter (θ)**:** I estimate θ separately for each year of my data and arrive at an average value of $\theta = 3.46$ with a standard error of 0.798. This serves as my baseline specification for the shape parameter, governing the dispersion of ability draws. Alternatively, estimating a common value across periods, I arrive at a value of $\theta = 3.19$, which is not statistically different from my preferred specification. Moreover, my estimate is largely consistent with the broader literature. Hsieh et al. (2019) report a baseline value of $\theta = 3.44$, which they derive from re-estimating θ for each decade of U.S. census wage data from 1960 onward.

Occupation Wedges (τ_o)**:** I estimate substantial wedges for Syrian refugees prior to work permits with an average $\tau_o = 0.53$ (with a standard deviation of 0.024). This is equivalent to Syrian refugees being paid an average 47% of their marginal product of labor prior to gaining the right to work through permits. By the end of the study period, wedges had fallen 29 p.p on average, corresponding to a 61% increase in refugees capture of their marginal product.

Figure 11 presents the resulting estimates for the wedges or frictions faced by Syrian refugees in each occupation (excluding unemployment) over time, split by occupation-level informality. Panel A plots the frictions for the four occupations that are less informal (below average in the z-scored informality index) while Panel B plots the frictions for the remaining four more informal occupations. After work permits are introduced, Syrians experience non-linearly decreasing frictions across all occupations.

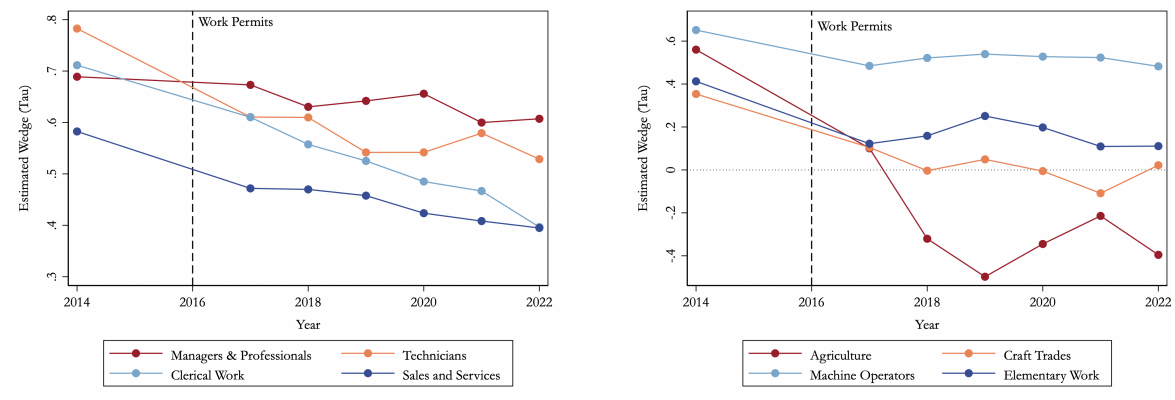
I also find a pronounced effect of the Jordanians government's introduction of "flexible" work permits in the occupations of agriculture and construction. This type of permit was designed to promote Syrian refugees' entry into targeted occupations. Agriculture appears directly in the set of estimated occupations, but construction is grouped within the broader ISCO 1-digit category of "Craft Trades." Consequently, the estimated effect of flexible permits on construction is attenuated by the inclusion of other occupations within the same category, which are not directly affected by the policy. Despite this, the policy was sufficiently effective that the estimated wedges become negative for agriculture and approach zero in craft trades – effectively [65] This result highlights the potential efficacy of refugee integration schemes that target specific occupations.

As expected, there is a negative correlation between the initial frictions Syrian refugees face in accessing an occupation and that occupation's level of informality—more informal occupations are initially easier for refugees to enter prior to the introduction of work permits. Appendix Table A6 reports each occupation's z-scored informality index (measured among Jordanian workers in 2014, as described in Section 3) alongside the estimated initial wedge, τ. However, contrary to my original

[65] While this has a positive effect on Syrian refugee wages, it creates a new margin of misallocation by over-incentivizing Syrians' entry into the occupations of agriculture and craft trades.

prediction, the decline in frictions following the introduction of permits is not consistently larger for more formal occupations. In fact, the reduction in τ is roughly comparable for formal occupations relative to informal ones, with the previously discussed exception of agriculture. This is likely due to the persistence of other frictions, which attenuate the effectiveness of the work permits, such as the existence of occupations that are closed to non-nationals, insufficient credential accreditation, and persistent employer-based discrimination toward refugees in more formal occupations.[66]

Figure 11: Evolution of Wedges (τ_o) After Work Permits



(a) Below Average Informality

(b) Above Average Informality

Note: Each panel plots the model estimated occupation-specific wedges in each year. Panel A plots wedges for occupations with below average informality, as defined by the informality index for the occupation. Panel B plots wedges for occupations above average.

Homophilic Preference Parameters (λ_g)**:** I find that Jordanians hold much stronger preferences for homophily than Syrians, nearly twelve times stronger on average. Syrians have an estimated mean value of $\lambda = 0.13$, with a mean standard error of 0.0074. Comparatively, Jordanians have a mean value of $\lambda = 1.64$, with a corresponding mean standard error of 0.0074. Beyond level differences, there are important changes in group-level homophily preferences over time. Syrians' preference for homophilly increases over time, nearly doubling from their pre-work permit levels (2014) to post work-permits (2017-2022). Jordanians see a more continuous weakening of preferences over time, decreasing by 45% from 2014 until 2022.

[66] See Appendix G for a list of closed occupations and corresponding ISCO 1-digit codes.

Table 3: Homophilic Preference Parameter Estimates (λ)

Parameter	2014	2017	2018	2019	2020	2021	2022
λ - Syrians	0.079	0.153	0.128	0.130	0.130	0.143	0.149
	(0.006)	(0.007)	(0.005)	(0.013)	(0.005)	(0.008)	(0.008)
λ - Jordanians	2.253	2.117	1.709	1.094	1.239	1.803	1.235
	(0.006)	(0.007)	(0.005)	(0.013)	(0.005)	(0.008)	(0.008)

Notes: The top row corresponds to estimated value of the preference parameter for homophily among Syrian refugees and the second row for Jordanians. Columns correspond to the year of data being estimated. Each cell reports the main GMM estimate and the bootstrapped standard error is below in parentheses.

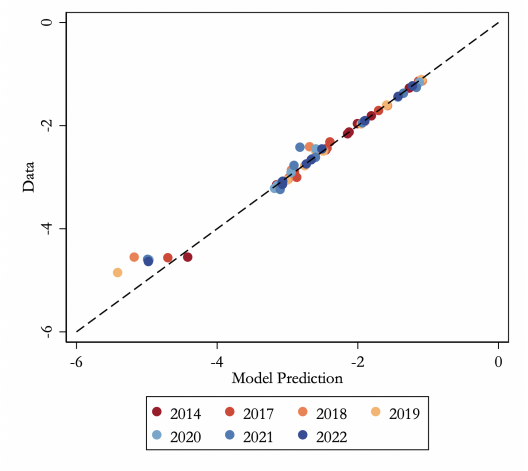
Intuitively, once Syrians have the right to work, frictions (τ_o) are less binding and Syrians are better able to sort along preferences for homophily. The trend for Jordanians is more consistent with a story of refugee integration – as Syrians integrate into Jordanians society over time, Jordanians' discriminatory sentiments weaken, reducing their preference for homophily. It should be noted that, even accounting for this trend, I find that homophily still plays a large role in Jordanians' sorting decisions.

Remaining Parameter Estimates: Appendix I.1 reports the full parameter estimates for $\{\tau_{o,g}, \alpha_{o,g}, \lambda_g\}$ and equilibrium object $\{w_o\}$ with boot-strapped standard errors for each year the model is estimated. From the demand-side equations, I am able to back out $\{A_o\}$ for each year as well but cannot report standard errors.

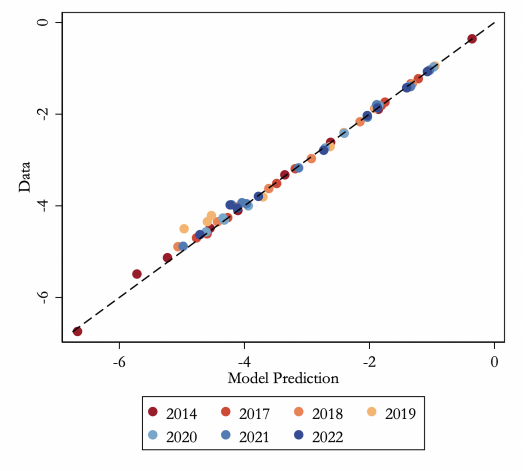
6.4 Model Fit

I present an overview of the model's fit to the moments targeted in the data. Figure 12 plot the model's predicted value for the log occupation share and log occupation average wage respectively against their observed value in the data for each year the model is estimated. For a complete assessment of model fit relative to targeted moments, see Appendix for a full set of results.

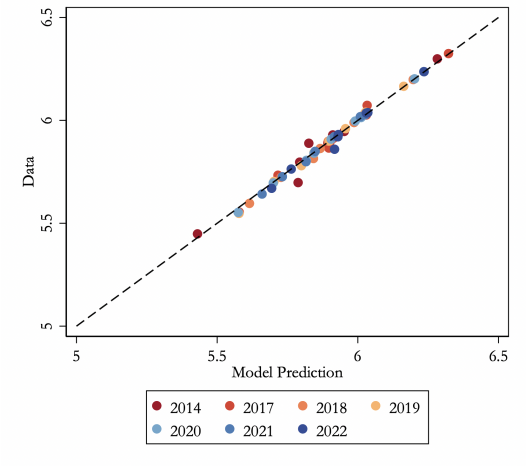
Figure 12: Key Moments - Data vs Model Prediction



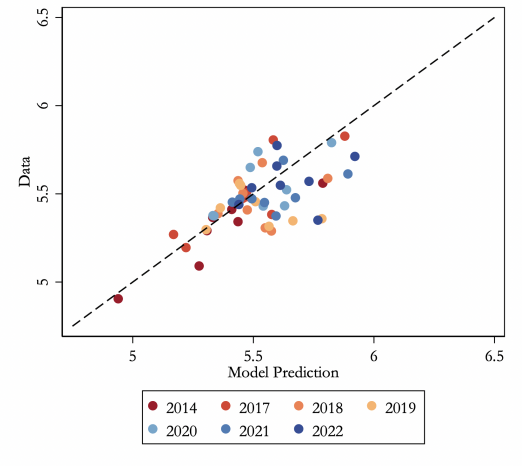
(a) Occupation Shares - Jordanians



(b) Occupation Shares - Syrians



(c) Occupation Avg. Wages - Jordanians



(d) Occupation Avg. Wage - Syrians

Note: The first row of panels plots the observed value in the data versus model predicted log share of each group in each occupation. Panels A and B corresponds to Jordanian and Syrian occupation shares respectively. The second row plots the observed value in the data versus model predicted log average wage in each occupation. Panels C and D corresponds to Jordanian and Syrian occupation average wages respectively. All moments are logged as the GMM estimation uses log-linearized model equations.

7 Evaluating the Effects of Work Permits

This section turns to answering the central question of the paper – what are the aggregate and distributional effects of reducing refugees' barriers to work? In my stylized facts, I show evidence of refugees' labor market outcomes improving after the introduction of permits. Using my event study design, I estimate relative effects between Jordanians in occupations that are highly exposed to Syrian refugees and those that are less exposed. Only through my estimated model of occupational choice, founded in my empirical results, can I directly quantify the aggregate and distributional consequences of the work permit scheme and ascertain the importance of re-sorting in driving these effects.

7.1 Identifying Effects of the Work Permit Scheme

To determine the aggregate effects of the work permit scheme, I have to isolate changes in the wage per efficiency unit that are caused by the supply of labor (driven by the permits) from changes caused by the non-fixed exogenous productivity parameter.[67] To do this, I will first have to take a stand on the general equilibrium parameter, ρ, which governs the substitution of labor in the firm's production function. I set this parameter based on the literature, and then utilize other values to evaluate the robustness of my benchmark results.

The few papers that estimate the elasticity of substitution across types of labor, typically do so with a narrower set of labor types – namely skilled and unskilled labor or education levels – rather than occupations. For my baseline specification, I thus select an elasticity of substitution $\sigma = 3$, which corresponds to $\rho = 2/3$, in line with the preferred specification of Hsieh et al. (2019). Importantly, a higher value of ρ will increase the substitutability of labor across occupations. Intuitively, when substitution across occupations is easier, the negative effects of labor being misallocated across occupations on aggregate production will be lessened. From the side of wages, when occupations are closer substitutes, relative wages will be less elastic to labor supply shocks.

In my main counterfactual, which isolates the effect of work permits, I will re-estimate the model with the productivity parameters fixed at their final estimated value in 2022, as denoted in Appendix Table A7, and the initial estimated wedges from 2014, prior to work permits. Using endline productivities allows the economy to evolve as it would have, regardless of the work permit scheme, as changes in the occupation-level productivity parameter are orthogonal to the introduction of the work permit scheme. This provides the alternative where work permits were never introduced, which I can then compare against the observed equilibrium with work permits.

[67] Recall the perfectly competitive firm's optimization problem results in the wage per efficiency unit being equal to the marginal product of labor, which is a function of the occupation's productivity parameter (A_o), the supply of labor to that occupation (H_o), and the elasticity of substitution across occupations (ρ).

To observe individual-level outcomes, I simulate a set of individuals based on the estimated distribution of ability, governed by shape parameter θ. Then I estimate their occupational choice based on their utility maximization problem under the two equilibria, as pinned down by the following model parameters $\{w_o, \tau_{o,g}, \alpha_{o,g}, \lambda_g\}$. From here, I can compare the occupational choices and wages of the same set of individuals with and without work permits to determine the winners and losers from the work permit policy.

7.2 Effects on Labor Supply and Occupational Re-Sorting

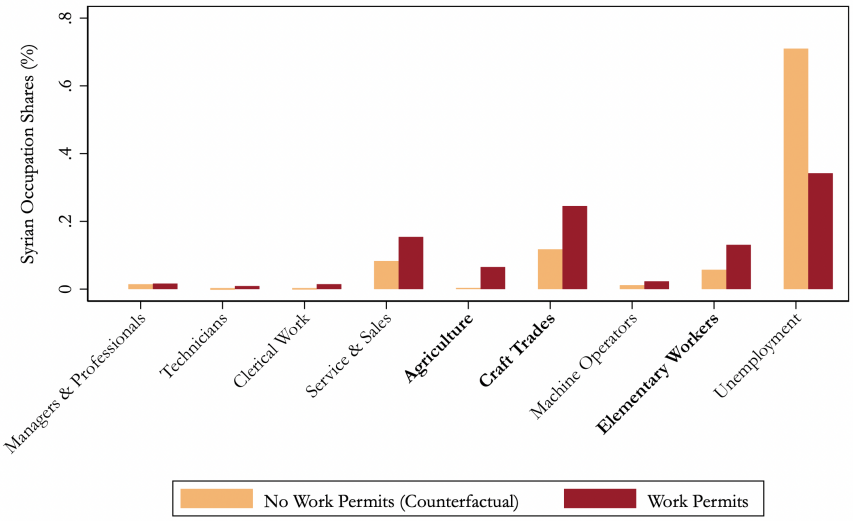
First, I look at how the work permits affected the relative supply of Syrians across occupations. Figure 13a plots the share of Syrians in each occupation with and without work permits, where the latter is the previously described counterfactual estimated by the model. Syrian refugees leave unemployment and enter into all occupations; however, they do not do so uniformly.[68] Agriculture, Craft Trades, and Elementary Workers see the largest relative increase in Syrian workers. Figure 13b then shows the percentage change in each occupation's size (total number of workers), as a result of this *direct supply effect* from Syrian entry, denoted by red bars. The second set of bars plots the total effect on the labor supply to each occupation, after accounting for the *re-sorting effect* of Jordanians. While entry by Syrian refugees increases the number of workers in all occupations relative to a labor market without work permits, re-sorting has a substantial effect on the magnitude. Consistent with the theory, Jordanians exit from occupations that see the biggest increases in Syrian refugees (those bolded) and re-sort into those with relatively fewer.

In addition to re-sorting across occupations, the model generates some exit among Jordanians as a result of the work permit scheme. The unemployment rate increase by 0.6 percentage points on a base rate of 23.4%, which is equivalent to a 2.6% increase.[69]

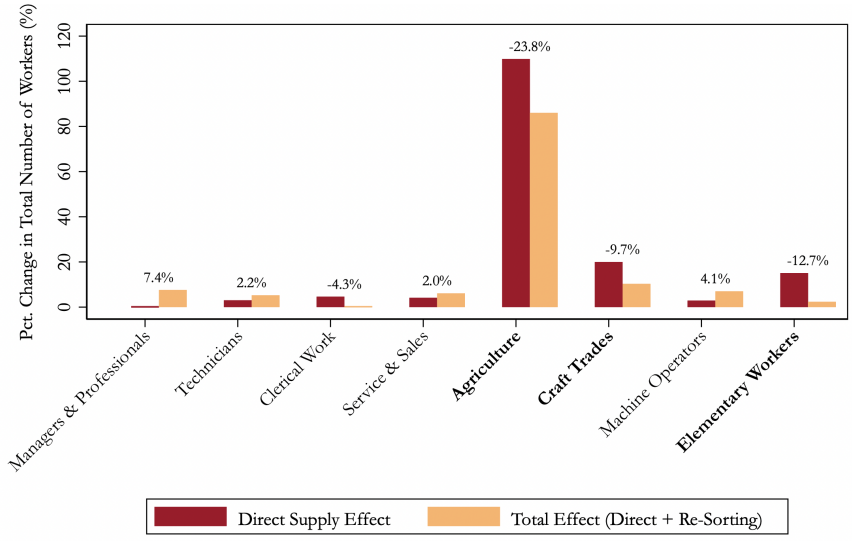
[68] For the full set of occupation transitions for Syrian refugees, see Appendix Figure A18.
[69] For the estimated effect on all Jordanian occupation shares, see Appendix Figure A19.

Figure 13: Estimated Effect of Work Permits on Labor Supplied

(a) Effect on Syrian Refugees' Labor Supply



(b) Total Effect on Occupation-Specific Labor Supply

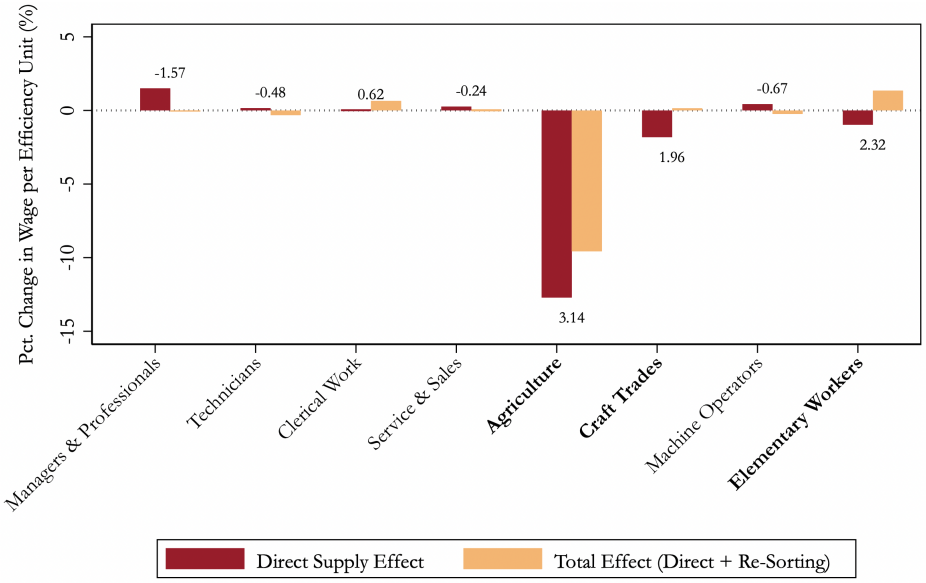


Note: Panel A plots the share of Syrians in each occupation under the counterfactual permits relative to the calibrated model with permits. Bolded occupations correspond to those that see the largest percentage point increase in Syrian refugees from introducing permits. Panel B plots the percentage change in an occupation's size from (i) the direct supply effect from Syrian entry under the work permit scheme and (ii) the total effect of the work permit scheme, including Syrian entry and the subsequent re-sorting of Jordanians. Agriculture is a small occupation to begin, making Syrian entry having very large effects in percentage terms, while reasonable in percentage points.

7.3 Effects on Wages

I begin with the effect on the wage per efficiency unit. Under the *direct supply effect*, Syrians enter more into Agriculture, Craft Trades, and Elementary Workers relative to other occupations, pushing the wage per efficiency unit down in those occupations. This produces the standard effect often cited in the migration literature where a labor supply shock has a negative effect on the wages of those that are directly substitutable with the migrants that arrive. However, after accounting for the re-sorting of Jordanians in response to Syrian entry, these effects largely flip – the wage per efficiency unit actually decreases in occupations where Syrians do not enter.[70] This is because the re-sorting of Jordanians is substantial enough to offset the relative supply shock of Syrian entry, reversing the overall directionality of the labor supply effect. Thus, occupations that initially received Syrian refugees actually become relatively scarce after Jordanians exit. Figure 14 shows the initial effect on the wage per efficiency unit from the *direct supply effect* of Syrian entry and the total effect once accounting for the *re-sorting effect* of Jordanians.

Figure 14: Estimated Effect on Wage Per Efficiency Unit



Note: This figure plots the percent change in the wage per efficiency unit from the direct supply effect of Syrian entry once work permits are introduced and the total effect after accounting for Jordanians re-sorting. The wage per efficiency unit is equivalent to the marginal product of labor in the model.

These effects are then magnified when taking the occupation-average wage for Jordanians. Under the *direct supply effect* alone, occupation-average wages fall for Jordanians in the highly exposed occupations (where Syrians enter most), as the wage per efficiency unit has fallen. Once accounting for Jordanians re-sorting, occupation-average wages among Jordanians increase in the highly

[70] With the exception of agriculture, where the de facto subsidization of Syrians who work there creates too large of an effect to be off-set.

exposed occupations as a result of the increase in the wage per efficiency unit and the additional selection effect – where the lowest quality Jordanians exit, raising the average productivity of workers remaining in the occupation. The corresponding plot is shown in Appendix Figure A20.

In the aggregate, the model predicts that the introduction of work permits resulted in a 0.92% increase in the average wage of Jordanians and a 20% increase in the average wage of Syrians. Without re-sorting, Jordanians gain 0.90% on average, reflecting that sorting is driven largely by homophily, as opposed to wage gains. For density plots of the full wage distributions under each scenario, see Appendix Figure A21 for Jordanians and Appendix Figure A22 for Syrians.

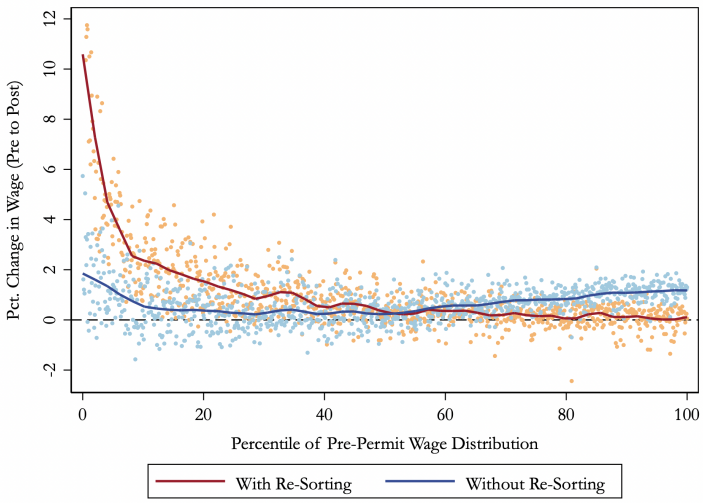
7.4 Winners and Losers

To understand the distributional effects of the work permit scheme and the importance of re-sorting as an adaptive response, I look at the changes in the wages across the model simulated Jordanian population in an economy with and without work permits. Figure 15 plots the percent change in individuals' wages along the income distribution in the counterfactual without work permits. For wage changes in levels, see Appendix Figure A23.

First, I consider what happens to wages when the work permits are introduced but Jordanians are not allowed to re-sort. The light blue dots correspond to percent changes in the wage among individuals binned at the 0.1 percentile of the income distribution and the dark blue line as a local polynomial fit of these values. Without re-sorting, the Jordanians who lose (those that see wage decreases) are clustered at the bottom of the income distribution. Comparatively, those that benefit the most from the introduction of work permits are at the top of the income distribution, working in the occupations that are relatively less exposed to Syrian entry. Without re-sorting, I find a story consistent with the literature, (i) there is broadly a null effect on average wages, (ii) the losers among the local workers are clustered at the bottom of the income distribution, facing the brunt of the labor supply shock, and, (iii) in cases where there are winners among locals, they are in the high-paying occupations that are largely complements to those occupations that received refugees.

However, the outcomes flip once I account for the role of locals' re-sorting. The orange dots plot the binned percent changes in individuals' wages from introducing work permits and allowing Jordanians to re-sort in response, with the dark red line fitting these values. Allowing for re-sorting, the winners are those at the bottom of the pre-work permit income distribution. The poorest 20% of Jordanians experience an average increase of 3% from the work permit scheme. Relative to the case without sorting, the losers are now concentrated at the top of the income distribution. Ultimately, re-sorting changes who wins and loses from granting refugees the right to work, reducing income inequality among the host community.

Figure 15: Simulated Effect of Re-Sorting on Wage Inequality



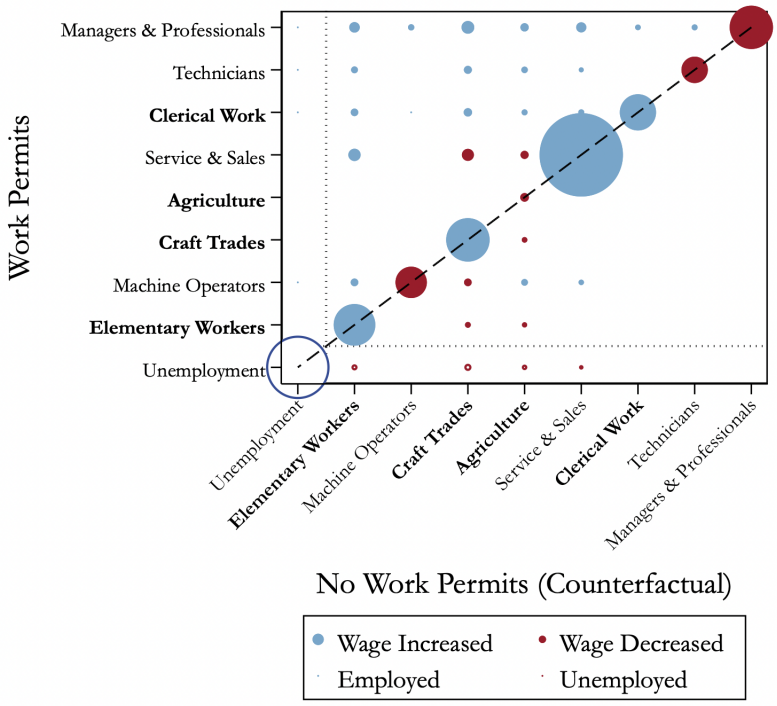
Note: The y-axis measures the percent change in the wage caused by introducing work permits. The x-axis represents a simulated individuals' percentile in the wage distribution before work permits are introduced. The dots then correspond to the percent change in an individual Jordanian's wage, binned at the 0.1 percentile for visibility. The light blue corresponds to the percent change in wages under the counterfactual where Jordanians cannot re-sort after work permits are introduced while the orange dots correspond to when they can. The maroon and dark blue lines plot the best fit line resulting from a kernel-weighted local polynomial regression of the percent change in the wage relative on the percentile in the pre-work permit wage distribution.

To understand how re-sorting drives these results, Figure 16 plots the occupation transitions of Jordanians from the counterfactual without work permits relative to the calibrated model with work permits. The size of circles represents the number of Jordanians in each transition cell and the colors correspond to the average wage effect for that group. Wage gains among the poorest workers come from two sources. First, some exit low-paying occupations, where Syrians enter once there are work permits, and upgrade to higher paying occupations, namely Technicians and Managers and Professionals. Those that upgrade to these occupations see wage increases. The second source of wage gains for the poorest workers comes from the increase in the wage per efficiency unit in low-paying occupations, as these types of labor become relatively scarce after Jordanians re-sort away.

7.5 Aggregate Output Effects and Efficiency Gains

The model implies a 10.9% increase in aggregate output following the introduction of work permits, driven almost entirely by improved allocation of Syrian refugee labor (10.8%) rather than improvements in the allocation of Jordanian labor, again consistent with sorting driven largely by homophilic preferences rather than wages.

Figure 16: Simulated Occupation Transitions by Winners and Losers



Note: The y-axis plots the occupational choice of simulated individuals after work permits and the x-axis plots the occupational choice in the counterfactual without work permits. The size of the circles correspond to the number of individuals in each transition cell. Those circles off the diagonal represent individuals who switched occupations in response to the work permit scheme. Maroon colored circles correspond to those in that given cell having a wage loss on average while light blue corresponds to an average wage gain. The open circles correspond to unemployment and are maroon when individuals exit an occupation and dark blue when they remain unemployed in both cases. Bolded occupations correspond to those that receive the most Syrian refugees after work permits are introduced.

Taken together, these results reveal a nuanced welfare trade-off. The work permit scheme improves allocative efficiency, raising total output by nearly 10.9%, and simultaneously compresses the Jordanian wage distribution by shifting gains toward the poorest workers. Both channels contribute positively to aggregate welfare under standard concave utility.

8 Conclusion

This paper examines how granting refugees the right to work reshapes the allocation of refugee and local labor across occupations and the subsequent aggregate and distributional impacts. Exploiting a unique natural experiment created by Jordan's introduction of a large-scale work permit scheme for Syrian refugees, I show that relaxing legal barriers to work triggered substantial occupational reallocation by both refugee and local workers. Syrian refugees entered into employment and gained access to a broader, less informal set of occupations. In response, Jordanians re-sorted

out of occupations that were most affected by Syrian entry, generating occupational upgrading and positive selection among those Jordanians who remained. This upgrading was driven by the over-educated Jordanians in highly exposed occupations, where their college-level skills were underutilized.

To formalize these dynamics, I develop a general equilibrium model of occupational choice that embeds homophilic preferences – a preference for working alongside one's own social or ethnic group – alongside standard wage-based sorting. Homophily transforms the right to work into a social as well as economic shock: as refugees enter new occupations, the change in worker composition amplifies Jordanians' re-sorting. The model shows that preferences for homophily amplify wage-based sorting responses among Jordanians, supporting equilibria where re-sorting by locals outweighs the direct supply effects of refugee entry.

Estimating my model against data, I find that the work permit scheme reduced the misallocation of refugee labor and generated large aggregate gains. Total output increased by roughly 11%, driven primarily by improved utilization of refugee labor. Jordanians' average wages rose modestly as did unemployment but income inequality declined. Accounting for re-sorting reverses the canonical distributional effects of refugee arrival – instead of lower-skill locals losing, they benefit through occupational upgrading and relative-scarcity effects from others' re-sorting. The model implies that the poorest quantile of Jordanians gain the most from work permits, with average wage rising by 3 percent.

A natural extension of this research is to study how social forces, such as homophily, continue to constrain refugees' access to job opportunities, once legal barriers are removed. In corollary work, I design an intervention to experimentally vary Syrian refugees' exposure to local Jordanian networks, – through matching treated refugees to Jordanian volunteer partners – to identify the causal effect of cross-group connections on job search and occupational mobility for refugees.[71] The experiment aims to quantify how reducing social distance between refugees and hosts can mitigate the misallocation of refugees that is induced by segmented networks and the corresponding segmentation of information. Simultaneously, the experiment will speak to the relative importance of mechanisms, such as discrimination and network-based job search, in driving homophilic preferences among Jordanians. Together, these results aim to micro-found homophily in the model and clarify its welfare implications.

The implications of this research extends beyond the labor markets of Jordan. As climate change, conflict, and demographic pressures drive ever-larger and longer waves of displacement, the policy question of how to best integrate refugees into labor markets will become increasingly central. This

[71] Personal connections, often familial-based, – known as *wasta* or *ma'aref* in Jordanian Arabic – are deeply rooted in Arab societies and govern many social and professional transactions (Baranik et al., 2023). In Jordan, these personal connections play a substantial role in both job search and matching. In survey data I collected in the northern governorate of Mafraq, which was most affected by Syrian refugee arrival, I find that 48% of Jordanians found their last job through a family or friend, 96% of whom were also Jordanian.

paper demonstrates that the right to work is not simply a humanitarian entitlement for refugees but a structural lever that can catalyze reallocation across occupations, unlocking productivity gains for both refugee and host workers. Yet effective integration requires understanding not only how refugees respond to policy, but how host communities adjusting in turn – through their re-sorting, wage responses, and social adaptations – can fundamentally shape the aggregate and distributional outcomes of reform. Studying these host-side dynamics is essential for designing refugee policies that are both economically efficient and politically sustainable in an era when mobility and displacement will define global development.

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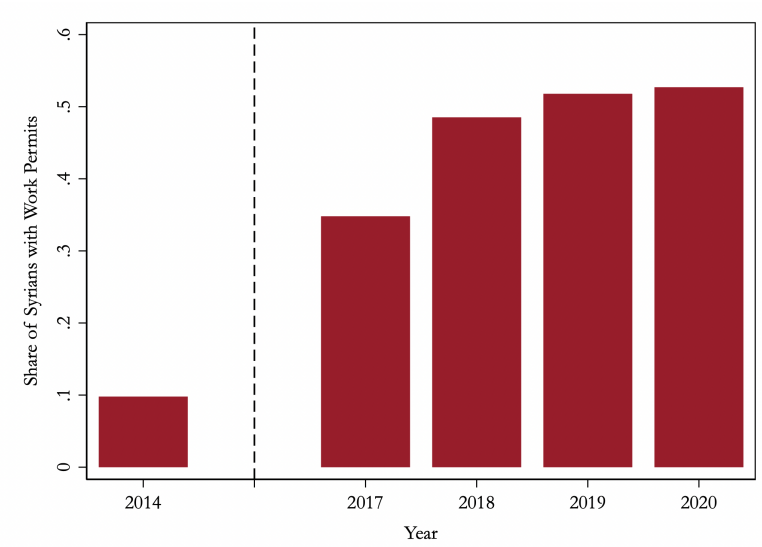
Appendices

A Appendix: Additional Tables and Figures

A.1 Empirical Results

Figure A1: Work Permit Coverage Among Employed Syrian Refugees



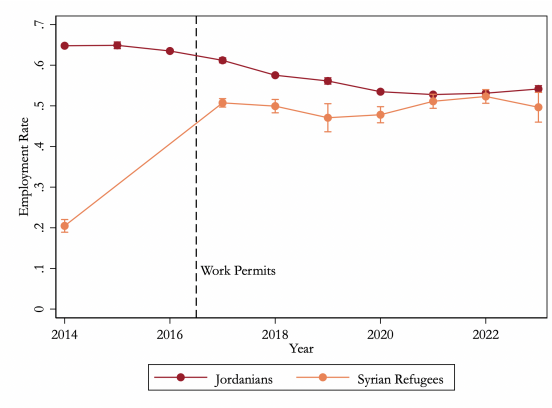
Note: sample restricted to employed working-aged male Syrian refugees. (Observations: 7,839)

Table A1: Reason for Working Without a Work Permit

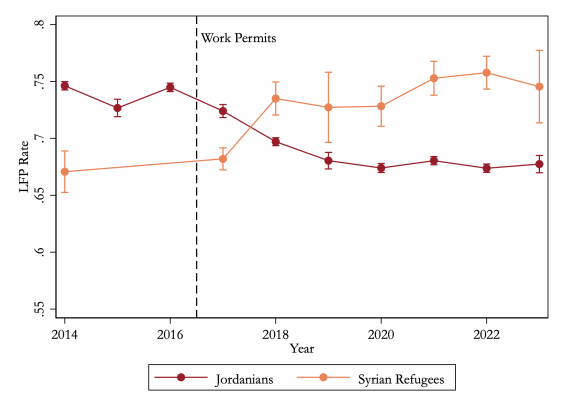
	Count	Percent
Not needed	1449	47.92
Applied but unsuccessful	650	21.49
Waiting to receive it	554	18.32
Employer won't support	180	5.95
Other	122	4.03
Too difficult a process	69	2.28
N	3024	

Note: sample restricted to working-aged male Syrian refugees employed in 2017 without work permits but after the work permit scheme has been introduced. Data comes from Fafo/DoS 2018 survey. (Observations: 3,024)

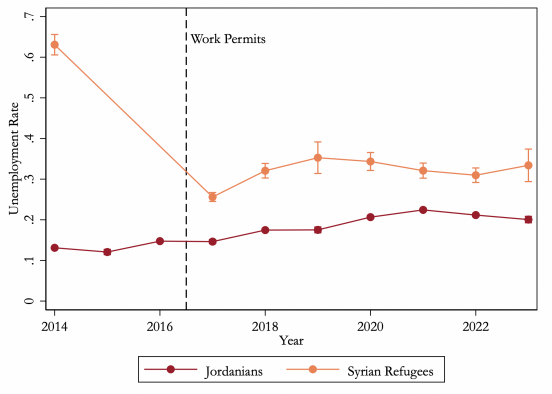
Figure A2: Labor Market Outcomes for Syrian Refugees and Jordanians



(a) Employment Rate



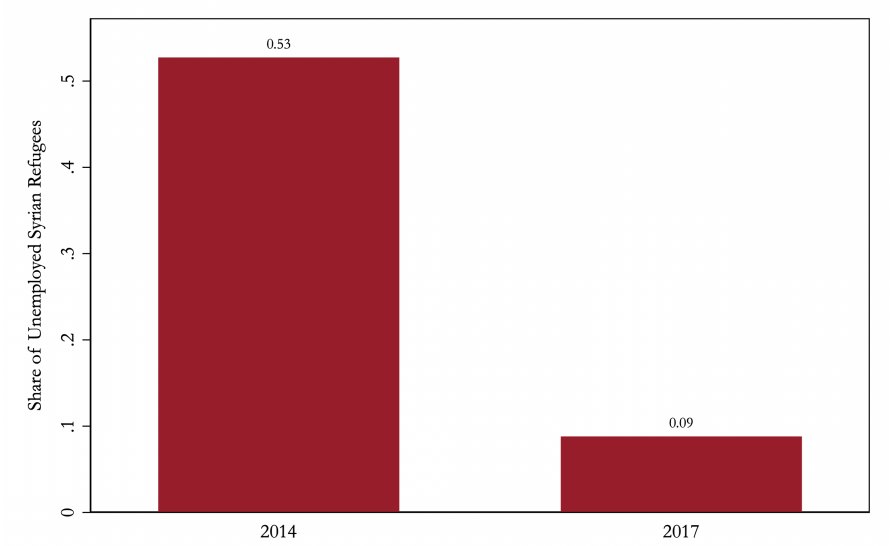
(b) Labor Force Participation Rate



(c) Unemployment Rate

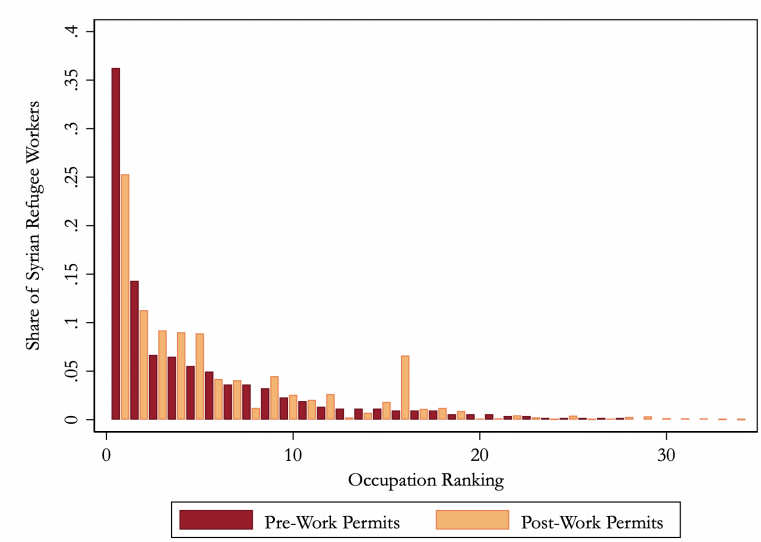
Notes: Sample includes working-aged male Syrian refugees and Jordanians. (A) Employment rate is the share of each group that is employed. (B) Labor force participation rate is the share of each group that is either employed or unemployed. (C) Unemployment rate is the conditional share of labor force participants in each group that is unemployed. (Observations: 448,325)

Figure A3: Labor Law Compliers as Share of Unemployed Syrians



Note: Sample restricted to unemployed working-aged male Syrian refugees. Data comes from ILO/Fafo 2014 and Fafo/DoS 2018 surveys. (Observations: 6,193)

Figure A4: Distribution of Syrian Refugee Occupation Shares (Ranked by 2014 Share Size)



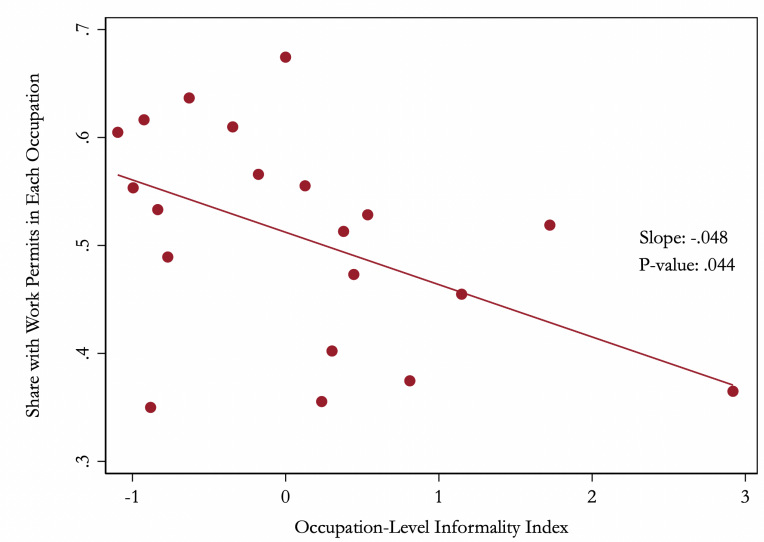
Note: the x-axis is the ranked order of 2-digit ISCO occupation codes based on the share of all employed working-aged male Syrian refugees in the occupation before work permits. The first bar refers to the share before work permits and the second bar refers to the average share in that occupation for the period after work permits are introduced. (Observations: 11,936)

Table A2: Characteristics of the Occupation Share Distributions

	Mean	Median	SD	Skewness
Pre-Work Permits	0.17	0.14	0.15	0.37
Post-Work Permits	0.12	0.09	0.09	0.63
Observations	11936			

Note: shares are defined as the share of all employed working-aged male Syrian refugees working in a 2-digit ISCO occupation codes in each period.

Figure A5: Work Permit Coverage by Occupation Informality Level



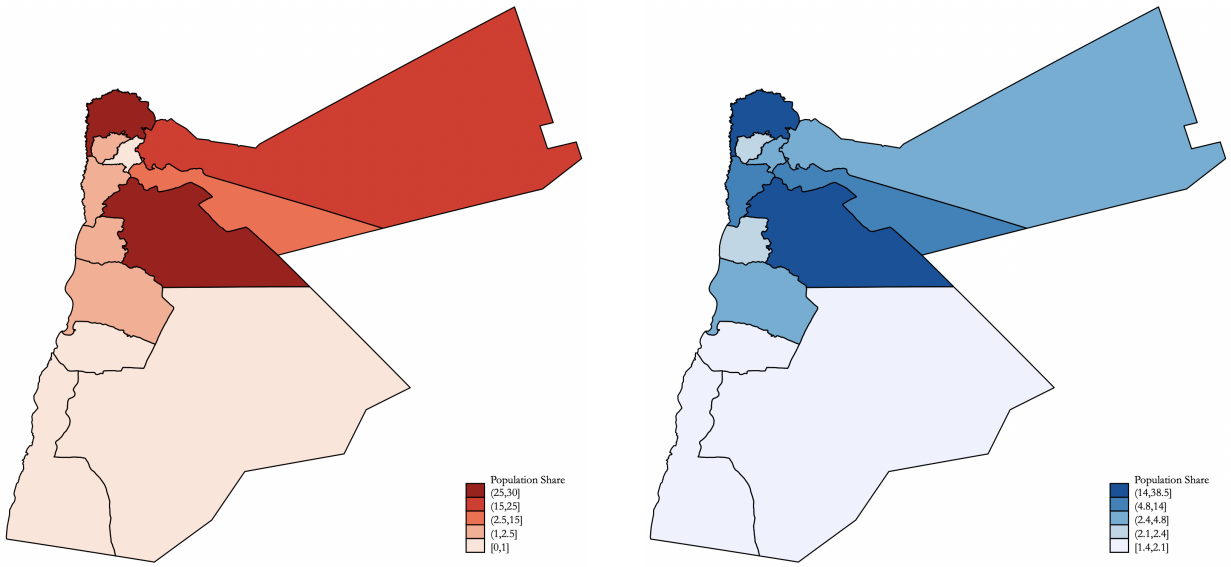
Note: this is a binned scatter plot from regressing the share of Syrian refugee workers that have work permits in a given 2-digit ISCO code occupation on the z-scored index of informality for the occupation. Regression includes year fixed effects. Sample conditioned to working-aged male Syrian refugees after the introduction of work permits. (Observations: 6,719)

Table A3: Wage Gap between Syrian Refugees and Jordanians

	Log Monthly Income	Monthly Income
	(1)	(2)
2014 x Refugee	-0.365	-70.067
	[0.032]***	[11.004]***
2017 x Refugee	-0.345	-60.877
	[0.043]***	[11.348]***
2018 x Refugee	-0.165	-29.999
	[0.035]***	[9.989]***
2019 x Refugee	-0.193	-40.871
	[0.034]***	[10.272]***
2020 x Refugee	-0.130	-24.438
	[0.038]***	[14.375]*
2021 x Refugee	-0.142	-34.703
	[0.038]***	[11.254]***
2022 x Refugee	-0.110	-20.735
	[0.040]***	[14.071]
Year	Yes	Yes
Governorate	Yes	Yes
Occupation	Yes	Yes
Industry	Yes	Yes
Human Capital Controls	Yes	Yes
2014 Jordanian Mean	5.72	337.74
Obs	145499	145604

Note: Coefficients estimate the wage gap (measured in monthly income) between Syrian refugees and Jordanians in a given year. The independent variable is an indicator variable for whether the worker is a Syrian refugee and the year the worker is observed. Regressions include fixed effects for year, governorate, 2-digit iSCO occupation codes, 1-digit ISIC industry codes. Regression also include Human capital controls (age and education in years). Standard errors are clustered at the level of year x 2-digit occupation.

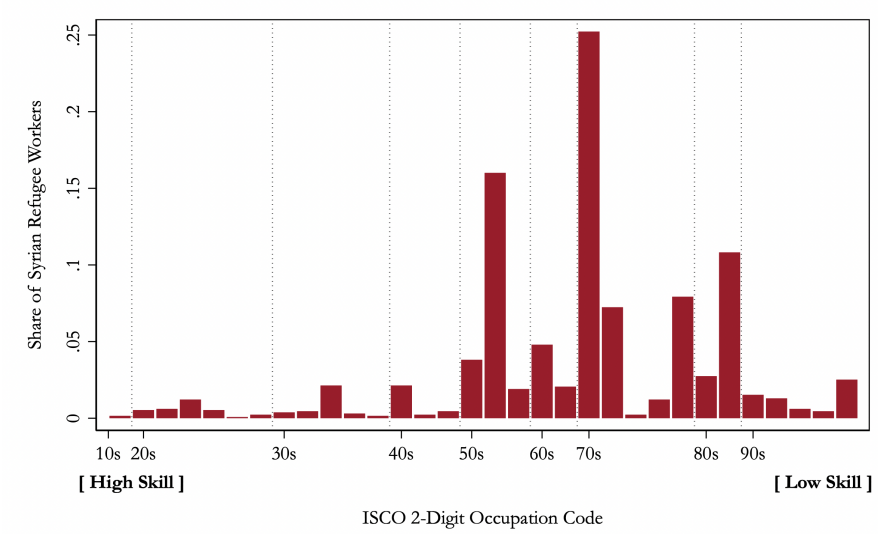
Figure A6: Spatial Distribution of Populations Across Jordan



(a) Syrian Refugees (b) Jordanians

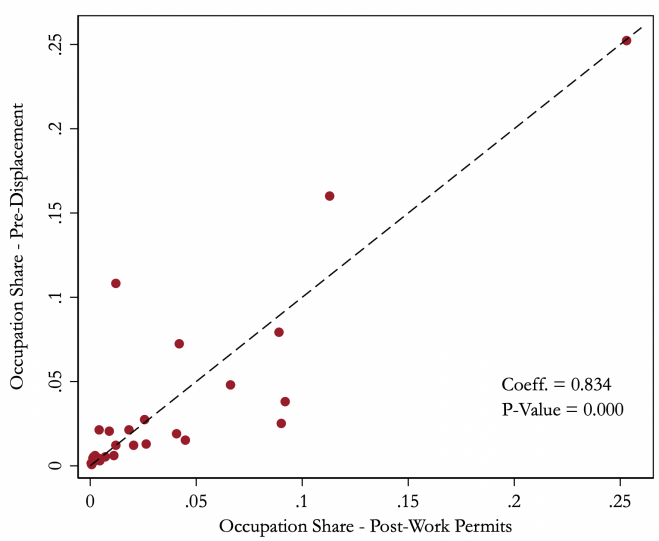
Note: Graphs plot the share of each population residing in each governorate in Jordan based on the Jordanian Department of Statistics' 2015 Census. Total population of Jordanians was 6,578,636 and total population of Syrian refugees was 953,289.

Figure A7: Pre-Displacement Occupation Distribution of Syrian Refugee Workers



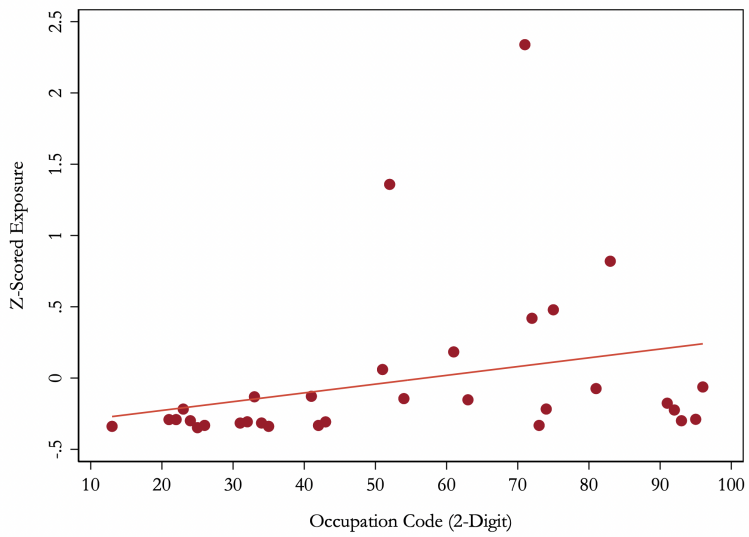
Note: the graph plots bar the share of Syrian refugees that had worked in a given 2-digit ISCO occupation code in Syria prior to displacement. The x-axis corresponds to the 2-digit ISCO occupation codes, which are themselves ordered by skill level. (Observations: 1,356)

Figure A8: Syrian Refugees' Occupation Shares Pre-Displacement vs. After Work Permits



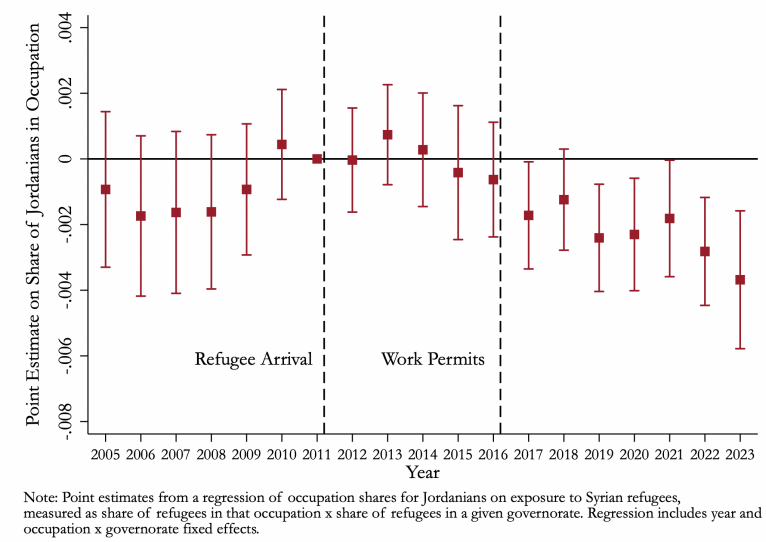
Note: the graph plots the z-score of the exposure measure averaged across locations for each 2-digit ISCO occupation code.

Figure A9: Average Z-Score Exposure by ISCO 2-Digit Occupation



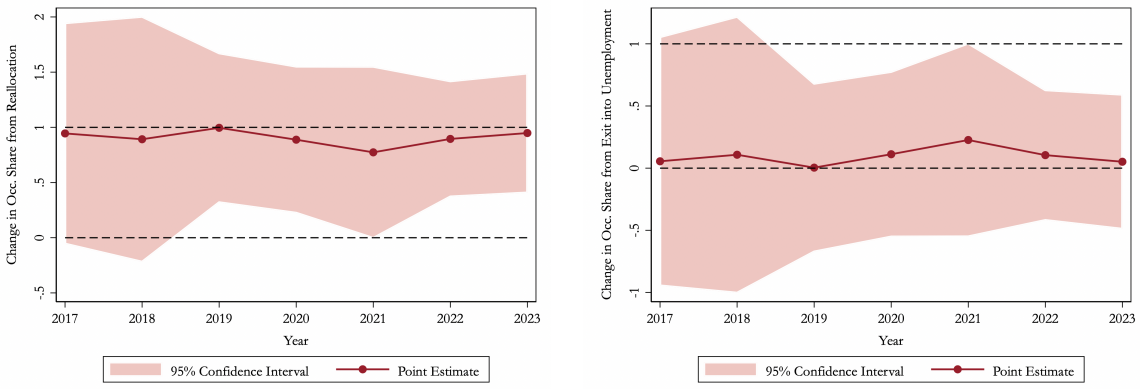
Note: The y-coordinate corresponds to the share of Syrian refugees that had worked in the occupation in Syria prior to displacement. The x-coordinate corresponds to the share of Syrian refugees that work in the occupation after work permits are introduced. (Observations: 12,620)

Figure A10: Effect of Exposure on Jordanian Occupational Shares (Excluding Unemployment)



Note: Point estimates from a regression of occupation shares, computed **excluding** unemployment from the denominator, for Jordanians on a z-scored shift-share measure of exposure to Syrian refugees, measured as share of refugees in that occupation x share of refugees in a given governorate. Regression includes year and occupation-by-governorate fixed effects. Standard errors are clustered at the unit of treatment: the occupation-governorate. (Observations: 6,696 occupation x governorates)

Figure A11: Decomposition of Effect on Occupation Shares - Reallocation vs. Unemployment



(a) Reallocation (≈ 85-90%)

(b) Unemployment (≈ 10-15%)

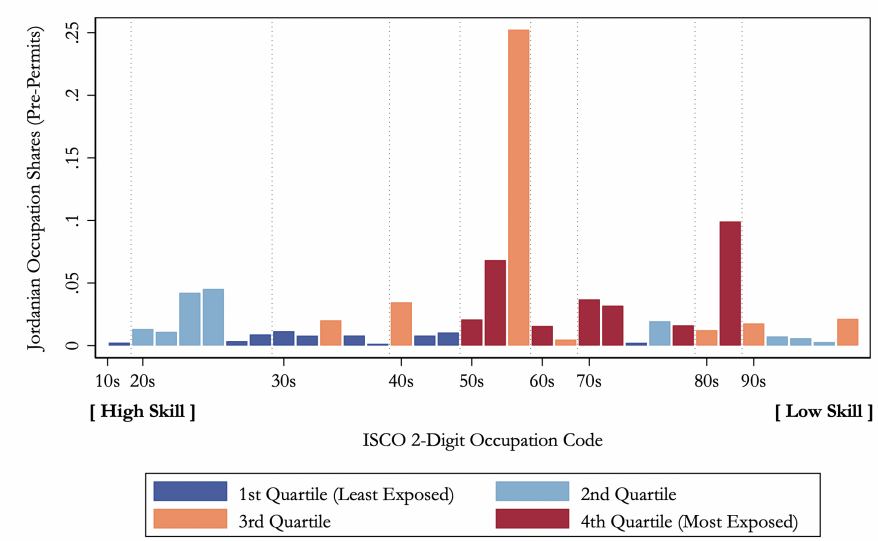
Note: Figures are based on the coefficient estimates of z-score exposure regressed on occupation shares where shares either **include** or **exclude** unemployment from the denominator. Recall inclusion of unemployment is the preferred specification include in the main text of the paper. The corresponding decomposition plotted above is then based on taking the absolute difference in these coefficients dived by the main specification coefficient to capture the component of the coefficient estimate attributable to unemployment. The amount attributable to reallocation is then 1-(unemployment amount), such that they together account for 100% of the variation. To construct standard errors, I use a delta method based on the standard errors for each specification's coefficients with the assumption of independence of sample variances.

Table A4: Full Decomposition of Estimated Exposure Coefficients for Occupation Shares

Year	$\beta_{t,u}$ (incl. unemployment)	$SE_{t,u}$	$\beta_{t,e}$ (excl. unemployment)	$SE_{t,e}$	Difference	Share Unemp.	Share Realloc.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2005	-.00103	.00106	-.00093	.00121	.0001	.0970874	.9029126
2006	-.00182	.0011	-.00174	.00124	.00008	.043956	.956044
2007	-.00139	.00112	-.00163	.00126	-.00024	.1726619	.8273381
2008	-.00129	.00104	-.00161	.0012	-.00032	.248062	.751938
2009	-.000788	.000924	-.000929	.00102	-.000141	.178934	.821066
2010	.000308	.000862	.000441	.000852	.000133	.4318182	.5681818
2011	0	.	0	.	0	.	.
2012	-.0000211	.000823	-.0000349	.000807	-.0000138	.6540284	.3459716
2013	.000431	.000769	.000738	.000776	.000307	.712297	.287703
2014	-.0000599	.000852	.000278	.000881	.0003379	5.641068	-4.641068
2015	-.000482	.00101	-.000417	.00104	.000065	.1348548	.8651452
2016	-.000929	.000815	-.00063	.00089	.000299	.3218515	.6781485
2017	-.00163	.000778	-.00172	.000831	-.00009	.0552147	.9447853
2018	-.00139	.000757	-.00124	.000784	.00015	.1079137	.8920863
2019	-.00241	.000805	-.0024	.000832	1.00e-05	.0041494	.9958506
2020	-.00259	.000877	-.0023	.000872	.00029	.1119691	.8880309
2021	-.00234	.000942	-.00181	.000903	.00053	.2264957	.7735043
2022	-.00315	.000879	-.00282	.000837	.00033	.1047619	.8952381
2023	-.00388	.00105	-.00368	.00107	.0002	.0515464	.9484536

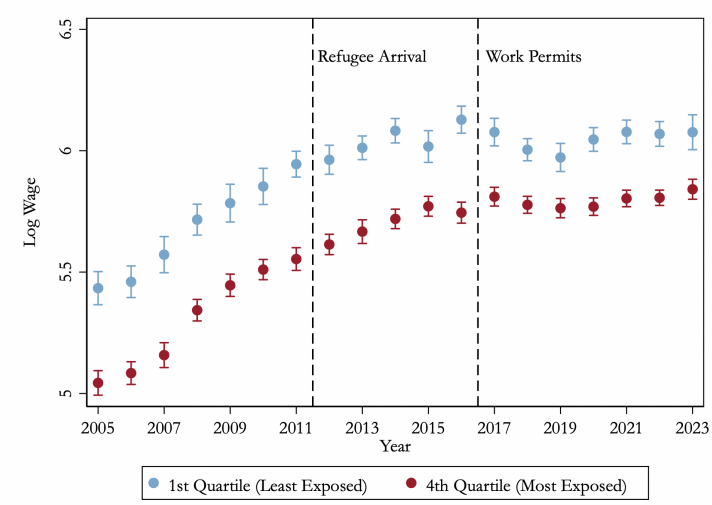
Note: Columns (1) and (3) correspond to the estimated coefficients on exposure in the regression on occupation shares, where (1) is the main specification estimate and includes unemployment in the denominator and (3) excludes it. Columns (2) and (4) correspond to the standard errors for each specification. Column (5) reports the difference in the point estimates between Columns (1) and (3). Column (6) and Column (7) correspond to decomposition of the main coefficient estimate into the share that can be attributed to unemployment and reallocation respectively. Values before 2016 are noisy because both specifications yield coefficients close to zero, mechanically inflating ratios. After 2016, the decomposition stabilizes. 2011 is the base year in the event study, so its coefficient is mechanically set to zero with no standard errors.

Figure A12: Jordanians' Occupation Distribution by Exposure to Syrian Refugees



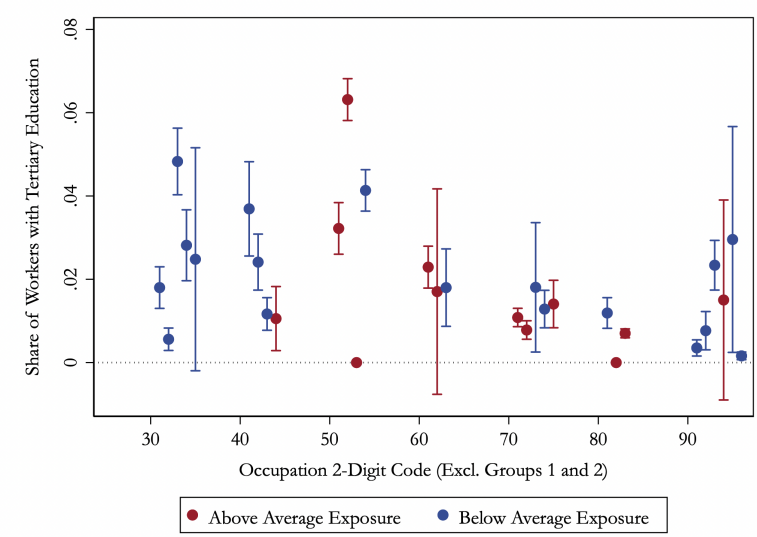
Note: the graph plots the share of Jordanians working in a given 2-digit ISCO occupation codes prior to the introduction of work permits. The color coding corresponds to the quartiles of the occupation-level exposure, defined by the pre-displacement occupation share of Syrian refugees. 36% of Jordanians work in an occupation in the highest exposure quartile prior to the work permit scheme.

Figure A13: Average Occupation-Level Wage by Exposure Quartile



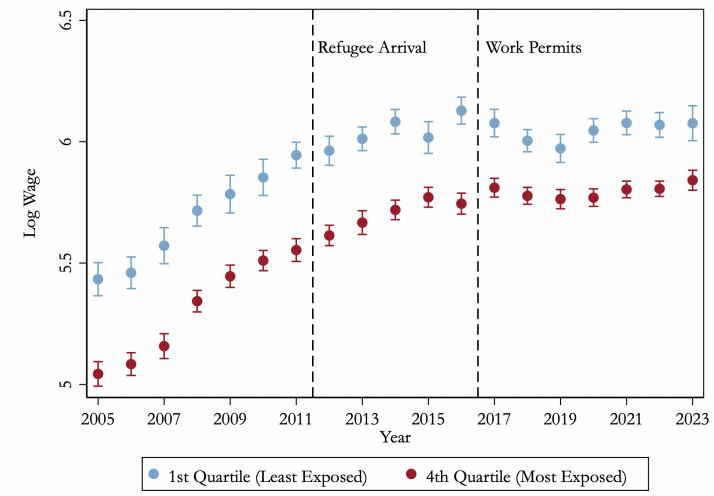
Note: the graph plots the evolution of the log average wage of Jordanians in occupations in the highest and lowest quartiles of exposure. Quartiles are based on the occupation-level exposure, defined by the pre-displacement occupation share of Syrian refugees. The highest level of exposure is the fourth quartile and the lowest is the first quartile.

Figure A15: Average Share of Workers with Tertiary Education by Exposure Level



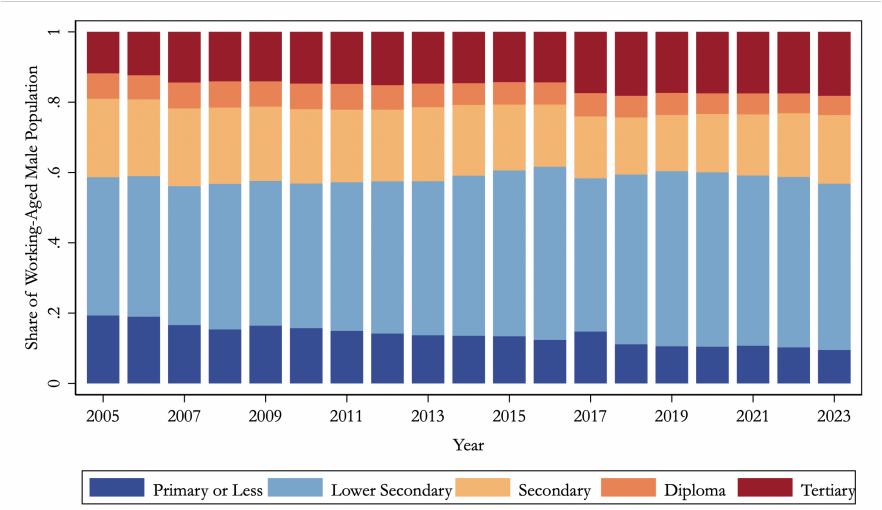
Note: the graph plots the average share of Jordanian workers who have tertiary education in each 2-digit ISCO occupation code (in each location), excluding Groups 1 and 2, which require tertiary education according to ILO skill requirements for each occupation. The remaining Groups 3-9, plotted here, do not require tertiary education. Data is is based on the years prior to the enactment of the work permits (pre-2016) before patterns of reallocation started. The colors of the bar correspond to whether the occupation was above or below the mean exposure level based on the shift-share measure of exposure. (Observations: 363,497)

Figure A14: Average Occupation-Level Wage by Exposure Quartile



Note: the graph plots the evolution of the log average wage of Jordanians in occupations in the highest and lowest quartiles of exposure. Quartiles are based on the occupation-level exposure, defined by the pre-displacement occupation share of Syrian refugees. The highest level of exposure is the fourth quartile and the lowest is the first quartile.

Figure A16: Highest Level of Education Completed by Year



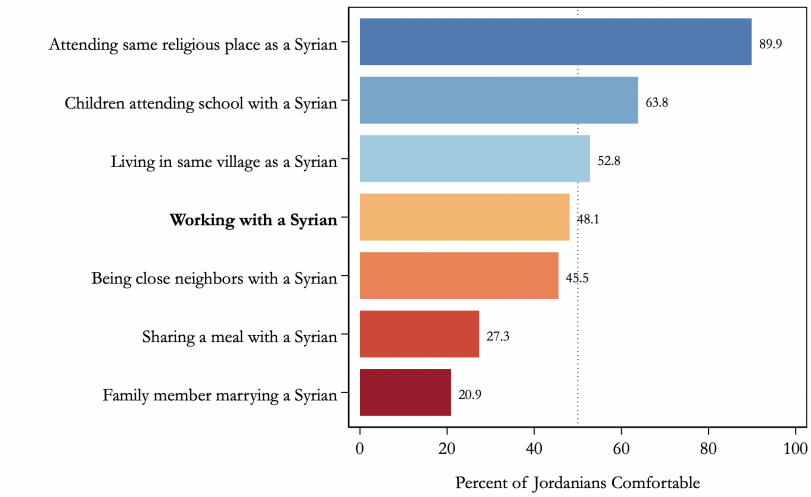
Note: the graph plots the distribution of working-aged male Jordanians by different levels of educational attainment. Each year adds up to 1. "Primary or less" includes education up to and including grade 5. "Lower secondary" corresponds to education up to and including 10. "Secondary" corresponds to grades 11 and 12. "Diploma" corresponds to post-secondary education that does not result in a four-year undergraduate degree."Tertiary" includes all college-level education including undergraduate degrees, masters, and PhDs. (Observations: 601,558)

Table A5: DiD Effects of Exposure on Extensive Margin Outcomes by Education

	Employed (All)	Employed (All)	Unemployed (Only LFPs)	Unemployed (Only LFPs)
	(1)	(2)	(3)	(4)
Exposure x Post	-0.006	-0.004	0.008	0.014
	[0.011]	[0.019]	[0.011]	[0.021]
Post	-0.251	-0.355	0.078	0.105
	[0.035]***	[0.049]***	[0.016]***	[0.027]***
Exposure x Post x Tertiary Educ		-0.070		0.016
		[0.038]*		[0.053]
Exposure x Post x Diploma		0.041		-0.024
		[0.063]		[0.029]
Exposure x Post x Secondary Educ		-0.012		-0.007
		[0.023]		[0.026]
Exposure x Post x Lower Secondary		0.017		-0.013
		[0.021]		[0.019]
Post x Tertiary Educ		0.146		-0.046
		[0.049]***		[0.031]
Post x Diploma		0.134		-0.049
		[0.062]**		[0.034]
Post x Secondary Education		0.120		-0.035
		[0.053]**		[0.030]
Post x Lower Secondary		0.118		-0.021
		[0.043]***		[0.028]
Individual FEs		Yes		Yes
2010 Dep. Var Mean		.71		.11
Obs	4834	4834	4339	4339

Notes: Reported regressions implement a DiD on different dummy variables for labor force outcomes on a measure of exposure, constructed at the level of the ISCO 2-digit occupation code x governorate, that accounts for both the share of refugees in a given location and the share of refugees that have experience working in a given occupation. Regressions control for age and include individual fixed effects. Standard errors are clustered at the unit of exposure - the ISCO 2-digit occupation x governorate. Regressions control for age and are restricted to working-aged men. Columns (1) and (2) use the outcome variable employed, which is the share of all working-aged men working. Columns (3) and (4) use unemployed, which restricts the same to only active labor force participants.

Figure A17: Jordanian Sentiments Toward Interacting With Syrian Refugees



Note: the graph plots the share of Jordanian respondents who said they were comfortable in each of the following settings described. Data is from the 2014 ILO/Fafo Survey.

A.2 Structural Results

Table A6: Occupation-Level Informality and Wedge Estimates

	Z-Scored Informality Index	Initial Tau	Change in Tau (2014 to 2022)
Managers and Professionals	-0.96	0.69	-0.08
Technicians	-0.95	0.78	-0.25
Clerical Workers	-1.08	0.71	-0.31
Service and Sales	-0.25	0.58	-0.19
Agriculture	1.75	0.56	-0.96
Craft Trades	0.81	0.35	-0.33
Machine Operators	0.28	0.65	-0.17
Elementary Jobs	0.40	0.41	-0.30

Notes: The rows correspond to each occupation in the model, excluding unemployment as it is assumed to be frictionless (no wedge). The first column corresponds to the Z-Scored Informality Index based on the informality of Jordanian workers in an occupation prior to the introduction of work permits. Values below zero correspond to below average levels of informality. The second column corresponds to the initial (2014) wedge estimate in the model, before refugees have work permits, starting in mid-2016. The last column reports the percentage point change in the estimated wedge between the initial and final period (2022).

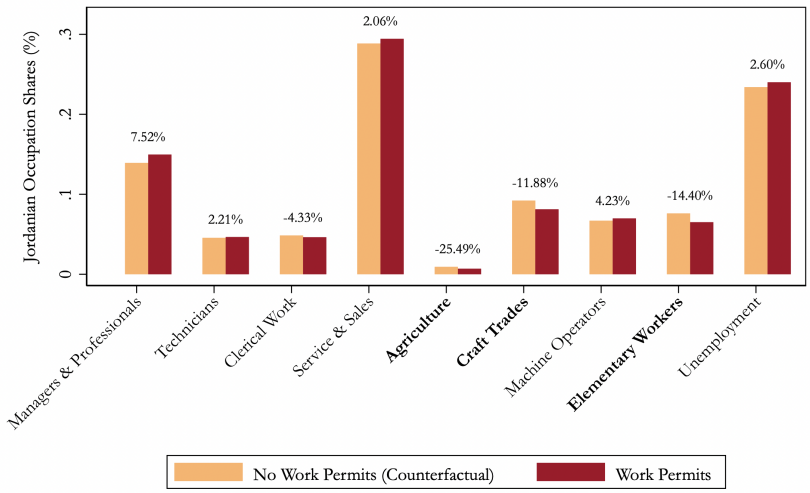
Table A7: Parameter Estimates for 2022 Data

Occupation	τ	w	α_{Syr}	α_{Jor}	H^S	H^S_{Syr}	H^S_{Jor}	A
Managers & Professionals	0.607	14.057	5.354	1.783	451.321	16.843	434.478	6.718
Technicians	0.529	10.506	5.910	2.229	156.258	8.600	147.658	2.554
Clerks	0.397	11.427	4.915	2.390	143.263	10.896	132.367	2.774
Services and Sales	0.395	19.238	5.989	2.647	514.675	54.432	460.242	11.486
Agriculture	-0.395	6.887	5.257	7.114	50.529	24.304	26.225	0.771
Craft Trades	0.022	14.577	5.013	3.946	237.659	69.313	168.346	5.148
Machine Operators	0.482	13.481	6.553	2.533	168.940	13.223	155.717	3.860
Elementary Jobs	0.111	11.914	6.026	4.162	181.430	42.706	138.723	3.323
Unemployment	0.000	12.942	5.632	4.180	523.763	101.781	421.982	N/A

$\lambda_{\text{Syr}} = 0.149$
$\lambda_{\text{Jor}} = 1.235$

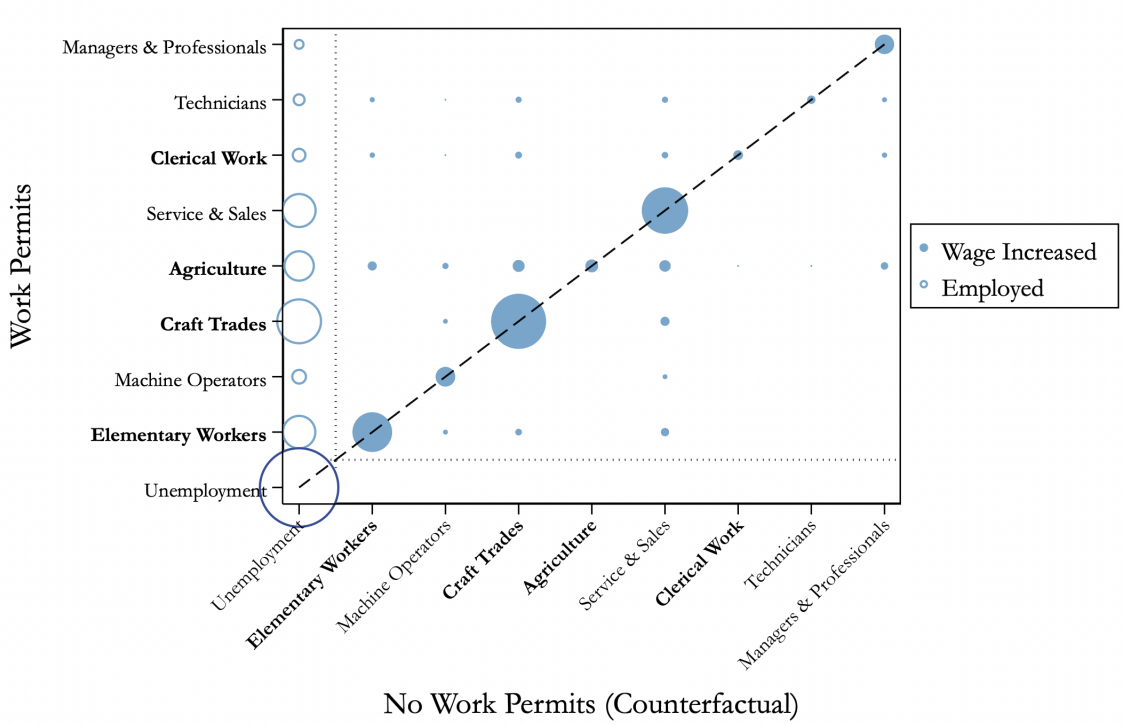
Notes: Columns correspond to parameter vectors for each occupation, denoted in rows. τ corresponds to the occupation-specific wedge faced by Syrian refugees. w is the wage per efficiency unit in each occupation. $\alpha_s yr$ and $\alpha_j o$ refer to the amenity-value each group has for each occupation. H^S refers to the total human capital units supplied to each occupation, disaggregated into the contribution by Syrians (H^S_{Syr}) and by Jordanians(H^S_{Jor}). A is the exogenous productivity of each occupation. Finally, λ correspond to the group-specific preferences for homophily, which are constant across occupations.

Figure A19: Estimated Effect of Work Permits on Jordanian Occupation Shares



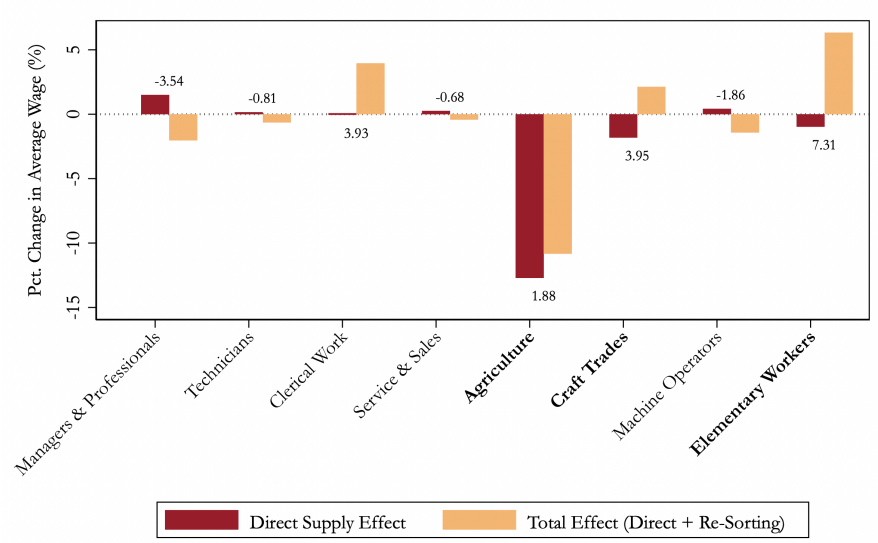
Note: The graph shows the share of Jordanians working in an occupation (or unemployment) under the counterfactual of the 2022 economy without work permits (maroon) and the observed 2022 economy with work permits. The difference between the bars corresponds to the percent change in that occupation's share without vs. with work permits. Bolded occupations correspond to those that received the largest increases of Syrian refugees from the introduction of work permits.

Figure A18: Syrian Occupation Transitions



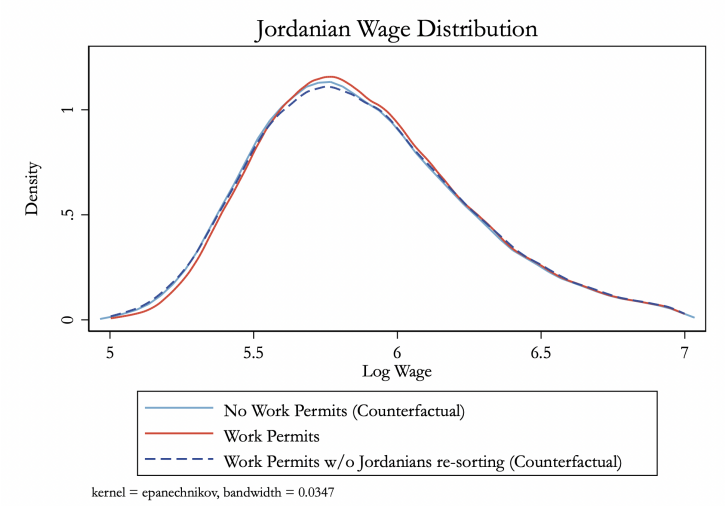
Note: The y-axis plots the occupational choice of simulated individuals after work permits and the x-axis plots the occupational choice in the counterfactual without work permits. The size of the circles correspond to the number of individuals in each transition cell. Those circles off the diagonal represent individuals who switched occupations in response to the work permit scheme. The open circles correspond to unemployment.

Figure A20: Estimated Effect of Work Permits on Jordanian Occupation-Average Wages



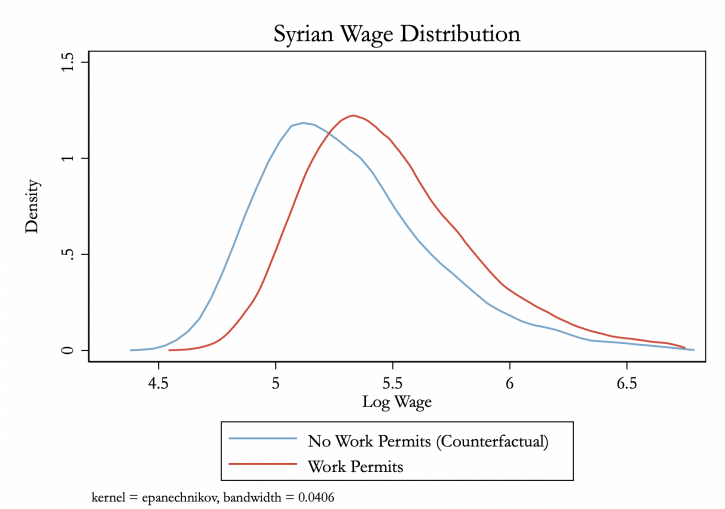
Note: The graph shows percent change in the average wage among Jordanians by occupation, accounting for only the direct supply effect of Syrian entry in response to work permits, as shown in maroon, and the total effect, which includes Jordanians' re-sorting, as shown in orange. The numbers represent the difference in the percent change between the two bars, corresponding to the change caused by the re-sorting effect alone. Bolded occupations correspond to those that received the largest increases of Syrian refugees from the introduction of work permits.

Figure A21: Simulated Wage Distributions for Jordanians



Note: The graph shows the kdensity plots of the simulated log wage distribution for Jordanians under different scenarios. The light blue corresponds to the counterfactual of the 2022 economy without work permits. The red line corresponds to the simulated version of the observed 2022 economy, where work permits exist. Finally, the dark blue dotted line represents the counterfactual of the 2022 economy with work permits, where Jordanians are not allowed to re-sort from their occupations determined in the without work permit counterfactual.

Figure A22: Simulated Wage Distributions for Syrians



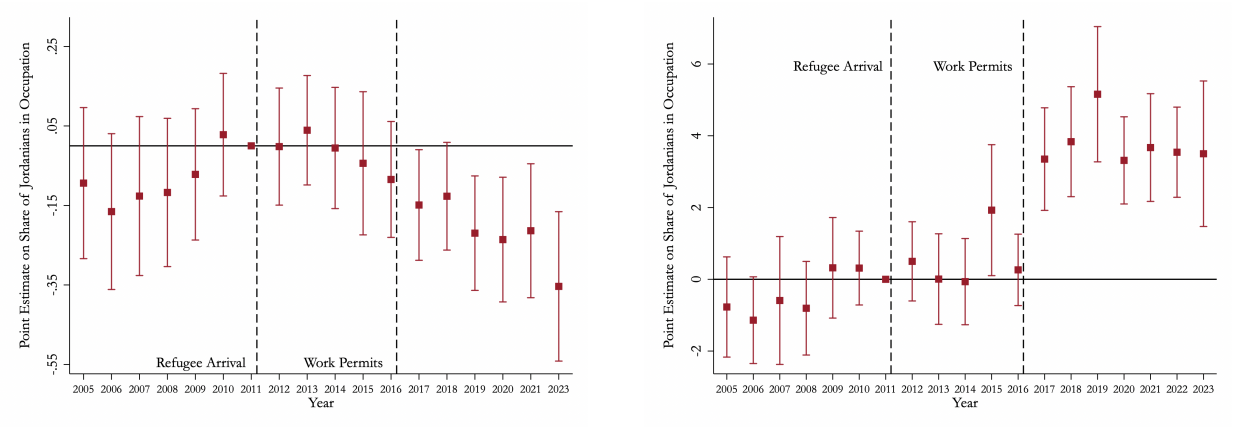
Note: The graph shows the kdensity plots of the simulated log wage distribution for Jordanians under different scenarios. The light blue corresponds to the counterfactual of the 2022 economy without work permits. The red line corresponds to the simulated version of the observed 2022 economy, where work permits exist.

Figure A23: Simulated Effect of Re-Sorting on the Percent Change in Wages by Wage Percentile

Note: The y-axis measures the change in the wage caused by introducing work permits, measured in the local currency of Jordanian Dinars. The x-axis represents a simulated individuals' percentile in the wage distribution before work permits are introduced. The dots then correspond to the percent change in an individual Jordanian's wage, binned at the 0.1 percentile for visibility. The light blue corresponds to the change in wages under the counterfactual where Jordanians cannot re-sort after work permits are introduced while the orange dots correspond to when they can. The maroon and dark blue lines plot the best fit line resulting from a kernel-weighted local polynomial regression of the change in the wage relative on the percentile in the pre-work permit wage distribution.

B Alternative Shift-Share Specifications

Figure B1: Main Event Studies with Non-standardized Exposure Measure

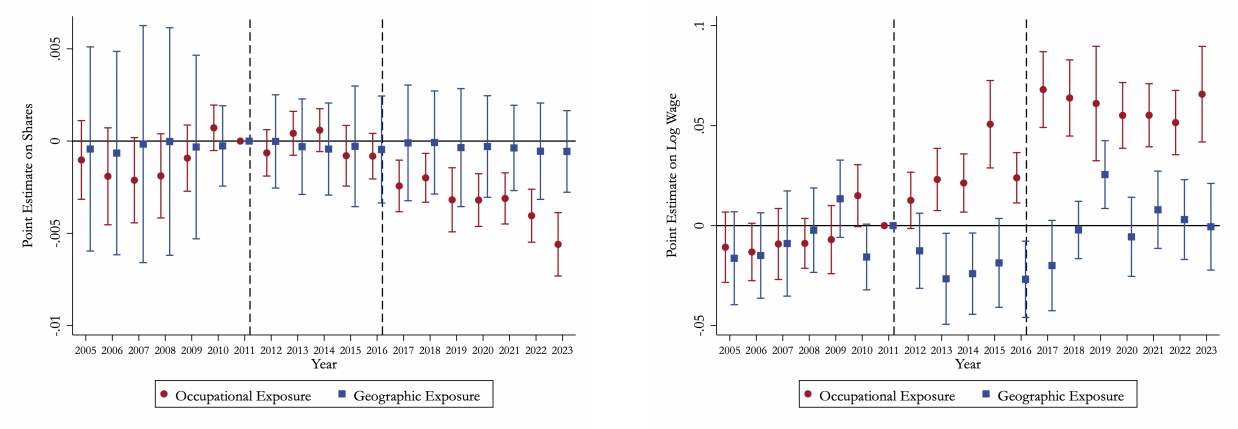


(a) Occupation Shares

(b) Occupation Log Average Wages

Note: Point estimates from regression of preferred specification for occupation shares (Panel A) and occupation log average wages (Panel B) for Jordanians on the main shift-share measure of exposure to Syrian refugees without standardization (not z-scored). Mean value of exposure is 0.39 percent – treatment effects should be scaled accordingly. Regression includes year and occupation-governorate fixed effects. Standard errors are clustered at the unit of treatment: occupation x governorate. (Observations: 6,696 occupation x governorates)

Figure B2: Decomposition of Effects into Geographic Exposure (Shift) and Occupation Exposure (Share)

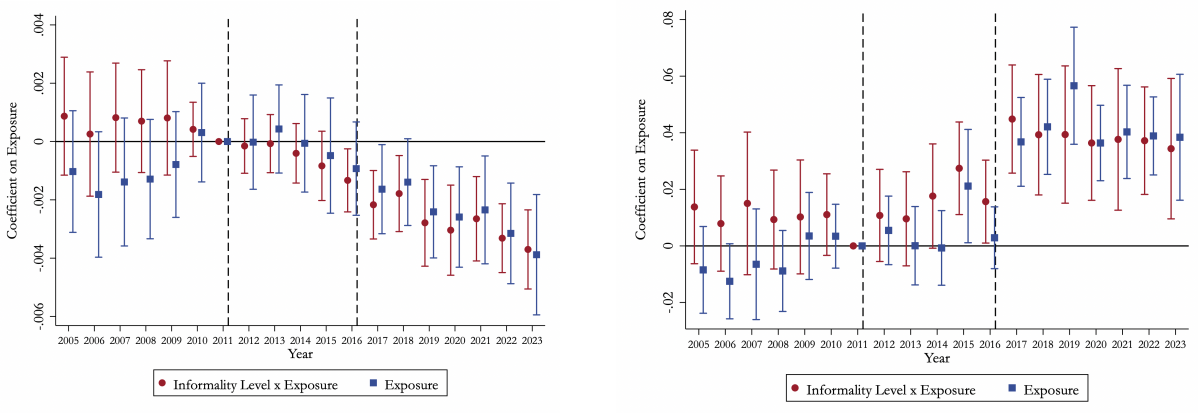


(a) Occupation Shares

(b) Occupation Log Average Wages

Note: Point estimates from regression of preferred specification for occupation shares (Panel A) and occupation log average wages (Panel B) for Jordanians on a the z-scored components of the shift-share measure of exposure to Syrian refugees. Occupation exposure is the z-score of the share of Syrians that worked in the occupation pre-displacement. Geographic Exposure is the z-score of the share of Syrians relative to the total population of the governorate. Regression includes year and occupation-governorate fixed effects. Standard errors are clustered at the unit of treatment: occupation x governorate (Observations: 6,696 occupation x governorates)

Figure B3: Exposure Effects with Occupation-Level Informality



(a) Occupation Shares

(b) Occupation Log Average Wages

Note: Point estimates from regression of preferred specification for occupation shares (Panel A) and occupation log average wages (Panel B) for Jordanians on a the z-scored shift-share measure of exposure compare to the z-scored shift-share measure interacted with the informality index of the occupation. Regression includes year and occupation-governorate fixed effects. Standard errors are clustered at the unit of treatment: occupation x governorate (Observations: 6,696 occupation x governorates)

C Appendix: Additional Evidence of Selection in Sorting

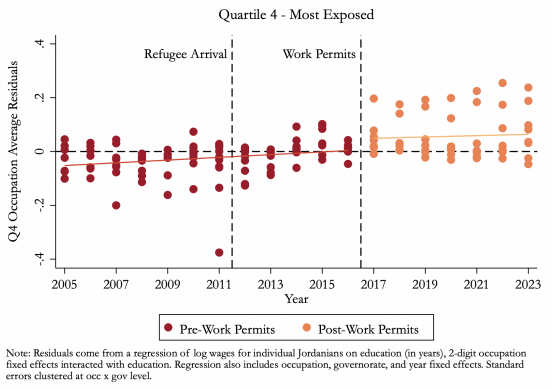
Without panel data for the majority of the study period, I can not observe the evolution of which individuals exit from each occupation nor where they reallocate. However, I can infer changes in the average ability or productivity of workers in a given occupation, using the residuals from the individual-level wage regression. Specifically, I implement the following regresion for Jordanian workers, controlling for occupation-level differences in productivity, returns to education overall and by occupation, governorate and year fixed effects,

$$Y_{i,t} = \beta_o \left[\mathbb{1}\left(\text{Occupation}_i = o\right) \times \text{Educ}_i\right] + \alpha \cdot \text{Educ}_i + \delta_o + \gamma_t + \epsilon_i, t \tag{17}$$

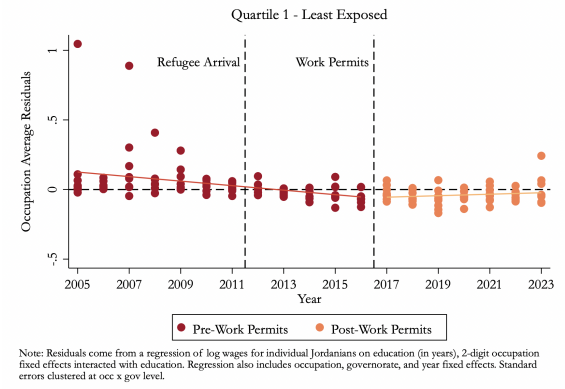
I then aggregate the resulting residuals from this regression to compute an occupation-level average, which proxies the average productivity level of the workers in that occupation in a given year. I then plot the evolution of these occupation average residuals over time by quartile. Figure C1a shows the evolution of these residuals for occupations in the highest quartile of exposure to Syrian refugee competition. I find that the occupation average residual increases following the introduction of work permits, consistent with a theory of Jordanians re-sorting in response to the supply shock. In particular, it should be the least productive Jordanians in these high exposure occupations that will exit, which would result in the average productivity of these occupations improving following work permits.

For comparison, Figure C1b plots the occupation-average residuals for the least exposed quaritle of occupations over time. If Jordanians are re-sorting to less exposed occupations, these entrants will be of lower productivity than the existing workers, thus bringing down the occupation average ability level. While the pattern is less pronounced, there is some evidence that the average residuals of the occupations in the least exposed quartile decline with the onset of work permits.

Figure C1: Occupation Average Wage Regression Residuals by Exposure Quartile



(a) Quartile 4 - Most Exposed



(b) Quartile 1 - Least Exposed

D Appendix: Detailed Description of Data

D.1 Description of Individual Data Sources

- **ERF EUS 2005-2016, excluding 2015:** This dataset comprises the old version of the Employment and Unemployment Survey that is run annually by DoS, made publicly available through a data sharing agreement with the Economic Research Forum in Cairo, Egypt. The survey is only representative for Jordanians and is implemented through a stratified sampling procedure using census data of households across the country. Because 2015 was the census year, that round was not shared with ERF. See OAMDI (2017) for description and access to data.
- **DoS EUS 2015:** A random 25% sample of the 2015 round of the Employment and Unemployment Survey was provided by DoS for use in this project. Given it was not shared with ERF, raising concerns of data quality, I take estimates from this year with a degree of caution. Similar to the other waves pre-2017, the data is only representative for Jordanians. See Department of Statistics (2024) for publicly available documentation and summary tables.
- **DoS EUS 2017-2023:** After Syrian refugees gained a legal pathway to work, the DoS Employment and Unemployment survey became representative for both Jordanians and Syrian refugees. The data is not public but DoS has given me access to a 25% random sample for the years of 2017 to 2023. Due to the COVID-19 pandemic, DoS conducted smaller-scale surveys in 2020 and 2021, leaving the resulting sub-sample provided under-powered for Syrian refugees. See Department of Statistics (2024) for publicly available documentation and summary tables.
- **ILO/Fafo 2014:** This dataset was originally collected by the International Labor Organization (ILO) in conjunction with the Fafo Institute in early 2014. Fafo has provided an anonymized version of the dataset for this project, although it is not publicly available. The dataset is representative for Syrian refugees and Jordanians living in Amman, Mafraq, and Irbid, which are the three governorates with the largest Syrian refugee populations. See Stave and Hillesund (2015) for the corresponding publicly available report.
- **JLMPS 2016:** The Jordan Labor Market Panel Survey 2016 round was collected by a team of researchers at ERF in conjunction with the Jordanian Department of Statistics (DoS) in early 2017. This data is publicly available on the ERF's data portal upon application. The dataset is representative for Syrian refugees and Jordanians across the entirety of Jordan. The sample for Syrian refugees is quite small once restricted to working-aged individuals (around 300 observations) so it is only used for the Jordanian dataset. See OAMDI (2018) for description and access to data.
- **Fafo/DoS 2018:** This dataset was originally collected by the Fafo Institute in conjunction

with DoS in late 2017. Fafo has provided this dataset to me, although it is not publicly available. The dataset only surveys Syrian refugees but is representative for all of Jordan. See Tiltnes et al. (2019) for the corresponding publicly available report.

D.2 Harmonization of Key Variables

To ensure measures are consistent across different datasets, I construct all variables using common survey questions found in all surveys.

Labor Force Status:

- **Working-aged:** An individual is working-aged if they are between the ages of 18-60 at the time of the survey, consistent with Jordan's minimum legal age for full time employment (18 years old) and the retirement age (60 years old).
- **Employed:** An individual is defined as employed if they answer that they have worked for at least one hour in the past 7 days.
- **Unemployed:** An individual is unemployed if they answer that they (i) want to be working and (ii) are actively looking for work, as defined as engaging in some job search activity in the past 30 days.
- **Labor Force Participant:** An individual that is either employed or unemployed and is of working-age.

Informality: Informality is defined along four dimensions in line with the ILO definition of informality – a worker is informal if they work for their own-account, work without a written contract, work on a temporary contract, or are not covered by the social security contribution scheme. Each of these components are elicited through survey questions in all surveys with the exception of DoS EUS pre-2016 and for some metrics after the 2020 adjustment for COVID questions. I take a more nuanced approach to measure inforamlity and construct an inverse-covariance weighted index of the four components of the ILO definition of informality to create a continuous measure of informality at the worker-level. Occupation-level informality is then the average index-value across Jordanian workers in a given occupation in a given year.

Wages: Wages are harmonized to be measured at the monthly-level consistent with Jordan's minimum wage, which is defined in terms of monthly wages. In the surveys, individuals are asked to report their last wage payment and the intervals (hourly, daily, weekly, monthly, etc.) that the payments are issued. If the wage is reported at the monthly level, I make no adjustments. If the wage is reported for a shorter interval of time, I scale the reported wage by the relevant hours worked (using reported hours worked each day or week) to construct a monthly measure.

Final wages are winsorized at the 99th percentile. From 2005-2016, the Jordanian Department of Statistics' EUS survey collected monthly wage data at binned intervals. I assign individuals to the mean value of their corresponding wage bin for these years. I can benchmark this binning against 2010 JLMPS and 2014 ILO/Fafo data, which have continuous measures of wages, and the distribution is consistent.

Occupation Average Wages: For harmonization in the event study, I assign individuals with continuous wages to corresponding wage bins to match the binned data. I then take the average value across individuals to construct the average wage measure at the unit of occupation x governorate x year. I find the results of the main event study are robust to using unbinned individual wage data where available, in the construction of this average.

Occupations: Occupations are defined using the ILO's ISCO 08 2-digit occupation codes. For the DoS EUS 2005-2009 data, occupations were categorized using the ISCO 88 codes. To harmonize these years' codes to the ISCO 08 codes, I use the crosswalk provided by ILO entitled "Correspondence ISCO-08 to ISCO-88" available here. However, the crosswalk is defined at the 4-digit level and my data is available only at the 3-digit level, requiring manual matching based on corresponding descriptions of occupations and work functions that fall under the given occupation code.

D.3 Summary Statistics for Final Harmonized Dataset

Table D1: Number of Observations by Year

	Data Sources		Observations	
Year	**Jordanians**	**Syrians**	**Jordanians**	**Syrians**
2005	ERF EUS		51,349	
2006	ERF EUS		50,593	
2007	ERF EUS		63,288	
2008	ERF EUS		62,271	
2009	ERF EUS		60,513	
2010	ERF EUS; JLMPS		65,637	
2011	ERF EUS	ILO/Fafo *Recall*	60,898	2,560
2012	ERF EUS		58,292	
2013	ERF EUS		54,551	
2014	ERF EUS; ILO/Fafo	ILO/Fafo	55,122	2,560
2015	DoS EUS		13,037	
2016	ERF EUS		53,338	
2017	DoS EUS; JLMPS	DoS EUS; Fafo/DoS	8,909	
2018	DoS EUS	DoS EUS	66,220	3,551
2019	DoS EUS	DoS EUS	15,883	803
2020	DoS EUS	DoS EUS	54,460	2,447
2021	DoS EUS	DoS EUS	64,151	3,220
2022	DoS EUS	DoS EUS	62,111	3,397
2023	DoS EUS		14,609	

Notes: The table above documents the number of working-aged males in each year by population group - Jordanians and Syrian refugees. The sources correspond to the data sources described in Appendix Subsection D.1. (Jordanian Obs: 950,111. Syrian Obs: 27,447)

Table D2: Jordanian Labor Market Summary Statistics (2005-2014)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Observations	51349	50593	63288	62271	60513	65637	60898	58292	54551	55122	58659.9
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(4819.7)
Age	32.54	32.57	32.86	32.96	33.03	33.22	33.38	33.60	33.85	34.00	33.20
	(11.46)	(11.51)	(11.36)	(11.35)	(11.32)	(11.37)	(11.37)	(11.50)	(11.59)	(11.65)	(11.45)
Urban Area	0.674	0.665	0.724	0.730	0.725	0.722	0.720	0.722	0.719	0.714	0.713
	(0.469)	(0.472)	(0.447)	(0.444)	(0.447)	(0.448)	(0.449)	(0.448)	(0.449)	(0.452)	(0.452)
LFP Rate	0.785	0.781	0.785	0.784	0.800	0.785	0.776	0.762	0.752	0.748	0.776
	(0.411)	(0.413)	(0.411)	(0.411)	(0.400)	(0.411)	(0.417)	(0.426)	(0.432)	(0.434)	(0.417)
Unemployment Rate	0.159	0.151	0.123	0.118	0.120	0.117	0.129	0.126	0.126	0.133	0.129
	(0.366)	(0.358)	(0.328)	(0.323)	(0.325)	(0.322)	(0.335)	(0.332)	(0.332)	(0.340)	(0.335)
Employment Rate	0.660	0.663	0.689	0.692	0.704	0.693	0.676	0.666	0.657	0.648	0.676
	(0.474)	(0.473)	(0.463)	(0.462)	(0.457)	(0.461)	(0.468)	(0.472)	(0.475)	(0.478)	(0.468)
Education (in Years)	10.81	10.87	11.16	11.20	11.18	11.27	11.28	11.31	11.30	11.28	11.17
	(3.709)	(3.720)	(3.647)	(3.568)	(3.566)	(3.559)	(3.519)	(3.479)	(3.423)	(3.372)	(3.560)
Current Student	0.104	0.105	0.107	0.109	0.105	0.107	0.106	0.107	0.110	0.111	0.107
	(0.305)	(0.306)	(0.310)	(0.312)	(0.306)	(0.310)	(0.307)	(0.309)	(0.313)	(0.314)	(0.309)
Monthly Wage	198.1	204.3	227.1	267.4	293.6	306.8	323.7	343.5	350.9	362.5	288.5
	(117.4)	(120.1)	(134.6)	(141.9)	(146.8)	(145.3)	(141.9)	(142.4)	(138.9)	(139.2)	(148.7)
Hours Per Week	45.76	44.64	47.11	43.66	44.43	40.36	41.99	41.67	42.24	42.61	43.42
	(14.59)	(14.40)	(13.23)	(12.47)	(13.68)	(16.10)	(13.54)	(11.89)	(11.63)	(11.18)	(13.54)

Notes: Columns correspond to years in the data with total being the average for the entire period. Rows correspond to variables. Means of each variable for each year are reported in each cell with standard deviations in parentheses below. Observations corresponds to the number of working-aged men in the sample for a given year, which does not have a corresponding standard deviation. Urban area corresponds to individual living in an urban area within Jordan. LFP rate measures the labor force participation rate of working-aged men. Unemployment rate is computed by the share of labor force participants not employed. Employment rate is the *effective* employment rate of all working-aged men, including non-labor force participants. Education is measured in years. Current student is the share of working-aged men that are enrolled as full-time students. Monthly wage is measured in Jordanian dinar. Hours per week is the average number of hours that employed individuals work in a given 7 day period. (Observations: 582,514)

Table D3: Jordanian Labor Market Summary Statistics (2015-2023)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Observations	13037	53338	23788	66220	15883	54460	64151	62111	14609	52695.1
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(17245.6)
Age	34.28	34.25	34.16	34.54	34.72	34.99	34.96	35.01	35.12	34.71
	(11.84)	(12.05)	(11.87)	(12.19)	(12.21)	(12.29)	(12.36)	(12.37)	(12.36)	(12.22)
Urban Area	0.716	0.711	0.769	0.765	0.761	0.763	0.760	0.753	0.746	0.752
	(0.451)	(0.453)	(0.421)	(0.424)	(0.426)	(0.426)	(0.427)	(0.431)	(0.435)	(0.432)
LFP Rate	0.727	0.745	0.724	0.697	0.680	0.674	0.680	0.674	0.677	0.695
	(0.446)	(0.436)	(0.447)	(0.460)	(0.466)	(0.469)	(0.466)	(0.469)	(0.467)	(0.460)
Unemployment Rate	0.121	0.147	0.146	0.175	0.175	0.207	0.224	0.212	0.201	0.187
	(0.326)	(0.355)	(0.353)	(0.380)	(0.380)	(0.405)	(0.417)	(0.408)	(0.400)	(0.390)
Employment Rate	0.638	0.635	0.612	0.575	0.561	0.535	0.528	0.531	0.542	0.565
	(0.481)	(0.481)	(0.487)	(0.494)	(0.496)	(0.499)	(0.499)	(0.499)	(0.498)	(0.496)
Education (in Years)	11.47	11.29	11.54	11.80	11.78	11.79	11.79	11.80	11.90	11.70
	(2.997)	(3.323)	(3.335)	(3.006)	(2.932)	(2.958)	(2.985)	(2.940)	(2.939)	(3.055)
Current Student	0.104	0.100	0.0855	0.0945	0.0864	0.0945	0.101	0.105	0.108	0.0981
	(0.305)	(0.300)	(0.280)	(0.292)	(0.281)	(0.293)	(0.301)	(0.306)	(0.311)	(0.297)
Monthly Wage	368.7	377.5	387.1	374.5	371.6	376.1	379.6	383.8	395.8	378.8
	(142.3)	(136.4)	(152.6)	(132.9)	(126.2)	(129.0)	(132.0)	(131.3)	(138.9)	(134.5)
Hours Per Week	43.67	42.25	35.27	44.81	44.17	42.97	44.29	44.69	44.71	43.31
	(8.833)	(10.02)	(19.14)	(9.481)	(9.291)	(9.768)	(8.490)	(8.633)	(7.859)	(10.47)

Notes: Columns correspond to years in the data with total being the average for the entire period. Rows correspond to variables. Means of each variable for each year are reported in each cell with standard deviations in parentheses below. Observations corresponds to the number of working-aged men in the sample for a given year, which does not have a corresponding standard deviation. Urban area corresponds to individual living in an urban area within Jordan. LFP rate measures the labor force participation rate of working-aged men. Unemployment rate is computed by the share of labor force participants not employed. Employment rate is the *effective* employment rate of all working-aged men, including non-labor force participants. Education is measured in years. Current student is the share of working-aged men that are enrolled as full-time students. Monthly wage is measured in Jordanian dinar. Hours per week is the average number of hours that employed individuals work in a given 7 day period. (Observations: 27,447)

Table D4: Syrian Refugee Labor Market Summary Statistics (2011, 2014, 2017-2022)

	2011	2014	2017	2018	2019	2020	2021	2022	Total
Observations	2560	2560	8909	3551	803	2447	3220	3397	4868.6
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(2848.0)
Age	32.75	32.75	33.06	34.11	33.74	34.16	34.18	34.21	33.53
	(10.71)	(10.71)	(11.16)	(11.05)	(11.30)	(11.48)	(11.64)	(11.76)	(11.25)
Urban Area	.	0.804	0.906	0.904	0.924	0.925	0.932	0.918	0.905
	(.)	(0.397)	(0.293)	(0.295)	(0.265)	(0.264)	(0.251)	(0.275)	(0.293)
LFP Rate	0.745	0.671	0.682	0.735	0.727	0.728	0.753	0.758	0.717
	(0.436)	(0.470)	(0.466)	(0.441)	(0.446)	(0.445)	(0.431)	(0.429)	(0.451)
Unemployment Rate	0.274	0.631	0.256	0.321	0.353	0.343	0.321	0.310	0.320
	(0.446)	(0.483)	(0.437)	(0.467)	(0.478)	(0.475)	(0.467)	(0.462)	(0.467)
Employment Rate	0.518	0.207	0.507	0.499	0.471	0.478	0.511	0.523	0.478
	(0.500)	(0.405)	(0.500)	(0.500)	(0.499)	(0.500)	(0.500)	(0.500)	(0.500)
Education (in Years)	.	8.361	8.041	8.495	8.372	8.500	8.640	8.581	8.351
	(.)	(3.223)	(3.065)	(2.907)	(2.854)	(2.944)	(2.974)	(3.026)	(3.032)
Current Student	.	0.0141	0.0274	0.0225	0.0374	0.0343	0.0438	0.0445	0.0310
	(.)	(0.118)	(0.163)	(0.148)	(0.190)	(0.182)	(0.205)	(0.206)	(0.173)
Monthly Wage	.	196.2	224.7	254.9	237.9	262.5	258.3	276.1	243.3
	(.)	(133.0)	(231.9)	(164.2)	(103.7)	(206.5)	(108.2)	(291.2)	(212.5)
Hours Per Week	.	49.53	38.92	44.03	44.12	43.96	44.83	45.41	42.61
	(.)	(23.08)	(25.03)	(12.98)	(11.84)	(12.96)	(11.52)	(11.74)	(18.99)

Notes: Columns correspond to years in the data with total being the average for the entire period. Rows correspond to variables. Means of each variable for each year are reported in each cell with standard deviations in parentheses below. Observations corresponds to the number of working-aged men in the sample for a given year, which does not have a corresponding standard deviation. Urban area corresponds to individual living in an urban area within Jordan. LFP rate measures the labor force participation rate of working-aged men. Unemployment rate is computed by the share of labor force participants not employed. Employment rate is the *effective* employment rate of all working-aged men, including non-labor force participants. Education is measured in years. Current student is the share of working-aged men that are enrolled as full-time students. Monthly wage is measured in Jordanian dinar. Hours per week is the average number of hours that employed individuals work in a given 7 day period. 2011 recall data has limited variables, explaining missing values. (Observations: 367,597)

E Appendix: Model Derivations and Proofs

E.1 Probability of Choosing an Occupation

Since all individuals within an occupation draw from the same distribution of ϵ's, I drop the individual subscript i for clarity in the remainder of the derivation of this model. The probability that an individual in group g chooses occupation o can be defined as $p_{o,g}$ such that:

$$\begin{aligned} p_{o,g} &= \mathbb{P}\left(\tilde{w}_{o,g}\epsilon_o > \tilde{w}_{k,g}\epsilon_k\right) \quad \forall k \neq o \\ &= \mathbb{P}\left(\epsilon_k < \frac{\tilde{w}_{o,g}\epsilon_o}{\tilde{w}_{k,g}}\right) \quad \forall k \neq o \\ &= \int f_{o,g}(\alpha_1\epsilon, ..., \alpha_m\epsilon)d\epsilon \end{aligned} \tag{18}$$

where $\alpha_m = \frac{\tilde{w}_{o,g}}{\tilde{w}_{m,g}}$. From the properties of the Frechet distribution, $f_{o,g}$ can be derived as the derivative of the joint CDF of F_g with respect to its k-th argument:

$$F_g(\epsilon_1, ..., \epsilon_m) = \exp\left(\sum_{j=1}^{m} \epsilon_j^{-\theta}\right) \tag{19}$$

$$\Rightarrow \frac{\partial F_g}{\partial \epsilon_o} = f_{o,g}(\alpha_1\epsilon, ..., \alpha_m\epsilon) = \theta\epsilon^{-\theta-1}\exp\left(\sum_{k=1}^{m} \alpha_k^{-\theta}\epsilon^{-\theta}\right) \tag{20}$$

Evaluating the integral in Equation (10)

$$\begin{aligned} p_{o,g} &= \int \theta\epsilon^{-\theta-1}\exp\left(\sum_{k=1}^{m} \alpha_k^{-\theta}\epsilon^{-\theta}\right) \\ &= \frac{1}{\sum_k \alpha_k^{-\theta}} \int \sum_k \alpha_k^{-\theta}\theta\epsilon^{-\theta-1}\exp\left(\sum_{k=1}^{m} \alpha_k^{-\theta}\epsilon^{-\theta}\right) \\ &= \frac{1}{\sum_k \alpha_k^{-\theta}} \int dF_g(\epsilon) \end{aligned}$$

Recalling that $\alpha_m = \frac{\tilde{w}_{o,g}}{\tilde{w}_{m,g}}$, I get a final expression for the probability of an individual in group g choosing occupation o.

$$\therefore p_{o,g} = \frac{\tilde{w}_{o,g}^{\theta}}{\sum_{k=1}^{m} \tilde{w}_{k,g}^{\theta}} \quad \text{where} \quad \tilde{w}_{o,g} = z_o(1-\tau_{o,g})w_o\phi_o(1-s)s^{\phi_o-1}$$

E.2 Occupation-Specific Average Quality

This appendix presents the full derivation to arrive at the expression for average worker quality by occupation in the model. Beginning from the human capital accumulation equation, the efficiency units of labor for a given individual in group g in occupation o can be defined as:

$$h_{o,g}\epsilon_o = s^{\phi_o}\epsilon_o$$

The average quality of workers (including human capital and talent) when workers sort based on their ability draw ϵ_o is then:

$$e^{\mathbb{E}[ln(h_{o,g}\epsilon_o)|\text{choose } o]} = s^{\phi_o} e^{\mathbb{E}[ln(\epsilon_o)|\text{choose } o]}$$

Let ϵ^* denote the ability of an individual in their chosen occupation. Post-distortion income from labor can then be defined as:

$$W^* = \max_o W_o = \max_o \tilde{w}_o\epsilon_o = \tilde{w}_o^*\epsilon_o^*$$

As individuals choose their occupation to maximize W_o and thus it inherits the extreme value distribution of ϵ_o

$$\begin{aligned}
\mathbb{P}(Y^* < x) &= \mathbb{P}(W_o < x) \quad \forall o \\
&= \mathbb{P}(\epsilon_o < \frac{x}{\tilde{w}_o}) \quad \forall o \\
&= F(\frac{x}{\tilde{w}_1}, ..., \frac{z}{\tilde{w}_m}) \\
&= \exp\left(-\sum_s \tilde{w}_s^\theta x^{-\theta} \right) \\
\Rightarrow \mathbb{P}(\epsilon^* < v) &= \mathbb{P}(\frac{Y^*}{\tilde{w}^*} < v) \\
&= \mathbb{P}(Y^* < v\tilde{w}^*) \\
&= \exp\left(-\sum_s \tilde{w}_s^\theta (v\tilde{w}^*)^{-\theta} \right) \\
&= \exp\left(-\sum_s \left(\frac{\tilde{w}_s}{\tilde{w}^*}\right)^\theta v^{-\theta} \right)
\end{aligned}$$

Then the CDF of ϵ^*, the ability of workers in their observed (chosen) occupation, is:

$$G(v) = \mathbb{P}(\epsilon^* < v) = \exp\left(-\sum_s \left(\frac{\tilde{w}_s}{\tilde{w}^*}\right)^\theta v^{-\theta}\right)$$
$$= \exp\left(\frac{1}{p^*} v^{-\theta}\right) \quad \text{where} \quad p^* = \sum_s \left(\frac{\tilde{w}^*}{\tilde{w}_s}\right)^\theta$$

Integrating over the PDF of ϵ^* to get the expected value of ϵ^*

$$\mathbb{E}[\epsilon^*] = \int \epsilon^* dG(\epsilon^*) = \int \epsilon^* g(\epsilon^*) d\epsilon^*$$
$$= \int \theta\left(\frac{1}{p^*}\right)\epsilon^{*\,-\theta} \cdot \exp\left[\left(\frac{-1}{p^*}\right)\epsilon^{*\,-\theta}\right]$$

Applying a Change of Variables where $x = \left(\frac{-1}{p^*}\right)\epsilon^{*\,-\theta}$, we can rewrite the above integral as:

$$\mathbb{E}[\epsilon^*] = \left(\frac{-1}{p^*}\right)^{\frac{1}{\theta}} \int x^{\frac{-1}{\theta}} e^{-x} dx$$

Recalling the Gamma Function: $\Gamma(\alpha) = \int x^{\alpha-1} e^{-x} dx$

$$\mathbb{E}[\epsilon^*] = \left(\frac{1}{p^*}\right)^{\frac{1}{\theta}} \Gamma(1 - \frac{1}{\theta})$$
$$\therefore \mathbb{E}[\epsilon_i | \text{choose } i] = \left(\frac{1}{p_{i,g}}\right)^{\frac{1}{\theta}} \Gamma(1 - \frac{1}{\theta})$$

Using properties of the Frechet distribution, if $x \sim Frechet(\theta)$, then it follows that $ln(x) \sim Gumbel(\frac{1}{\theta})$ and $\mathbb{E}[ln(x)] = \frac{\gamma_{em}}{\theta} \equiv \tilde{\Gamma}$ where γ_{em} is the Euler-Mascheroni constant. Applying this to Equation (15), I get the geometric mean ability for individuals given that occupational sorting is done based on one's ability draw.

$$e^{\mathbb{E}[ln(h_{o,g}\epsilon_o)|\text{choose } o]} = s^{\phi_o}\left[\left(\frac{1}{p_{o,g}}\right)^{\frac{1}{\theta}} \tilde{\Gamma}\right]$$

This concludes the derivation of the average worker quality in a given occupation.

E.3 Homophily as an amplifier of re-sorting

Proposition 1 (Homophily amplifies re-sorting)**.** *Suppose the aggregate production function is* $Y = [\sum_o (A_o H_o)^\rho]^{1/\rho}$ *with* $0 < \rho < 1$*, and that* $\frac{\partial H_o}{\partial p_{o,S}} > 0$*. Then, for any occupation* o *that is not*

the only one contributing to aggregate output,

$$\frac{\partial w_o}{\partial p_{o,S}} < 0 \quad \textit{and} \quad \frac{\partial z_{o,J}}{\partial p_{o,S}} < 0.$$

Consequently, the utility of Jordanians in occupation o satisfies

$$\frac{\partial U_{o,i,J}}{\partial p_{o,S}} = \left(\frac{\partial z_{o,J}}{\partial p_{o,S}} w_o + z_{o,J} \frac{\partial w_o}{\partial p_{o,S}} \right) s_{i,o}^{\phi_o} \epsilon_{i,o,J} < 0,$$

and the magnitude of this decline is strictly greater than in the case without homophily ($\lambda_J = 0$). Homophily thus amplifies re-sorting by deepening the utility loss for Jordanians in high-exposure occupations.

Here I provide a proof that homophily acts as an amplifier of re-sorting by exacerbating the decline in utility beyond the case of wage-based sorting with exogenous preferences. I show that an increase in the share of Syrians in an occupation ($p_{o,S}$) pushes down both (i) the wage per efficiency unit in that occupation and (ii) the non-wage value of working in that occupation for Jordanians.

I begin with the utility function for an individual i from group g in occupation o:

$$U_{o,i,g} = \underbrace{\alpha_{o,g} \left(\frac{N_J p_{o,J}}{\sum_g N_g p_{o,g}} \right)^{\lambda_g}}_{\equiv z_{o,g}} \underbrace{w_o s_i^{\phi_o} \epsilon_{i,o,g}}_{\equiv \text{wage}_{i,o,g}}, \qquad g \in \{S, J\}.$$

Now imagine that Syrian refugees enter occupation o, such that the occupation share of Syrian refugees $p_{o,S}$ increases. The derivative of Jordanians' utility with respect to this change is:

$$\begin{aligned} \frac{\partial U_{o,i,J}}{\partial p_{o,S}} &= \left(\frac{\partial z_{o,J}}{\partial p_{o,S}} \right) w_o s_i^{\phi_o} \epsilon_{i,o,J} + z_{o,J} \left(\frac{\partial w_o}{\partial p_{o,S}} \right) s_i^{\phi_o} \epsilon_{i,o,J} \\ &= \left[\left(\frac{\partial z_{o,J}}{\partial p_{o,S}} \right) w_o + \left(\frac{\partial w_o}{\partial p_{o,S}} \right) z_{o,J} \right] \left(s_i^{\phi_o} \epsilon_{i,o,J} \right). \end{aligned}$$

Consistent with wages falling as total human capital in an occupation increases, the wage per efficiency unit should be decreasing with respect to the share of Syrians in that occupation. Recall that the wage per efficiency unit follows from the firm's first order condition under the aggregate production function

$$Y = \left[\sum_o (A_o H_o)^\rho \right]^{\frac{1}{\rho}}.$$

Taking the derivative of the first-order condition for occupation o,

$$w_o = A_o^\rho H_o^{\rho - 1} Y^{1-\rho},$$

with respect to $p_{o,S}$ gives:

$$\frac{\partial w_o}{\partial p_{o,S}} = w_o \left[(\rho - 1) \frac{1}{H_o} \frac{\partial H_o}{\partial p_{o,S}} + (1 - \rho) \frac{1}{Y} \frac{\partial Y}{\partial p_{o,S}} \right].$$

Because $\frac{\partial Y}{\partial p_{o,S}} = \frac{\partial Y}{\partial H_o} \frac{\partial H_o}{\partial p_{o,S}} = w_o \frac{\partial H_o}{\partial p_{o,S}}$, we can simplify to:

$$\frac{\partial w_o}{\partial p_{o,S}} = \frac{\partial H_o}{\partial p_{o,S}} w_o (1 - \rho) \Big(\frac{w_o}{Y} - \frac{1}{H_o} \Big).$$

The partial derivative of human capital in occupation o with respect to the share of Syrians in occupation o is positive, since adding more members of either group raises total efficiency units of labor:

$$\frac{\partial H_o}{\partial p_{o,S}} > 0.$$

Hence, the sign of $\frac{\partial w_o}{\partial p_{o,S}}$ depends on the term in parentheses:

$$\operatorname{sign}\left(\frac{\partial w_o}{\partial p_{o,S}} \right) = \operatorname{sign}\Big(\frac{w_o}{Y} - \frac{1}{H_o} \Big).$$

Using $w_o = A_o^\rho H_o^{\rho - 1} Y^{1 - \rho}$, we have

$$\frac{w_o}{Y} - \frac{1}{H_o} = \frac{A_o^\rho H_o^{\rho - 1}}{Y^\rho} - \frac{1}{H_o} = \frac{1}{H_o} \left[\frac{(A_o H_o)^\rho}{Y^\rho} - 1 \right].$$

Since $Y^\rho = \sum_k (A_k H_k)^\rho$, we know that $(A_o H_o)^\rho < Y^\rho$ whenever occupation o is not the only one in production. Thus,

$$\frac{\partial w_o}{\partial p_{o,S}} = \frac{\partial H_o}{\partial p_{o,S}} w_o (1 - \rho) \Big(\frac{w_o}{Y} - \frac{1}{H_o} \Big) < 0.$$

Next, to determine whether this effect is amplified or attenuated by homophily, consider the derivative of the preference term with respect to the share of Syrians in the occupation:

$$\begin{aligned} \frac{\partial z_{o,J}}{\partial p_{o,S}} &= \alpha_{o,J} \lambda_J \left(\frac{N_J p_{o,J}}{\sum_g N_g p_{o,g}} \right)^{\lambda_J - 1} \frac{\partial}{\partial p_{o,S}} \left(\frac{N_J p_{o,J}}{\sum_g N_g p_{o,g}} \right) \\ &= - z_{o,J} \, \lambda_J \, \frac{N_S p_{o,S}}{(\sum_g N_g p_{o,g}) p_{o,J}} < 0. \end{aligned}$$

Thus, an increase in the share of Syrians in occupation o reduces both the Jordanian preference value for that occupation and the wage rate in that occupation, negatively affecting Jordanian

utility:

$$\frac{\partial U_{o,i,J}}{\partial p_{o,S}} = \left(\frac{\partial z_{o,J}}{\partial p_{o,S}} w_o + z_{o,J} \frac{\partial w_o}{\partial p_{o,S}} \right) s_{i,o}^{\phi_o} \epsilon_{i,o,J} \quad \Rightarrow \quad \frac{\partial U_{o,i,J}}{\partial p_{o,S}} < 0.$$

Because homophily introduces an additional negative channel via $\frac{\partial z_{o,J}}{\partial p_{o,S}} < 0$, the overall decline in utility is strictly larger than in a model without homophily. Homophily therefore acts as an amplifier of re-sorting.

E.4 Demand-Side Wage Effects from Labor Supply Shocks

This appendix derives the equilibrium effects on the wage per efficiency unit across occupations in response to a labor supply shock.

E.4.1 Wage Effect from Direct Supply Shock

I prove here that the labor demand is downward sloping – an increase in the labor supply to an occupation will result in a decrease in its wage per efficiency unit. Here, I derive the derivative of the wage per efficiency unit w_o with respect to total human capital H_o in occupation o, under the CES production function. The firm's first-order condition implies that the wage per efficiency unit in occupation o is

$$w_o = A_o^\rho H_o^{\rho-1} Y^{1-\rho}.$$

Taking the derivative of w_o with respect to H_o and using the fact that Y itself depends on H_o gives

$$\frac{\partial w_o}{\partial H_o} = A_o^\rho (\rho - 1) H_o^{\rho-2} Y^{1-\rho} + A_o^\rho H_o^{\rho-1} (1-\rho) Y^{-\rho} \frac{dY}{dH_o}.$$

From the production function, $\frac{dY}{dH_o} = w_o$. Substituting this into the expression above yields:

$$\frac{\partial w_o}{\partial H_o} = A_o^\rho H_o^{\rho-2} Y^{1-\rho} (1-\rho) \left(\frac{(A_o H_o)^\rho}{Y^\rho} - 1 \right).$$

Equivalently, using $w_o = A_o^\rho H_o^{\rho-1} Y^{1-\rho}$, this can be written as:

$$\frac{\partial w_o}{\partial H_o} = w_o (1-\rho) \left(\frac{w_o}{Y} - \frac{1}{H_o} \right) = w_o (1-\rho) \frac{1}{H_o} \left[\frac{(A_o H_o)^\rho}{Y^\rho} - 1 \right].$$

Sign of the derivative. All multiplicative terms preceding the bracket are positive:

$$w_o > 0, \qquad 1 - \rho > 0, \qquad H_o > 0.$$

The term in brackets is strictly negative whenever occupation o is not the sole contributor to aggregate output:

$$\frac{(A_o H_o)^\rho}{Y^\rho} - 1 = \frac{(A_o H_o)^\rho}{\sum_k (A_k H_k)^\rho} - 1 < 0.$$

Therefore,

$$\frac{\partial w_o}{\partial H_o} < 0 \quad \text{for all } o \text{ such that } (A_o H_o)^\rho < Y^\rho.$$

As an elasticity. Multiplying by H_j / w_o gives

$$\varepsilon_{w_o, H_o} = (1-\rho)\Big(\frac{w_o H_o}{Y} - 1\Big).$$

Interpretation. An increase in total efficiency units of labor H_o in a given occupation o, where the total number of occupations used in the production function is greater than one, reduces the marginal product of labor per efficiency unit (and thus the wage per efficiency unit). This property ensures that the model exhibits diminishing marginal returns to occupation-specific human capital, consistent with the standard CES production function structures

The corresponding elasticity is negative, unless occupation o accounts for the entire labor input. Notably, it also very with respect to the substitution parameter ρ. As $\rho \to 1$, occupations become near-perfect substitutes so the firm does not care about the relative supply of human capital across occupations, resulting in the wage per efficiency unit becomes less elastic to changes in the human capital supply. Lower values of ρ will result in the wage per efficiency unit being more responsive to changes in the relative supply of labor.

E.4.2 Wage Effect from an Indirect Supply Shock

Next, I see how a labor supply shock to one occupation impacts the remaining occupations through general equilibrium adjustments in the wage per efficiency unit. To do this, I derive the cross derivative of w_o with respect to H_j $(j \neq o)$.

Since H_o does not depend on H_j for $j \neq o$, the dependence runs only through Y:

$$\frac{\partial w_o}{\partial H_j} = A_o^\rho H_o^{\rho-1} (1-\rho)\, Y^{-\rho}\, \frac{\partial Y}{\partial H_j}.$$

Using $\dfrac{\partial Y}{\partial H_j} = w_j = A_j^\rho H_j^{\rho-1} Y^{\,1-\rho}$, the result cross-derivative is positive:

$$\frac{\partial w_o}{\partial H_j} = (1-\rho)\,\frac{w_o\, w_j}{Y} \;>\; 0 \qquad (j \neq o).$$

As an elasticity. Multiplying by H_j/w_o gives

$$\varepsilon_{w_o,H_j} = (1-\rho)\,\frac{w_j H_j}{Y}$$

Interpretation. This derivation shows that the wage per efficiency unit of occupations that do not receive the labor supply shock will also be affected. In a CES production function when types of labor are substitutable ($\rho > 0$) with constant returns to scale, an increase in the labor supply to one occupation will strictly raise the equilibrium wages in all other occupations. This result comes from the fact that output is strictly increasing with respect to human capital units supplied and the wage per efficiency unit scales with output. Moreover, since the CES is homogeneous of degree one, $\sum_k w_k H_k = Y$, the term $\frac{w_j H_j}{Y}$ is occupation j's income share. Hence, the cross elasticity is positive and proportional to j's share.

Together, these two results have important implications for the model's results with respect to an increase in human capital supplied by refugees. First, occupations that receive relatively higher human capital supply shocks will experience a decrease in the wage per efficiency unit, which will dominate. Second, an increase in human capital units overall will increase output and this creates a positive indirect effect on the wage per efficiency unit of all occupations. Thus, all wages per efficiency unit will adjust in response to a supply shock.

F Appendix: Timeline of Jordan Compact

Table F1: Detailed Timeline of Work Permit Policy Changes (2016-2021)

	Policy Change
February 2016	Jordan Compact signed
April 2016	Work permit fees waived for Syrian refugees
October 2016	Beginning of flexible work permits (not tied to an employer) in the agriculture sector
June 2017	Beginning of flexible work permits in the construction sector
August 2017	Syrian refugees in Zaatari refugee camp are able to obtain work permits
October 2017	The Ministry of Labor waives the requirement of the Recognition of Prior Learning (RPL) certificate for construction work permits
February 2018	Syrian refugees in Azraq refugee camp are able to obtain work permit
October 2018	Syrian refugees with work permits are allowed to move freely between any industrial sector
November 2018	Syrian refugees are allowed to obtain work permits for home-based and independent businesses in three sectors - food processing, handicrafts, and tailoring
January 2019	Work permits for Syrian refugees become automatically renewed
September 2019	Syrian refugee workers and their employers are exempted from fines associated with working with an expired work permit
December 2020	The Ministry of Labor publishes updated list of open occupations for non-Jordanian workers.
June 2021	The Ministry of Labor introduces flexible work permits for all occupations that are open to Syrian refugees.

Note: This table was adapted from a table published in Kattaa et al. (2021) with additional verification from ILO (2022) and Tobin and Alahmed (2019).

G Appendix: Occupations Closed to Non-Jordanian Workers

According to a formal document issued in October 2016 by the then Minister of Labor Dr. Nidal Murdi Al Katamine, the following 19 occupations were closed to foreign workers (Jordanian Ministry of Labor, 2016). This in an affirmation of restrictions first set out in the 1996 Labor Law and 2007 Regulations for Foreign Workers (Jordan et al., 2023).

1. Administrative and accounting professions
2. Clerical work including typing and secretarial work
3. Switchboards, telephones, and connections work
4. Warehouse work
5. Sales work, including all groups
6. Decoration work *
7. Fuel selling in main cities *
8. Electricity professions *
9. Mechanical and car repair professions *
10. Drivers (except drivers who work in companies where the Jordanian government is a partner)
11. Guards and servants
12. Medical professions **
13. Engineering professions **
14. Haircutting (case-by-case exceptions considered via consultation with Ministry of Labor)
15. Teaching professions (case-by-case exceptions considered via Civil Service Bureau)
16. Loading and unloading workers in fruit and vegetable markets (except in central market)
17. Loading and unloading workers in malls and supermarkets
18. Cleaning workers in private schools and hotels
19. Regional offices for foreign companies (unless they are the regional or deputy regional coordinator)

Occupations marked with * have the following exceptions for work renewals and companies that provide training programs for Jordanian workers. Occupations with marked with ** are open to foreign workers only if no Jordanian staff are available to fill the position and after consultation with the related ministries and departments overseeing this occupation.

Below is a proposed matching between these occupations and the 9 major occupation groups in the ISCO8 Codes, excluding "workers in regional offices for foreign companies" as that could span multiple groups(ILO, 2008).

Table G1: Potential Matching Between ISCO8 Occupation Groups and Closed Occupations

Occupation Group	Corresponding Closed Occupations	Count
Manager	*None*	0
Professional	Medical professionals; engineering professionals; teaching professionals	3
Technicians	Administrative and accounting professions; switchboard, telephones, and connections work; mechanical and car repair professions; electricity professions	4
Clerical Support	Clerical work	1
Service and Sales	Sales work; decoration work; fuel selling in main cities; haircutting; guards and servants	5
Skilled Agriculture	*None*	0
Craft and Trade	*None*	0
Machine Operator	Drivers; warehouse work	2
Elementary Work	Loading and unloading workers in fruit/vegetable markets; loading and unloading workers in malls/supermarkets; cleaning workers in private schools and hotels	3

H Appendix: Review of 2-Digit ISCO Occupation Codes

Table H1: ISCO-08 Two-Digit Occupations with Specific Examples

ISCO Code	Occupation Title	Common Examples in Jordan
1. Managers		
11	Chief Executives, Senior Officials and Legislators	Company directors, municipal officials, NGO executives
12	Administrative and Commercial Managers	Business managers, marketing managers, shop managers
13	Production and Specialized Services Managers	Construction site managers, factory supervisors, hotel managers
14	Hospitality, Retail and Other Services Managers	Restaurant managers, tourism managers, retail branch managers
2. Professionals		
21	Science and Engineering Professionals	Civil engineers, architects, environmental specialists
22	Health Professionals	Doctors, pharmacists, nurses
23	Teaching Professionals	School teachers, university lecturers
24	Business and Administration Professionals	Accountants, auditors, financial analysts
25	Information and Communications Technology Professionals	Software developers, systems analysts, network engineers
26	Legal, Social and Cultural Professionals	Lawyers, social workers, journalists, artists
3. Technicians and Associate Professionals		
31	Science and Engineering Associate Professionals	Engineering technicians, surveyors, lab technicians
32	Health Associate Professionals	Medical lab assistants, dental hygienists, nursing aides
33	Business and Administration Associate Professionals	Office supervisors, procurement clerks, customs officers
34	Legal, Social, Cultural and Related Associate Professionals	Paralegals, teaching assistants, community workers
35	Information and Communications Technicians	IT support staff, telecommunications technicians
4. Clerical Support Workers		
41	General and Keyboard Clerks	Secretaries, receptionists, data-entry clerks
42	Customer Services Clerks	Bank tellers, call center staff, hotel front-desk agents
43	Numerical and Material Recording Clerks	Cashiers, stock clerks, shipping clerks
5. Service and Sales Workers		
51	Personal Service Workers	Hairdressers, waiters, childcare workers
52	Sales Workers	Shop assistants, street vendors, cashiers
53	Personal Care Workers	Housekeepers, elderly care aides
54	Protective Services Workers	Police officers, security guards, firefighters
6. Skilled Agricultural, Forestry and Fishery Workers		
61	Market-Oriented Skilled Agricultural Workers	Crop farmers, livestock herders, greenhouse growers
62	Market-Oriented Skilled Forestry, Fishery and Hunting Workers	Fishermen, forestry technicians (limited in Jordan)
63	Subsistence Farmers, Fishers, Hunters and Gatherers	Smallholder farmers, traditional herders
7. Craft and Related Trades Workers		
71	Building and Related Trades Workers (excluding Electricians)	Bricklayers, masons, plumbers, painters
72	Metal, Machinery and Related Trades Workers	Welders, mechanics, machine fitters
73	Handicraft and Printing Workers	Tailors, jewelers, artisans
74	Electrical and Electronic Trades Workers	Electricians, appliance repairers, telecom installers
75	Food Processing, Woodworking, Garment and Other Craft Workers	Bakers, carpenters, textile workers, upholsterers
8. Plant and Machine Operators, and Assemblers		
81	Stationary Plant and Machine Operators	Factory machine operators, textile operators
82	Assemblers	Electronics assemblers, furniture assemblers
83	Drivers and Mobile Plant Operators	Truck drivers, taxi drivers, forklift operators
9. Elementary Occupations		
91	Cleaners and Helpers	Janitors, domestic workers, hotel cleaners
92	Agricultural, Forestry and Fishery Laborers	Farm laborers, fruit pickers, packers
93	Laborers in Mining, Construction, Manufacturing and Transport	Construction helpers, loaders, porters
94	Food Preparation Assistants	Kitchen helpers, fast-food workers
95	Street and Related Sales and Service Workers	Street vendors, hawkers
96	Refuse Workers and Other Elementary Workers	Street sweepers, garbage collectors, maintenance workers
0. Armed Forces Occupations		
01	Commissioned Armed Forces Officers	Military officers
02	Non-Commissioned Armed Forces Officers	Sergeants, training officers
03	Armed Forces Occupations, Other Ranks	Soldiers, military support staff

Notes: Occupation titles follow ISCO-08 two-digit classification. Examples reflect typical jobs found in Jordan's labor market.

I Appendix: GMM Estimation Results

I.1 Full Parameter Estimates

Table I1: Structural Estimates for Occupation-Specific Wedges (τ)

Parameter	2014	2017	2018	2019	2020	2021	2022
τ - Managers & Professionals	0.689	0.673	0.630	0.642	0.656	0.600	0.607
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Technicians	0.783	0.611	0.610	0.542	0.542	0.579	0.529
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Clerks	0.711	0.610	0.557	0.525	0.485	0.467	0.397
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Services and Sales	0.583	0.472	0.470	0.458	0.424	0.408	0.395
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Agriculture	0.560	0.101	-0.320	-0.497	-0.345	-0.214	-0.395
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Craft Trades	0.354	0.105	-0.004	0.049	-0.005	-0.109	0.022
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Machine Operators	0.651	0.485	0.522	0.540	0.528	0.523	0.482
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)
τ - Elementary Jobs	0.413	0.122	0.159	0.251	0.198	0.109	0.111
	(0.022)	(0.011)	(0.019)	(0.041)	(0.024)	(0.018)	(0.022)

Table I2: Structural Estimates for Wage Per Efficiency Unit (w)

Parameter	2014	2017	2018	2019	2020	2021	2022
w - Managers & Professionals	13.566	15.221	13.397	12.806	13.468	13.806	14.057
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Technicians	9.096	10.590	9.869	10.034	9.875	10.038	10.506
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Clerks	12.567	12.952	11.318	10.519	10.831	10.944	11.427
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Services and Sales	16.986	19.266	18.799	19.054	18.848	18.717	19.238
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Agriculture	7.561	6.535	6.249	5.868	5.813	6.522	6.887
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Craft Trades	15.682	14.919	13.711	12.724	13.006	13.269	14.577
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Machine Operators	15.717	14.396	13.538	13.050	12.633	12.803	13.481
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Elementary Jobs	8.445	10.599	11.107	11.024	10.583	11.453	11.914
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)
w - Unemployment	15.901	10.932	12.250	12.159	12.018	12.670	12.942
	(0.616)	(0.310)	(0.090)	(0.172)	(0.112)	(0.114)	(0.115)

Table I3: Structural Estimates for Homophilic Preference Parameters (λ)

Parameter	2014	2017	2018	2019	2020	2021	2022
λ - Syrians	0.079	0.153	0.128	0.130	0.130	0.143	0.149
	(0.006)	(0.007)	(0.005)	(0.013)	(0.005)	(0.008)	(0.008)
λ - Jordanians	2.253	2.117	1.709	1.094	1.239	1.803	1.235
	(0.006)	(0.007)	(0.005)	(0.013)	(0.005)	(0.008)	(0.008)

Table I4: Structural Estimates for Exogenous Preferences - Syrians (α_{Syr})

Parameter	2014	2017	2018	2019	2020	2021	2022
α_{Syr} - Managers & Professionals	3.945	4.875	5.028	4.991	5.342	4.878	5.354
	(0.202)	(0.116)	(0.120)	(0.326)	(0.155)	(0.124)	(0.137)
α_{Syr} - Technicians	6.259	5.890	5.918	4.874	5.632	5.908	5.910
	(0.359)	(0.131)	(0.164)	(0.313)	(0.162)	(0.187)	(0.189)
α_{Syr} - Clerks	5.687	6.016	5.916	5.578	5.381	5.356	4.915
	(0.378)	(0.177)	(0.143)	(0.331)	(0.164)	(0.128)	(0.135)
α_{Syr} - Services and Sales	6.006	5.776	6.030	5.951	5.654	5.690	5.989
	(0.247)	(0.081)	(0.061)	(0.149)	(0.065)	(0.080)	(0.090)
α_{Syr} - Agriculture	5.643	6.365	5.120	5.447	5.617	5.288	5.257
	(0.431)	(0.224)	(0.195)	(0.256)	(0.133)	(0.129)	(0.083)
α_{Syr} - Craft Trades	5.370	4.656	4.786	5.343	4.934	4.593	5.013
	(0.172)	(0.097)	(0.063)	(0.130)	(0.083)	(0.066)	(0.144)
α_{Syr} - Machine Operators	5.693	5.925	6.531	7.016	6.715	6.822	6.553
	(0.551)	(0.122)	(0.152)	(0.287)	(0.151)	(0.141)	(0.206)
α_{Syr} - Elementary Jobs	7.907	5.851	5.928	6.454	6.220	5.820	6.026
	(0.249)	(0.097)	(0.090)	(0.146)	(0.095)	(0.094)	(0.105)
α_{Syr} - Unemployment	4.217	5.155	5.284	5.509	5.667	5.415	5.632
	(0.125)	(0.054)	(0.045)	(0.079)	(0.059)	(0.045)	(0.048)

Table I5: Structural Estimates for Exogenous Preferences - Jordanians (α_{Jor})

Parameter	2014	2017	2018	2019	2020	2021	2022
α_{Jor} - Managers & Professionals	1.261 (0.000)	1.230 (0.000)	1.624 (0.000)	1.677 (0.000)	1.627 (0.000)	1.658 (0.000)	1.783 (0.000)
α_{Jor} - Technicians	1.695 (0.000)	1.715 (0.000)	2.001 (0.000)	1.990 (0.000)	2.042 (0.000)	2.066 (0.000)	2.229 (0.000)
α_{Jor} - Clerks	1.809 (0.000)	1.699 (0.000)	2.119 (0.000)	2.144 (0.000)	2.146 (0.000)	2.399 (0.000)	2.390 (0.000)
α_{Jor} - Services and Sales	2.192 (0.000)	2.160 (0.000)	2.469 (0.000)	2.338 (0.000)	2.427 (0.000)	2.687 (0.000)	2.647 (0.000)
α_{Jor} - Agriculture	2.320 (0.000)	5.933 (0.000)	7.014 (0.000)	7.081 (0.000)	7.163 (0.000)	7.048 (0.000)	7.114 (0.000)
α_{Jor} - Craft Trades	2.949 (0.000)	4.516 (0.000)	4.311 (0.000)	3.658 (0.000)	3.815 (0.000)	4.540 (0.000)	3.946 (0.000)
α_{Jor} - Machine Operators	1.886 (0.000)	2.154 (0.000)	2.396 (0.000)	2.373 (0.000)	2.405 (0.000)	2.542 (0.000)	2.533 (0.000)
α_{Jor} - Elementary Jobs	4.008 (0.000)	6.630 (0.000)	4.188 (0.000)	3.398 (0.000)	3.624 (0.000)	4.477 (0.000)	4.162 (0.000)
α_{Jor} - Unemployment	6.641 (0.000)	4.247 (0.000)	4.472 (0.000)	3.927 (0.000)	4.196 (0.000)	4.495 (0.000)	4.180 (0.000)

Table I6: Structural Estimates for Occupation-Specific Productivity (A)

Parameter	2014	2017	2018	2019	2020	2021	2022
A - Managers & Professionals	6.025	7.237	6.282	5.800	6.414	6.650	6.719
A - Technicians	2.054	2.570	2.311	2.513	2.346	2.456	2.555
A - Clerks	3.953	3.289	2.797	2.457	2.509	2.631	2.775
A - Services and Sales	9.338	11.462	11.701	12.036	11.867	11.519	11.488
A - Agriculture	0.859	0.642	0.636	0.578	0.635	0.693	0.771
A - Craft Trades	6.357	5.374	4.553	4.190	4.397	4.286	5.149
A - Machine Operators	5.853	4.429	4.119	3.940	3.567	3.689	3.861
A - Elementary Jobs	1.569	2.653	2.805	2.908	2.616	3.065	3.324

I.2 GMM Model Fit

2014 GMM Estimation - Model Fit

Table I7: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-4.490	-4.550	0.0599
Log Shares - Syrian Technicians	-6.741	-6.669	-0.0722
Log Shares - Syrian Clerks	-5.132	-5.231	0.0989
Log Shares - Syrian Services and Sales	-2.614	-2.621	0.0067
Log Shares - Syrian Agriculture	-5.488	-5.719	0.2307
Log Shares - Syrian Craft Trades	-1.893	-1.857	-0.0363
Log Shares - Syrian Machine Operators	-4.102	-4.104	0.0018
Log Shares - Syrian Elementary Jobs	-3.323	-3.353	0.0300
Log Shares - Syrian Unemployment	-0.355	-0.358	0.0029
Log Shares - Jordanian Managers & Professionals	-2.158	-2.146	-0.0122
Log Shares - Jordanian Technicians	-3.148	-3.155	0.0068
Log Shares - Jordanian Clerks	-2.470	-2.455	-0.0152
Log Shares - Jordanian Services and Sales	-1.270	-1.268	-0.0019
Log Shares - Jordanian Agriculture	-4.550	-4.418	-0.1315
Log Shares - Jordanian Craft Trades	-1.961	-2.006	0.0446
Log Shares - Jordanian Machine Operators	-2.124	-2.124	-0.0004
Log Shares - Jordanian Elementary Jobs	-3.179	-3.146	-0.0329
Log Shares - Jordanian Unemployment	-1.809	-1.808	-0.0015

Table I8: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.561	5.788	-0.2273
Log Wage - Syrian Technicians	5.521	5.463	0.0588
Log Wage - Syrian Clerks	5.342	5.436	-0.0941
Log Wage - Syrian Services and Sales	5.291	5.308	-0.0161
Log Wage - Syrian Agriculture	5.091	5.275	-0.1841
Log Wage - Syrian Craft Trades	5.367	5.331	0.0352
Log Wage - Syrian Machine Operators	5.412	5.411	0.0012
Log Wage - Syrian Elementary Jobs	4.905	4.940	-0.0344
Log Wage - Jordanian Managers & Professionals	6.299	6.282	0.0163
Log Wage - Jordanian Technicians	5.946	5.952	-0.0055
Log Wage - Jordanian Clerks	5.929	5.911	0.0183
Log Wage - Jordanian Services and Sales	5.797	5.793	0.0036
Log Wage - Jordanian Agriculture	5.889	5.826	0.0629
Log Wage - Jordanian Craft Trades	5.698	5.788	-0.0900
Log Wage - Jordanian Machine Operators	5.892	5.893	-0.0014
Log Wage - Jordanian Elementary Jobs	5.448	5.430	0.0182

Table I9: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.738	-0.491	-0.2475
Log Wage Ratio - Technicians	-0.425	-0.452	0.0276
Log Wage Ratio - Clerks	-0.587	-0.523	-0.0640
Log Wage Ratio - Services and Sales	-0.506	-0.481	-0.0244
Log Wage Ratio - Agriculture	-0.798	-0.518	-0.2793
Log Wage Ratio - Craft Trades	-0.331	-0.485	0.1538
Log Wage Ratio - Machine Operators	-0.480	-0.482	0.0019
Log Wage Ratio - Elementary Jobs	-0.543	-0.492	-0.0511

2017 GMM Estimation - Model Fit

Table I10: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-4.257	-4.267	0.0095
Log Shares - Syrian Technicians	-4.699	-4.767	0.0674
Log Shares - Syrian Clerks	-4.611	-4.597	-0.0138
Log Shares - Syrian Services and Sales	-1.811	-1.810	-0.0004
Log Shares - Syrian Agriculture	-3.512	-3.484	-0.0279
Log Shares - Syrian Craft Trades	-1.226	-1.218	-0.0075
Log Shares - Syrian Machine Operators	-3.191	-3.188	-0.0029
Log Shares - Syrian Elementary Jobs	-1.737	-1.751	0.0138
Log Shares - Syrian Unemployment	-1.336	-1.337	0.0009
Log Shares - Jordanian Managers & Professionals	-1.919	-1.917	-0.0017
Log Shares - Jordanian Technicians	-3.014	-2.981	-0.0335
Log Shares - Jordanian Clerks	-2.898	-2.901	0.0026
Log Shares - Jordanian Services and Sales	-1.136	-1.136	-0.0000
Log Shares - Jordanian Agriculture	-4.562	-4.701	0.1389
Log Shares - Jordanian Craft Trades	-2.315	-2.397	0.0816
Log Shares - Jordanian Machine Operators	-2.436	-2.438	0.0017
Log Shares - Jordanian Elementary Jobs	-3.002	-2.869	-0.1337
Log Shares - Jordanian Unemployment	-1.707	-1.705	-0.0019

Table I11: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.827	5.879	-0.0522
Log Wage - Syrian Technicians	5.383	5.576	-0.1932
Log Wage - Syrian Clerks	5.806	5.583	0.2230
Log Wage - Syrian Services and Sales	5.483	5.470	0.0133
Log Wage - Syrian Agriculture	5.270	5.169	0.1007
Log Wage - Syrian Craft Trades	5.507	5.472	0.0348
Log Wage - Syrian Machine Operators	5.475	5.456	0.0184
Log Wage - Syrian Elementary Jobs	5.195	5.221	-0.0253
Log Wage - Jordanian Managers & Professionals	6.325	6.322	0.0023
Log Wage - Jordanian Technicians	6.073	6.033	0.0398
Log Wage - Jordanian Clerks	6.026	6.030	-0.0039
Log Wage - Jordanian Services and Sales	5.913	5.913	-0.0003
Log Wage - Jordanian Agriculture	5.554	5.578	-0.0243
Log Wage - Jordanian Craft Trades	5.865	5.897	-0.0317
Log Wage - Jordanian Machine Operators	5.896	5.901	-0.0051
Log Wage - Jordanian Elementary Jobs	5.733	5.716	0.0172

Table I12: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.497	-0.449	-0.0489
Log Wage Ratio - Technicians	-0.690	-0.461	-0.2292
Log Wage Ratio - Clerks	-0.221	-0.436	0.2152
Log Wage Ratio - Services and Sales	-0.430	-0.445	0.0149
Log Wage Ratio - Agriculture	-0.284	-0.431	0.1465
Log Wage Ratio - Craft Trades	-0.359	-0.437	0.0787
Log Wage Ratio - Machine Operators	-0.422	-0.442	0.0204
Log Wage Ratio - Elementary Jobs	-0.538	-0.435	-0.1026

2018 GMM Estimation - Model Fit

Table I13: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-4.020	-4.106	0.0857
Log Shares - Syrian Technicians	-4.891	-5.063	0.1722
Log Shares - Syrian Clerks	-4.348	-4.429	0.0812
Log Shares - Syrian Services and Sales	-1.876	-1.915	0.0387
Log Shares - Syrian Agriculture	-2.969	-2.928	-0.0409
Log Shares - Syrian Craft Trades	-1.339	-1.316	-0.0231
Log Shares - Syrian Machine Operators	-3.623	-3.609	-0.0135
Log Shares - Syrian Elementary Jobs	-2.165	-2.151	-0.0137
Log Shares - Syrian Unemployment	-1.040	-1.042	0.0020
Log Shares - Jordanian Managers & Professionals	-1.917	-1.900	-0.0171
Log Shares - Jordanian Technicians	-3.156	-3.104	-0.0515
Log Shares - Jordanian Clerks	-3.039	-2.988	-0.0506
Log Shares - Jordanian Services and Sales	-1.133	-1.083	-0.0501
Log Shares - Jordanian Agriculture	-4.550	-5.180	0.6299
Log Shares - Jordanian Craft Trades	-2.409	-2.686	0.2773
Log Shares - Jordanian Machine Operators	-2.487	-2.480	-0.0069
Log Shares - Jordanian Elementary Jobs	-2.860	-2.944	0.0842
Log Shares - Jordanian Unemployment	-1.612	-1.577	-0.0343

Table I14: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.588	5.809	-0.2208
Log Wage - Syrian Technicians	5.290	5.575	-0.2855
Log Wage - Syrian Clerks	5.307	5.549	-0.2420
Log Wage - Syrian Services and Sales	5.409	5.475	-0.0660
Log Wage - Syrian Agriculture	5.575	5.437	0.1380
Log Wage - Syrian Craft Trades	5.677	5.537	0.1397
Log Wage - Syrian Machine Operators	5.503	5.457	0.0466
Log Wage - Syrian Elementary Jobs	5.387	5.353	0.0342
Log Wage - Jordanian Managers & Professionals	6.198	6.197	0.0014
Log Wage - Jordanian Technicians	6.021	6.015	0.0059
Log Wage - Jordanian Clerks	5.989	5.987	0.0029
Log Wage - Jordanian Services and Sales	5.898	5.895	0.0034
Log Wage - Jordanian Agriculture	5.597	5.615	-0.0184
Log Wage - Jordanian Craft Trades	5.815	5.842	-0.0278
Log Wage - Jordanian Machine Operators	5.863	5.866	-0.0029
Log Wage - Jordanian Elementary Jobs	5.723	5.727	-0.0039

Table I15: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.610	-0.443	-0.1680
Log Wage Ratio - Technicians	-0.731	-0.426	-0.3058
Log Wage Ratio - Clerks	-0.682	-0.402	-0.2801
Log Wage Ratio - Services and Sales	-0.489	-0.407	-0.0827
Log Wage Ratio - Agriculture	-0.022	-0.429	0.4073
Log Wage Ratio - Craft Trades	-0.138	-0.409	0.2713
Log Wage Ratio - Machine Operators	-0.360	-0.390	0.0297
Log Wage Ratio - Elementary Jobs	-0.336	-0.399	0.0636

2019 GMM Estimation - Model Fit

Table I16: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-4.212	-4.528	0.3155
Log Shares - Syrian Technicians	-4.500	-4.965	0.4647
Log Shares - Syrian Clerks	-4.346	-4.592	0.2466
Log Shares - Syrian Services and Sales	-1.873	-1.897	0.0247
Log Shares - Syrian Agriculture	-2.708	-2.628	-0.0798
Log Shares - Syrian Craft Trades	-1.424	-1.388	-0.0361
Log Shares - Syrian Machine Operators	-3.807	-3.704	-0.1028
Log Shares - Syrian Elementary Jobs	-2.400	-2.410	0.0101
Log Shares - Syrian Unemployment	-0.949	-0.952	0.0030
Log Shares - Jordanian Managers & Professionals	-1.966	-1.951	-0.0149
Log Shares - Jordanian Technicians	-3.056	-3.007	-0.0488
Log Shares - Jordanian Clerks	-3.121	-3.100	-0.0207
Log Shares - Jordanian Services and Sales	-1.105	-1.095	-0.0106
Log Shares - Jordanian Agriculture	-4.850	-5.415	0.5651
Log Shares - Jordanian Craft Trades	-2.487	-2.600	0.1127
Log Shares - Jordanian Machine Operators	-2.493	-2.494	0.0009
Log Shares - Jordanian Elementary Jobs	-2.777	-2.755	-0.0226
Log Shares - Jordanian Unemployment	-1.600	-1.590	-0.0098

Table I17: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.359	5.784	-0.4254
Log Wage - Syrian Technicians	5.347	5.664	-0.3169
Log Wage - Syrian Clerks	5.316	5.565	-0.2489
Log Wage - Syrian Services and Sales	5.456	5.509	-0.0533
Log Wage - Syrian Agriculture	5.421	5.363	0.0574
Log Wage - Syrian Craft Trades	5.559	5.442	0.1169
Log Wage - Syrian Machine Operators	5.548	5.447	0.1008
Log Wage - Syrian Elementary Jobs	5.297	5.304	-0.0068
Log Wage - Jordanian Managers & Professionals	6.166	6.163	0.0024
Log Wage - Jordanian Technicians	6.040	6.028	0.0121
Log Wage - Jordanian Clerks	5.960	5.956	0.0035
Log Wage - Jordanian Services and Sales	5.900	5.899	0.0010
Log Wage - Jordanian Agriculture	5.548	5.578	-0.0299
Log Wage - Jordanian Craft Trades	5.780	5.799	-0.0196
Log Wage - Jordanian Machine Operators	5.842	5.844	-0.0016
Log Wage - Jordanian Elementary Jobs	5.703	5.702	0.0008

Table I18: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.807	-0.499	-0.3071
Log Wage Ratio - Technicians	-0.693	-0.568	-0.1251
Log Wage Ratio - Clerks	-0.644	-0.469	-0.1749
Log Wage Ratio - Services and Sales	-0.445	-0.403	-0.0421
Log Wage Ratio - Agriculture	-0.127	-0.382	0.2550
Log Wage Ratio - Craft Trades	-0.221	-0.383	0.1621
Log Wage Ratio - Machine Operators	-0.294	-0.356	0.0624
Log Wage Ratio - Elementary Jobs	-0.406	-0.394	-0.0115

2020 GMM Estimation - Model Fit

Table I19: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-4.310	-4.322	0.0120
Log Shares - Syrian Technicians	-4.568	-4.613	0.0449
Log Shares - Syrian Clerks	-4.266	-4.343	0.0768
Log Shares - Syrian Services and Sales	-1.807	-1.851	0.0445
Log Shares - Syrian Agriculture	-2.738	-2.708	-0.0293
Log Shares - Syrian Craft Trades	-1.400	-1.376	-0.0233
Log Shares - Syrian Machine Operators	-4.000	-3.937	-0.0626
Log Shares - Syrian Elementary Jobs	-2.418	-2.403	-0.0143
Log Shares - Syrian Unemployment	-0.970	-0.974	0.0037
Log Shares - Jordanian Managers & Professionals	-1.921	-1.916	-0.0044
Log Shares - Jordanian Technicians	-3.159	-3.145	-0.0136
Log Shares - Jordanian Clerks	-3.217	-3.185	-0.0325
Log Shares - Jordanian Services and Sales	-1.160	-1.126	-0.0340
Log Shares - Jordanian Agriculture	-4.603	-4.968	0.3651
Log Shares - Jordanian Craft Trades	-2.451	-2.596	0.1453
Log Shares - Jordanian Machine Operators	-2.638	-2.647	0.0086
Log Shares - Jordanian Elementary Jobs	-2.911	-2.949	0.0374
Log Shares - Jordanian Unemployment	-1.447	-1.431	-0.0166

Table I20: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.790	5.824	-0.0342
Log Wage - Syrian Technicians	5.523	5.638	-0.1146
Log Wage - Syrian Clerks	5.432	5.630	-0.1974
Log Wage - Syrian Services and Sales	5.431	5.541	-0.1103
Log Wage - Syrian Agriculture	5.377	5.333	0.0442
Log Wage - Syrian Craft Trades	5.739	5.519	0.2201
Log Wage - Syrian Machine Operators	5.650	5.487	0.1625
Log Wage - Syrian Elementary Jobs	5.375	5.337	0.0386
Log Wage - Jordanian Managers & Professionals	6.202	6.202	0.0001
Log Wage - Jordanian Technicians	6.014	6.012	0.0021
Log Wage - Jordanian Clerks	5.996	5.991	0.0057
Log Wage - Jordanian Services and Sales	5.909	5.905	0.0035
Log Wage - Jordanian Agriculture	5.553	5.575	-0.0219
Log Wage - Jordanian Craft Trades	5.806	5.817	-0.0115
Log Wage - Jordanian Machine Operators	5.841	5.844	-0.0035
Log Wage - Jordanian Elementary Jobs	5.696	5.700	-0.0036

Table I21: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.411	-0.379	-0.0321
Log Wage Ratio - Technicians	-0.490	-0.395	-0.0955
Log Wage Ratio - Clerks	-0.564	-0.422	-0.1420
Log Wage Ratio - Services and Sales	-0.478	-0.410	-0.0679
Log Wage Ratio - Agriculture	-0.176	-0.396	0.2197
Log Wage Ratio - Craft Trades	-0.066	-0.405	0.3386
Log Wage Ratio - Machine Operators	-0.191	-0.374	0.1833
Log Wage Ratio - Elementary Jobs	-0.321	-0.374	0.0531

2021 GMM Estimation - Model Fit

Table I22: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-3.931	-4.038	0.1071
Log Shares - Syrian Technicians	-4.882	-4.981	0.0983
Log Shares - Syrian Clerks	-3.978	-4.205	0.2267
Log Shares - Syrian Services and Sales	-1.794	-1.884	0.0898
Log Shares - Syrian Agriculture	-3.172	-3.133	-0.0395
Log Shares - Syrian Craft Trades	-1.398	-1.343	-0.0556
Log Shares - Syrian Machine Operators	-3.954	-3.968	0.0135
Log Shares - Syrian Elementary Jobs	-2.067	-2.033	-0.0337
Log Shares - Syrian Unemployment	-1.041	-1.038	-0.0025
Log Shares - Jordanian Managers & Professionals	-1.945	-1.933	-0.0112
Log Shares - Jordanian Technicians	-3.101	-3.084	-0.0169
Log Shares - Jordanian Clerks	-3.238	-3.104	-0.1342
Log Shares - Jordanian Services and Sales	-1.259	-1.168	-0.0902
Log Shares - Jordanian Agriculture	-4.593	-4.989	0.3964
Log Shares - Jordanian Craft Trades	-2.418	-2.823	0.4051
Log Shares - Jordanian Machine Operators	-2.615	-2.602	-0.0136
Log Shares - Jordanian Elementary Jobs	-2.770	-2.907	0.1372
Log Shares - Jordanian Unemployment	-1.372	-1.352	-0.0203

Table I23: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.613	5.892	-0.2792
Log Wage - Syrian Technicians	5.478	5.674	-0.1963
Log Wage - Syrian Clerks	5.375	5.594	-0.2193
Log Wage - Syrian Services and Sales	5.451	5.546	-0.0953
Log Wage - Syrian Agriculture	5.471	5.444	0.0271
Log Wage - Syrian Craft Trades	5.690	5.625	0.0658
Log Wage - Syrian Machine Operators	5.472	5.494	-0.0218
Log Wage - Syrian Elementary Jobs	5.453	5.413	0.0401
Log Wage - Jordanian Managers & Professionals	6.237	6.235	0.0023
Log Wage - Jordanian Technicians	6.027	6.026	0.0011
Log Wage - Jordanian Clerks	6.018	6.009	0.0089
Log Wage - Jordanian Services and Sales	5.921	5.916	0.0048
Log Wage - Jordanian Agriculture	5.642	5.660	-0.0177
Log Wage - Jordanian Craft Trades	5.799	5.816	-0.0167
Log Wage - Jordanian Machine Operators	5.849	5.848	0.0009
Log Wage - Jordanian Elementary Jobs	5.726	5.732	-0.0054

Table I24: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.624	-0.402	-0.2221
Log Wage Ratio - Technicians	-0.549	-0.392	-0.1574
Log Wage Ratio - Clerks	-0.643	-0.399	-0.2441
Log Wage Ratio - Services and Sales	-0.470	-0.392	-0.0783
Log Wage Ratio - Agriculture	-0.171	-0.368	0.1972
Log Wage Ratio - Craft Trades	-0.109	-0.386	0.2772
Log Wage Ratio - Machine Operators	-0.377	-0.364	-0.0136
Log Wage Ratio - Elementary Jobs	-0.273	-0.342	0.0684

2022 GMM Estimation - Model Fit

Table I25: Targeted Moments - Occupation Shares

Target	Data	Model Estimate	Difference
Log Shares - Syrian Managers & Professionals	-4.050	-4.115	0.0649
Log Shares - Syrian Technicians	-4.628	-4.711	0.0830
Log Shares - Syrian Clerks	-3.980	-4.228	0.2487
Log Shares - Syrian Services and Sales	-1.864	-1.871	0.0066
Log Shares - Syrian Agriculture	-2.787	-2.732	-0.0551
Log Shares - Syrian Craft Trades	-1.424	-1.405	-0.0186
Log Shares - Syrian Machine Operators	-3.794	-3.776	-0.0180
Log Shares - Syrian Elementary Jobs	-2.031	-2.035	0.0043
Log Shares - Syrian Unemployment	-1.071	-1.073	0.0025
Log Shares - Jordanian Managers & Professionals	-1.903	-1.899	-0.0036
Log Shares - Jordanian Technicians	-3.078	-3.068	-0.0105
Log Shares - Jordanian Clerks	-3.139	-3.071	-0.0677
Log Shares - Jordanian Services and Sales	-1.228	-1.223	-0.0050
Log Shares - Jordanian Agriculture	-4.636	-4.978	0.3428
Log Shares - Jordanian Craft Trades	-2.452	-2.511	0.0585
Log Shares - Jordanian Machine Operators	-2.662	-2.662	0.0001
Log Shares - Jordanian Elementary Jobs	-2.743	-2.732	-0.0112
Log Shares - Jordanian Unemployment	-1.433	-1.427	-0.0062

Table I26: Targeted Moments - Occupation Average Wages

Target	Data	Model Estimate	Difference
Log Wage - Syrian Managers & Professionals	5.712	5.921	-0.2088
Log Wage - Syrian Technicians	5.571	5.731	-0.1600
Log Wage - Syrian Clerks	5.351	5.768	-0.4170
Log Wage - Syrian Services and Sales	5.549	5.612	-0.0634
Log Wage - Syrian Agriculture	5.535	5.493	0.0414
Log Wage - Syrian Craft Trades	5.774	5.598	0.1761
Log Wage - Syrian Machine Operators	5.658	5.597	0.0604
Log Wage - Syrian Elementary Jobs	5.440	5.440	-0.0005
Log Wage - Jordanian Managers & Professionals	6.236	6.236	0.0009
Log Wage - Jordanian Technicians	6.038	6.036	0.0020
Log Wage - Jordanian Clerks	6.036	6.030	0.0055
Log Wage - Jordanian Services and Sales	5.931	5.931	0.0002
Log Wage - Jordanian Agriculture	5.670	5.694	-0.0239
Log Wage - Jordanian Craft Trades	5.860	5.917	-0.0577
Log Wage - Jordanian Machine Operators	5.920	5.929	-0.0090
Log Wage - Jordanian Elementary Jobs	5.763	5.763	0.0002

Table I27: Targeted Moments - Average Wage Ratios

Target	Data	Model Estimate	Difference
Log Wage Ratio - Managers & Professionals	-0.524	-0.347	-0.1771
Log Wage Ratio - Technicians	-0.467	-0.364	-0.1028
Log Wage Ratio - Clerks	-0.685	-0.471	-0.2145
Log Wage Ratio - Services and Sales	-0.382	-0.326	-0.0559
Log Wage Ratio - Agriculture	-0.135	-0.326	0.1913
Log Wage Ratio - Craft Trades	-0.085	-0.300	0.2152
Log Wage Ratio - Machine Operators	-0.262	-0.305	0.0421
Log Wage Ratio - Elementary Jobs	-0.324	-0.323	-0.0009