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Is the Gig Economy a Stepping Stone for Refugees? Evidence from Administrative Data*

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Abstract

We examine whether gig jobs in online food delivery (OFD) are a stepping stone for refugees entering the Austrian labor market. Our identification strategy combines the quasi-random assignment of refugees to Austrian regions with the expansion of gig firms across the country. The local availability of OFD jobs at the time of access to the labor market initially accelerates job finding among refugees. Subsequently, however, gig workers remain in low-paid, unstable jobs with low career prospects, while the employment rate of refugees without gig opportunities catches up. The local availability of gig jobs negatively affects human capital investments and job search behavior, even among refugees outside the gig economy.

Keywords: gig work, refugees, employment restrictions, labor market integration
JEL codes: J15, J61, J81

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1 Introduction

Integrating refugees into the labor market is a major challenge for many receiving economies, often hampered by strict labor market regulation and a lack of flexibility.[1] In the recent decade, the rise of a particularly flexible form of work arrangements—mediated through online platforms and commonly referred to as gig work—has found its way to most European countries (OECD, 2023). Gig work encompasses a variety of jobs and tasks that can be performed remotely or in a specific location, with the most prominent examples being ride-sharing and online food delivery services. Gig work is usually characterized by low entry barriers and high flexibility, both in labor demand and labor supply (Chen et al., 2019; Angrist et al., 2021). For refugees who enter their host country's labor market for the first time, the existence of such low-barrier work opportunities might reduce hurdles to labor market participation. At the same time, gig work raises concerns about poor working conditions, low income security, limited social security, and negative impacts on future career prospects (e.g., Prassl, 2018; Jackson, 2022; Boeri et al., 2020; Fisher, 2022; Adermon and Hensvik, 2022). Refugees who enter the gig economy therefore might get trapped in low-paying, unstable jobs, and invest less into their human capital.

In this paper, we estimate the causal effect of gig work on the labor market integration and career progression of refugees in Austria. We focus on the Online Food Delivery (OFD) industry, a location-based type of gig work where workers deliver food from a restaurant to a customer. Commonly, OFD workers are disproportionately young, male, and have a migration background, potentially due low entry barriers and language requirements.[2] The low entry barriers could be particularly important for migrant workers and refugees who may have few outside options (Ahrens et al., 2024) and a low labor market attachment (Brell et al., 2020). Although OFD provides relevant work opportunities for refugees, the effects of such jobs on refugees' labor market integration have, to the best of our knowledge, not been assessed before. We hence analyze whether gig work serves as a stepping stone for refugees by examining whether the availability of OFD work increases employment rates of refugees and how it affects their job stability and quality, as well as human capital investments.

We focus on refugees entering Austria between 2014 and 2022. Austria has one of the largest shares of refugees in the population among high-income countries, especially since the onset of increased refugee inflows to Europe in 2015 (Eurostat, 2025). Over the same time period, firms in the OFD industry gradually expanded across Austrian cities. Starting in Vienna in 2015, OFD firms—which predominantly started out as pure intermediary platforms offering services for restaurants—began to hire their own fleet of riders and to organize the food delivery themselves. Subsequently, OFD gradually spread to all larger Austrian cities.

To identify causal effects of the local availability of gig jobs on refugee careers, we combine

[1] Employment rates of refugees are substantially higher in the US than in most European countries. Besides lower language barriers and differences in the settlement process, the higher flexibility of the US labor market is an important factor explaining these differences (Brell et al., 2020).

[2] OFD workers typically only have to provide a smartphone, a bicycle, and a work permit. Depending on the institutional setting, they can be mostly self-employed (e.g., in the US and UK) or mostly regularly employed (e.g., in Germany). In Austria, the majority of gig workers is employed via freelance contracts (*Freie Dienstnehmer*), a contract form that offers less social protection than regular employment contracts, but is attached to a particular company. For recent studies on gig workers in the OFD industry see, e.g., Kecht and Marcolin, 2022 for Germany; Fisher, 2022 for the UK; Adermon and Hensvik, 2022 for Sweden; and Plotkin, 2024 for Brazil.

the variation in the availability of gig jobs across Austrian cities resulting from the staggered expansion of OFD with the quasi-random assignment of refugees to Austrian locations. Refugees who enter Austria are quasi-randomly allocated to refugee shelters in the nine different Austrian states and are only allowed to work and move their location once they are granted asylum or subsidiary protection (Dellinger and Huber, 2021; Wett et al., 2024). Consequently, refugees becoming eligible for work in the Austrian labor market in different locations and at different points in time face different opportunities to take up work in the gig economy. We thus focus on refugees who are granted asylum or subsidiary protection and exploit variation in the local availability of OFD jobs at the time of their labor market access.

Our analysis is based on the Austrian Labor Market Database (AMDB), a matched employer-employee database covering the universe of private sector employment in Austria. We address the key challenge of measuring the gig economy, and in particular the OFD industry, by designing a novel approach that tracks changes in industry classifications and worker-flows between firms to identify networks of subsidiaries, regional branches, or subcontractors of OFD firms.[3] The final data allows us to observe the detailed career paths of workers in Austria, and, in particular, when they enter and leave the OFD industry. We complement this linked employer-employee data with granular vacancy data provided by the Austrian Labor Market Agency (AMS) to measure the local availability of gig jobs over time.

We present five main empirical results. First, we show that the availability of gig jobs at the time and location of refugees' labor market access indeed increases their take-up of OFD jobs (and employment more generally) in the first few months after labor market access. Tracking refugees over the two years after access, however, we find that—while those who gained access in a city with gig jobs available are persistently more likely to work in OFD firms—there are no positive employment effects after about one year. Quite in contrast, in the second year after labor market access, refugees who gained access in a city without gig availability are more likely to be employed and earn higher wages. These differences are not driven by mobility towards cities with more flexible job opportunities.

Second, we show that workers who gained access in a city with gig availability are on average in worse employment relations. They have lower wages and accumulated earnings (although this difference is not statistically significant in all of our specifications), they have lower levels of job stability, and are less likely to climb up the job ladder.

Third, we find that individuals who gained access in a city with gig availability invest less in their human capital. In particular, when unemployed, they are less likely to be enrolled in labor market training, including language classes. Moreover, they are less likely to pursue an apprenticeship.

[3]Measuring the gig economy has been found to be challenging in most administrative data sets as in many countries gig workers are mostly self-employed (Abraham et al., 2018). Recent approaches are based on US (Garin et al., 2025, 2023) and Canadian (Jeon et al., 2021) tax records. In contrast, we rely on social security records and identify OFD work in two steps. First, we identify OFD firms by tracking changes in the industry classification of platform companies from IT activities to transportation activities. Second, we track worker-flows from and to the firms identified in the first step to enlarge the set of plausible OFD companies with networks of subsidiaries, regional branches, or subcontractors, and to capture changes in employer identifiers resulting from mergers, aquisitions, renamings, and rebrandings of OFD firms. We validate the resulting classification with external information from industry reports, newspaper articles, web-scraped hiring data from known OFD firms, and posted vacancies.

Fourth, we examine heterogeneity of the effects of gig availability and find that—while having no positive employment effects on average—the availability of OFD jobs increases employment rates for refugees with a very long waiting time until asylum is granted and for very young refugees below the age of 22.

Finally, we focus on refugees who actually took up a job in the OFD industry in their first year after labor market access and compare their subsequent outcomes to a matched control group of similar refugees who gained access in a labor market without gig jobs and, hence, did not work in the OFD industry. This direct analysis of gig take-up confirms the findings from our analysis of gig availability: Initially, gig workers find jobs faster. Two years after labor market access, however, they are not more likely to be employed than the control group. Instead, they are employed in lower-paying and less stable jobs and work in lower-paying and smaller firms with a less favorable coworker composition—even if they have left the gig economy.

Overall, our findings suggest that the option to work in the gig economy does not serve as a stepping stone for refugees into successful labor market careers, but rather substitutes for better-paid and more stable regular jobs. The option to take up a gig job appears to distort human capital investments and job search behavior of refugees, even those who are not directly working in OFD. However, some groups with particularly low labor market prospects and very little assets appear to benefit from the opportunity to take-up low-barrier OFD jobs through higher employment rates.

We provide extensive evidence that our results are not driven by different labor market trends in cities with and without gig work available or by the way we measure gig work. In particular, we estimate triple differences regressions using variation in the exposure to gig work within city-by-month cells. The main idea is that—within a city and time period—the exposure to the labor demand from OFD firms differs across refugees depending on how strongly they are connected to other gig workers via social networks. We find that our main conclusions also hold when considering the variation created by differences in the share of gig workers among refugees with the same ethnic background and age, netting out any differences induced by location-specific time trends. Our results are also robust to alternative definitions of the treatment variable or the classification of gig firms. In particular, we consider the local intensity of gig opportunities measured by the share of local gig workers prior to labor market access and find very similar patterns at the intensive margin. We also find similar effects when using a definition of gig employment that does not depend on our data-driven classification of OFD firms.

Our work relates to three broad strands of the literature. First, we relate to studies that investigate the effects of gig work on different parts of a worker's life cycle (Koustas, 2018; Jackson, 2022; Fisher, 2022; Kecht and Marcolin, 2022; Abraham et al., 2024; Jeon and Ostrovsky, 2024; Plotkin, 2024). Most closely related is Jackson (2022) who examines how the local availability of gig work impacts short- and long-term labor market outcomes of individuals who become unemployed in the US. Exploiting the variation from staggered market entries of the biggest gig companies, she finds that the negative displacement effects after job loss are mitigated for workers who have a high propensity to perform gig work and become unemployed in an area with high gig availability. In the longer run, however, labor market outcomes of these workers become worse compared to similar individuals in areas without gig work.

Our focus on Austria allows us to examine the effects of gig work in a different institutional setting where, in contrast to the US, even gig jobs are covered by some extent of social security protection. Our focus on refugees contributes evidence for a part of the workforce with low labor market attachment for which the gig economy is particularly relevant but understudied. In addition, it allows us to exploit the quasi-random assignment of refugees to locations as an additional source of exogenous variation. Adermon and Hensvik (2022) leverage an online experiment in Sweden to compare callback rates to fictitious applications for recent high-school graduates with varying levels of (OFD-) work experience. They find that experience in OFD work has no effect on the callback rate for migrants, in contrast to natives who experience a slightly higher callback rate when having gig experience. We are the first to specifically investigate the effect of having gig work available for parts of the migrant workforce. By analyzing how the availability of gig work affects refugees' labor market integration, we also add to the understanding of a crucial part of refugees' careers.

Second, we contribute to the discussion of measuring the gig economy. Difficulties in measuring gig work are mostly due to the fact that in most countries gig workers are self-employed, which makes it hard to disentangle the gig-workforce from traditional solo self-employment. Additionally, gig work is oftentimes used as an additional income source that administrative data or household surveys fail to capture (Abraham et al., 2018; Katz and Krueger, 2019). In the North American setting, scholars have found ways to identify gig workers in tax data, allowing them to assess the magnitude and importance of the gig economy for modern labor markets (Garin et al., 2025, 2023 for the US context, Jeon et al., 2021 for Canada). The different institutional setting Europe allows us to track gig workers and firms in social security data over time and, hence, to offer first evidence from administrative data on the characteristics of gig workers and the effect of gig work that extends survey-based evidence from other contexts (Drahokoupil and Piasna, 2019; Boeri et al., 2020; Fisher, 2022).

Finally, our research builds upon and adds to the literature that studies which factors influence the labor market integration of refugees (for recent overviews see Brell et al., 2020 and Bahar et al., 2024). Previous work has highlighted the importance of local (labor market) characteristics such as attitudes against migrants, local unemployment rates, and labor market performance (Åslund and Rooth, 2007; Aksoy et al., 2023; Wett et al., 2024), the structure of local markets (Eckert et al., 2022), the availability of language training (Foged et al., 2024), and the presence of co-ethnic networks (Beaman, 2012; Egger et al., 2021) among others. Our paper contributes to this literature by investigating the gig economy as a factor that affects local labor market conditions by providing flexible, yet unstable work arrangements that are highly relevant for the migrant workforce.

The remainder of the paper is structured as follows. Section 2 provides background on the online food delivery industry in Austria and explains how we identify it in our data. Section 3 provides background on refugees in Austria. Section 4 describes our empirical framework and estimates the effect of the local availability of gig work on refugees' labor market outcomes. Section 5 estimates the direct effect of taking up gig work on subsequent career progress. Section 6 concludes. Additional detail is provided in the appendix.

2 Online Food Delivery in Austria

The market for online food delivery (OFD) in Austria and elsewhere is characterized by permanent change, comprising firm entry and exit, firm re-naming and re-branding, mergers and acquisitions, spin-offs, complex company networks with subsidiaries and subcontractors, and generally high levels of fluctuation and turnover (e.g., Fisher, 2022).

2.1 Institutional Background

The history of *Mjam/Foodora* To illustrate the unstable nature of the OFD industry, we describe the history of *Mjam*, one of the oldest and largest companies in the market.[4] *Mjam* was founded in Vienna in 2008 as an online platform mediating between people who order food and restaurants that prepare and deliver the food via their own delivery services. Initially, *Mjam*'s revenue was generated by brokerage fees that restaurants paid for each order and by advertisements that restaurants could place on the platform. In 2018, *Mjam* started its own delivery service to generate additional revenue through fees for food delivery. Their *RadlExpress* increasingly hired riders to deliver food, starting in Graz and—over the subsequent years—expanding to Salzburg, Innsbruck, Klagenfurt, Vienna, St. Pölten, and Linz. In February 2019, *Foodora*—as *Mjam* belonging to the Berlin-based parent company *Delivery Hero*—announced that it would be merged into *Mjam*. *Foodora* had already employed their own riders in Vienna since 2015 and had grown to around 700 riders at the time of the merger. By October 2019, the majority of *Foodora*'s riders was taken over by *Mjam*. Around the same time, *Uber Eats*, another competitor, left the Austrian market. *Mjam* hired a large share of *Uber Eats*' former workers. In 2022, the end of our sample period, the Austrian market for OFD was dominated by two large companies, *Mjam* and its main competitor *Lieferando*. Both companies were registered in Vienna and of comparable size, both in the number of riders as well as in the number of restaurants that offered their food via the companies' online platforms.[5]

Contract Types Firms in the OFD industry employ workers of three employment types: dependent employees in regular work contracts (which comprise full-time, part-time, and marginal employment), freelance contractors (*Freie Dienstnehmer*), and self-employed workers. The exact composition of the workforce is typically not disclosed by the companies. *Mjam/Foodora*, for instance, is estimated to have about five percent of their riders in regular work contracts (Lutz and Risak, 2017). These workers are subject to the Austrian labor law and thus enjoy the full benefits of the Austrian social security system. They have the right to take vacation

[4] This paragraph draws on various newspaper articles and company reports, in particular from *Horizont.at* (https://tinyurl.com/3mahv2kd), *Moment.at* (https://tinyurl.com/627jua6v), *Wiener Zeitung* (https://tinyurl.com/yyt6zx84), *mjam.net* (https://tinyurl.com/2f3hnnwb, *foodora.at* (https://tinyurl.com/4j2bf4uj, https://tinyurl.com/52wyz7f3, https://tinyurl.com/dkpy27rz), *Arbeit & Wirtschaft* (https://tinyurl.com/wajsku2z, https://tinyurl.com/2p8pk46h), *Der Standard* (https://tinyurl.com/3t35nuzp, https://tinyurl.com/3vc4r95w), *orf.at* (https://orf.at/stories/3111526/), *Kurier.at* (https://tinyurl.com/3mbsu9vu), *Die Presse* (https://tinyurl.com/47a4crxy), *creditreform.de* (https://tinyurl.com/zya6c755, https://tinyurl.com/yk9nv4w6) and the *Italian National Institute of Statistics* (https://tinyurl.com/4ty7t472). All online sources have been last accessed on March 3rd, 2025.

[5] In May 2023 the fate of *Mjam* took another turn and the company was re-branded to *Foodora* again. In the same year, *Wolt*—a Helsinki-based company that was acquired by the US-based company *Doordash*—also entered the Austrian market.

and receive special annual payments. Since January 2020, riders with regular employment contracts are even subject to the collective bargaining agreement for bicycle riders, one of the first agreements of this kind worldwide (Wirtschaftskammer Österreich, 2020). Most OFD riders, however, are employed as freelance contractors (*Freie Dienstnehmer*) and do not enjoy these rights and protection. Freelance workers are granted more freedom in choosing the scope of their employment and their working hours, and are in principle not bound by the employer's instructions. At the same time, they are subject to social security contributions, which allows us to observe them in social security registers. In many OFD firms, freelance contracts are the typical employment type upon entry. Some companies like *Mjam/Foodora* leverage the prospect of promotion to a regular employment contract as an incentive for their freelancers to work extra hard and reliably. Finally, some OFD companies also contract with self-employed workers. At *Mjam/Foodora* these relations are called the "old self-employed" and are not offered any more at the time of writing.[6]

2.2 OFD Companies and Workers in Austrian Administrative Data

In this section, we present our data sources and summary statistics on key characteristics of the OFD industry in Austria.

Data sources Our study is based on the Austrian Labor Market Data Base (AMDB). The AMDB provides information on the Austrian labor market, including employment and unemployment episodes, periods outside the employment system, and job vacancies.

Our main analyses use the matched employer-employee data from the AMDB. The data cover the universe of private sector employment in Austria since 1997 and provide highly reliable daily information on workers' employment and unemployment spells as well as annual wages for each employer-employee combination. We observe individual characteristics such as age, gender, nationality, and the location of residence as well as employer characteristics such as the four-digit industry code, location, and founding year.

In addition to the social security data, the AMDB also includes vacancy data provided by the Austrian Public Employment Service (AMS, *Arbeitsmarktservice*; see Mueller et al., 2024). The vacancy data contain the entirety of job openings advertised through the AMS platform, which is the predominant platform for job postings by Austrian employers, accounting for nearly 60% of all Austrian vacancies. We use the vacancy data in order to assess the demand for OFD workers in different regions in Austria, focusing on job openings in the 6-digit occupation "bicycle delivery riders".

Additional information on the AMDB is provided in Appendix B.1.

Sample and characterization of OFD firms We focus on the six largest cities in Austria: Vienna, Graz, Linz, Salzburg, Innsbruck, and Klagenfurt. These cities have a population of more than 100,000 inhabitants and at least one OFD company starts employing riders in each

[6]We observe self-employed workers in our data, but cannot link them to the company they are providing services for. Pure self-employment as an employment type in the OFD industry seems to have lost its importance, perhaps due to policy efforts to curb pseudo-self-employment in the EU. For examples, see the cases of Germany (Friedrich et al., 2024) and Spain (Dolado et al., 2025). We deal with self-employed refugees in Section 4.6.

of them at some point in our observation period from 2014 to 2022.[7] We use a data-driven procedure to characterize OFD firms in the anonymized administrative data. Our approach is described in detail in Appendix B.2. It is based on changes in industry classifications of platform companies from IT activities to transportation activities and complemented by a worker-flow approach to detect networks of subsidiaries, regional branches, or subcontractors, as well as changes in employer identifiers resulting from mergers, acquisitions, and rebrandings of OFD firms. We validate the resulting classification of OFD firms in the AMDB using external data sources. Our final sample includes 188 OFD firms with a total of 21,500 workers.

OFD Employment across Time and Space Figure 1a illustrates the number of OFD workers in Austria from 2014 to 2022. The number of OFD workers increased substantially over our sample period. The Covid-19 pandemic accelerated the already strong upward trend in the industry, as evident from the pronounced surge between early 2020 and 2021. Our data reveal a notable increase from less than 500 workers in 2014 to almost 5,000 workers in 2021. These numbers are corroborated by information from Austrian newspapers and company reports.[8] After a peak around the middle of 2021, however, employment in OFD firms decreased again, reaching somewhat more than 3,000 workers at the end of 2022.[9]

Figure 1b shows the development separately for each of the six cities in our sample. The largest share of OFD employment occurs in Vienna. At the beginning of our sample period, Vienna is the only city that employs OFD workers. Subsequently, other cities follow, starting with Graz, Innsbruck, and Linz. The development in these cities follows a similar pattern as the one in Vienna, albeit at smaller levels.

The expansion of OFD firms across Austria is depicted in Figure 2 where we map the availability of OFD jobs for selected years in each of the six cities in our sample. Each map shows whether a job opening in the 6-digit occupation "bicyle delivery rider" has been posted in the respective city according to the vacancy data provided by the Austrian Public Employment Service (AMS). We observe a staggered entry that starts in Vienna in 2015, followed by Graz in 2017, Salzburg and Linz in 2019, and comprises all major Autrian cities from 2021 on. Appendix Table B.2 shows robustness by considering alternative measures of the OFD expansion. Appendix Figure A.1 depicts the expansion of OFD firms at the intensive margin by plotting the share of workers employed in OFD firms.

OFD Worker Characteristics Table 1, Panel A, shows the demographic composition of the sample of OFD workers, using a snapshot from August 1st, 2021. We relate the characteristics of gig workers (columns 1-4) to two comparison groups. In columns 5-8, we focus on all workers

[7] Some OFD firms are also active in smaller cities and rural regions. However, in these locations they primarily operate as online platforms that mediate services from restaurants. Their presence may influence restaurants' business and hiring decisions, but not by creating platform-mediated gig work opportunities that provide the flexible gig employment options considered in our paper.

[8] See *Der Standard* (https://tinyurl.com/3t35nuzp, https://tinyurl.com/3vc4r95w), *Die Presse* (https://tinyurl.com/47a4crxy), *mjam.net* (https://tinyurl.com/2f3hnnwb), and *Kurier.at* (https://tinyurl.com/3mbsu9vu), all last accessed on March 3rd, 2025.

[9] Friedrich et al. (2024) report very similar time trends for Germany. In addition, the share of OFD employment in the overall workforce reported there is similar to the one observed in our data.

who are employed either in "Temporary Work Agencies", "Delivery", or "Food Services".[10] In columns 9-12, we show characteristics for all workers employed in the six largest cities. Gig workers in the OFD industry are more likely to be male and substantially younger than workers in the other groups. The share of non-Austrians (70% of OFD workers), and in particular of refugees (24%) is exceptionally high. Another overrepresented group are students.

Table 1, Panel B, shows labor market outcomes of workers in the three groups on August 1st, 2021. 22% of gig workers hold more than one job at the same time, compared to 9% among temp, food, and delivery workers and 3% among all urban workers. About half of the OFD workers are employed in freelance contracts, while this share only amounts to 2% in temp, food, and delivery work and to 1% among all urban workers. The share of workers with marginal work contracts is 11% among OFD workers and thus higher than in the two comparison groups. Monthly wages—computed as the earnings from the spell ongoing on August 1st, 2021 divided by its duration—are substantially lower than those in the two other groups. The variation in wages of OFD workers is comparatively high. The large spread between the 25th and 75th percentile most likely reflects both, differences in hourly wages and in the number of hours worked, underscoring the flexibility that gig work offers. Furthermore, estimated AKM worker fixed effects are lower among gig workers.

Overall, the composition of OFD workers in terms of demographics and labor market outcomes in Austria is dominated by young, male and foreign low-wage workers. These characteristics are commonly found in studies of gig work in other countries and settings (e.g., Hall and Krueger, 2018; Drahokoupil and Piasna, 2019; Fisher, 2022; Friedrich et al., 2024).

3 Refugees in Austria

Austria has been a significant destination for refugees, particularly since the onset of large migration flows to Europe in 2015 (Dustmann et al., 2017; Dellinger and Huber, 2021). Between 2014 and 2022, approximately 377,000 people sought asylum in Austria (Bundesministerium für Inneres, Vienna, 2015 – 2023).[11] According to Eurostat, asylum seekers represented 1% of the Austrian population in 2015, one of the highest shares in Europe and among other high income countries. The primary countries of origin were Syria, Afghanistan, Irak, and Pakistan. Asylum seekers were on average around 30 years old and 70% were male. Around 197,000 asylum seekers who arrived since 2014 have been granted either asylum or subsidiary protection as of 2022, the end of our sample period (Bundesministerium für Inneres, Vienna, 2015 – 2023).[12]

[10] The specific Nace, Rev. 2 codes considered are *4941-Freight transport by road*; *5610-Restaurants and mobile food service activities*; *5629-Other food service activities*; *7810-Activities of employment placement agencies*; *7820-Temporary employment agency activities*.

[11] These official numbers do not include refugees from Ukraine. Due to special regulations, Ukrainians do not have to apply for asylum in Austria upon arrival, but directly receive a temporary right of residence. We therefore exclude refugees from Ukraine in our analyses. In any case, the number of gig workers from Ukraine is extremely small.

[12] Asylum seekers whose asylum application has been approved are legally entitled to refugee status ("persons entitled to asylum"). Foreigners whose application for asylum has been rejected due to a lack of persecution, but whose life or integrity is otherwise threatened in their country of origin, are granted subsidiary protection. They are therefore not entitled to asylum, but receive temporary protection from deportation. The two groups differ in the social welfare benefits they are entitled to (see below). However, both groups receive full access to the Austrian labor market after the asylum decision. Our data does not allow us to cleanly separate between the two groups and we therefore consider them jointly.

3.1 Institutional Background

Upon arrival in Austria, all individuals who apply for asylum are required to register at one of three federally-run first reception centers (Bundesamt für Fremdwesen und Asyl, 2024). Asylum seekers are then assigned to one of the nine federal states and transferred to one of the many asylum shelters across the country shortly thereafter. While awaiting their asylum decision, applicants receive basic subsistence support (*Grundversorgung*) from the assigned federal state, which includes housing and a small monetary allowance (Rosenberger and König, 2012). While waiting for the asylum decision, asylum seekers are effectively excluded from the Austrian labor market (Limberger, 2010; Rosenberger and König, 2012).[13]

Assignment to federal states is based on a quota system (*Grundversorgungsvereinbarung – Art. 15a B-VG (2004)*, see Limberger, 2010). Importantly, the allocation is not based on integration prospects or labor market conditions (Wett et al., 2024). In Appendix Table A.1, we estimate linear regression models that predict the number of asylum seekers assigned to a location using multiple characteristics. The only significant predictors of the number of applicants in a region are population size and population density. In contrast, neither regional labor market characteristics such as unemployment rates, average earnings, labor market tightness, and local GDP, nor other characteristics of the local population such as average age, education level, or the living space per capita have a significant impact on where refugees are located.

Except for the special case of family reunions, asylum seekers have no influence over their location decision.[14] Rejecting the proposed accommodation can result in the loss of housing and basic subsistence support (Rosenberger and König, 2012). Before being granted asylum or subsidiary protection, applicants are also not allowed to relocate between states without forfeiting their basic subsistence support. The threat of losing basic subsistence support and the exclusion from the Austrian labor market place strong incentives for asylum seekers to remain in the accommodation to which they have been assigned during the asylum procedure (Dellinger and Huber, 2021).

The duration of the asylum procedure can vary from a few months to several years. In our data, the median length amounts to 19 months.[15] Asylum seekers do not receive information about the progress of their application and the expected timing of their asylum decision. Thus, the initial assignment to a federal state, the strict mobility restrictions, the long duration of the asylum procedure, and the uncertainty about the timing of the final decision lead to a quasi-

[13] There are some exceptions to this rule, allowing applicants to work in specific settings. Particularly, asylum seekers may take up dependent employment as harvest workers and seasonal workers. The duration of this employment is limited to a maximum of 6 months for seasonal workers and 6 weeks for harvest workers and requires a work permit from the AMS, which is only offered if no unemployed Austrian worker is available for the job. Further, asylum seekers can take on non-profit work, for example, the maintenance of public buildings or the care of green spaces. Finally, asylum seekers can start a business as self-employed workers, in which case they lose their entitlement to basic subsistence support. We specifically examine the implications of these exceptions for our results in Section 4.6.

[14] In our analyses, we focus on adult men only, the group that is least likely to be affected by family unions (Egger et al., 2021).

[15] According to the law, the Austrian Federal Administrative Court (*Bundesverwaltungsgericht*) should make a decision within 6 months. In practice, however, this deadline is exceeded in many cases. The Austrian Court of Audit (*Rechnungshof*) criticized the long duration of proceedings and calculated that more than 63% of cases took longer than the legally stipulated 6 months and 37% of cases took more than two years (https://tinyurl.com/mpstww3r , last accessed March 3, 2025).

random timing and location of access to the Austrian labor market for successful applicants. We will exploit this quasi-randomness in combination with the spatio-temporal variation created by the expansion of OFD firms to identify the causal effect of gig availability at labor market access on refugees' labor market outcomes.

After being granted asylum, refugees obtain the same labor market access as Austrian citizens and are free to move within Austria. Refugees granted asylum lose access to basic subsistence support and are required to leave their refugee shelter within four months. Instead, they have access to social welfare benefits equivalent to those received by unemployed Austrians. Applicants granted subsidiary protection also receive full access to the Austrian labor market. However, they are only granted core social assistance benefits that do not exceed the level of basic welfare support.[16] Applicants who are denied asylum and subsidiary protection lose their right to residency and stay in basic subsistence support until leaving the country.

3.2 Summary Statistics

We identify asylum seekers in our data by their enrollment in the specific health insurance (*Pflichtversicherung*) that is part of their basic subsistence support. We then proxy positive asylum decisions by instances where the *Pflichtversicherung* for asylum seekers ends and the individual enters a different labor market position (such as employment, receipt of unemployment benefits, social assistance, or other social security benefits). Appendix B.3 provides details and describes how we construct our main analysis sample. The final sample consists of 33,962 male refugees aged 20 to 40 who gained access to the Austrian labor market between 2014 and 2022 in one of the six largest Austrian cities.

Table 2, Panel A, shows descriptives for the refugees in our final sample in columns 1-4. Most refugees originate from Syria and Afghanistan. The average age at the time of access to the labor market is 27.8 years. On average, the asylum procedure lasted for more than two years with a considerable amount of variation (emphasizing the uncertainty around the timing of labor market access).

Table 2, Panel B, shows labor market outcomes for our sample of refugees. Two years after entering the country, only 12% of all refugees are employed. In international comparison, this puts Austria near the bottom of the distribution with similarly low levels reached in Finland and Germany (Brell et al., 2020).[17]

One year after being granted labor market access, the share of employed refugees has increased to 34%. Among the employed refugees, 4% hold multiple jobs at the same time, 2%

[16] See information by the Federal Ministry of Social Affairs, Health, Care and Consumer Protection (Bundesministerium für Soziales, Gesundheit, Pflege und Konsumentenschutz, 2025) . If individuals under subsidiary protection do not take up employment and stay in the temporary asylum shelter, they continue to have access to the basic subsistence support. Consequently, we cannot identify the timing of labor market access for individuals with subsidiary protection who stay in the temporary refugee shelter and do not work. We would misclassify these individuals as still awaiting their decision until they either move or take up employment. We think that this pertains only to a small fraction of individuals with subsidiary protection because the share of all asylum decisions that result in a refugee status or subsidiary protection in our data is equal to the corresponding share reported in Dellinger and Huber (2021), who are able to exactly observe granted subsidiary protection in their data (see details in Appendix B.3).

[17] Brell et al. (2020) report employment rates two years after migration in several countries. The rate of employment is substantially higher in Australia (23%), Sweden (28%), the UK (38%), Canada (48%), and the US (61%).

have freelance contracts. The average wage among employed refugees is 1291 EUR and, thus, substantially lower than wages among the general urban population (see columns 9-12 of Table 1). Similarly, their estimated AKM worker fixed effects are lower compared to the urban population. On average, refugees have a tenure of about 6.5 month in their current job after one year. One year after labor market access, about one quarter of refugees are unemployed, but enrolled in some kind of labor market training offered by the Austrian labor market services (AMS). 4% of refugees pursue an apprenticeship. One year after gaining access to the Austrian labor market and the associated freedom to move across the country, 14% of male refugees have switched their location.[18]

Almost a quarter of all OFD workers are refugees (see Table 1), and for refugees employment in the gig economy is a viable option. Columns 5-8 of Table 2 provide descriptive statistics on the 969 refugees (almost 3% of all refugees who entered one of the larger cities) who have at some time in our sample period worked in an OFD firm. These refugees are younger than the average refugee and have a different composition in terms of their origin countries. Two years after entering Austria, they are twice as likely to be employed, despite their asylum process lasting substantially longer on average. One year after labor market access, more than 70% of these workers are employed, 12% having multiple jobs at the same time and 50% having a freelance contract. Tenure in the current job is substantially lower compared to the average refugee. There are no differences in mobility after gaining labor market access, however.

4 The Effect of Gig Jobs on Refugees' Labor Market Outcomes

In this section, we estimate the effect of job opportunities in the gig economy on labor market outcomes of refugees in Austria. Our identification strategy leverages spatial and temporal variation in the availability of gig work at the time and location where refugees gain access to the labor market. In particular, we regress labor market outcomes of refugees on measures of whether and to what extent working in the gig economy was an option at the time and location they became eligible to work in Austria. The combination of the gradual expansion of OFD firms across Austrian cities with the quasi-random allocation and unforeseeable timing of the asylum decision allows us to identify the causal effect of having gig jobs available locally on labor market outcomes.

There are two threats to the validity of our design. First, the strategy is invalidated if refugees strategically sort into locations based on job prospects in the gig economy. Due to the mobility restrictions while waiting for the asylum decision and due to the uncertainty in the timing of labor market access, this should not be a concern in our setting. Table A.1 additionally shows that neither regional labor market characteristics nor other characteristics of the local population are significant predictors for the number of refugees assigned to a location. In addition, we examine the role of mobility explicitly in Section 4.6. Second, the strategy is invalidated if overall employment prospects systematically differ between cities with and without gig jobs. Our model specification addresses this concern by including a rich set of fixed effects that capture level differences between locations and flexible time-trends, and by

[18] Mobility is higher if we consider all refugees, not only those in the major Austrian cities (Wett et al., 2024).

controlling for the labor market performance of each region to capture different time trends in employment prospects across locations. In addition, we present results based on variation within city $\times$ month cells, estimating triple differences regressions based on variation in the propensity to take up gig work determined by network connections to other workers in the gig economy. Estimating these triple differences specifications effectively nets out any location-specific characteristics that vary over time.

4.1 Gig Availability and Refugee Employment

We start by examining the relation between the availability of OFD jobs when refugees gain access to the labor market and their subsequent employment probabilities. We measure the availability of OFD jobs in city c at month m by an indicator variable that equals to one starting from the first month when a "bicycle delivery-rider" vacancy opens up in c.

$$\text{Gig Availability}_{cm} = \mathbb{1}\{m \geq \underset{k \in \{Jan2014,\ldots,Dec2022\}}{\arg\min} \exists \text{ delivery vacancy in month } k \text{ and city } c\}.$$

Due to the rapid and asynchronous expansion of OFD firms across Austrian cities, refugees who gain access to the Austrian labor market at different times and in different locations face substantially different opportunities to take up gig work (see also the maps in Figure 2). We track all refugees over the first 24 months after labor market access and compare employment outcomes of those who enter a local labor market at a time when gig jobs are available to outcomes of those who face a gig availability of zero at the time of access.

Descriptive Analysis The upper panels of Figure 3 show a descriptive analysis of refugee employment over the two years after labor market access. The graph on the left plots the share of refugees employed in an OFD firm over time. Among refugees who face positive gig availability at access, the share working in the OFD industry rapidly rises to about 1.5 percent within the first nine months and remains relatively stable afterwards. Among refugees with no gig availability at access, the share working in the OFD industry increases as well, but to a much lower extent, reaching about 0.25 percent after two years.[19] The graph in the middle shows the share of refugees employed in firms in Temp Work, Food Services, and Delivery Services, separately by gig availability. These sectors include a substantial part of the gig economy, but also other, more traditional low-skilled jobs. Consequently, refugees find employment in Temp, Food, and Delivery Services in labor markets with and without gig availability. Initially, in cities with gig availability, we observe higher employment rates in the Temp, Food, and Delivery Services industries. Strikingly, however, the persistently higher share of OFD workers in cities with gig availability is not reflected in higher employment rates in Temp, Food, and Delivery Services over time. Quite in contrast, after slightly less than a year, workers who entered labor markets with gig availability are less likely to be employed in these industries.

[19]Note that due to the gradual expansion of OFD firms across the Austrian cities even workers without gig availability at access might have gig opportunities in their allocated location after some time. In addition, the sample includes refugees who—after becoming eligible to work in Austria—switch their location. We explicitly address the role of mobility for our findings in Section 4.6.

The graph on the right examines the overall employment probability of refugees and paints a very similar picture. Overall, the employment rate rises from around 20% at the time of access to more than 40% after two years. While initially the share is higher among refugees who gain access to a labor market with OFD jobs, the two groups converge over time. After about a year there is no difference any more and, subsequently, the employment probability is higher among refugees who accessed a market without gig availability.

Taken together, the descriptive evidence in Figure 3 suggests that the availability of gig work at the time of gaining labor market access induced refugees to take up gig work in OFD firms. While the higher rate in OFD firms is persistent, refugees in locations with gig availability are not more likely to be employed (overall or in Temp, Food, and Delivery Services) around one year after labor market access. Thus, in the medium run access to gig opportunities does not lead to higher employment among refugees, if anything their employment rates are lower if gig work was available at labor market access.

The Effect of Gig Availability on Employment We proceed by quantifying the effect of gig availability on refugee employment in a regression approach that exploits the variation from refugee assignment and OFD expansion. Compared to the descriptive approach above, the empirical design allows us to address the potential concern that labor markets with or without gig opportunities generally differ in terms of their employment opportunities. As common in the literature, level differences across cities or over time are addressed by including restrictive sets of fixed effects. Moreover, we explicitly control for the dynamic labor market development in each city over time by controlling for local labor market tightness. We estimate the following regression equation:

$$Y_{ict} = \alpha_c + \lambda_t + \sum_{k \neq -1} \beta^k \left(\mathbb{1}_{t=k} \times \text{Gig Availability}_{c\mathbf{m}(i,t^0)} \right) + \Gamma X_{ict} + \epsilon_{ict}, \tag{1}$$

where Y_{ict} is one of our outcome variables for worker i in city c at time t. Time t is measured in months relative to labor market access, where $t^0 = 0$ is the month in which i gained access to the Austrian labor market. Two-way fixed effects for cities (α_c) and months since access (λ_t) are included throughout and control for unobserved level differences between locations and over time. Our main regressor is Gig Availability$_{c\mathbf{m}(i,t^0)}$, where $\mathbf{m}(i, t^0)$ is a function that returns the calendar month m that corresponds to the time when i became eligible to enter the Austrian labor market. We interact Gig Availability$_{c\mathbf{m}(i,t^0)}$ with indicators for each month relative to labor market access (leaving out the period prior to access).

We include a vector of control variables, X_{ict}, that contains refugee-specific characteristics, notably the age at the time of labor market access, the time that the individual already spent in Austria, dummies for 21 different regions of origin (e.g., South-east Asia, North Africa, etc.), and dummies for the year of access to the Austrian labor market. Moreover, X_{ict}, includes a time-varying measure of local labor market tightness defined by the Austrian labor market office, the so-called *Stellenandrangziffer*, which measures the number of unemployed over the number of vacancies in a city.

The coefficients of interest, β_k, are event-study estimators measuring the effect of having gig

jobs available at labor market access on our outcomes over time. The lower panels of Figure 3 show the results from estimating Equation (1). Panel (a) plots the effect on employment in OFD firms. There is a positive and significant effect of becoming eligible in a city where gig work is available on working in OFD. After half a year, refugees in cities with gig availability are about 1.2 percentage points more likely to be employed by an OFD firm. Panel (b) shows results for the effect on employment in Temporary Work, Food Services, or Delivery Services. There is no statistically significant effect of gig availability on employment in these industries. The coefficients are positive initially, but after about a year they are very close to zero. Panel (c) shows results for the effect on the overall probability to be employed. Again, there are no significant effects. For gig availability, the coefficients are positive initially, but close to zero or even slightly negative after about a year.

Summarizing the Effects We summarize the dynamic effects in single estimates for the average treatment effects of gig availability on employment in the two years after labor market access. To this aim, we replace the dummies for each month of eligibility with a dummy for the post labor market access period

$$Y_{ict} = \alpha_c + \gamma post_{ict} + \delta post_{ict} \times \text{Gig Availability}_{c\mathbf{m}(i,t^0)} + \Gamma X_{ict} + \epsilon_{ict} \tag{2}$$

The coefficient γ thus shows the conditional mean of the outcome in the two years after eligibility (relative to the pre-access period) for individuals without gig availability. The coefficient δ shows the conditional difference in the mean for individuals with gig availability. Table 3, Panel A, shows that on average the probability that a refugee is employed by an OFD firm in a given month in the two years after gaining access is about 1.2 percentage points higher if gig work is available. In relation to the low baseline probability of being employed by an OFD firm this implies a twelve-fold increase in the chance of being in gig work. In contrast, the probability to be employed in Temp./Food/Delivery Services as well as the overall probability to be employed do not differ significantly between refugees who gain labor market access in cities with or without gig availability averaged over the first two years. If anything, the coefficient on overall employment is negative. Columns 4-6 summarize the effect of gig opportunities on the cumulated number of months employed. After 6 and 12 months, refugees with gig availability on average have accumulated about 0.25 more months (about 7-8 more days) of employment compared to refugees without gig availability. After 2 years, this is reversed and refugees without gig availability have accumulated slightly more days.

The crucial assumption for a causal interpretation of the estimates is that, conditional on the controls included in the estimation, the labor market trajectories of refugees in cities with and without gig availability would have evolved in parallel if OFD firms did not enter. We believe that this assumption is plausible due to the absence of sorting determined by the institutional setting and due to the fact that we condition on city-specific labor market tightness. In Section 4.3, we address remaining concerns by using a triple differences approach based on variation within city $\times$ month cells.

4.2 The Effect of Gig Availability on Earnings, Job Stability, and Job Quality

We examine how other outcomes, such as earnings, job stability, job quality, and human capital investments are affected by having gig work available at labor market access.

Table 3, Panel A, column 7, shows that—conditional on having employment—workers who gained labor market access in cities with gig availability earn on average about 62 Euros less per month. Compared to the conditional mean of 1464 Euros, this implies roughly 4 percent lower wages in the first two years after access, although the difference is not statistically significant. Columns 8-10 illustrate the dynamic development of labor income: Cumulated over the first six month, labor income of refugees who gained access in cities with gig availability is (non-significantly) higher by 195 Euros. After one year, however, refugees in non-gig cities have accumulated more labor income on average - despite working slightly fewer days. Finally, after two years there is a (non-significant) gap of more than 1,500 Euros, almost 13 percent of the conditional sample mean of cumulated labor income after labor market access. This finding shows that the faster initial job finding rate among refugees in cities with gig jobs does not result in higher levels of earnings in the medium run. Quite in contrast, not having gig work available when gaining labor market access appears to be associated with (non-significantly) better pay across the first two years.

We examine job stability and quality in columns 11 and 12. Conditional on having employment, tenure at the current employer in a given month is about two thirds of a month lower for workers who entered a market with gig availability compared to those entering into a city without gig availability (column 11). This difference corresponds to 11% of the average tenure in the sample. Column 12 considers the probability that refugees end up at a better firm if they switch jobs. We measure the quality of a firm using estimated firm fixed effects from a decomposition of log wages as outlined in the influential study by Abowd et al. (1999, henceforth AKM, see details in Appendix B.1). On average, about 34 percent of all job-to-job transitions of refugees are targeted towards higher-paying firms. For refugees who gained access in cities with gig availability, the share of job switches to a better firm is about 2.7 percentage points lower.

Finally, we examine the probability to be enrolled in a job market training program provided by the AMS. On average, 29 percent of unemployed refugees are at one point enrolled in such program, also in the period prior to labor market access. After labor market access, the share substantially increases for workers in cities without gig availability, but not for refugees who entered a city with gig work available. A possible interpretation is that refugees in cities where gig work is available are facing lower pressure to search for a regular job, and thus have - even conditional on being unemployed - lower incentives to invest in labor-market specific training.

4.3 Within City × Month Variation in Gig Exposure

In this section, we address potential concerns that the effects on refugees' labor market trajectories are driven by differences in the economic development of cities with and without gig availability that might remain even after controlling for local labor market tightness and our set of fixed effects. To this aim, we exploit an additional source of variation *within* city × month cells. We show that our findings are qualitatively and quantitatively robust.

Specifically, we exploit variation in the exposure to gig work within city × month cells, in addition to the spatial and temporal variation in gig opportunities used above. The main idea is that—within a city and time period—the exposure to the labor demand from OFD companies differs across refugees and, to a large extent, depends on connections to the gig economy via social networks. Previous work has shown that ethnicity-based networks are important drivers of refugee employment since many employment opportunities are transmitted via referrals among individuals from the same origin (Dustmann et al., 2017). Consider, for example, two young refugees who both receive labor market access in Vienna in May 2019, resulting in an equal measure of gig availability. However, based on differences in their connections to workers who are already employed in the OFD industry, their individual propensity to take up gig work could differ substantially. Imagine one of the two refugees is from Syria and the other one from Somalia. Because the share of Syrians who work in the gig industry in Vienna is substantially higher than the share among Somalians, the probability that the Syrian refugee has a contact in the gig industry is higher and, hence, might increase his likelihood of taking up a gig job.

To capture this variation, we compute for each refugee in each city a measure of network exposure. Network exposure is based on the share of refugees from each demographic group—defined by the 21 origin regions and two age categories (20-29 and 30-40)—who are employed in the OFD industry within a given city. In particular, for each city c, region of origin o, and age group a, we compute the share of gig workers,

$$\text{Network Gig Share}_{coa} = \frac{\sum_{m=Jan2014}^{Dec2022} \#\text{ Workers employed at OFD firm}_{mcoa}}{\sum_{m=Jan2014}^{Dec2022} \#\text{ Workers employed}_{mcoa}}.$$

Separately for each city, we then compute the median share among all demographic groups and define an indicator, High Network Exposure$_{ic}$, that equals to one if the network gig share among refugees from the same origin and age group as i is above the city-level median:

$$\text{High Network Exposure}_{ic} = \mathbb{1}\{\text{Network Gig Share}_{co(i)a(i)} > Median(\text{Network Gig Share}_{coa})_c\}.$$

Appendix Table A.2 Panel A provides summary statistics on the network gig share and network exposure. Among young (20-29 year old) refugees, 2 percent of ethnic network members are employed in OFD firms. Across cities and origin regions, there is substantial variation, indicated by a standard deviation of 0.06. As an example, the median network gig share in Vienna is 3 percent. Among young refugees from Western Asia (mostly Syrians) in Vienna, the network gig share is 7 percent and, hence, the high network exposure dummy equals to one for young refugees from Western Asia in Vienna. For young refugees from Eastern Africa (mostly Somalia) in Vienna, in contrast, the network gig share is only 0.4 percent and thus clearly below the city-level median. As a result, the high network exposure dummy for young refugees from Eastern Africa in Vienna equals 0.

We then estimate a regression where we interact our measure of gig availability at labor market access with the high network exposure indicator:

$$
\begin{aligned}
Y_{ict} = \alpha_{ct} + \gamma post_{ict} + \kappa \text{High Network Exposure}_{ic} + \delta post_{ict} \times \text{Gig Availability}_{c\mathbf{m}(i,t^0)} + \\
\eta post_{ict} \times \text{High Network Exposure}_{ic} + \\
\theta post_{ict} \times \text{Gig Availability}_{c\mathbf{m}(i,t^0)} \times \text{High Network Exposure}_{ic} + \Gamma X_{ict} + \epsilon_{ict}.
\end{aligned} \tag{3}
$$

To capture differences in the overall employment prospects of refugees from specific origins, our set of controls X_{ict} includes the share of all refugees from the same origin and age group as i who are employed in addition to the variables included in Equation (2). We report the main coefficients in Table 3, Panel B. Column 1 examines the probability to work in an OFD firm. As before, this probability is significantly higher if labor market access occurs in a city with gig work available. Most of the effect, however, comes from refugees who have an above-median share of refugees from the same origin × age group in the gig economy. Column 3 shows that, as in our main specification, gig availability at labor market access does not lead to higher employment rates among refugees. This is also not the case for refugees with high network exposure to the gig economy. In contrast, there are small and marginally significant negative effects on wages, fewer switches to better firms, and (non-significantly) lower tenure and labor market training. Thus, the triple difference regressions broadly confirm the findings from our main analysis. Even if part of the difference between refugees in cities with and without gig availability was driven by different economic conditions rather than the presence of gig opportunities, the variation within regions with gig opportunities supports the interpretation that more opportunities in OFD work do not have positive employment effects, but lead to worse employment conditions.

4.4 Intensive Margin: The Intensity of OFD Jobs

Our main results examine the effect of the availability of gig jobs on labor market outcomes at the extensive margin where we measure the presence of gig opportunities using our vacancy data. In this section, we examine the effect of gig opportunities at the intensive margin, using variation in the extent of gig work within a city. To this aim, we construct a measure of gig intensity that captures the gradual growth of gig opportunities within locations over time. The measure of gig intensity in city c at month m is based on the actual share of overall local employment in OFD firms, computed in our linked employer-employee data and averaged over the three months before m,

$$
\text{Gig Intensity}_{cm} = \frac{\sum_{s=m-3}^{m-1} \#\text{ Workers employed at OFD firm}_{cs}}{\sum_{s=m-3}^{m-1} \#\text{ Workers employed}_{cs}}.
$$

Appendix Figure A.1 maps the intensity of OFD jobs for selected years in each of the six cities in our sample. Similar to the spread of gig availability, gig intensity starts to rise in Vienna and gradually spreads out across cities.[20]

Naturally, the share of local employment in the gig economy could be endogenously related to our outcome variables, which assess whether refugees take up work in the gig economy (and other labor market outcomes). While we measure gig intensity in the three month prior to

[20] In Appendix B.4 we provide additional details on our measure of gig intensity and explain why we do not base it on the intensive margin of vacancy posting.

labor market access to mitigate some of this simultaneity, there could be persistent local labor demand shocks that affect both variables jointly. To address this concern we use two alternative measures that are not influenced by local shocks.

Mechanical Expansion First, following Jackson (2022) we compute an alternative measure of gig intensity that abstracts from local conditions and mechanically increases with the time that gig firms are available in a given city. Specifically, Gig intensity$_{cm}^{Mechanical}$ linearly increases with the number of months since the first vacancy in c was offered. Formally, let $\mathbf{s}(c, m)$ be a function that returns the number of month since gig work became available in city c for calendar month m. For instance, when gig work became available in Salzburg in November 2018, we will have $\mathbf{s}(Salzburg, Nov2019) = 12$. The mechanical measure of gig intensity is defined as

$$\text{Gig Intensity}_{cm}^{\text{Mechanical}} = \frac{\mathbf{s}(c, m)}{max_{c,m}\mathbf{s}(c, m)},$$

where we normalize by the maximum number of month that are possible in our sample. The goal is to separate the exogenous variation due to the increasing popularity and availability of OFD platforms on average, from the potentially endogenous variation in the speed of local growth that arises from specific labor market prospects for refugees in a particular area (cf. Jackson, 2022, p.13).

Leave-one-out Instrumental Variables As a second strategy, we instrument the local share of employment in a given city c with the leave-one-out share of gig employment in all other cities. Importantly, if gig intensity in c is measured s months after gig work first became available in that city, we construct the instrument based on the gig employment share in other cities using the same time lag s after gig work first became available in these other cities. As above, let $\mathbf{s}(c, m)$ return the number of month since gig work became available in city c at calendar month m. Let $\mathbf{m}'(c', \mathbf{s}(c, m))$ be the inverse function that returns for city $c' \neq c$ the calendar month m' in which the first availability of gig work also took place $\mathbf{s}(c, m)$ months ago, e.g., $\mathbf{m}'(Vienna, 12) = Aug2016$ since gig first became available in Vienna in August 2015. Our instrument is then defined as

$$\text{Gig Intensity}_{cm}^{\text{IV}} = \frac{\sum_{c' \neq c} \sum_{s=m'-3}^{m'-1} \#\text{ Workers employed at OFD firm}_{c's}}{\sum_{c' \neq c} \sum_{s=m'-3}^{m'-1} \#\text{Workers employed}_{c's}}, \quad m' = \mathbf{m}'(c', \mathbf{s}(c, m))$$

Thus, our instrument captures the average time development of the gig economy after availability across all cities except for c and abstracts from the local labor demand conditions in c that could be correlated with refugees' labor market outcomes there.[21]

The Effect of Gig Intensity on Labor Market Outcomes Table 4 shows results exploiting variation at the intensive margin. Panel A uses our baseline measure of gig intensity, Panel B relies on the mechanical increase over time, and Panel C is based on our IV approach.

[21] Such leave-out approaches that use national employment shares to instrument for local employment are popular in the literature in labor economics (see, e.g., Schubert et al., 2024). In our case, the exogeneity of the instrument is further supported by the fact that the leave-out shares are measured relative to gig entry, and hence there is no direct time congruence between the local and national measurement.

The coefficients can be interpreted as the change in the outcome for a one standard deviation increase in gig intensity as we standardize our measures of gig intensity. One standard deviation in gig intensity amounts to 0.86 and corresponds, for example, to the difference between Vienna in June 2016 and Vienna in June 2018, or between Graz and Vienna in June 2019. Overall, the effects at the intensive margin are very similar to our findings at the extensive margin. Higher gig intensity leads to more OFD work, but has no discernible impact on employment. Job stability, and job quality significantly decrease with higher gig intensity, and the training probability is also lower.

Compared to the baseline measure of gig intensity, the effects based on the mechanical increase and the IV approach are less negative for overall employment and wages and, thus, very close to the results we find for gig availability. The first-stage F-statistic is strong throughout.

4.5 Heterogeneity

On average, the availability of OFD jobs has no positive effect on refugee employment and leads to low-quality jobs. Nevertheless, specific subgroups of the refugee population could benefit from the opportunity to take up gig jobs. In this section, we examine heterogeneity of our results for different groups in the duration of the asylum process and across age. The underlying hypothesis is that gig work could benefit particularly those refugees who have more difficulties to find employment otherwise and who have little assets.

A long duration of the asylum process has been shown to be detrimental to refugees' employment prospects (e.g., Hainmueller et al., 2016). The negative effects of long waiting times could be driven by skill depreciation, but also by psychological costs and low motivation after long idle times. We split the sample and perform our analysis separately for individuals above and below the 75th percentile in the distribution of waiting time for each year. The 75th percentile corresponds to roughly 3 years of waiting time between entry into Austria and labor market access. The results presented in Table 5, Panel A, reveal interesting differences between the groups. First, the effect of gig availability on take-up of OFD work is stronger for individuals with a very long waiting time (1.5% vs. 1%). Most importantly, overall employment effects point in opposite directions: As for the entire sample, there is no significant effect on the employment probability for individuals in the bottom three quartiles of the waiting time distribution (with a negative coefficient). Quite in contrast, individuals in the highest quartile experience positive employment effects of gig availability that even exceed the actual effect of OFD jobs. Hence, the availability of gig jobs enables these less attached refugees to gain a foothold in the labor market. Refugees with long waiting time still experience lower wages and tenure when gig work is available, but they are much less likely to reduce training time or vocational training (as compared to those with a shorter waiting time).

Another group that could benefit from the quick availability of gig jobs are credit-constrained individuals. We do not observe asset holdings in our data, but use very young age as a proxy.[22] The results are shown in Table 5, Panel B. For refugees above 21 years of age, the coefficients resemble those in our baseline and indicate that refugees above 21 do not benefit from gig

[22] Very young workers had less time to accumulate assets in their home country. The age proxy is also used in the literature on optimal social benefits over the life-cycle (e.g., Michelacci and Ruffo, 2015).

availability. Refugees aged 20 or 21, however, are about twice as likely to end up in the gig economy and experience, at least in the first year, a significantly positive effect of gig availability on employment that remains positive but insignificant thereafter.

4.6 Sensitivity Checks and Summary

We conduct extensive sensitivity checks for our findings. We provide details in Appendix C.1 and summarize the most important points here. Our results are robust to changes in the empirical specification, in particular to different ways of computing standard errors and to the inclusion of more restrictive calendar month fixed effects. We also address the potential bias of two-way fixed effects estimators in the presence of treatment effect heterogeneity. Moreover, the results are not driven by the selective mobility of refugees towards locations with more flexible employment opportunities: We find very similar estimates when restricting the sample to refugees who stay in their originally assigned location. Our results are also unchanged when we control for variation in (time-varying) local differences in welfare benefit levels. We also examine whether our results are affected when we include refugees who use one of the exceptions to work before being granted labor market access or when we include refugees aged 18-50, with virtually unchanged results. In contrast, when we consider refugees above the age of 50 we do not find any effect on OFD employment or overall employment. This is consistent with the idea that gig work is not a relevant option for elderly workers, but overall employment patterns do not differ across cities with and without gig jobs. Finally, we show that our results are not driven by the particular way we classify OFD firms as we find a similar effect of gig availability on the share of freelance workers.

In sum, our results show that the availability of gig jobs when refugees gain labor market access leads to higher take-up of work in OFD firms. However, refugees with access to gig jobs are not more likely to be employed two years after becoming eligible to work, compared to those without initial gig opportunities. Quite in contrast, the availability of low-barrier work opportunities in the gig economy results in lower-quality employment relations characterized by higher job turnover, (slightly) lower earnings, and less career progress. We find that even unemployed refugees are affected by the availability of low-barrier work opportunities in the gig economy and are less likely to invest in human capital formation. This behavior could be rationalized by workers directing their job search efforts away from costly search for regular jobs (that might include investments in language skills etc.) towards more easily accessible jobs in the gig economy. Despite these rather discouraging results, there are some groups that benefit from the presence of gig work, in particular very young refugees and refugees with very long waiting times who's labor market prospects might be particularly low in the absence of OFD work.

5 The Effect of Taking Up Gig Work on Individual Careers

In this section, we estimate the direct effect of starting a job in the OFD industry after labor market access on the subsequent career progression, assessing whether working in the gig economy serves as a stepping stone for the labor market career of refugees in Austria. Specifically,

we investigate the effect of taking a job in the OFD industry within the first year after receiving labor market access on labor market outcomes at the end of the second year after access. Naturally, the selection into gig work within the first year after access is not random. Table 1 shows substantial differences between refugees who work in the gig economy and the rest of the sample. We therefore define a matched control group of refugees who are similar to those who take up OFD work, but gain labor market access in a city where gig work is not available. Under the assumption that the careers of refugees who select into gig work and their matched control units would have developed in parallel in the absence of gig firms, the comparison of the two groups allows us to identify the causal effect of taking up gig work after labor market access.

5.1 Refugees in OFD Work and a Matched Control Group

We use the available socio-demographic information and the (limited) information about outcomes before labor market access to determine statistical twins for our treatment group of refugees who work in an OFD firm within the first year after labor market access.

We proceed in three steps. First, we focus on all refugees who became eligible to work in a city where gig work was available and train an elastic net regularization model to predict whether they actually take up a gig job. The set of predictor variables includes the age at labor market access, the length of the asylum process, and the indicators $HighNetworkExposure$ and $HighNetworkEmployment$ that equal to one if an above-median share of refugees from the same region of origin and age group in the respective location is employed in OFD firms (or employed in general). In addition, the predictor variables include an indicator whether the refugee has participated in a training program offered my the AMS prior to labor market access. Such training programs include language classes and are thus an important indicator for whether the refugee invests in specific skills for the Austrian labor market. Appendix Table A.3 shows the estimated coefficients for the elastic net. Quite intuitively, the probability to work in a gig job declines with age and is higher if the share of network members in the OFD industry is high. A longer duration of the asylum procedure and participation in labor market training offered by the AMS are also related to a higher take-up of gig work. The network employment dummy is excluded by the elastic net.

Second, we turn to the potential control refugees who became eligible in a city where gig work was not available. For each potential control unit, we compute two measures of similarity to individuals in the treatment group: (a) the Mahalanobis distance based on all variables selected by the machine learning algorithm in the first step, and (b) the predicted propensity score of taking up gig work based on an out-of-sample prediction from the elastic net regularization model from the first step.

Third, we select the nearest neighbor for each refugee who took up gig work by choosing the control unit with the closest Mahalanobis distance and the closest propensity score, respectively.

Panel A of Table 6 shows that the Mahalanobis distance matching procedure successfully eliminates the differences in the matching variables between individuals who take up gig work in the first year after labor market access (the treatment group) and the matched individuals without gig work opportunities available (the control group). Similar to the whole sample of

refugees in the OFD industry (see Table 2), our matched treatment and control group consist of relatively young individuals whose asylum process took relatively long. Both groups are also similar in terms of their network exposure to the gig economy and their pre-labor market access behavior.[23] Panel B of Table 6, however, shows stark difference in their employment outcomes in the first year. Refugees in the treatment group are on average employed in 56% of the months within the first year. In 46% of the months, they have a job in an OFD firm, in 12% of the months they have a non-OFD job (indicating that there is a small overlap of refugees who simultaneously hold OFD and non-OFD jobs). In contrast, similar refugees in the control group—who do not have the option to work in an OFD firm because gig work is not (yet) available in their location—are only employed in 28% of the months, exclusively in non-OFD firms. The difference is also reflected in the time it takes until the first employment spell starts. While gig workers need on average 4 months until they start working, it takes almost 8 months in the matched control group. Interestingly, conditional on being employed wages do not differ between refugees in the treatment and control group, both amounting to about 1120 EUR on average. However, the composition of wages in the treatment group indicates that average wages from spells in OFD firms are higher at about 1290 EUR while average wages from spells in non-OFD firms are substantially lower at about 730 EUR. The combination of faster job finding and similar average wages results in substantially higher earnings being accumulated in the treatment group within the first year.

Appendix Figure A.2 shows the overlap in propensity scores before (Panel a) and after (Panel b) the matching procedure indicating that propensity score matching also performs well, although overall levels of the propensity score are relatively low.

5.2 The Effect of Gig Work in the First Year on Labor Market Outcomes in the Second Year

To estimate the effect of taking-up gig work after labor market access on subsequent labor market outcomes, we specify the following regression equation in the sample of refugees in the treatment and control groups:

$$Y_{ic24} = \alpha_c + \gamma_m + \beta \, \text{Gig Worker}_{i1-12} + \Gamma X_{ic24} + \epsilon_{ic24} \tag{4}$$

where Y_{ic24} is one of our outcome variables for worker i in city c, measured two years after labor market access, i.e., at time $t = 24$. Fixed effects for cities (α_c) and calendar months (γ_m) are included throughout and control for unobserved level differences between locations and across time. Gig Worker$_{i1-12}$ is an indicator whether individual i has worked in the OFD industry within the first year after access and, hence, is part of the treatment group. We also include a vector of control variables, X_{ic24}, that includes refugee-specific characteristics (age at the time of eligibility to enter the labor market, the time that the individual already spent in Austria, dummies for 21 different regions of origin, and dummies for the year of entering the Austrian labor market) and local labor market tightness in month $t = 24$.

[23] The dummy for having a high employment share in the local network is eliminated by the elastic net procedure. In Appendix C we show that our results are robust to including this variable.

Table 7 Panel A shows the results from estimating Equation (4) where the control group is determined via Mahalanobis distance matching. Refugees who take up work in an OFD firm within their first year in the Austrian labor market are 36 percentage points more likely to also be employed in an OFD firm at the end of the second year compared to similar individuals in the control group who did not have gig work opportunities when gaining labor market access. This difference indicates a high persistence of employment in the OFD industry, despite the high separation rates in such jobs. The higher employment in OFD jobs does not translate to a significantly higher overall likelihood to be employed after two years. In contrast to the large differences in employment in the first year, workers in control and treatment group are equally likely to be employed after two years. Wages earned two years after labor market access are significantly lower for workers in the treatment group. The magnitude is sizable and amounts to about 780 EUR per month. Average tenure is lower by almost 4 months for treated individuals, albeit not statistically significant. Moreover, gig workers who switch jobs are less likely to make an upward move in the distribution of AKM firm fixed effects by 23 percentage points.

These findings are in line with our previous findings on the labor market effects of gig availability, but add an important insight into the role of gig work as a potential stepping stone for refugees: Although gig work adds low-barrier work opportunities that accelerate job finding at the individual level, it appears to be a substitute for better-paid regular work in the medium run rather than a pathway into more and better employment.

To better understand the differences in outcomes between both groups, columns 8-15 consider various measures of the quality of their employer two years after labor market access. Refugees who started their career in gig jobs subsequently end up in smaller firms that on average pay lower wages, both in terms of median wages and AKM firm FEs. Treated workers are also more likely to be employed in firms with fewer Austrian coworkers, who are also younger on average and have lower estimated AKM worker fixed effects.

In the second part of Panel A, we document that the lower wages and lower levels of firm quality are not only due to the higher prevalence of gig jobs in the treatment group, but are also found when we only compare treatment and control workers in non-OFD jobs in the second year. This finding suggests that even when gig workers have managed to transition out of gig jobs into more regular jobs, they end up in worse employment relations than similar individuals who did not have the chance to take up gig work in their first year.

Table 7 Panel B shows very similar results for the sample where the control group is determined using propensity score matching. Appendix C.2 provides additional sensitivity checks. In particular, we vary the estimation of standard errors, adjust the time period to balance treatment and control group in our sample, and include additional variables in our matching procedure. Our results remain unchanged.

6 Conclusion

We estimate the causal effect of the availability of employment opportunities in the gig economy on the labor market integration of refugees. We focus on online food delivery and examine the market for delivery riders in the six largest cities in Austria. Starting in Vienna in 2015,

OFD firms have gradually expanded over time. During the same years, a large number of asylum seekers has entered Austria. Asylum seekers are quasi-randomly allocated to locations in Austria. While waiting for an asylum decision, they are excluded from the Austrian labor market. When a positive decision is made, refugees are eligible to work. Upon gaining access to the labor market, they face vastly different possibilities to work in the gig economy, depending on the time of the decision and where they are located. We exploit these two sources of variation and examine the impact of having gig work available at labor market access. We find a positive impact on taking up OFD work, but no discernible effect on overall employment. Hence, the gig economy does not induce additional refugees to enter the labor market in the medium term. Our evidence suggests that refugees in cities with gig availability start employment somewhat faster. However, they also face less favorable employment conditions as indicated by higher turnover, slightly lower wages, and fewer opportunities to climb up the job ladder. Finally, the availability of gig jobs reduces the take-up of training programs. In line with recent evidence on the impact of work-first policies (Arendt, 2022; Arendt and Bolvig, 2023), this finding suggests that incentivizing refugees to quickly take up employment might not be the most successful integration strategy in the medium term as it could distort investments in human capital and reduce the intensity of search for better employment opportunities.

Why do refugees do gig work despite these less favorable prospects? Our results appear to rule out the hypothesis that most refugees would not find alternative employment outside the gig economy. However, we find evidence that some specific groups benefit from the availability of gig jobs, potentially due to other characteristics that make gig jobs particularly attractive for refugees. Some refugees, for example, might value having quick employment opportunities particularly high, e.g., because they are credit constrained or because it enables them to send home remittances. They might also value specific job amenities such as job flexibility higher than others. Finally, gig work might enable additional income opportunities, e.g., via higher tips or easier access to undocumented extensions in the shadow economy. Future work could aim to disentangle these channels in order to better understand why refugees get stuck in unfavorable gig jobs.

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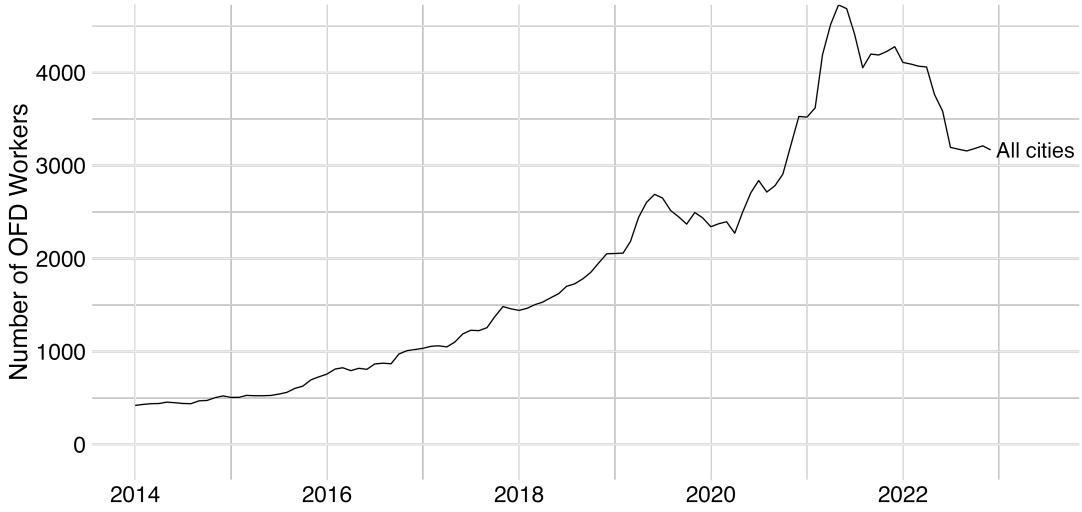
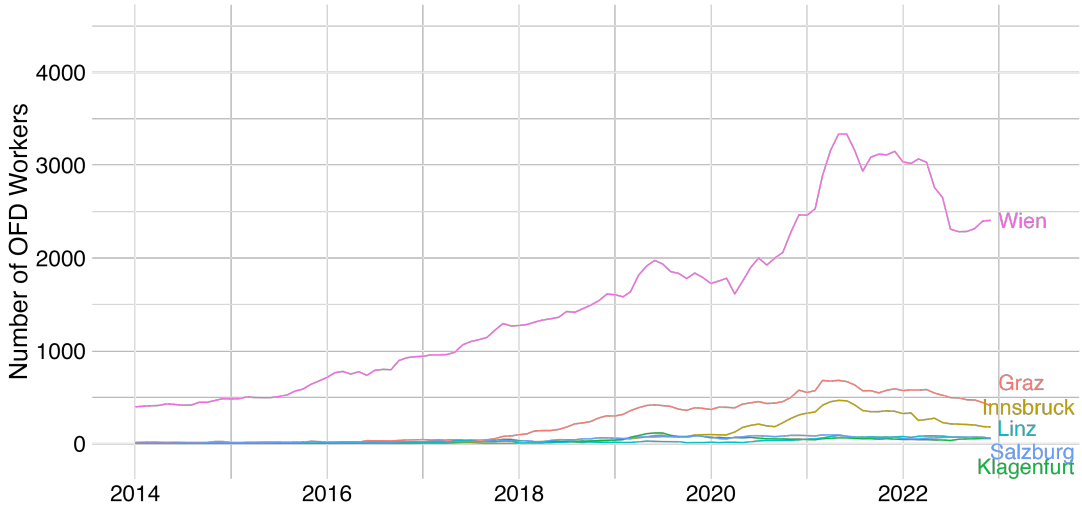
Figure 1: Numbers of Workers in the OFD Industry



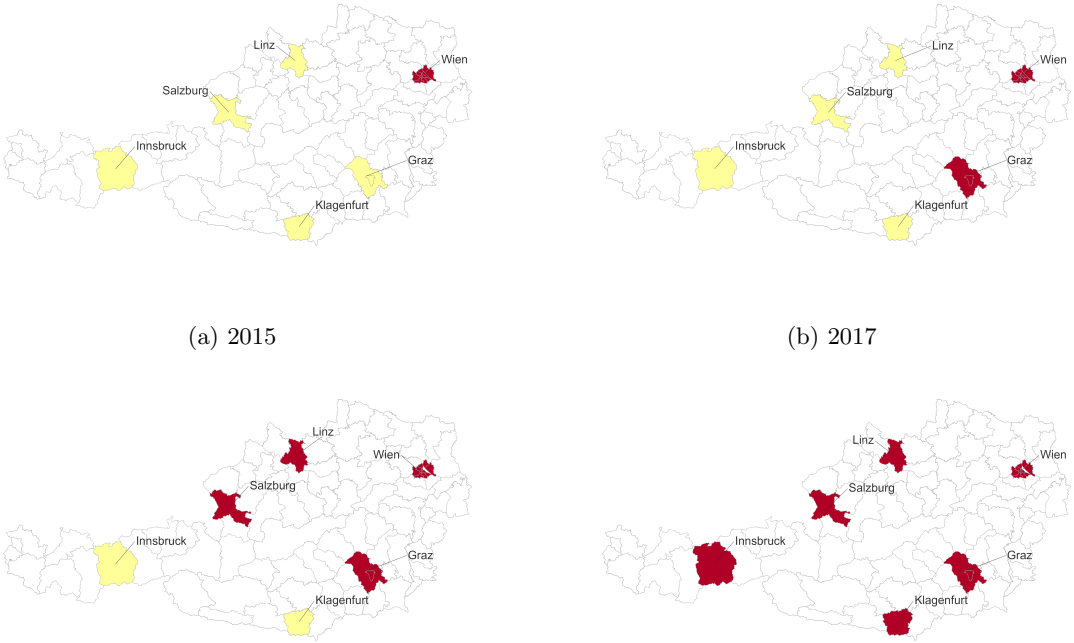
(a) Total employment



(b) Employment by city

Notes: This figure shows the number of workers employed in the OFD industry in the six largest Austrian cities for each month in the sample period from January 2014 to December 2022 (Panel a) and separately by city (Panel b). OFD firms are defined by our two-step procedure detailed in Appendix B.2. In total 21,500 individuals work in the OFD industry at some point during our sample period.

Figure 2: Expansion of OFD Firms in Austria



(a) 2015

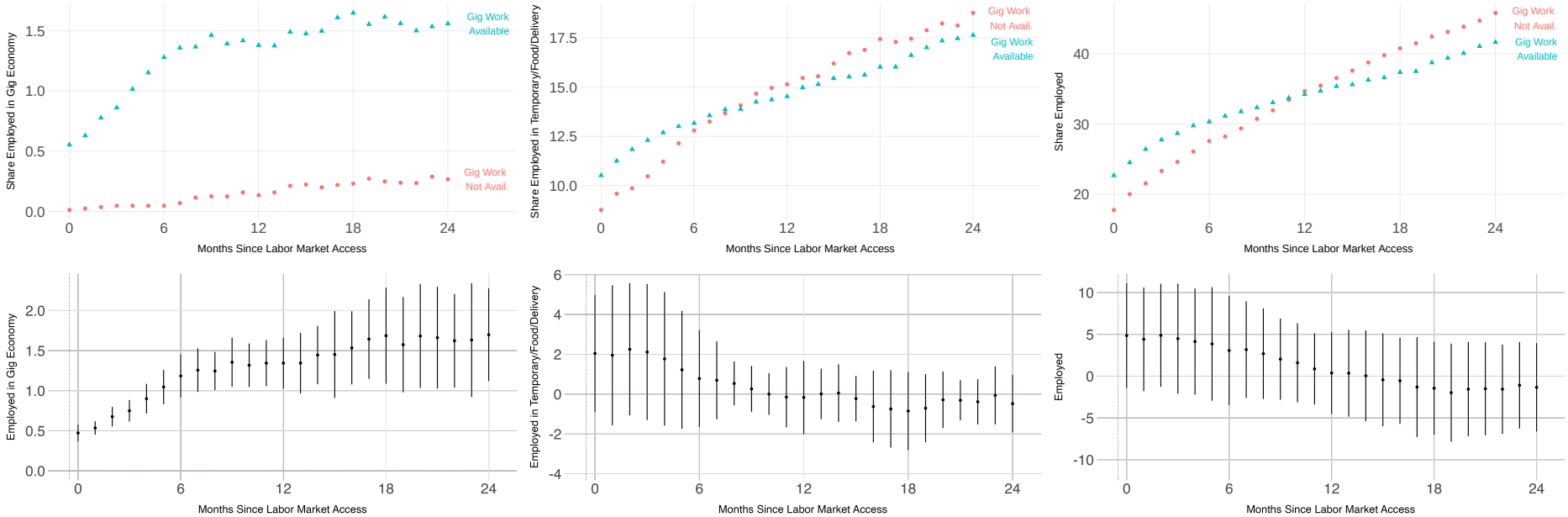
(b) 2017

(c) 2019

(d) 2021

Notes: This figure shows the spatial and temporal variation in the gig availability indicator across the six largest Austrian cities for various years (at the cutoff date of August 1st). Gig availability equals to one starting from the first month when a "bicycle delivery rider" vacancy opens up in a given city onwards, based on vacancy data provided by the Austrian Public Employment Service (AMS).

Figure 3: Gig Availability and Refugee Employment after Labor Market Access



(a) Employment in OFD Firms

(b) Employment in Temporary/Food/Delivery Sector

(c) Overall Employment

Notes: This figure shows descriptives and regression coefficients for the relation between employment rates of refugees in the two years after they became eligible to work in Austria and gig availability. The upper panels show sample averages, separating between refugees who become eligible in cities with (in blue) and without (in red) gig availability. The lower panels show monthly regression coefficients for the indicator of gig availability from estimating Equation (1) in our sample of refugees in the six largest Austrian cities. Panel (a) shows the share of refugees employed in OFD firms, Panel (b) shows the share of refugees employed in firms in Temporary Work, Food Services, or Delivery Services. Panel (c) shows overall employment.

Table 1: Summary Statistics on OFD Workers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OFD Workers				Temporary-, Food- & Delivery Workers				All Urban Workers			
	Mean	Median	p25	p75	Mean	Median	p25	p75	Mean	Median	p25	p75
Panel A. Demographics												
Share Female	0.14				0.36				0.45			
	(0.34)				(0.48)				(0.5)			
Share Non-Austrian	0.7				0.5				0.25			
	(0.46)				(0.5)				(0.43)			
Share Refugee	0.24				0.1				0.03			
	(0.43)				(0.31)				(0.16)			
Share Student	0.11				0.03				0.03			
	(0.31)				(0.16)				(0.18)			
Age	28.7	27	23	32	36.3	35	26	46	40.4	40	30	51
	(8)				(12.4)				(13)			
Panel B. Labor Market Outcomes												
Share Multiple Jobs	0.22				0.09				0.03			
	(0.42)				(0.29)				(0.17)			
Share Freelance Contract	0.51				0.02				0.01			
	(0.5)				(0.12)				(0.12)			
Share Marginally Employed	0.11				0.07				0.04			
	(0.31)				(0.25)				(0.19)			
Wage	1,071	866	408	1,546	1,606	1,552	1,003	2,140	1,928	1,885	633	2,839
	(910)				(926)				(1,476)			
Tenure	10.8	6	2	13	20.4	10	3	25	42.7	32	10	92
	(14)				(26)				(35.4)			
AKM Worker FE	4.22	4.2	4.07	4.34	4.26	4.23	4.09	4.41	4.3	4.28	4.13	4.47
	(0.24)				(0.24)				(0.25)			
Observations	3,489				206,230				2,936,850			

Notes: This table shows summary statistics for gig workers and two comparison groups for the month of August 2021. Columns 1-4 refer to all workers who are employed by an OFD firm. Columns 5-8 refer to all workers who are employed by firms in Temporary Work, Food Services, or Delivery Services. Columns 9-12 refer to all workers employed in one of the six largest Austrian cities. Wages are measured in EUR per month, tenure is measured in months.

Table 2: Summary Statistics on Refugees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Refugees in Large Cities				Refugees in OFD Firms			
	Mean	Median	p25	p75	Mean	Median	p25	p75
Panel A. Demographics								
Share Afghan	0.23				0.52			
	(0.42)				(0.5)			
Share Syrian	0.51				0.31			
	(0.5)				(0.47)			
Age at Entry (in years)	27.8	27	23	32	24.4	23	21	26
	(5.6)				(4.2)			
Length of Asylum Procedure (in months)	26.8	18.57	10.4	38.2	42.73	41.65	15.27	66.33
	(21.19)				(26.14)			
Panel B. Labor Market Outcomes								
Two Years after Migration								
Share Employed	0.12				0.24			
	(0.32)				(0.42)			
Wage	1,291	1,370.48	780.66	1,736.35	1,323.12	1,391.74	850.74	1,738.47
	(657.28)				(686.21)			
One Year after Labor Market Access								
Share Employed	0.34				0.72			
	(0.47)				(0.45)			
Share Multiple Jobs	0.04				0.12			
	(0.19)				(0.33)			
Share Freelance Contract	0.02				0.5			
	(0.13)				(0.5)			
Wage	1,390	1,459	1,036	1,792	1,284	1,379	887	1,640
	(659)				(619)			
AKM Worker FE	4.2	4.17	4.04	4.31	4.19	4.15	4.03	4.32
	(0.23)				(0.21)			
Tenure	6.5	6	2	11	5.1	4	2	7
	(4.4)				(3.8)			
Share in Training / Active Labor Market Policy	0.25				0.11			
	(0.43)				(0.32)			
Share Vocational Training	0.04				0.01			
	(0.2)				(0.12)			
Share Movers after Access	0.14				0.12			
	(0.34)				(0.33)			
Observations	32,837				969			

Notes: This table shows summary statistics on all refugees in our sample (columns 1-4) and refugees who work in OFD firms at least once in the two years after labor market access (columns 5-8). Labor market outcomes are measured two years after migration to Austria and one year after labor market access. The share of multiple jobs, the share freelance contracts, wages and tenure are conditional on being employed. Wages are measured in EUR per month, tenure is measured in months.

Table 3: The Effect of Gig Availability on Employment, Earnings, Job Stability and Quality, and Training

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Employment						Labor Income				Job Stability and Quality		Training	
	OFD	Temp./Food/Delivery		Cumulated Employment after				Cumulated Earnings after				Switch to	Labor Market	Vocational
	Firm	Firm	Overall	6 month	12 month	24 month	Wage	6 month	12 month	24 month	Tenure	Better Firm	Training	Training
Panel A. Extensive Margin														
Post	0.001	0.128***	0.334***	1.30***	3.38***	8.00***	1 464.43***	1 721.91***	4 679.52***	11 669.11***	6.42***	0.343***	0.159***	0.033**
	(0.001)	(0.018)	(0.058)	(0.25)	(0.66)	(1.37)	(48.83)	(364.19)	(980.96)	(2 191.44)	(0.19)	(0.009)	(0.017)	(0.009)
Gig availability × Post	0.012***	0.000	-0.002	0.26	0.25	-0.35	-61.64	194.51	-16.41	-1 503.33	-0.70***	-0.027**	-0.157***	-0.017*
	(0.001)	(0.004)	(0.019)	(0.15)	(0.24)	(0.63)	(36.21)	(212.67)	(397.59)	(1 161.95)	(0.13)	(0.009)	(0.013)	(0.009)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel B. Within City × Month Variation														
Post	0.000	0.126***	0.303***	1.41***	3.89***	9.22***	1 405.44***	1 837.83***	5 311.43***	13 458.25***	5.68***	0.341***	0.122***	0.018
	(0.000)	(0.020)	(0.052)	(0.21)	(0.33)	(0.48)	(43.07)	(284.59)	(515.90)	(872.09)	(0.21)	(0.018)	(0.018)	(0.009)
Gig availability × Post	0.003***	-0.011	0.001	0.20	-0.12	-1.01	-15.04	147.88	-543.47	-2 568.44*	-0.45	-0.015	-0.125***	-0.010
	(0.001)	(0.012)	(0.030)	(0.22)	(0.60)	(0.76)	(41.72)	(288.75)	(812.28)	(1 192.35)	(0.38)	(0.023)	(0.024)	(0.008)
High Network Exposure × Post	0.002	-0.012	-0.010	-0.13	-0.13	0.08	16.46	-155.64	-142.00	164.45	-0.15	-0.002	0.012	-0.004
	(0.001)	(0.020)	(0.031)	(0.21)	(0.44)	(0.50)	(25.89)	(306.07)	(687.30)	(929.79)	(0.21)	(0.011)	(0.015)	(0.015)
Gig Availability × Post × High Network Exposure	0.008***	0.004	-0.015	-0.09	-0.25	-0.22	-68.09*	-192.49	-495.01	-672.50	-0.04	-0.025**	-0.020	0.019
	(0.001)	(0.017)	(0.040)	(0.22)	(0.40)	(0.44)	(30.91)	(330.03)	(639.74)	(830.46)	(0.08)	(0.010)	(0.017)	(0.013)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739

Notes: This table shows coefficients from estimating the effect of gig availability on refugee labor market outcomes. Panel A estimates Equation (2). We report the coefficient for a dummy that equals to one in all periods after labor market access (*post*) and the coefficient for the interaction between *post* and gig availability. The outcome variables are a dummy for employment in an OFD firm, a dummy for employment in Temporary Work, Food Services, or Delivery Services, and a dummy for being employed. Further, we examine cumulated employment (in months) after 6 months, 12 months, and 24 months, monthly wages in EUR (conditional on working), cumulated earnings after 6, 12, and 24 months in EUR, tenure in months (conditional on working), and an indicator for switching to a better firm (conditional on switching employers). Finally, we consider an indicator for being enrolled in labor market training (conditional on being unemployed) and an indicator for conducting vocational training. All regressions control for city fixed effects, the age at the time of labor market access, the time since arrival in Austria, dummies for 21 regions of origin, dummies for the year of entering the Austrian labor market, and local labor market tightness. Standard errors are clustered at the city level. Panel B estimates the triple differences specification in Equation (3) using variation in exposure to the gig economy within city × month cells. We report coefficients on the *post* dummy, the interaction between the *post* dummy and the gig availability dummy, the interaction between the *post* dummy and the high network exposure dummy, and the triple interaction between the three dummies. The outcome and control variables correspond to those in Panel A. Additionally, we control for the share of refugees from the same origin who are employed three months earlier to labor market access. Standard errors are clustered at the city level.

Table 4: The Effect of Gig Intensity on Employment, Earnings, Job Stability and Quality, and Training

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Employment						Labor Income				Job Stability and Quality		Training	
	OFD	Temp./Food/Delivery		Cumulated Employment after				Cumulated Earnings after				Switch to	Labor Market	Vocational
	Firm	Firm	Overall	6 month	12 month	24 month	Wage	6 month	12 month	24 month	Tenure	Better Firm	Training	Training
Panel A. Intensive Margin														
Post	0.008***	0.129***	0.337***	1.49***	3.59***	7.94***	1 427.89***	1 888.34***	4 729.74***	10 872.81***	5.99***	0.325***	0.065**	0.022***
	(0.001)	(0.016)	(0.049)	(0.28)	(0.62)	(0.89)	(33.45)	(371.93)	(872.57)	(1 322.27)	(0.03)	(0.005)	(0.024)	(0.002)
Gig Intensity × Post	0.008***	-0.011	-0.032	-0.09	-0.16	-0.22	-43.82	-188.43	-368.09	-935.45	-0.47***	-0.015***	-0.070***	-0.011**
	(0.001)	(0.007)	(0.028)	(0.17)	(0.37)	(0.85)	(23.60)	(214.75)	(511.20)	(1 261.15)	(0.04)	(0.003)	(0.012)	(0.004)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel B. Mechanical Increase														
Post	0.000	0.132***	0.339***	1.41**	3.46**	7.66***	1 455.44***	1 828.30**	4 662.19**	11 009.28***	6.56***	0.342***	0.108*	0.031***
	(0.001)	(0.021)	(0.073)	(0.40)	(0.93)	(1.76)	(62.18)	(538.02)	(1 329.04)	(2 690.40)	(0.06)	(0.009)	(0.046)	(0.007)
Months since Gig Entry × Post	0.028***	-0.014	-0.021	0.19	0.33	1.09	-102.97	81.33	32.62	-523.48	-1.89***	-0.056**	-0.178**	-0.032*
	(0.001)	(0.009)	(0.056)	(0.27)	(0.83)	(2.73)	(76.59)	(359.50)	(1 213.60)	(4 240.87)	(0.12)	(0.016)	(0.052)	(0.015)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel C. Instrumental Variables														
Post	-0.005	0.129***	0.327***	1.23**	3.20**	7.08**	1 460.05***	1 617.04**	4 382.31**	10 633.20**	6.97***	0.345***	0.153***	0.037***
	(0.004)	(0.017)	(0.071)	(0.38)	(0.93)	(2.17)	(63.53)	(511.79)	(1 361.53)	(3 253.63)	(0.15)	(0.012)	(0.034)	(0.009)
Leave-one-out-instrumented Intensity × Post	0.012***	0.000	0.006	0.21**	0.33	1.20	-31.48	200.88	275.69	719.95	-0.89***	-0.019*	-0.082***	-0.016*
	(0.001)	(0.002)	(0.015)	(0.07)	(0.20)	(0.85)	(27.33)	(119.16)	(347.99)	(1 401.25)	(0.11)	(0.008)	(0.012)	(0.007)
First-stage F-stat	36,224	36,224	36,224	2,412	2,568	4,205	8,990	2,412	2,568	4,205	8,990	1,620	20,532	36,224
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739

Notes: This table shows coefficients from estimating the effect of gig intensity on refugee labor market outcomes. In Panel A, gig intensity is defined as the share of OFD workers in local employment averaged over the three months before labor market access. In Panel B, we define a mechanical measure of gig intensity that for each city linearly increases with the number of months since the first "bicycle delivery rider" vacancy was offered in that city. In Panel C, we instrument our baseline measure of gig intensity with the leave-one-out share of gig employment in all other cities. Details are provided in Section 4.3. The estimation is based on Equation (2). The outcome and control variables correspond to those in Table 3. Standard errors are clustered at the city level.

Table 5: Heterogeneity in the Effect of Gig Availability on Labor Market Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Employment						Labor Income				Job Stability and Quality		Training	
	OFD	Temp./Food/Delivery		Cumulated Employment after				Cumulated Earnings after				Switch to	Labor Market	Vocational
	Firm	Firm	Overall	6 month	12 month	24 month	Wage	6 month	12 month	24 month	Tenure	Better Firm	Training	Training
Panel A. Length of Asylum Procedure														
Gig Availability × Post	0.010***	-0.005	-0.033	0.08	-0.19	-0.91	-72.57*	-13.61	-579.63	-2 256.45	-0.86***	-0.039*	-0.185***	-0.020*
0-75th percentile	(0.001)	(0.004)	(0.017)	(0.08)	(0.17)	(0.76)	(34.94)	(110.34)	(323.13)	(1 311.21)	(0.18)	(0.018)	(0.013)	(0.008)
Observations	481,791	481,791	481,791	41,989	39,507	35,632	138,396	41,989	39,507	35,632	138,396	24,914	275,407	481,791
Gig Availability × Post	0.015***	0.021*	0.080**	0.85***	1.57***	1.02	-41.29	890.71**	1 553.95*	-203.60	-0.46**	-0.001	-0.070***	0.003
> 75th percentile	(0.002)	(0.008)	(0.029)	(0.19)	(0.36)	(0.56)	(42.08)	(300.25)	(669.22)	(1 184.95)	(0.14)	(0.011)	(0.016)	(0.010)
Observations	166,427	166,427	166,427	14,172	13,505	12,144	83,659	14,172	13,505	12,144	83,659	10,188	54,916	166,427
Panel B. Age at Labor Market Access														
Gig Availability × Post	0.010***	0.000	-0.012	0.22	0.13	-0.69	-64.59	134.45	-223.53	-2 196.98	-0.74***	-0.029**	-0.168***	-0.012*
> 21 years	(0.001)	(0.004)	(0.019)	(0.15)	(0.24)	(0.71)	(37.04)	(218.41)	(418.00)	(1 301.55)	(0.15)	(0.010)	(0.018)	(0.005)
Observations	542,872	542,872	542,872	47,512	44,689	40,102	184,409	47,512	44,689	40,102	184,409	29,483	282,814	542,872
Gig Availability × Post	0.019***	-0.002	0.029	0.44**	0.70**	0.40	-49.11	464.64*	695.75	-12.44	-0.48**	-0.023	-0.110***	-0.026
≤ 21 years	(0.001)	(0.007)	(0.025)	(0.15)	(0.27)	(0.50)	(38.15)	(208.99)	(415.29)	(943.24)	(0.14)	(0.022)	(0.024)	(0.020)
Observations	155,867	155,867	155,867	9,720	10,386	11,253	53,436	9,720	10,386	11,253	53,436	6,169	67,542	155,867

Notes: This table shows coefficients from estimating the effect of gig availability on refugee labor market outcomes in different subgroups of the refugee population. We estimate Equation (2) and report the coefficient for the interaction between *post* and gig availability. Panel A separates between refugees in the bottom three quartiles of the distribution of the length of the asylum procedure and those in the top quartile. The quartiles are computed separately for each year. Panel B separates between refugees above 21 years of age and those below. The outcome and control variables correspond to those in Table 3. Standard errors are clustered at the city level.

Table 6: Refugees in Gig Work and a Matched Control Group

	(1)	(2)	(1) - (2)
	Gig in First Year	Matched Control Group	p-Value
Panel A. Matched Covariates			
Length of Asylum Procedure (in months)	30.57	30.46	(0.954)
Age at Entry (in years)	25.46	25.97	(0.125)
Potential Gig Network	0.77	0.75	(0.571)
Share in Training / Active Labor Market Policy	0.72	0.68	(0.373)
Panel B. Differences in Outcomes			
Share Employed	0.56	0.28	(0.000)***
Employed in OFD Firm	0.46	0.00	(0.000)***
Employed in Non-OFD Firm	0.12	0.28	(0.000)***
Sectoral Shares			
Accomodation / Food Service Sector	0.14	0.30	(0.000)***
Manufacturing Sector	0.01	0.12	(0.000)***
Construction Sector	0.014	0.059	(0.000)***
Wholesale / Retail Sector	0.026	0.092	(0.000)***
Facilities Sector	0.011	0.039	(0.000)***
Temporary Work Sector	0.059	0.148	(0.000)***
Transportation Sector	0.026	0.055	(0.000)***
Health Sector	0.011	0.039	(0.000)***
Other Sector	0.70	0.13	(0.000)***
Months until First Employment	3.9	7.8	(0.000)***
Wage	1,121.8	1,122.9	(0.961)
Wage in OFD Firm	1,286		
Wage in Non-OFD Firm	726	1,123	(0.000)***
Cumulated Earnings after 1 year	7,029	4,949	(0.000)***
Cumulated Employment after 1 year	5.9	3.7	(0.000)***
Observations	447	447	

Notes: This table shows summary statistics on refugees employed in an OFD firm within the first year after labor market access and the matched control group defined by nearest neighbor in terms of the Mahalanobis distance based on the matching variables. Panel A shows averages of the matching variables for both groups as well as the p-value for the test of equality in the two samples. The matching variables are determined in a pre-step by estimating an elastic net regularization model. Details are provided in Section 5.1. Panel B shows average labor market outcomes in the first year after labor market access. Wages are measured in EUR per month.

Table 7: The Effect of Taking Up OFD Work in the First Year on Labor Market Outcomes in the Second Year

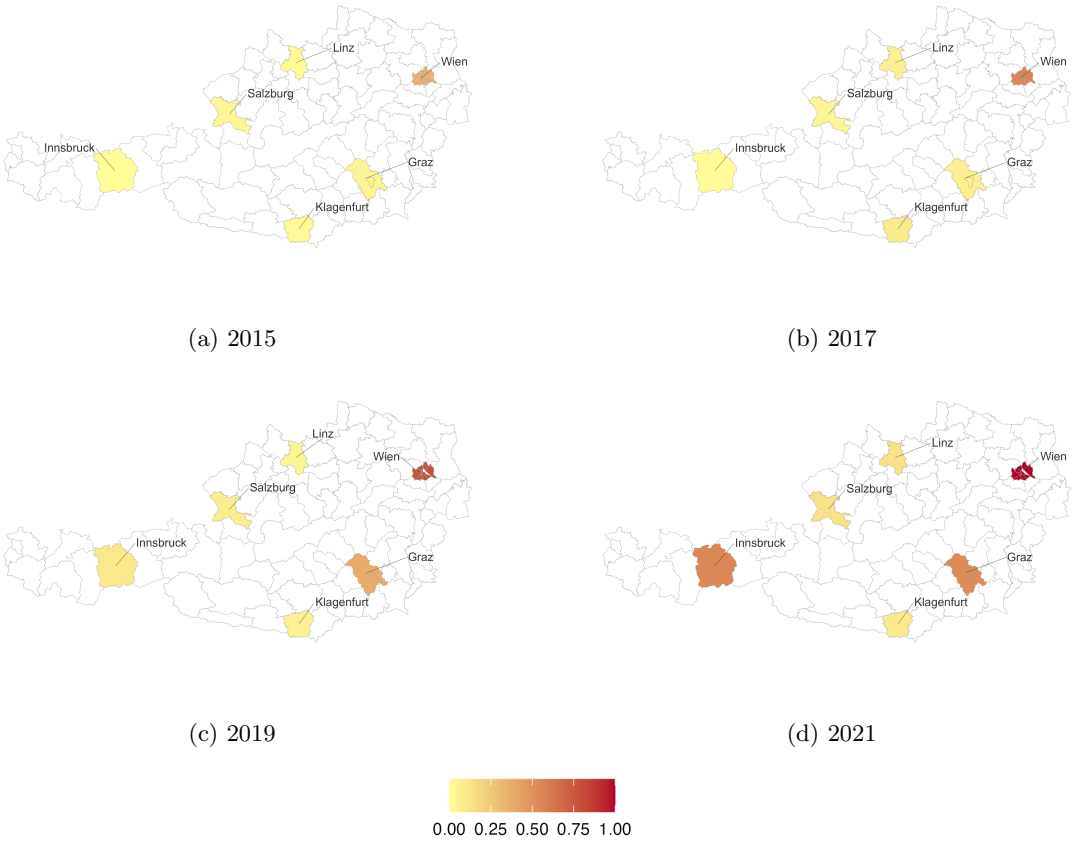
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Employment and Wages			Job Stability and Quality		Firm and Coworker Characteristics					
	OFD Firm	Overall	Wage	Tenure	Firm FE Change	Firm FE	Firm Size	Median Wage	Share Austrians	Avg. Age	Avg. Worker FE
Panel A. Mahalanobis Distance Matching											
Gig Worker	0.360**	-0.010	-780.22***	-3.93	-0.23***	-0.27*	-962.40	-302.59	-0.33*	-7.81***	-0.09**
	(0.105)	(0.110)	(156.64)	(2.31)	(0.035)	(0.108)	(957.176)	(176.645)	(0.141)	(1.382)	(0.031)
Observations	585	585	309	309	172	244	258	258	258	258	256
Gig Worker		-0.084	-484.65**	-3.30	-0.23*	-0.31*	-1 260.63	-402.46	-0.35*	-5.12**	-0.08
Outcomes without OFD Firms		(0.106)	(132.94)	(2.66)	(0.092)	(0.154)	(1 188.837)	(318.494)	(0.138)	(1.878)	(0.051)
Observations		521	247	247	128	193	214	214	214	214	212
Panel B. Propensity Score Matching											
Gig Worker	0.382**	0.016	-688.43*	-4.13	-0.22	-0.15	-1 531.29	-505.12**	-0.33***	-4.59*	-0.10***
	(0.146)	(0.137)	(305.37)	(2.49)	(0.222)	(0.098)	(926.660)	(128.549)	(0.072)	(2.026)	(0.017)
Observations	592	592	326	326	176	262	285	285	285	285	284
Gig Worker		-0.065	-401.96	-4.65	-0.31	-0.10	-1 279.02	-522.63*	-0.31**	-1.22	-0.10**
Outcomes without OFD Firms		(0.170)	(269.84)	(3.27)	(0.318)	(0.104)	(1 022.534)	(231.373)	(0.111)	(1.840)	(0.025)
Observations		529	266	266	133	213	242	242	242	242	241

Notes: This table shows results from estimating Equation (4) in the sample of refugees employed in an OFD firm within the first year after labor market access and a matched control group of similar non-OFD workers who did not have gig work available when gaining labor market access. We report the coefficient on the treatment dummy of taking up gig work within year one. The outcome variables are measured two years after labor market access. We consider an indicator for being employed in an OFD firm two years after labor market access, an indicator for being employed, and the monthly wage two years after access. Further, we examine tenure in the current job and an indicator whether the AKM firm effect of the current job is larger than the firm effect of the first job (conditional on switching). Finally, we consider several characteristics of the current firm two years after access (conditional on being employed), in particular, the AKM firm effect, firm size, the median wage among all employees, the share of Austrian and female employees, the average worker age, and the average AKM worker fixed effect. All regressions control for city and calendar month fixed effects, age at the time of eligibility to enter the labor market, the time that the individual already spent in Austria, dummies for 21 different regions of origin, dummies for the year of entering the Austrian labor market, and a time-varying measure of local labor market tightness. Standard errors are clustered at the city level.

ONLINE APPENDIX

A Additional Figures and Tables

Figure A.1: Expansion of OFD Firms in Austria – Gig Intensity



(a) 2015

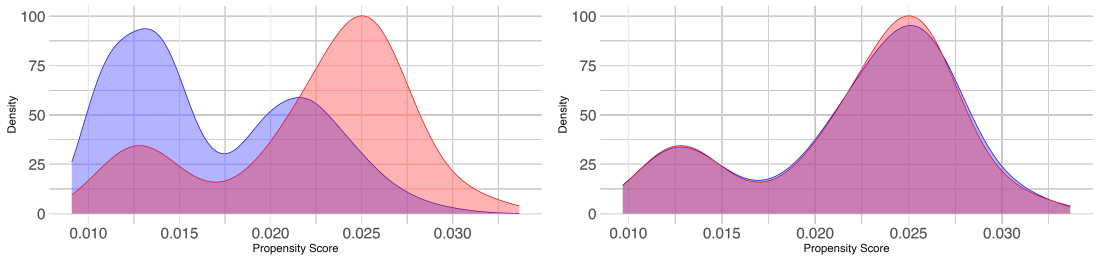
(b) 2017

(c) 2019

(d) 2021

Notes: This figure shows the spatial and temporal variation in gig intensity across the six largest Austrian cities for various years (at the cutoff date of August 1st). Gig intensity is defined as the share of workers employed in an OFD firm among all employed workers in the given city, aggregated over the three previous months.

Figure A.2: Kernel Density Plots of Propensity Scores in Treatment (red) and Control (blue) Group



(a) Kernel Density before Matching

(b) Kernel Density after Matching

Notes: This figure plots the distribution of estimated and predicted propensity scores for the treatment group of refugees who took up gig work in the first year after labor market access (in red) and the potential control group of refugees who entered a city without gig availability (in blue). Panel (a) plots the distributions before matching and panel (b) plots the distribution after selecting the nearest neighbors.

Table A.1: Determinants of Refugee Allocation to Austrian Counties

	(1)	(2)	(3)	(4)
	All Austria			Six largest
	AMS regions	Counties	States	Cities
Log Population	0.73***	0.69***	0.82***	0.25
	(0.11)	(0.07)	(0.09)	(0.21)
Log Population Density	0.32**	0.54**	-0.05	0.87*
	(0.12)	(0.17)	(0.17)	(0.30)
Unemployment Rate	0.098	0.044	0.036	-0.16
	(0.062)	(0.052)	(0.092)	(0.125)
Log Earnings per Capita	-1.51	-3.99	0.67	-15.12
	(1.15)	(2.27)	(5.32)	(8.35)
Log Average Age	-0.74	-0.09	-1.10	3.11
	(1.50)	(0.92)	(1.06)	(2.52)
Large City Dummy	0.12	0.05		
	(0.27)	(0.24)		
Log GDP per Capita		0.23	-0.07	-0.92
		(0.26)	(0.78)	(2.01)
Share with Primary Education			-0.034	
			(0.018)	
Share with Tertiary Education			0.013	
			(0.112)	
Log Living Space per Capita			-3.70	
			(2.24)	
Year Fixed Effects	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes		
R^2	0.78	0.88	0.93	0.93
Observations	665	279	72	48

This table examines the determinants of the refugee allocation to Austrian labor market regions (AMS regions), counties, states, and cities. AMS-regions for Vienna are aggregated to one region because not all variables are available at the AMS level. We regress the log of the number of male asylum seekers in a region on a range of region characteristics. Earnings per capita and average age are computed for full-time employed workers in our administrative data. The large-city dummy equals to one for the counties of the six large cities included in our sample. GDP per capita, the share of primary and tertiary education, and living space per capita are obtained from Statistics Austria. Primary education measures the share of 25-64 year old inhabitants with highest degree in ISCED categories 0-2, tertiary education measures the share of 25-64 year old inhabitants with highest degree in ISCED categories 6-8. Living space per capita originates from the Austrian Microcensus. All regressions are pooled estimations for the years from 2015 to 2022 and include year fixed effects. Standard errors are two-way clustered at the year and state level.

Table A.2: Potential Gig Network Descriptives

	(1)	(2)	(3)	(4)
	Mean	Std. Dev.	Median	Share Refugees with High Gig / Employment Network Exposure
Panel A. Network Gig Share				
Age Group 20-29	0.02	(0.06)	0.02	0.14
Age Group 30+	0.01	(0.03)	0.02	0.13
Panel B. Network Employment Share				
Age Group 20-29	0.37	(0.21)	0.38	0.48
Age Group 30+	0.47	(0.23)	0.45	0.48

Notes: This table shows summary statistics for the share of an individual's network at labor market access in OFD work and in overall employment in August, 2021.

Table A.3: Elastic Net Coefficients

Variable	Coefficient
High Network Exposure	0.24
Age at Entry (in years)	-0.11
Length of Asylum Procedure (in months)	0.09
In Training / Active Labor Market Policy before Labor Market Access	0.09
High Network Employment	.
Constant	-3.97

Notes: This table shows the coefficients for estimating the elastic net reguralization model in the sample of refugees who enter a city with gig availability. The outcome variable is an indicator that equals to one if the refugee takes up a job in an OFD firm within the first year after labor market access. The predictor variable High Network Employment is eliminated by the elastic net.

B Data Appendix

B.1 The Austrian Labor Market Database (AMDB)

The matched employer-employee data in the AMDB is compiled on the basis of information from the social insurance institutions in Austria. Since different social insurance institutions are responsible for different types of individuals, the origin of the data allows us to identify specific subgroups of the population. We make use of this feature to identify refugees by assessing whether a person receives the basic subsistence insurance for refugees.

AKM Wage Decomposition For part of our analyses, we use the matched employer-employee data in the AMDB to compute firm and worker fixed effects following Abowd et al. (1999) (henceforth AKM). The AKM model decomposes log wages for a given worker into a person effect, a firm effect, year fixed effects, a component reflecting the impact of observable characteristics, and a residual component.[24] The worker effect represents a portable component of wages that workers can take with them to other employers, often interpreted as capturing unobserved skills, but potentially also reflecting bargaining leverage or other individual wage determinants. We use the estimated AKM worker effects to provide a more comprehensive comparison of gig and non-gig workers. The firm effect represents a non-portable wage premium that applies to all workers employed at a given firm, often interpreted to be a function of the firm's productivity. We use the estimated AKM firm effects to proxy for the unobserved quality of firms, allowing us to assess the extent to which gig workers climb the job ladder.

B.2 Identifying OFD firms in the AMDB

Due to the rapid change in the OFD industry, locating OFD firms in anonymized administrative data poses several challenges. Reported industry codes do not necessarily reflect the actual business activity because revenues in OFD firms are generated from services that are in the range between offering a intermediary online platform, providing advertisements for restaurants, and offering food delivery services.[25] In addition, the complex company networks consisting of subcontractors and regional branches are not necessarily captured by common employer identifiers.[26] Finally, employer identifiers might change in the wake of mergers, acquisitions, or

[24] In our estimation, the observable characteristics included are a third-order polynomial in age, fully interacted with gender and nationality where the linear term is normalized to be constant above age 40, a second order polynomial in tenure, also fully interacted with gender and nationality, and an indicator for censored wages, i.e., wages above the social security limit which varies by year.

[25] Industry classifications are assigned by the Austrian Statistical Office based on a company's main business activity which is defined as the industry a company creates the most revenue in. Whenever the latter changes, the Austrian statistical office updates the NACE-code correspondingly (Statistik Austria, 2023).

[26] In general, the notion of an employer in the dataset is closer to a firm than to an establishment. Fink et al. (2010) contrast the number of employer IDs in the AMDB with the number of firms in the Austrian firm register.

re-brandings.

To identify OFD firms and workers in the AMDB, we exploit two patterns that are regularly observed in the OFD industry and help us to address the above-mentioned challenges. First, we filter the data for *changes* in the NACE industry classification of the same employer identifier over time. Such changes reflect the shift of (or some ambiguity about) the main business activity of OFD firms. In particular, we select all employer identifiers that have at some point been re-classified by the Austrian Statistical Office, changing from an industry associated with IT activities or online platforms to an industry associated with (food) delivery (or vice-versa).[27] We then exclude employer identifiers that experience additional re-classifications into an industry that is not (broadly) related to IT activities, web portals, or (food)-delivery.[28] We filter the selected firms for those that are located in the six largest Austrian cities.[29] This first step selects 173 potential OFD firms with 6,229 workers.

Second, we use a worker-flow approach to account for the potentially complex firm networks of subsidiaries, regional branches, and subcontractors, for mergers and acquisitions, and for the fact that some firms in the platform or food delivery industries might not be subject to changes in the industry code. The basic idea of the worker-flow approach is that, while employer identifiers often change when a firm undergoes re-naming or re-branding, mergers or acquisitions, or outsourcing to subsidiaries or subcontractors, typically a large number of employees jointly switches from one employer identifier to another. We therefore analyze worker flows to and from the 173 potential OFD firms identified in the first step. We add employer identifiers to the set of OFD firms if, within three months, we observe at least 50 workers switching to or from our initial sample of firms. Furthermore, we account for multiple job holding, a phenomenon commonly observed in the OFD industry, and add employer identifiers that have at least 25 workers who also work in one of our potential OFD firms. This procedure increases the number of employer identifiers in our final set of OFD firms slightly to 188 employers. The worker-flow approach increases the number of workers to 21,500 as some of the additionally detected firms are large players in the OFD industry created through takeovers of other companies.

The AMDB has more units than the firm register but the difference is small. As a consequence, the authors conclude that employers in the AMDB are mostly firms. We cannot verify whether this is specifically the case for the gig economy.

[27] In particular, we consider the NACE, Rev. 2 codes *6201 - Computer programming activities*; *6202-Computer consultancy activities*; *6209-Other information technology and computer service activities*; *6312-Web portals*; and *7311-Advertising agencies* for IT activities and NACE, Rev. 2 codes *4941-Freight transport by road*; *5629-Other food service activities*; *5320-Other postal and courier activities*; and *5610-Restaurants and mobile food service activities* for delivery services. These codes are selected on the basis of third-party information on the industry classification of known OFD firms in Austria and other European countries obtained from credit bureaus or company reports.

[28] We list all industry codes that we classify as broadly related to the OFD industry in Appendix Table B.1.

[29] In detail, we drop firms that have less than 80% of their employees living in one of the six biggest cities in Austria, or less than 60% living in one of the six biggest cities and surrounding labor market regions.

Validating the OFD Firm Expansion We trace back the staggered entry of OFD firms across the six cities in our sample using a variety of data sources in Table B.2. Column 1 reports the year when the number of employees in OFD firms according to our characterization in the AMDB exceeds 10. Column 2 is based on the vacancy data from the Austrian Employment Service (AMS) and reports the year in which the first job opening in the 6-digit occupation "bicycle delivery rider" was advertised. The first position as a rider was advertised in Vienna in 2015, followed by Graz (2017), Linz and Salzburg (2018), Klagenfurt (2019), and Innsbruck (2021). Column 3 is based on information obtained from company websites of the two dominant OFD firms, *Mjam/Foodora* and *Lieferando* using the Wayback Machine Internet Archive. We report the first year in which one of the two companies includes the respective city in the list of places where they are hiring on their recruiting web page for riders. Overall, the different sources paint a roughly consistent picture of market entry. There are deviations between sources but the overall pattern of gradual entry is matched across sources.

B.3 Identifying Refugees in the AMDB

During the application process, asylum seekers are enrolled in a specific health insurance (*Pflichtversicherung*), which is part of their basic subsistence support and allows us to identify them in the AMDB. In total, approximately 310,000 asylum seekers received this *Pflichtversicherung* between 2014 and 2022 in Austria. Hence, we observe about 82% of all 377,000 asylum seekers who entered the country in our sample period (see Section 3.1). The remaining share consists of individuals who are not registered in the health insurance for asylum seekers individually, which is mainly the case for dependent family members and in particular children of asylum seekers (Dellinger and Huber, 2021). Figure B.1a compares the official number of asylum seekers in Austria provided by the Federal Ministry of the Interior to the number of individuals enrolled in the *Pflichtversicherung* in our administrative data for each year. Although a fraction of asylum seekers consistently remains unobserved in our data, the highly volatile developments over time are captured with remarkable accuracy.

From the set of asylum seekers identified in our data, we select those individuals who received a positive asylum decision between 2014 and 2022. While we cannot directly observe the outcome of the asylum decision in our data, we proxy a positive asylum decision by instances where the *Pflichtversicherung* for asylum seekers ends and the individual enters a different labor market position (such as employment, receipt of unemployment benefits, social assistance, or other social security benefits).[30]

[30]The end of the *Pflichtversicherung* for asylum seekers indicates the end of receiving basic subsistence support. However, due to some transitional regulations, refugees in need can receive basic subsistence support for up to four month after obtaining protection and gaining full labor market access. We use the first month without

We classify around 134,000 refugees as having been granted asylum or subsidiary protection between 2014 and 2022. Hence, we capture about 68% of all 197,000 refugees who were granted asylum or subsidiary protection by the Federal Ministry in our sample period. This share equals the share reported in Dellinger and Huber (2021), who observe the actual outcome of the asylum procedure.[31] The remaining share is mainly due to family members of successful applicants.[32] Figure B.1b compares the official number of positive asylum (or subsidiary protection) decisions from the Ministry of the Interior to the number of successful applicants found in our data over time. Again, our data matches the patterns of positive asylum decisions well, despite consistently showing somewhat lower levels.

Sample Restrictions We employ a range of sample restrictions to construct our analysis sample. First, we exclude individuals who have worked in Austria in a previous year before returning to the country and applying for asylum; refugees who had an exceptionally short asylum procedure; and a few cases with missing information on location or nationality. Second, we focus on male refugees aged between 20 and 40 (corresponding to the 5th and 95th percentile of the age distribution among gig workers) who are allocated to one of the six largest Austrian cities. We incorporate the gender restriction because female refugees are substantially more likely to be part of a family reunion and, hence, the argument of quasi-random allocation is less plausible.[33] Finally, we drop refugees who, based on one of the exceptions listed in footnote 13, worked before gaining general access to the Austrian labor market. Table B.3 shows how these different steps affect our sample size. Our final sample consists of 33,962 refugees who gained access to the Austrian labor market between 2014 and 2022 in one of the cities we consider.

B.4 Measuring the Extent of OFD Jobs at the Intensive Margin

Our measure of the availability of gig jobs in a given city and month is based on vacancy data from the AMS. While providing an objective measure of the time when gig jobs became available in a given city, the vacancy data have some drawbacks for measuring the extent of gig work at the

Pflichtversicherung as indication for labor market access. To account for occasional data entry errors, we consider only cases where the individual has a labor market position other than *Pflichtversicherung* for a steady period of at least six month.

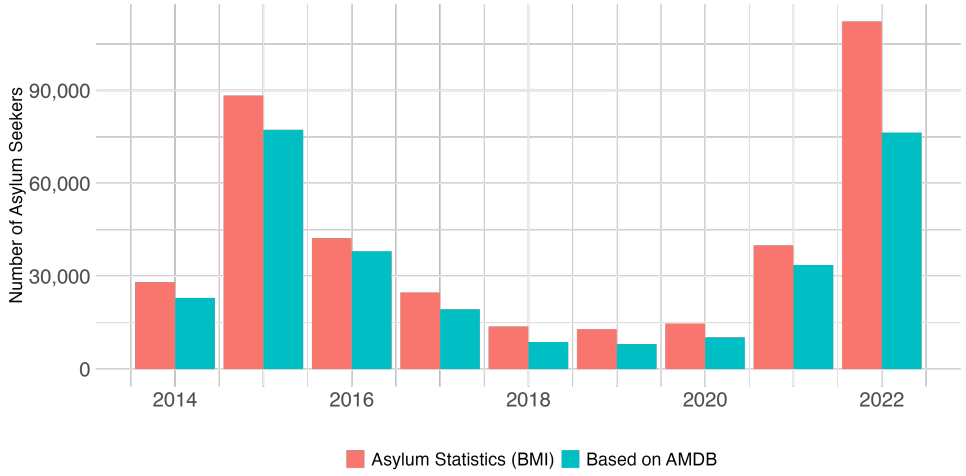
[31] Our sample period partly overlaps with the period analyzed by Dellinger and Huber (2021). For 2014-2018, they identify 73.7% of all asylum claims as successful applicants. Our approximation yields a share of 74.2%. We are thus confident that we capture granted asylums and subsidiary protection quite accurately.

[32] If a household head successfully applies for asylum, their family members automatically are also granted asylum. Hence, these family members will appear in the official counts of granted asylums. Many dependent family members and in particular children, however, are not individually insured or out of the labor force, and hence not appear in our social security data.

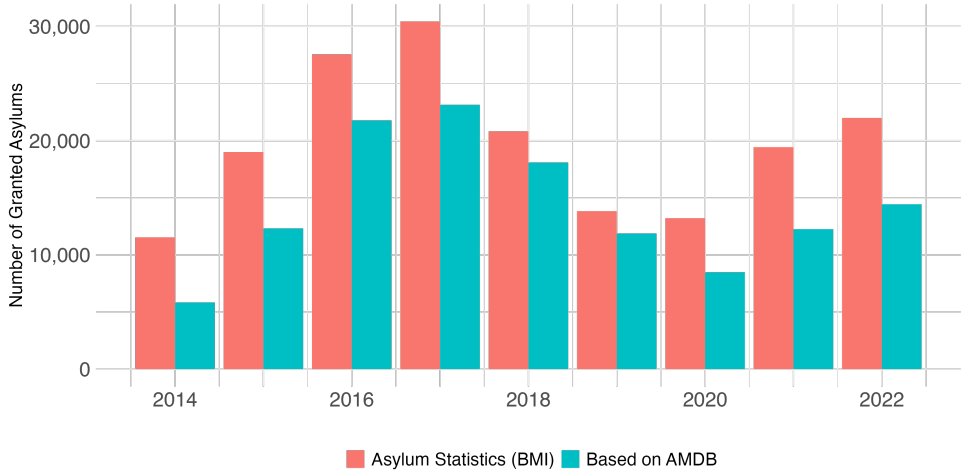
[33] Egger et al. (2021) study a similar allocation procedure for refugees in Switzerland. They find family reunions to be the main exception to random allocation, affecting mostly women joining their partners. The restriction to male workers has no substantial impact on our results as about 98% of refugees who work in the OFD industry are male.

intensive margin. Figure B.2 contrasts the number of gig vacancies with the number of workers employed in OFD firms (left column) and the number of new hires (right column) identified in our micro data, exemplarily for the two biggest cities, Vienna and Graz. The graphs show pronounced spikes in the number of AMS vacancies at the beginning when employment in OFD starts to rise. Similar spikes can be observed during the COVID-19 pandemic and in the most recent months. In between, however, there are no or only few vacancies posted at the AMS, while employment continues to rise during these periods. The discrepancy between vacancy posting and employment in OFD firms is reflected in the correlation between the two time series. At the beginning when gig firms enter a location, the two time series are highly correlated. Over time, however, the connection becomes weaker as illustrated in Panel (c) of B.2. The most likely reason is that registered vacancies cover only a small subset of the jobs that open up at gig firms, an industry with a high importance of job referrals. Most gig firms have explicit programs that incentivize their current employees to refer other potential employees to the firm, see, e.g., the Refer-a-Friend bonus at https://sites.google.com/foodora.at/rider-guide/english. Consequently, they might not rely on classical job ads once they have established a stock of workers in a given city. We therefore believe that our measure of gig intensity based on the observed OFD employment share in the matched-employer-employee data better captures the gradual growth of gig opportunities within locations over time.

Figure B.1: Asylum Statistics by Federal Ministry Compared to AMDB data



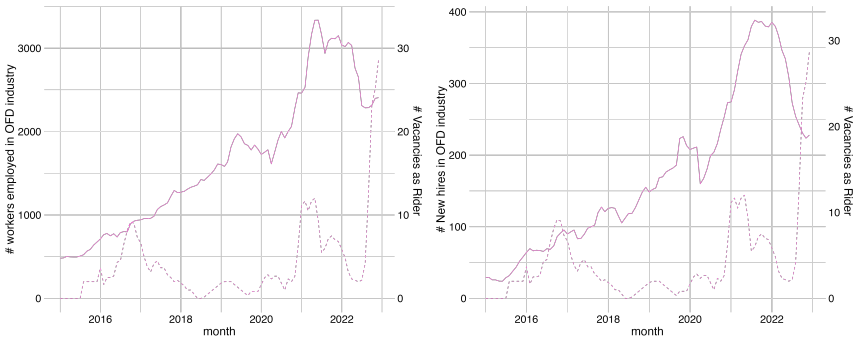
(a) Asylum Claims



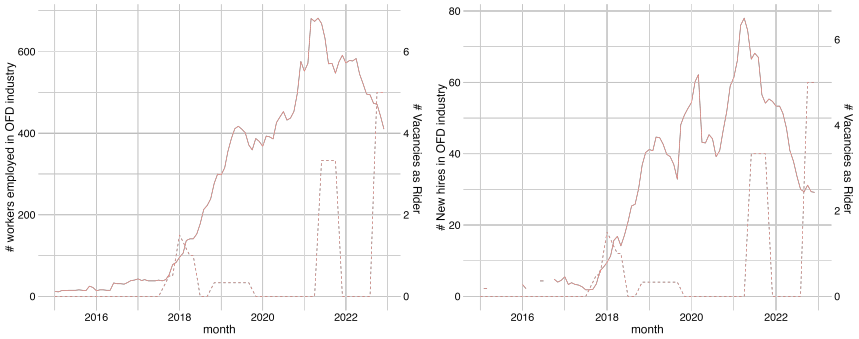
(b) Positive Asylum Decisions (Asylum + Subsidiary Protection)

Notes: This figure shows, for each year in our sample period, the number of asylum applicants (Panel a) and positive asylum decisions (Panel b). In Panel (a), we compare the official number of asylum seekers provided by the Federal Ministry of the Interior (*BMI*) in red to the number of individuals enrolled in the *Pflichtversicherung* in our administrative data in blue. The difference between the two numbers results from individuals who are not registered in the health insurance for asylum seekers individually, which is mainly the case for dependent family members and children of asylum seekers. The start of being enrolled in the *Pflichtversicherung* is our indicator for the entry of asylum seekers into Austria. In Panel (b), we compare the number of positive asylum decisions (defined as granted asylum and granted subsidiary protection) provided by the Ministry of the Interior in red to the number of cases where the *Pflichtversicherung* for asylum seekers ends and the individual enters a different labor market position (such as employment, receipt of unemployment benefits, social assistance, or other social security benefits) in our administrative data in blue. We use the first month without *Pflichtversicherung* as indication for labor market access of the refugee. Again, the difference is mainly due to family members of successful applicants who are not individually insured or out of the labor force.

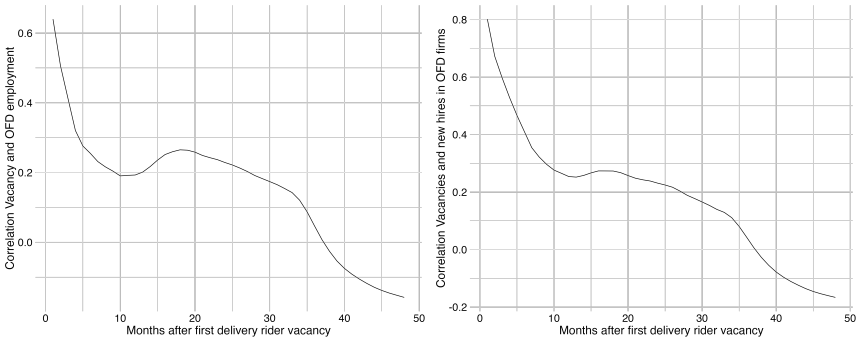
Figure B.2: Vacancies for "Bicycle Delivery Riders" (dotted) and OFD Employment (solid)



(a) Vienna



(b) Graz



(c) Correlation Coefficient

Employment New Hires

Notes: This figure contrasts the number of vacancies posted via the Austrian Labor Market Service (AMS) for the 6-digit occupation "bicycle delivery riders" with the number of employees (left column) and new hires (right column) in OFD firms according to our classification in the AMDB. Panel (a) focuses on Vienna. Panel (b) focuses on Graz. Panel (c) shows the correlation coefficient between both time series for all cities, calculated within the t months after the first "bicyvle delivery rider" vacancy posted in city c depicted on the horizontal axis.

Table B.1: NACE, Rev. 2 Codes and Industries Broadly Related to OFD

Broad Category	**NACE Code**	**NACE Industry Name**
IT Activities	6200	Computer programming, consultancy, and related activities
	6201	Computer programming activities
	6202	Computer consultancy activities
	6203	Computer facilities management activities
	6209	Other information technology and computer service activities
	6300	Not Specified
	6311	Data processing, hosting, and related activities
	6312	Web portals
Web Portals	7300	Not Specified
	7311	Advertising agencies
Food/Delivery	4619	Agents involved in the sale of a variety of goods
	4634	Wholesale of beverages
	4690	Non-specialized wholesale trade
	4719	Other retail sale in non-specialized stores
	4778	Other retail sale of new goods in specialized stores
	4791	Retail sale via mail order houses or via Internet
	4900	Land transport and transport via pipelines
	4941	Freight transport by road
	5200	Warehousing and support activities for transportation
	5210	Warehousing and storage
	5221	Service activities incidental to land transportation
	5300	Not Specified
	5320	Courier activities
	5600	Food and beverage service activities
	5610	Restaurants and mobile food service activities
	5621	Event catering activities
	5629	Other food service activities
Other Business Activities & Temporary Work	7810	Activities of employment placement agencies
	7820	Temporary employment agency activities
	7830	Other human resources provision
	8200	Not Specified
	8299	Other business support service activities not elsewhere classified
	9609	Other personal service activities n.e.c.

Notes: This table lists all NACE, Rev. 2 codes and industries that we (manually) classify as broadly related to the OFD industry. In the first step of our classification algorithm, we exclude all firms identified as potential gig firms that undergo a change of industry classification to a NACE code *outside* this list.

Table B.2: Roll-out of the OFD Industry across the Six Largest Cities

	(1)	(2)	(3)
	OFD Employment > 10	First Vacancy	Wayback Machine
Wien	2014	2015	2015
Graz	2017	2017	2018
Linz	2021	2018	2020
Salzburg	2019	2018	2018
Innsbruck	2020	2021	2018
Klagenfurt	2017	2019	2019

Notes: This table shows the year of entry of OFD firms for each of the six cities in our sample according to three different data sources. Column 1 is based on employment in OFD firms according to our characterization in the AMDB and reports the year when the number of employees in local OFD firms exceeds 10. Column 2 is based on the vacancy data, derived from job openings advertised via the Austrian Employment Service (AMS) and reports the year in which the first job opening in the 6-digit occupation "bicycle delivery rider" was advertised. Column 3 is based on information obtained from company websites of the two dominant OFD firms, *Mjam/Foodora* and *Lieferando* using the Wayback Machine Internet Archive. It reports the first year in which one of the two companies includes the respective city in the list of places where they are hiring on their recruiting web page for riders.

Table B.3: Construction of Sample for Refugees in the Six Largest Cities

Step	Sample Size
Refugees Registering for Asylum Procedure	342,968
Positive Asylum Decisions	134,619
Drop Individuals with...	
Registration not First Labor Market Position	124,987
Asylum Procedure Shorter than 30 Days	119,338
Missing Location and Nationality	119,248
Male Only	78,502
Age 20-40 (p5-p95 among Refugee Gig Workers)	54,071
Placed in one of the Six Largest Cities	38,211
Not Employed before Labor Market Access	32,837

Notes: This table shows the sample construction for our sample of refugees who gain access to the labor market in one of the six largest cities in Austria. We document the number of observations associated with each step in the construction of the sample.

C Sensitivity Checks

In this section, we provide additional robustness checks for our analyses of the effects of gig availability and gig take-up.

C.1 Sensitivity of the Effects of Gig Availability

The Computation of Standard Errors In our baseline specification, we cluster standard errors at the city level. However, the number of cities in our sample is relatively small. To address this issue, Table C.1, Panel A, shows standard errors clustered at the city × year-of-labor-market-access level in parentheses. The number of clusters increases to 60 without substantial changes to the estimated standard errors. In squared brackets, we show p-values from a wild cluster bootstrap procedure using our original city-level clusters. Again, we find significant effects for employment in OFD firms as well as for tenure, switches to better firms, labor market and vocational training, but no significant employment effects.

Changes in the Empirical Specification A more restrictive variant of Equation (1) includes dummy variables for each calendar month in the sample. This way, we allow for separate intercepts in each calendar month that capture more granular general time trends. Table C.1, Panel B, shows that our results are robust to including calendar month fixed effects. The cumulated employment and earnings effects are even somewhat more negative.

Potential Bias from Treatment Effect Heterogeneity In the presence of treatment effect heterogeneity, two-way fixed effects models with variation in treatment timing can be biased because the implicit weights used by the two-way fixed effects estimator to average group-specific treatment effects are generally not inversely proportional to group size and may even be negative (see, e.g., Roth et al., 2023). To our knowledge, none of the recently suggested solutions is directly applicable to our setting where most outcomes are fixed to zero by the strict labor market restrictions prior to labor market access. Nevertheless, following related work by Ahrens et al. (2024) we address the issue by showing that our results are robust to accounting for heterogeneous treatment effects along pre-specified dimensions. Table C.1, Panel C, shows results where we interact our treatment variable with group indicators for three different groups based on the year of labor market access (access in years 2014-2017, 2018-2020, and 2020-2022). We then aggregate the different treatment effects using group shares to avoid issues associated with negative weights. Our results are qualitatively and quantitatively very similar to the baseline, with slightly more negative employment effects and one deviation regarding switches to better firms. We obtain similar results when using heterogeneity along

the dimension of time spent in Austria before labor market access (not reported).

The Role of Welfare Benefits In addition to differences in local labor market opportunities, variation in the (local) level of welfare benefits could determine the take-up of employment among refugees. Welfare levels in Austria depend on the particular federal state and have undergone some reforms within our sample period (for a detailed account see Wett et al., 2024). In Panel D, we therefore include the benefit levels for refugees and for subsidiary protected individuals as additional control variables without changes in our estimates.

The Role of Geographic Mobility A potential concern with our findings is that, as soon as they become eligible for the Austrian labor market, refugees are free to move to any location in the country. The absence of any difference in employment rates between refugees who start in a labor market with and without gig availability could therefore be due to mobility responses. In particular, one might be concerned that workers switch from cities without gig jobs to cities that offer gig jobs.

To examine the role of mobility we estimate Equation (2) in the subsample of refugees who stay in their originally assigned state. Within the first two years after labor market access, these are about 85% of all refugees. The results, reported in Table C.1, Panel E, remain unchanged, suggesting that mobility towards high-intensity cities is not the reason for the convergence in employment and earnings after the first year.

A second check regarding spatial mobility concerns the occasional case of refugees who change their location prior to becoming eligible for the labor market. While the moving restrictions are strict and asylum seekers lose their entitlement to social benefits if they leave the state they are allocated to, there are a few exceptions where such mobility is possible, especially for bringing families together. To examine that our results are not affected by these pre-movers, we replicate our results in a sample where all refugees who switch their location before labor market access are dropped. Table C.1, Panel F, shows that, again, our findings are unchanged.

While our main results are not driven by the mobility towards cities with gig availability, we nevertheless observe an effect of gig jobs on the probability to switch location after becoming eligible to work in Austria. Column 6 of Table C.2 shows that refugees who gain labor market access in a city with gig jobs are about 7 percentage points less likely to move to a different city. This might reinforce our finding that the availability of low-barrier jobs in a given labor market reduces the scope and intensity of job search.

Employment prior to Labor Market Access As discussed in Section 3.1, the Austrian law allows for a few exceptions where asylum seekers can take up employment before receiving

general access to the Austrian labor market. In our baseline, we have excluded all individuals with an employment (or self-employment) spell before their asylum decision. In Table C.1, Panel G, we include these individuals, which comprise around 8% of all refugees in our sample. Including refugees who worked prior to receiving general access to the laboratory market leaves our findings unchanged, indicating that take-up of the work exceptions is not systematically related to gig opportunities. In addition, Table C.2, columns 8-9, show that there are no difference in the take-up of work exceptions between cities with and without gig availability or intensity, neither for employment in the sectors where work is permitted nor in starting self-employed businesses.

Age Range In our baseline specification, we restrict the sample to refugees aged 20 to 40. This choice reflects the dominant age range for workers in the gig economy. In Table C.1, Panel H, we extend the age range to 18-50 without changes to our findings. In Table C.2, columns 1-3, we examine the effects for refugees aged 50 or older. Due to the physical demands of the OFD industry it is quite unlikely that there are gig workers in this age group. In line with this, we do not find any effect of gig availability or intensity on OFD take-up for these older age group. At the same time, there are also no differences in overall employment for older workers, supporting the notion that labor markets with and without gig availability are similar except for the gig presence.

Definition of OFD Jobs Our outcome variable of taking up gig work relies on the data-driven definition of OFD firms described in Section 3. In Table C.2, columns 4-5, we examine an alternative definition that is independent of this procedure and instead uses the directly observable category of freelance contractors (*Freie Dienstnehmer*) to classify gig work. In column 4, we show that there is also a higher take-up of freelance jobs in cities and time periods where gig work is available or more intensely offered. In column 5, however, we see that this difference only derives from jobs that our data-driven approach classified as OFD jobs, lending support to the accuracy of this classification.

C.2 Sensitivity of the Effects of Gig Take-up

Table C.3 shows various sensitivity checks for the results based on our matching approach.

Standard Errors Our baseline estimates cluster standard errors at the city level, resulting in a small number of clusters. In Panel A, we compute two alternatives. In parentheses, we show clustered standard errors at the city $\times$ year-of-labor-market-access level, increasing the number of clusters to 60. In squared brackets, we show p-values based on a wild cluster bootstrap using

the original city-level clusters. Note that to compute wild cluster bootstrapped p-values we slightly adjust the model, excluding year-of-access dummies for computational reasons. In both cases our conclusions remain unchanged. We find significant differences in OFD employment in year 2 with lower wages, tenure, improvements in firm effects for the treatment group.

Balanced sample Our main sample includes all refugees who can still be observed two years after labor market access. The increase in gig availability over time creates an imbalance where refugees in the control group are more likely to be observed two years after access than those in the treatment group. The calendar month fixed effects at least partly account for this imbalance. Nevertheless, we repeat our matching and estimation for a subsample of individuals who received labor market access before 2022, allowing both treatment and control group equally to be in the sample after two years. Panel B shows that our results are robust to this change.

Additional Matching Variables In our baseline, we use the set of variables selected by the elastic net to compute the Mahalanobis distance between treatment and control units. In Panel C, we include the High Network Employment dummy that was eliminated by the elastic net. Overall, the results are very similar, with slightly positive but insignificant employment effects.

Employment prior to Labor Market Access In Panel D, we include workers who were employed prior to labor market access using one of the exceptions described in Section 3.1. We include the High Network Employment dummy and a dummy for whether an individual was employed before labor market access into the set of matching variables. Again, results are very similar with insignificant (but slightly positive) employment effects.

Table C.1: Sensitivity of the Effects of Gig Availability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Employment						Labor Income				Job Stability and Quality		Training	
	OFD	Temp./Food/Delivery		Cumulated Employment after				Cumulated Earnings after				Switch to	Labor Market	Vocational
	Firm	Firm	Overall	6 month	12 month	24 month	Wage	6 month	12 month	24 month	Tenure	Better Firm	Training	Training
Panel A. Baseline + Standard Errors														
Gig availability × Post	0.012***	0.000	-0.002	0.26	0.25	-0.35	-61.64*	194.51	-16.41	-1 503.33	-0.70**	-0.027**	-0.157***	-0.017**
	(0.003)	(0.017)	(0.045)	(0.25)	(0.56)	(0.99)	(30.83)	(337.15)	(770.83)	(1 426.03)	(0.32)	(0.012)	(0.023)	(0.007)
	[0.000]	[0.844]	[0.781]	[0.031]	[0.094]	[0.500]	[0.219]	[0.125]	[0.906]	[0.156]	[0.000]	[0.062]	[0.000]	[0.062]
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel B. Including Calendar Month Fixed Effects														
Gig availability × Post	0.009***	0.003	0.003	-0.07	-1.11***	-2.52***	-59.86	-220.51	-1 899.77***	-4 583.26***	-0.50***	-0.033**	-0.128***	-0.012
	(0.001)	(0.011)	(0.025)	(0.10)	(0.21)	(0.34)	(36.18)	(170.06)	(418.17)	(842.65)	(0.07)	(0.010)	(0.011)	(0.008)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel C. Addressing Treatment Effect Heterogeneity														
Gig availability × Post	0.003***	-0.011	-0.030*	-0.06	-0.25	-0.42	-23.44	-164.66	-425.32	-862.11	-0.24***	0.004**	-0.046***	-0.007**
	(0.001)	(0.007)	(0.018)	(0.10)	(0.23)	(0.32)	(19.40)	(153.86)	(366.76)	(573.14)	(0.03)	(0.002)	(0.011)	(0.003)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel D. Controlling for Welfare Benefits														
Gig Availability × Post	0.012***	0.000	-0.001	0.26	0.26	-0.36	-59.54	198.26	-10.46	-1 527.89	-0.67***	-0.026**	-0.158***	-0.017*
	(0.001)	(0.004)	(0.020)	(0.15)	(0.24)	(0.66)	(37.60)	(214.44)	(403.03)	(1 205.39)	(0.11)	(0.009)	(0.013)	(0.008)
Observations	698,739	698,739	698,739	57,232	55,075	51,355	237,845	57,232	55,075	51,355	237,845	35,652	350,356	698,739
Panel E. Only Stayers														
Gig Availability × Post	0.013***	-0.011	-0.023	0.18	0.00	-0.82	-90.47*	63.30	-485.43	-2 475.92	-0.82***	-0.042**	-0.147***	-0.023*
	(0.002)	(0.006)	(0.019)	(0.14)	(0.22)	(0.70)	(40.92)	(200.86)	(397.91)	(1 281.65)	(0.10)	(0.012)	(0.019)	(0.010)
Observations	610,811	610,811	610,811	54,104	51,358	47,265	206,440	54,104	51,358	47,265	206,440	34,328	307,996	610,811
Panel F. No Pre-Movers														
Gig Availability × Post	0.013***	0.002	0.002	0.29	0.35	-0.19	-62.63	226.74	86.16	-1 346.50	-0.68***	-0.028**	-0.153***	-0.018*
	(0.002)	(0.005)	(0.019)	(0.16)	(0.25)	(0.61)	(36.22)	(224.91)	(405.47)	(1 112.29)	(0.13)	(0.009)	(0.015)	(0.009)
Observations	625,554	625,554	625,554	51,323	49,387	45,899	218,231	51,323	49,387	45,899	218,231	32,184	309,855	625,554
Panel G. With Pre-Employed														
Gig Availability × Post	0.013***	0.005	0.010	0.43**	0.60**	0.29	-45.96	408.60*	464.18	-590.17	-0.60***	-0.021**	-0.140***	-0.017*
	(0.002)	(0.003)	(0.018)	(0.13)	(0.22)	(0.67)	(36.14)	(184.44)	(400.25)	(1 230.37)	(0.12)	(0.007)	(0.015)	(0.008)
Observations	793,373	793,373	793,373	65,292	62,720	58,244	298,649	65,292	62,720	58,244	298,649	42,064	373,074	793,373
Panel H. Age Range 18-50														
Gig Availability × Post	0.011***	0.001	0.002	0.27	0.30	-0.40	-56.58	221.44	85.06	-1 480.18	-0.70***	-0.023**	-0.142***	-0.020*
	(0.001)	(0.004)	(0.017)	(0.14)	(0.21)	(0.55)	(32.80)	(196.36)	(355.24)	(1 007.34)	(0.12)	(0.009)	(0.010)	(0.009)
Observations	857,283	857,283	857,283	71,097	68,129	63,149	271,122	71,097	68,129	63,149	271,122	43,464	434,012	857,283

Notes: This table provides sensitivity checks to our main results in Table 3. Panel A replicates our baseline coefficients and shows two additional ways to compute standard errors (based on city × year-of-access clusters in parentheses and p-values based on a wild cluster bootstrap in squared brackets). Panel B includes calendar month fixed effects. Panel C interacts the treatment variables with group indicators for different years of labor market access and aggregates the group effects using population weights. Panel D includes local welfare benefit levels (for single refugees) as an additional control variable. Panel E restricts the sample to refugees who stay in their originally assigned state. Panel F excludes all refugees who use one of the exceptions to switch their location before gaining labor market access. Panel G extends the sample to include individuals who used one of the exceptions to be employed or self-employed before labor market access. Panel H extends the sample to include individuals in the age range from 18 to 50 years. All outcome variables and control variables correspond to those in Table 3. Standard errors in Panels B to F are clustered at the city level.

Table C.2: Additional Robustness Results for the Effect of Gig Availability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Subsample of Individuals Aged 51-60			Freelance Contracts				Pre-Labor Market Access	
	OFD Firm	Temp./Food/Delivery Firm	Overall	With OFD	Without OFD	Moved City	Self-Employed	Employed	Self-Employed
Gig Availability × Post	0.000	0.001	-0.002	0.008***	0.000	-0.069**	0.001	-0.003	0.002
	(0.001)	(0.013)	(0.026)	(0.001)	(0.000)	(0.023)	(0.003)	(0.008)	(0.004)
Observations	32,877	32,877	32,877	698,739	659,525	698,739	698,739	31,915	31,915

Notes: This table provides additional results from estimating Equation (2) in varying samples. Columns 1-3 show employment effects for the sample of workers aged 51-60. Columns 4-5 examine the effect of gig availability on having a freelance job in our main sample and in our main sample excluding all spells in OFD firms. Column 6 examines the effect of gig availability on the probability to move away from the allocated city within the two years after labor market access. Column 7 examines the effect of gig availability on being self-employed after labor market access in our main sample. Columns 8-9 examine the effect of gig availability on taking up employment or self-employment before labor market access using one of the exceptions detailed in Section 3.1.

Table C.3: Propensity Score Matching Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Employment and Wages			Job Stability and Quality		Firm and Coworker Characteristics					
	OFD Firm	Overall	Wage	Tenure	Firm FE Change	Firm FE	Firm Size	Median Wage	Share Austrians	Avg. Age	Avg. Worker FE
Panel A. Main Results + Standard Errors											
Gig Worker	0.360***	-0.010	-780.22***	-3.93	-0.23***	-0.27**	-962.40	-302.59	-0.33**	-7.81***	-0.09**
	(0.082)	(0.138)	(235.24)	(3.18)	(0.067)	(0.125)	(1 138.338)	(184.025)	(0.142)	(2.555)	(0.033)
	[0.000]	[0.844]	[0.031]	[0.094]	[0.031]	[0.531]	[0.844]	[0.125]	[0.281]	[0.031]	[0.188]
Observations	585	585	309	309	172	244	258	258	258	258	256
Panel B. Labor Market Entry Before 2022											
Gig Worker	0.417**	0.011	-1 016.030**	-0.850	-0.160	-0.150	-284.280	-219.410	-0.370*	-6.820**	-0.060*
	(0.138)	(0.178)	(375.69)	(3.25)	(0.083)	(0.103)	(375.691)	(227.442)	(0.160)	(1.891)	(0.028)
Observations	370	370	213	213	141	177	185	185	185	185	183
Panel C. Including Employment Network Dummy											
Gig Worker	0.354**	0.103	-162.63	-6.70	-0.03	-0.16	175.02	-227.87	-0.22	-4.49***	-0.06**
	(0.092)	(0.090)	(140.40)	(3.66)	(0.038)	(0.087)	(572.471)	(122.497)	(0.156)	(1.100)	(0.022)
Observations	588	588	300	300	169	240	246	246	246	246	243
Panel D. Including Employment Network Dummy & Pre-Employment Dummy											
Gig Worker	0.445***	0.068	-489.81***	-3.08	-0.11**	-0.03	-1 800.79*	-550.08***	-0.37**	-5.76	-0.05
	(0.067)	(0.082)	(108.56)	(2.05)	(0.043)	(0.024)	(726.610)	(101.292)	(0.145)	(2.938)	(0.058)
Observations	771	771	429	429	250	342	347	347	347	347	345

Notes: This table provides sensitivity checks to the results in Table 7. Panel A replicates our baseline coefficients and shows two additional ways to calculate standard errors (based on city × year-of-access clusters in parentheses and p-values based on a wild cluster bootstrap in squared brackets). Panel B restricts the sample to those refugees who gained labor market access before 2022. Panel C includes the employment network dummy in the Mahalanobis Matching. Panel D includes also workers who were employed through one of the exceptions described in Section 3 before labor market access and includes the employment network dummy and a dummy for whether an individual was employed before access in the Mahalanobis matching procedure.