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Challenges and Opportunities for Refugee Entrepreneurship: Empirical Evidence from the 2014/15 Refugee Influx in Germany

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Furthermore, I would like to acknowledge the data and reports provided by various governmental and non-governmental organizations, which have been instrumental in my understanding of the integration efforts of refugees in Germany. The experiences of Syrian refugees in Germany have brought to light significant policy issues and underscored the necessity for sustained assistance and the implementation of effective integration strategies. It is my hope that this research will contribute to the development of policies that more effectively support refugees and facilitate their successful integration into society.

Finally, I would like to express my gratitude to my family for their continued support throughout this academic program.

HARTELIJK DANK
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Abstract

Purpose The impact of immigration on labor markets, business demographics, and the broader political economy is a highly debated topic, particularly in light of the recent displacement of millions of individuals due to conflicts in the Middle East and North Africa. Germany has been confronted with considerable socio-political challenges as a result of the considerable influx of refugees in recent years. These challenges include the equitable distribution of asylum seekers and the high fiscal costs associated with the response to the refugee crisis. Nevertheless, the integration of refugees can result in long-term advantages, including the alleviation of labor shortages and economic benefits.

Design/Methodology/Approach This research examines entrepreneurship as an alternative path to labor market integration, focusing on the short-term effects of the refugee influx on entrepreneurship in Germany, specifically business registrations and self-employment. Utilizing a natural experiment from the 2014/15 surge in asylum seekers and employing fixed effects panel regression and difference-in-differences methods, the study addresses endogeneity concerns through exogenous variation in refugee distribution.

Findings The findings indicate a modest negative impact on entrepreneurial activity in Germany, largely due to significant short-term fiscal costs and the strain on public resources resulting from elevated rates of unemployment among refugees. Although many refugees aspire to start businesses, few succeed due to substantial barriers within Germany's institutional and legal framework. The discrepancy between the immediate economic costs and the challenges refugees face in entrepreneurship restricts their ability to offset the initial public expenses associated with their arrival in the country.

Practical Implications It is crucial to establish an environment that is conducive to the success of refugee entrepreneurs and to facilitate their long-term success. Stakeholders from economic, administrative, political, non-profit, and social sectors must collaborate to enhance self-employment opportunities, improve access, disseminate information about the German economic system, and reinforce networking efforts.

Originality This study contributes to the growing body of knowledge on refugee entrepreneurship by underscoring the significance of providing support to refugee entrepreneurship as a means of facilitating economic integration and offering an alternative to traditional employment pathways. This study is among the first to empirically assess the impact of such a significant event in Germany on entrepreneurial activity, and to provide evidence on the implications for business registrations and self-employment numbers.

Keywords Refugee Entrepreneurship, Refugee Crisis, Labor Market Integration, Economic Integration, Germany

1 Introduction

The topic of immigration has become a key area of public debate, particularly in relation to its impact on labor markets, business demographics, and the broader political economy. (Shamsi 2024). The ongoing conflicts in the Middle East and North Africa (MENA) region have resulted in the displacement of millions, with the global refugee population approaching 60 million (UNHCR 2022). In Syria alone, around 13.5 million individuals require assistance, a development that has significantly heightened the discourse on the subject (Sameeksha Desai and Stel 2019; UNHCR 2022). In recent years, the European Union has been confronted with the profound consequences of civil war and conflict, which have resulted in a considerable surge in the number of refugees seeking asylum. Germany, in particular, has witnessed a notable rise in the number of refugees arriving at its borders from a multitude of crises regions, a trend that is anticipated to prevail in the foreseeable future (International Centre for Migration Policy Development (ICMPD) 2024). This influx has sparked significant public debate, as refugees introduce a range of socio-political challenges to host countries like Germany (Koch et al. 2023). Key issues include the equitable distribution of refugees within the country and the substantial fiscal costs associated with their reception and accommodation, encompassing housing construction, school integration, language and education programs, and public safety measures (Bach et al. 2017).

Despite these challenges, incorporating refugees into the economic system can be advantageous (International Centre for Migration Policy Development (ICMPD) 2024). Investments in language skills and educational qualifications for refugees are likely to yield significant long-term benefits, aligning with initial expectations that the influx of refugees would address the shortage of skilled labour and alleviate the burden on social systems (Bach et al. 2017). These long-term benefits present a significant opportunity for Germany, a country facing considerable demographic changes and a growing shortage of workers and trainees in many labour market segments (Angenendt, Knapp, and Kipp 2023). Thus, recognising refugees not only as a 'burden' but also as an 'investment in the future' will be a crucial societal task (Council of Europe 2023). While economic forecasts indicate promising long-term prospects for refugees, it is crucial to prioritize measures that will improve the current circumstances of those seeking asylum (Council of Europe 2023). Despite the fact that approximately half of those who have sought asylum in Germany since 2013 are currently in employment, the necessity for further integration measures is evident, particularly given the limitations of qualification transferability to the German labour market (Brücker et al. 2020; Kosyakova 2020).

The majority of studies on the professional integration of refugees focus on dependent employment, thereby overlooking the potential for immigration to drive the creation of new companies, stimulate innovation and generate new jobs (Chliova, Farny, and Salminvaara 2018). While for many, embarking on an entrepreneurial journey represents a significant challenge and is often perceived as an implausible option for those seeking to rebuild their lives in the aftermath of refugeehood, some refugees pursue entrepreneurial opportunities as a means of achieving self-sufficiency and financial stability (Alrawadieh, Cetin, and Karayılan 2018; Ortlieb and Knappert 2023). In fact, a notable proportion of refugees, particularly those from countries with a high prevalence of self-employment, indicate a preference for self-employment over wage consistency (Zalkat, Barth, and Rashid 2023). This potential is frequently overlooked in the public debate surrounding refugee integration, despite the fact that self-employment represents an alternative path to labour market integration (Bach et al. 2017). This thesis addresses this gap in the existing literature by providing empirical evidence on the short-term effects of the influx of refugees on entrepreneurship as an alternative integration path in Germany. The evidence is presented for both the overall refugee population and for a subset of Syrian refugees.

The study employs a natural experiment, namely the unanticipated influx of asylum seekers in Germany during 2014/15, to leverage administrative data on the distribution of refugees across counties. This research employs fixed effects panel regression and difference-in-differences continuous treatment methods to evaluate the effects on business registrations and self-employment numbers. The identification strategy employs an accommodation-based allocation system for asylum seekers, generating exogenous variation in the number of asylum seekers per county across various states in Germany (Gehrsitz and Ungerer 2022). This approach serves to mitigate potential endogeneity issues, such as reverse causality and selection bias, which are detailed in the Section 5. Furthermore, the study demonstrates that the distribution of asylum seekers across districts occurred independently of pre-existing trends in business registrations and self-employment.

The findings indicate a notable but relatively modest negative impact on entrepreneurial activity in Germany. This can be attributed to the German economy's difficulties in absorbing the influx of refugees, which has resulted in significant short-term fiscal costs incurred by the German government for receiving and accommodating refugees. These costs, which include expenditures related to housing, healthcare, and social welfare, are further compounded by high unemployment rates among refugees. This results in constrained public budgets that are unable to provide adequate support for entrepreneurship, thereby compromising the strength of the economy. Despite the fact that a considerable number of refugees have expressed a desire to integrate into the labor market through entrepreneurship, only a minority succeed. The limited success observed can be attributed to the significant barriers that refugees encounter in the German institutional and legal context when attempting to establish businesses. Consequently, refugees are unable to fully exploit their entrepreneurial potential to overcome unemployment and integrate into and contribute to the economy. The ongoing unemployment among refugees places a significant burden on public finances. This situation is further compounded by the government's failure to provide adequate incentives and support structures for fostering refugee entrepreneurship.

The remainder of this paper is structured as follows: The paper begins with an examination of the theoretical background and the existing literature on refugee entrepreneurship. This is followed by an analysis of the contextual background regarding the refugee crisis in the German institutional setting, the allocation of asylum seekers, and entrepreneurship in Germany. Subsequently, this paper presents the data employed in this thesis, including the data on the inflow of refugees, the outcome variables studied, and county-specific characteristics related to the distribution of refugees across counties in Germany. Subsequently, this thesis outlines the empirical setup, the two distinct models utilized in this thesis, and the assumptions upon which the identification strategy of the models is based. Subsequently, the results are presented and discussed, with additional robustness checks included. In conclusion, the paper presents a summary of the findings and their implications for policymakers.

2 Theoretical Background

The domain of refugee entrepreneurship remains a critical yet underexplored area within the current academic literature, despite its significant implications for policymaking at various levels (Alrawadieh, Cetin, and Karayılan 2018). The term "refugee" refers to individuals who flee their country due to a well-founded fear of persecution, discrimination, conflict, or violence, seeking refuge in a safer country (Gehrsitz and Ungerer 2022; Zehra and Usmani 2023). Entrepreneurship involves the entrepreneurial actions of all business own-

ers, stakeholders, or senior management within a company (Geradts and Alt 2022). This includes founding companies, implementing new ideas, and driving innovation (Schwarzkopf 2016).

2.1 Overview of the Refugee Entrepreneurship Literature

In the broader context of economic studies on refugees, existing research predominantly focuses on the processes of refugee integration into the host country labor market, the challenges refugees face in securing employment, the resulting labor market outcomes, particularly concerning wage labor, the impacts on native-born workers' wages, and unemployment rates (Sameeksha Desai and Stel 2019). Although some scholars have started to explore migration and entrepreneurship, the literature primarily concentrates on the experiences of immigrant entrepreneurs, often categorizing refugees within the broader immigrant group (Sameeksha Desai and Stel 2019). This approach neglects the unique characteristics of refugee experiences, as their motivations, circumstances, and pathways of mobility differ significantly from those of other migrants (Abebe 2022). This distinction is particularly important because refugees typically relocate due to forced displacement, which uniquely shapes their economic activities and entrepreneurial endeavors in host communities (Sameeksha Desai and Stel 2019). Consequently, the potential of entrepreneurship as an alternative pathway for refugee integration into labor markets is substantially overlooked in the existing literature, even though establishing their own businesses can enable refugees to mitigate economic uncertainty and enhance their integration into new societies (Kloosterman, Leun, and Rath 2002). Entrepreneurship, however, not only helps refugees sustain their livelihoods in host countries but also drives economic growth (Zalkat, Barth, and Rashid 2023). Research indicates that refugee entrepreneurs significantly contribute to economic development by creating jobs and introducing new products and services (Newman, Macaulay, and Dunwoodie 2023). For example, Kone, Ruiz, and Vargas-Silva (2021) found that individuals who arrived in the UK as refugees had a 6% higher propensity for self-employment compared to voluntary migrants or UK-born individuals. Additionally, they found that refugees were 2% more likely to employ others than voluntary migrants, a rate comparable to that of UK-born individuals (Kone, Ruiz, and Vargas-Silva 2021).

2.2 Motivations for Refugee Entrepreneurship

Refugees utilize personal attributes, such as prior entrepreneurial experience, to respond to constrained formal employment opportunities and limited economic prospects (Zehra and Usmani 2023; Newman, Macaulay, and Dunwoodie 2023). For instance, In countries like Jordan, South Africa, Brazil, and Morocco, refugees frequently pursue entrepreneurial endeavors to sustain their livelihoods (Elis, Citilgulu, and Nichols n.d.). Similar evidence was found in Turkey, with empirical evidence by Kachkar (2018) indicating that approximately 25% of refugees in Turkey have established businesses within refugee camps, utilizing savings or family sponsorships for funding (Kachkar 2018). Similarly, Alexandre, Salloum, and Alam (2019) discovered that a significant proportion of Syrian refugees in Lebanon are inclined to establish businesses despite encountering financial and administrative challenges. This study also observed that shared cultural values between the Syrians and the Lebanese, including a common language and culinary traditions, facilitate social integration, which is a crucial factor for entrepreneurial success (Alexandre, Salloum, and Alam 2019).

International studies further suggest that a significant proportion of new immigrants, especially those from countries with high self-employment numbers, prefer to work as independent contractors rather than wage employees (Bizri 2017). For instance, while the self-employment rate in Germany is around 11%, it is approximately 34% in Syria and 39% in Iran (Berlin Chamber of Industry and Commerce (IHK) 2016). Refugees

thereby bring a diverse set of characteristics and experiences to their host countries, often adapting their skills and qualifications to meet new market demands (Ortlieb and Knappert 2023). They address issues pertinent to their home countries through entrepreneurial activities and create innovative solutions based on their unique experiences and challenges as refugees (Jiang et al. 2022). Their backgrounds and personal networks, inherited from their families, often serve as the foundation for their entrepreneurial endeavors (Arregle et al. 2013).

2.3 Challenges to Refugee Entrepreneurship

While there is significant entrepreneurial motivation among refugees, previous scholarly contributions to the field of refugee entrepreneurship have identified several factors that place refugee entrepreneurs at a comparative disadvantage compared to other migrant entrepreneurs (Heilbrunn and Iannone 2020). These factors include having less extensive social networks, limited or no access to resources from their countries of origin, inadequate preparation for migration processes, social isolation, a loss of valuable assets and resources left behind in their home countries, and a general unsuitability for paid labor due to various constraints (Heilbrunn and Iannone 2020; Wiedner, Salikutluk, and Giesecke 2018). These factors contribute to longer time-spans before gaining employment, which is further exacerbated by the illegality and uncertainty surrounding their legal status, which can foster considerable instability (Heilbrunn and Iannone 2020). Likewise, Embiricos (2020) asserts that while entrepreneurship offers a promising pathway to self-reliance for refugees, it is thus not an immediate solution. In Germany, for instance, the temporary nature of their stay, which typically lasts for three years, restricts access to long-term financing (Bach et al. 2017). Similarly, Zighan (2020) highlight that Syrian refugees in Jordan encounter financial, cultural, and managerial challenges. Additionally, Alrawadieh, Cetin, and Karayılan (2018) noted that refugees entering Western societies face significant obstacles in establishing their businesses due to a lack of knowledge, skills, and pervasive labor market discrimination. Abebe (2022) further indicates that refugees often begin their entrepreneurial ventures in the informal sector due to insufficient support, gradually formalizing their activities over time.

Refugee entrepreneurs in Germany encounter further significant barriers including language difficulties and complex bureaucratic procedures (Embiricos 2020). Furthermore, the presence of language barriers, a lack of familiarity with the German market and customer base, and the presence of bureaucratic hurdles serve to compound the challenges faced by those attempting to enter the German market (Berlin Chamber of Industry and Commerce (IHK) 2016). The German market is governed by a distinct legal and regulatory framework, which is characterised by heightened competition and a customer base with preferences that differ from those in their home countries (Berlin Chamber of Industry and Commerce (IHK) 2016). Despite the fulfillment of the legal prerequisites for self-employment, sector-specific institutional regulations in Germany, such as those pertaining to licensed trades, present an additional obstacle to the establishment of a business (Bach et al. 2017).

2.4 Policy Implications for Refugee Entrepreneurship

In wake of these challenges several scholars have called for customized programs and policies to support refugee entrepreneurship. Alrawadieh, Cetin, and Karayılan (2018), for instance, emphasized the necessity for policy frameworks that facilitate access to employment and entrepreneurial opportunities for refugees, highlighting the slow integration process of Syrian refugees into the Turkish labor market. Research by Kassab, Omar, and Ghura (2022) further underscore the need for tailored entrepreneurial policies in Turkey to support Syrian refugees, recommending measures such as easier access to financial systems and reduced regulatory

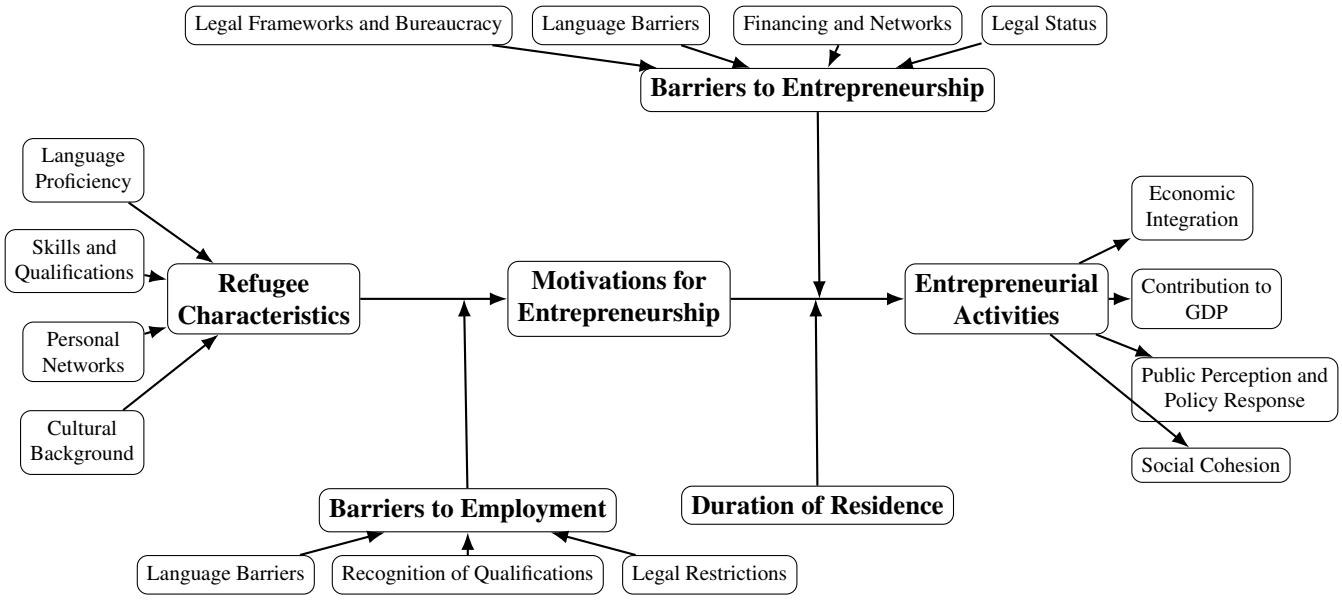

Figure 1: Mechanisms behind Refugee Entrepreneurship

Notes: The figure was constructed by the author of this paper based on an analysis of the existing literature on refugee entrepreneurship. The figure illustrates the underlying mechanism by which refugee characteristics influence entrepreneurial activities. It also includes factors that influence motivations for entrepreneurship, barriers to entrepreneurial activities, and the contribution that refugees can make to the economy and society at large through entrepreneurship.

hurdles. Additionally, Zalkat, Barth, and Rashid (2023), in their comparison of the motivations of Syrian refugee entrepreneurs in Germany and Sweden, underscored the need for improved communication between refugees and the entrepreneurial ecosystem, focusing on financial assistance and accounting services to promote sustainable entrepreneurship. Moreover, Refai and McElwee (2021) discussed the evolving international policy landscape, which increasingly focuses on economic development and emphasizes refugee entrepreneurship as a critical policy area. They highlighted the importance of understanding the entrepreneurial motivations of refugees, shaped by a combination of push and pull factors, social bonds, and cultural integration (Refai and McElwee 2021).

2.5 Contribution to the Literature

In light of the theoretical context and existing literature, this thesis proposes a model that synthesizes various factors, including economic conditions, individual motivations, and the broader regulatory environment, which influence refugee entrepreneurship in Germany, as depicted in Figure 1. Refugees' entrepreneurial aspirations are influenced by their country of origin and individual characteristics, such as language proficiency, skills, cultural background, and personal networks. These factors, along with challenges in entering the regular labor market—like language barriers, skill recognition, and legal restrictions—push refugees towards entrepreneurship, either out of necessity or perceived opportunities. The existing literature further identifies two primary factors that influence the transition from initial motivations to the pursuit of entrepreneurial activities. First, refugees face significant obstacles, similar to those in the labor market, compounded by entrepreneurship-specific challenges such as regulatory frameworks, bureaucracy, and lack of financing and networks. Second, the length of time spent in Germany is crucial, as it affects refugees' ability to develop the necessary skills and resources to actualize their entrepreneurial aspirations.

In light of these complexities, it is crucial for policymakers to gain a comprehensive understanding of the specific challenges refugees face in pursuing entrepreneurship and to identify ways in which they can become active contributors to the economy. Nevertheless, the discussion of entrepreneurship as a potential avenue for economic integration has been largely absent from the public discourse. Moreover, to the best of my knowledge, no empirical evidence has been presented regarding the actual impact of an influx of refugees on entrepreneurial variables. It can be reasonably proposed that only when the significant challenges to entrepreneurship are overcome and the period of residence in Germany is sufficiently long will entrepreneurial activities be successfully initiated. In the absence of supportive policy measures, it is probable that the economic impact of the refugee influx will be negative, with increased public spending and an inability of refugees to contribute to the economy. Germany, with its stable and thriving economy, extensive data access, and significant refugee influx, thereby represents a particularly valuable case study for other countries facing similar refugee influxes. This study aims to address the gap in the existing literature by employing the sharp and unexpected increase in asylum seekers arriving in Germany in 2014/15 as a natural experiment to provide empirical evidence on the immediate effects of the refugee influx on entrepreneurship as an alternative to traditional labor market integration in Germany. In consideration of the aforementioned literature, this research aims to address the following question:

To what extent did the 2014/2015 refugee influx in Germany influence entrepreneurial activity, and what mechanisms underlie these effects?

3 Contextual Background

Following the outbreak of the Syrian civil war in 2011, only 50,000 asylum applications were registered in Germany that year (Gehrsitz and Ungerer 2022). However, by 2014, the number of individuals undertaking the journey to Europe had increased significantly (German National Contact Point for the European Migration Network (EMN) 2017). The situation reached a critical point in late summer 2015, with a significant increase in the number of individuals arriving at the German border daily, placing substantial strain on the asylum processing system (Gehrsitz and Ungerer 2022). Ever since then Germany has emerged as a major host nation, accommodating approximately 2.5 million refugees, with a significant proportion originating from Syria (Kassam and Becker 2023). In response, German policymakers enacted regulations to expedite and improve the efficiency of asylum procedures (Keita and Dempster 2020).

3.1 Distribution of Refugees in Germany

Upon entering Germany, refugees were registered at the nearest reception center (Erstaufnahmeeinrichtungen, EAEs) in the federal state where they arrived (Federal Office for Migration and Refugees (BAMF) 2022). These EAEs, equipped with large-scale housing facilities, serve as initial points for collecting detailed information from asylum claimants and entering it into the initial distribution of asylum seekers quota system (EASY)[1] (Gehrsitz and Ungerer 2022). The distribution of Syrian refugees in Germany follows the provisions of the Asylum Act, the Asylum Seekers' Benefits Act, and the Koenigsteiner Key (Federal Office for Migration and Refugees (BAMF) 2022). The Koenigsteiner Key, which is recalculated on an annual basis by the Office of the Joint Science Conference, is based on a two-thirds to one-third ratio of state tax revenues to population figures (Federal Office for Migration and Refugees (BAMF) 2022). This method ensures that the financial and

[1]The EASY system anonymously distributes asylum seekers without storing personal data, functioning solely as a case-based distribution system with information on "receiving Federal Land," "country of origin," and "family composition."(Federal Office for Migration and Refugees (BAMF) 2022)

logistical burdens associated with housing and processing asylum claims are distributed equitably across all states (Federal Office for Migration and Refugees (BAMF) 2022). The most recent data shows that the states with the highest distribution quotas for asylum seekers are North Rhine-Westphalia (21.2%), Bavaria (15.5%), and Baden-Wuerttemberg (12.08%) (Gehrsitz and Ungerer 2022). These percentages represent the proportion of the total asylum seekers each state must accommodate, based on their tax revenue and population size, with the quotas recalculated annually to maintain a balanced distribution (Federal Office for Migration and Refugees (BAMF) 2022).

It is important to note, however, that some federal states have a greater number of reception facilities (EAEs) and superior infrastructure to accommodate refugees. Nevertheless, once asylum seekers have been registered with one of the EAEs, they are legally obliged to reside in an initial reception center within the federal state for up to six weeks (Gehrsitz and Ungerer 2022). As a result, reception centers that initially receive a large number of refugees may reach full capacity. This overflow forces other reception centers to accommodate the additional refugees, leading to deviations from the original state quotas, as shown in Table 1.

Table 1: Asylum Seeker Allocations to German Counties and EAE Capacities

	Refugees (total)			Syrian Refugees		
Federal State	Total	Percent	EAE Capacities	Total	Percent	Quota
Baden-Wuerttemberg	105,680	11.5%	26,400	42,272	11.1%	13.0%
Bavaria	106,763	11.6%	22,377	45,840	12.0%	15.5%
Berlin	67,228	7.3%	n/a	28,842	7.6%	5.1%
Brandenburg	30,930	3.4%	5,092	12,372	3.2%	3.1%
Bremen	12,507	1.4%	n/a	5,003	1.3%	1.0%
Hamburg	28,937	3.1%	n/a	11,575	3.0%	2.5%
Hesse	57,575	6.3%	22,047	23,030	6.0%	7.3%
Mecklenburg Western Pomerania	22,641	2.5%	989	9,056	2.4%	2.0%
Lower Saxony	84,475	9.2%	5,028	33,790	8.8%	9.3%
North Rhine-Westphalia (NRW)	224,589	24.4%	16,245	89,836	23.9%	21.2%
Rhineland Palatinate	34,899	3.8%	10,622	13,959	3.7%	4.8%
Saarland	12,192	1.3%	1,300	4,877	1.3%	1.2%
Saxony	41,554	4.5%	16,845	16,622	4.4%	5.1%
Saxony-Anhalt	27,736	3.0%	6,259	11,109	3.0%	2.8%
Schleswig-Holstein	36,500	4.0%	15,667	14,600	3.9%	3.4%
Thuringia	24,657	2.7%	6,951	9,138	2.4%	2.7%
Total	918,805	100.0%	148,414	375,111	100.0%	100.0%

Notes: The table illustrates the federal quota (Koenigsteiner Key) of migrants to be distributed among the states, along with the number of asylum seekers and Syrian refugees forwarded by states to their subordinate counties, both in total numbers and percentages. Furthermore, it demonstrates the existing capacity to accommodate asylum seekers in state-run reception centers (EAEs). The data on the total refugee population have been obtained from a research paper by Gehrsitz and Ungerer (2022). The data regarding Syrian refugees and the Koenigsteiner Key were obtained from the Federal Statistical Office of Germany and the Federal Office for Migration and Refugees.

Table 1 illustrates the discrepancies between the anticipated and actual distribution of asylum seekers among the federal states of Germany. For instance, Baden-Wuerttemberg and Bavaria were assigned 13% and 15.5%, respectively, yet only received 11.5% and 11.6% of the total refugees, and 11.1% and 12% of Syrian refugees, respectively. Conversely, Berlin and North Rhine-Westphalia (NRW) received a greater number of asylum

seekers than was allocated to them according to the quota. The state of North Rhine-Westphalia (NRW), for instance, was allocated 21.2% but accepted 24.4% of all refugees and 23.9% of Syrian refugees. The discrepancies from the initial quotas can be attributed to the operational capacities of the EAE centers, as previously explained. Following a six-week period of initial residence in the aforementioned EAEs, refugees are subsequently distributed throughout the federal state in accordance with a comparable quota system (Federal Office for Migration and Refugees (BAMF) 2022). Overall, despite minor deviations from the quota, the distribution of refugees across the federal states resulted in a relatively equitable distribution across Germany (see Figure 2).

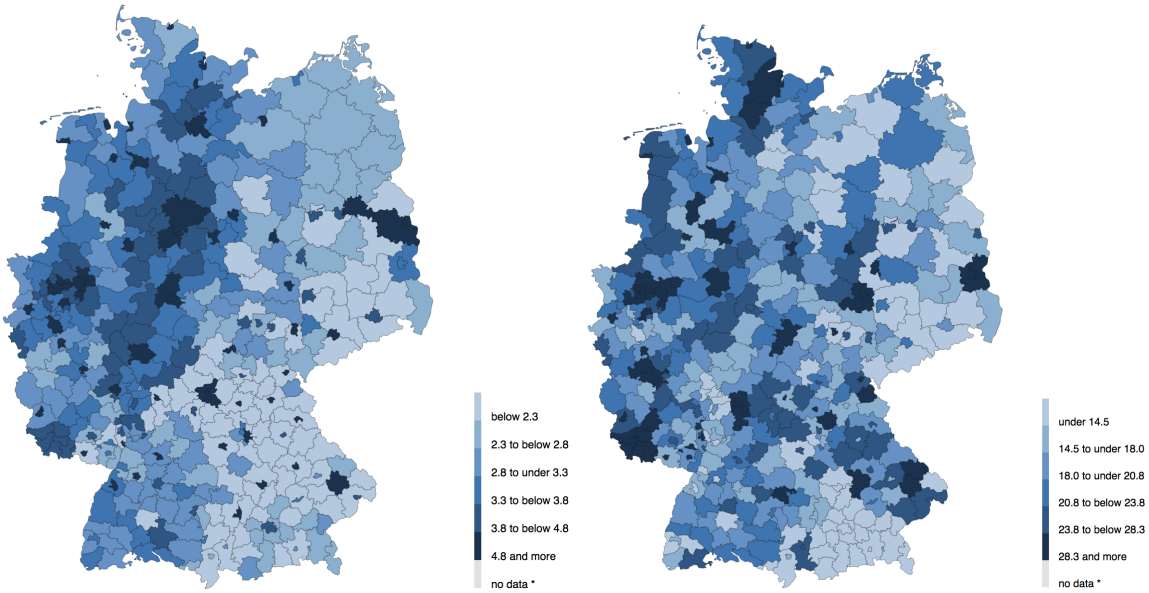

Figure 2: Distribution of (Syrian) Refugees by Municipalities

Notes: The graph shows the distribution percentages of refugees across municipalities in Germany. The left side indicates the total number of refugees, while the right side focuses on Syrian refugees. Municipalities in light blue receive less than 2.3% of the total refugee population or less than 14.5% of the Syrian refugee population. Municipalities in dark blue receive more than 4.8% of the total refugee population or more than 28.3% of the Syrian refugee population. Source: Destatis, BA BAMF, 2022.

3.2 Asylum Procedures and Labour Market Integration of Refugees

Once relocated to their designated municipalities, refugees continue their application process and integration activities. The duration of the asylum application process varies considerably, usually taking between three to six months, largely dependent on the asylum seeker's country of origin and the documentation they can provide (Gehrsitz and Ungerer 2022). During this initial period, they are prohibited from engaging in any form of employment; however, once an asylum application is fully approved, individuals are permitted to enter the labor market (Federal Office for Migration and Refugees (BAMF) 2022).

By 2018, 72 percent of asylum seekers had been granted protection in Germany, thereby enabling them to engage in gainful employment without encountering any legal restrictions (Keita and Dempster 2020). Nevertheless, 17% of applicants continued to experience uncertainty, with their claims pending and work authorisations restricted (Keita and Dempster 2020). Despite the fact that 47.4 percent of the refugee population expressed a strong desire to integrate into the job market and pursue their career aspirations in Germany, only 24.7 percent of the refugees were gainfully employed (Worbs and Bund 2016). This leaves a significant majority of individuals neither employed nor actively seeking employment in Germany (Worbs and Bund 2016).

3.3 Entrepreneurship in Germany

Entrepreneurship plays a pivotal role in the economy, yet the number of entrepreneurs in Germany has shown significant fluctuations over the years. From 2015 onward, the number of business establishments exhibited a downward trajectory, reaching the lowest point in 2017 (KfW Development Bank 2023). These declinig rates were attributed to high unemployment rates during that period. In 2018, with the support of a robust domestic economy, startup activity in Germany reached a point of stabilization, with approximately 547,000 new business formations recorded (KfW Development Bank 2023). In 2019, entrepreneurial activity increased for the first time in years, driven by cyclical and labor market growth, with the number of business foundations rising to 605,000 (KfW Development Bank 2023).

In order to engage in self-employment and establish a new business in Germany, individuals, including refugees, are required to comply with a number of legal obligations. In the initial phase, refugees are required to obtain a residence permit that permits self-employment from the local authority responsible for foreign nationals (Federal Office for Migration and Refugee (BAMF) 2024). In order to progress, aspiring entrepreneurs are required to present a viable business plan, demonstrate sufficient funding, and provide evidence of relevant qualifications (Federal Office for Migration and Refugee (BAMF) 2024). Moreover, individuals are obliged to complete the requisite registrations with both the trade and tax authorities, in addition to registering with the relevant commercial offices, in order to finalise the process (Federal Office for Migration and Refugee (BAMF) 2024). It is only upon fulfillment of all aforementioned processes that an individual may commence operations of their own business in Germany.

4 Data

4.1 Inflow Measures

The analysis presented in this thesis is based on a number of panel datasets, which have been compiled into a single, unified dataset. Of particular significance are the administrative records from 16 federal states on the distribution of asylum applicants in 401 districts, 294 of which are rural districts and 107 of which are urban districts, for the period between 2012 and 2019. These records are typically maintained by the respective federal state ministries of the interior. Generally, all federal states adhered to uniform reporting standards, facilitating easy comparison of data across states. The data comprises the total number of refugees (Schutzsuchende), which includes individuals recognized under the Geneva Convention[2] and all persons who do not hold German citizenship as defined by Article 116 (1) of the Basic Law (Federal Statistical Office of Germany (Destatis) 2024b). This encompasses stateless persons and individuals of undetermined citizenship (Federal Statistical Office of Germany (Destatis) 2024b). Additionally, the data encompasses figures for the three most significant sub-populations of refugees in Germany, namely Syrians, Afghans, and Iraqis.

In the German legal context, all persons seeking protection must apply for asylum to obtain the status of recognized refugees (Federal Ministry of the Interior and Community (BMI) 2024). Once their application is registered in the system, these individuals are officially classified as asylum seekers (Federal Ministry of the Interior and Community (BMI) 2024). The term ”asylum seekers” itself does not imply that the asylum application was successful (Gehrsitz and Ungerer 2022). Therefore, the data on asylum seekers on which this paper is based include not only those who have successfully obtained a positive asylum decision, but also those

[2]The 1951 Convention outlines the rights and protections afforded to refugees and establishes the standards for their treatment. It also specifies the obligations of host countries in protecting them (UNHCR 2024).

who are still awaiting a decision. This distinction is crucial for the analysis, as individuals awaiting an asylum decision are not legally permitted to enter the labor market and consequently will not affect the outcome variables of business registrations and self-employment numbers. Thus, only a subset of the initial asylum seekers will impact the outcome variables. In addition to examining the refugee population as a whole, this thesis also investigates Syrian refugees as a subset, given that they constituted the largest group of refugees arriving in Germany during the 2014/2015 period.

It is important to note that the refugee data is not without limitations. Firstly, it is possible that the administrative data may be inaccurate, particularly with regard to the precise number of refugees distributed to each municipality. Such discrepancies could introduce potential biases if certain municipalities underreport or overreport refugee numbers or fail to accurately capture refugee characteristics. For instance, counties in Saxony and Saxony-Anhalt frequently exhibit missing or inaccurate data, and analogous issues are observed in counties in Saarland. Furthermore, the analysis may not fully account for the heterogeneity within the refugee population, such as variations in skills, motivation, and resources, which can significantly influence entrepreneurial outcomes. These qualitative aspects are typically not included in official databases and are unavailable at the county level.

4.2 Outcome Variables

The outcome variables employed in this study to assess entrepreneurial activity in Germany are derived from administrative records provided by the German Federal Statistical Office. These include business registrations and self-employment numbers from 2012 to 2019.

To compile the data, this thesis collects statistics on business registrations from the respective federal statistical offices of the states. Business registrations refer to the mandatory process of registering a new company with the local trade office in Germany, a crucial step for starting any form of commercial activity (Berlin Chamber of Industry and Commerce (IHK) 2024). Data on business registrations can be broken down into several categories: new establishments, business startups, relocations, and takeovers. New establishments refer to the creation of entirely new economic units (Statistical Office of Bavaria 2024). This process involves more than just the registration of a business; it includes setting up the actual operations and organizational structure necessary for the business to function, such as establishing the management framework and operational processes (Statistical Office of Bavaria 2024). Business startups, on the other hand, involve the creation of new physical locations or facilities for already existing enterprises, including the construction of new offices, factories, or retail premises (Federal Statistical Office of Germany (Destatis) 2024a). This category also includes the creation of new enterprises but often refers to the expansion of existing enterprises into new physical locations (Federal Statistical Office of Germany (Destatis) 2024a). Relocations describe the process of moving an existing company to a new county, while takeovers refer to the acquisition and possible transformation of existing business activities. Although technically only new establishments refer to the entrepreneurial activity of setting up a business from scratch, this thesis considers the other three variables to be equally important indicators of entrepreneurial activities. This is particularly relevant for refugees, who often find it challenging to set up a business from the outset. In such cases, it may be more feasible for them to take over and transform an existing business. Accordingly, all four variables are included as indicators of entrepreneurial activity.

For the second outcome variable of self-employment numbers, this paper utilizes data from the employment statistics of the federal states provided by the federal statistical offices. By definition, self-employment refers

to all individuals who are mainly engaged in entrepreneurial or freelance activities (Federal Statistical Office of Germany (Destatis) 2024c). This also encompasses all active owners of sole trading entities and partnerships, in addition to professionals such as self-employed medical practitioners, lawyers, accountants, architects and craftspeople (Federal Statistical Office of Germany (Destatis) 2024c). Additionally, family members who regularly and predominantly work without compensation in a family enterprise managed by a self-employed individual are included in this group. The data set includes information on the number of self-employed individuals within specific economic sectors and activities, which allows for the calculation of self-employment rates within various sectors, including manufacturing, construction, services, and financial and real estate.

4.3 Covariates

When conducting an econometric analysis like ours, it is crucial to consider county-specific characteristics that could potentially introduce bias into the resulting estimates. Accordingly, this paper compiles a number of county-specific variables from the databases of the statistical offices of the federal states. These characteristics include each district's gross domestic product (GDP) per capita, expressed in euros (€), and the age structure of each county, given by the youth and elderly coefficients. The youth coefficient is defined as the ratio of individuals aged below 20 years to those aged between 20 and 64 years. Similarly, the elderly coefficient is defined as the ratio of persons aged 65 and above to those aged between 20 and 64. Furthermore, data is gathered on the total population of each county and the proportion of males within this population as an indicator of diversity and gender distribution. Finally, the tax rates for property and commercial units are collected. The property tax rate applies to the value of business-owned real estate, while the commercial tax rate is applied to business profits, both set by the respective counties.

In the context of this analysis, it is essential to recognize several data limitations that could influence the results. These include the impact of specific infrastructural and socioeconomic variables on entrepreneurial activities. Infrastructural variables play a significant role in the establishment of businesses because they encompass the essential facilities and services required for business operations. Infrastructural data for Germany is available via the BBSR's Accessibility Model. This model includes metrics such as the average travel time by car to the nearest motorway, international airport, railway station, and port. However, the data is only available for the years 2022 and 2023, which falls outside of the study period. Similarly, data on broadband availability from the Broadband Atlas, Atene KOM, and BMDV is only available for recent years, making it unsuitable for this analysis. This thesis posits that the exclusion of these variables is less problematic since refugee entrepreneurial endeavors typically do not operate at a scale where such infrastructure metrics are critically relevant in the initial stages. Furthermore, Germany's infrastructure is sufficiently developed across different counties to facilitate the establishment of businesses without significantly impeding their operations. It is therefore unlikely that not controlling for these variables will have a significant impact on the results. Moreover, the availability of commercial and industrial space represents another potentially significant factor, the data for which is only available from 2016 onwards. This limitation constrains the ability of this paper to incorporate it into the analysis, although this paper acknowledges the potential impact on entrepreneurial activities, particularly in relation to rental prices and the feasibility for refugees to obtain facilities for their operations. Similarly, the educational qualifications, as defined by the International Standard Classification of Education (ISCED) levels, only commence from 2016 onwards. Consequently, this also precludes their inclusion in the study.

To address the limitations of the data, this paper will later demonstrate how estimating two county-level econometric models that incorporate both county and year fixed effects—and thus control for unobserved hetero-

geneity across counties and over time—will ensure the validity and robustness of the findings of this paper.

4.4 Descriptive Statistics

Based on the data on the number of refugees arriving in the counties during the period from 2014 to 2015, the counties can be classified into high and low migration counties. The categorization into the two groups is based upon the number of refugees they have hosted as of 2015. Counties with a high refugee population are those that have hosted more than 395 refugees, while counties with a low refugee population have hosted less than 395 refugees. This number represents the median of all refugees registered in Germany for 2014 and 2015 at the county level, resulting in an even 50/50 split between counties designated as having high and low refugee populations [3]. Table 2 provides a summary of the inflow measures, outcome variables, and county-specific characteristics of the two groups both before and after the influx of refugees.

Table 2 highlights significant trends and disparities between high and low migration counties before and after the refugee crisis. Before the 2014/15 influx, high-migration counties hosted approximately 2,600 refugees, compared to 600 in low-migration counties. Post-influx, these numbers rose to about 6,200 and 1,000, respectively. The Syrian refugee population also experienced a notable increase from approximately 120 individuals prior to 2014/15 to an average of 1,200 individuals during the period between 2015 and 2019. This represents a growth from 7% to 29% of the total refugee population. For business registrations, high-migration counties initially registered about 2,700 businesses, decreasing slightly to 2,500 post-influx. Low-migration counties saw a smaller change, with registrations declining from 1,000 to 900. A similar trend was observed in self-employment numbers: high-migration counties saw a decrease from approximately 15,800 to 15,100, while low-migration counties declined from 6,800 to 6,400. Economic indicators like GDP per capita showed growth in both county types, rising from €34,169 to €38,172 in high-migration counties and from €31,662 to €35,554 in low-migration counties. Demographically, both groups maintained a consistent age structure, with the elderly coefficient exceeding the youth coefficient and both increasing slightly after the influx. The overall population and proportion of males also grew in both county types. Tax revenues increased across the both groups. Before the influx, the mean property tax rate was 397%, meaning businesses paid 3.97 times the assessed property value in taxes. The commercial tax rate rose from 379% to 389% post-influx, indicating businesses paid 3.89 times their taxable profit in commercial tax. The estimates presented in Table 2 provide evidence that counties with high rates of migration demonstrate stronger economic performance than those with low migration rates. This finding is consistent with the pre-defined quotas that require economically stronger states to host larger numbers of refugees. Section 5 of this thesis will present evidence that these differences largely disappear when state-specific characteristics are taken into account.

5 Research Methodology

Having defined and examined the relevant inflow measures, outcome variables, and county characteristics, this section outlines the methodology of the paper. The two outcome variables, business registrations and self-

[3] The division of the groups is based on the accumulated number of asylum seekers in 2014/2015, assuming a similar distribution of overall refugees and Syrian refugees across countries. A binary treatment variable is employed to indicate counties with high and low refugee inflows, respectively. It is acknowledged that counties with a high refugee migration in 2015 may not meet the criteria for a high migration county in subsequent years. Consequently, the approach may be subject to certain limitations. Nevertheless, given that data are available for most of the 401 counties, it is reasonable to conclude that there are sufficient observations to account for some of these shifts in and out of high and low migration counties. Moreover, as the distribution is based on fixed quotas, the majority of counties exhibited comparable inflows over time. In light of these considerations, it is believed that the results shown are indicative of the different means between the two groups.

Table 2: Descriptive Statistics

	2012-13 (Pre-treatment)			2014-19 (Post-treatment)		
	All	High migration	Low migration	All	High migration	Low migration
	(1)	(2)	(3)	(4)	(5)	(6)
Inflow measures						
Refugees (total)	1611.931	2563.575	638.179	4023.531	6239.875	980.2
SyrianRefugees	118.561	187.705	42.5923	1155.492	1804.91	486.679
Outcome Variables						
Business registrations (total)	1870.56	2718.865	1013.157	1737.489	2482.438	936.388
New establishments	1534.184	2253.662	805.226	1424.256	2053.344	740.098
Business start-ups	325.081	477.765	168.051	319.322	463.811	159.668
Relocations	201.270	273.17	130.529	187.991	255.165	123.719
Takeovers	135.605	192.033	78.0258	123.629	172.737	72.6464
Self-employed (total)	11319.29	15811.22	6763.558	10789.1	15137.84	6351.917
Self-employed (Manufacturing)	678.719	877.554	478.929	624.826	807.307	442.487
Self-employed (Construction)	1279.8	1724.791	837.478	1216.965	1641.642	789.948
Self-employed (Service)	2774.564	4058.124	1462.867	2713.881	3988.388	1410.881
Self-employed (Finance)	2812.718	4083.082	1513.126	2713.881	4112.513	1523.834
County Characteristics						
GDP per capita	32922.03	34169.12	31662.09	36857.52	38171.57	35554.41
Youth coefficient	29.995	30.201	29.967	30.585	30.929	30.400
Elderly coefficient	35.443	35.074	35.812	37.163	36.606	37.690
Share male	0.490	0.489	0.491	0.494	0.493	0.495
Population	204567	287358.9	116265.4	208232.7	295125.6	118662
Property tax rate	397.267	418.61	375.810	427.932	453.785	400.765
Trade tax rate	379.146	389.975	366.087	388.922	399.852	375.224
Observations	1,218	600	585	2,050	1,000	971

Notes: Column (1) depicts the mean outcomes from 2012 to 2013, the period preceding the refugee crisis. Columns (2) and (3) present the mean outcomes for counties that were anticipated to experience either a significant influx of migrants (Syrian refugees) or a relatively minor influx of migrants. The term "high-migration counties" is used to describe those counties that have experienced an influx of at least 395 Syrian refugees seeking asylum. In contrast, the term "low-migration counties" is used to describe those counties that have not met this threshold. Columns (4) to (6) show the outcomes of interest in the post-treatment period, from 2014 to 2019. County-specific characteristics include each district's gross domestic product (GDP) per capita, expressed in euros (€). The youth coefficient is defined as the ratio of individuals aged below 20 years to those aged between 20 and 64 years. The elderly coefficient is defined as the ratio of persons aged 65 and above to those aged between 20 and 64.The property tax rate applies to the value of business-owned real estate, while the commercial tax rate is applied to business profits. The table is inspired by the theoretical framework presented in the paper by Gehrsitz and Ungerer (2022).

employment numbers, will be observed at multiple points in time between 2012 and 2019, and the impact of the refugee inflows on these measures will be evaluated based upon two distinct models.

5.1 Fixed Effects Panel Regression Model

First, a fixed effects regression model of the following form is estimated:

$$Y_{ct} = \alpha + \beta_1 \mathrm{Z}_c + \beta_2 (\mathrm{Z}_c)^2 + \theta X_{ct} + \mu_c + \lambda_t + \epsilon_{ct} \tag{1}$$

where Y_{ct} represents the two outcomes of interest—business registrations and self-employment numbers, in county c at time t. The coefficients of primary interest are β_1 and β_2. The coefficient β_1 captures the impact of the inflow measures in continuous units, with the allocation of individuals to a county occurring between January 1, 2014, and December 31, 2019. Z_c thereby represents either the number of asylum seekers or the number of Syrian refugees. The coefficient β_2 accounts for the possibility of a non-linear relationship between the inflow measures and the outcome variables. The term θX_{ct} represents a vector of the county-specific characteristics (GDP per capita, population size, share of males, youth, and elderly coefficient, property tax rate, and commercial tax rate) that may influence both refugee distribution and entrepreneurial activity. The model also incorporates county fixed effects μ_c, which capture the impact of external factors that differ across counties but remain constant over time [4]. Furthermore, year fixed effects λ_t are included to control for the influence of external factors that vary over time but are consistent across all counties in a given year. Finally, ϵ_{ct} denotes random disturbances, representing unobserved factors affecting entrepreneurship not accounted for by the model.

The fixed-effects regression model, which employs panel data, can be utilized to directly estimate the impact of refugee inflows on business registrations and self-employment numbers at the county level. This model effectively controls for unobserved heterogeneity at both the county and temporal levels. However, it does not establish a causal relationship, as it is not possible to determine what outcomes would have been observed in each county in the absence of the refugee influx. This limitation underscores the fundamental problem of causal inference. To accurately identify a direct cause-and-effect relationship between an intervention (such as the influx of asylum seekers) and the observed outcomes, this paper employs a difference-in-difference approach that involves creating a group of counties with low migration inflows that is similar to the group of counties with high migration inflows. By comparing the results between these two groups, a counterfactual scenario can be created, which helps to infer what would have happened in terms of business registrations and self-employment numbers in the absence of a significant influx of refugees. This approach allows for a more meaningful comparison and helps to mitigate the challenge of establishing a causal relationship. Section 6 will present a comparative analysis of the results estimated in both models.

5.2 Difference-in-Difference Regression Model

To employ the difference-in-difference methodology, this paper utilizes the abrupt and substantial increase in asylum seekers during the 2014/15 period as a quasi-experimental setting. This empirical framework, which may be most accurately described as a fuzzy difference-in-differences design, differs from the traditional approach in that a continuous treatment (refugee inflows) is applied to all observation units, with varying intensity across counties [5]. Subsequently, changes in the outcome variables are evaluated by comparing business regis-

[4] In order to capture region-specific factors and unobserved heterogeneity at a more granular level, this model employs county fixed effects in preference to state fixed effects. This approach enables a more precise examination of the influence of refugee inflows, which exhibit greater variability at the county level.

[5] This study employs a continuous treatment variable instead of a binary indicator for several reasons. The continuous measure better captures the varying intensity of refugee inflows across different counties and over time. Counties experience differing levels of refugee inflows depending on their capacity and other factors, and using a binary variable (high vs. low immigration) could result in counties shifting in and out of the treatment category as inflows fluctuate. Such shifts could distort the results by introducing artificial

trations and self-employment numbers in the pre-treatment period with those in the post-treatment period for counties with high and low refugee inflows [6].

Therefore, a difference-in-difference regression model of the following form is estimated:

$$Y_{ct} = \delta_c + \gamma D_{post} + \beta_1(D_{post} \times \mathrm{Z}_c) + \beta_2(D_{post} \times (\mathrm{Z}_c)^2) + \theta X_{ct} + \mu_c + \lambda_t + \epsilon_{ct} \tag{2}$$

where Y_{ct} represents the two outcomes of interest—business registrations and self-employment numbers—in county c at time t. D_{post} serves as an indicator for the post-treatment period. The interaction terms $D_{post} \times \mathrm{Z}_c$ and $D_{post} \times (\mathrm{Z}_c)^2$ capture the impact of the respective inflow measure captured by Z_c and its respective quadratic form, captured by ${Z_c}^2$, on business registration and self-employment numbers in the post-treatment period. θX_{ct} represents a vector of county-specific characteristics, as detailed previously. The model also includes county fixed effects μ_c, year fixed effects λ_t, and the error term ϵ_{ct}.

The principal benefit of employing this approach is that it accounts for unobserved, time- and county-invariant discrepancies between the groups, thus enabling us to isolate the impact of the refugee influx on the outcome variables from other factors influencing entrepreneurial activity. The discrepancy in the county-characteristics of the two groups as evidenced in Table 2 does thereby not affect the reliability of the estimates presented. The identification strategy rather relies on the assumption that in the absence of the influx of refugees, both groups would have followed parallel trends over time, regardless of their initial entrepreneurial levels. By demonstrating that high and low refugee inflow counties follow similar pre-treatment trends in entrepreneurial activity, the methodology strengthens the assumption that post-treatment differences are caused by refugee inflows rather than pre-existing trends. To test this assumption, this paper uses the previously divided groups to plot business registration trends for high and low immigration counties (see Figure 3)[7]. Figure 3 illustrates that counties with a notable increase in the number of migrants tend to have slightly higher levels of business registration, as previously demonstrated in Table 2. However, there is no evident discrepancy in the trajectory of business registrations during the pre-treatment interval when the two groups are compared. The seasonal patterns observed in counties with high and low refugee populations both exhibit fluctuating business registration numbers throughout the 2000s and 2010s. There is an initial increase in the number of registrations until 2004, followed by a decline until 2008. After 2008, there is a subsequent increase and subsequent decline in the number of registrations after 2010. A decline in business takeovers, which constitute one subgroup of business registrations, has been observed since 2004, with numbers remaining at this level ever since. However, again no notable differences in the trends for both groups are evident. Similarly, the figures for self-employment (see Figure 4) demonstrate comparable pre-crisis trends in counties with low and high refugee populations. While the rates of self-employment exhibited a gradual increase towards 2012, a subsequent decline was observed. The number of self-employed individuals in the service and hospitality sector has exhibited a decline since 2004. This decline is consistent across both groups. As detailed in Section VII, these pre-existing similarities have been demonstrated to be statistically robust.

variations. By using a continuous treatment variable, the actual exposure levels of each county to refugee influx can be more accurately reflected, leading to more precise and reliable estimates of treatment effects.

[6] The division of counties into those with high and low migration rates is consistent with the categorization presented in Section 4.

[7] The division is again based on the accumulated number of asylum seekers in 2014/2015, assuming a similar distribution of overall refugees and Syrian refugees across countries. As a consequence of employing a binary treatment variable to indicate countries with high and low refugee inflows, the inherent limitations of the binary variable itself, which may not accurately reflect observed fluctuations in and out of high and low migration counties, must be acknowledged.

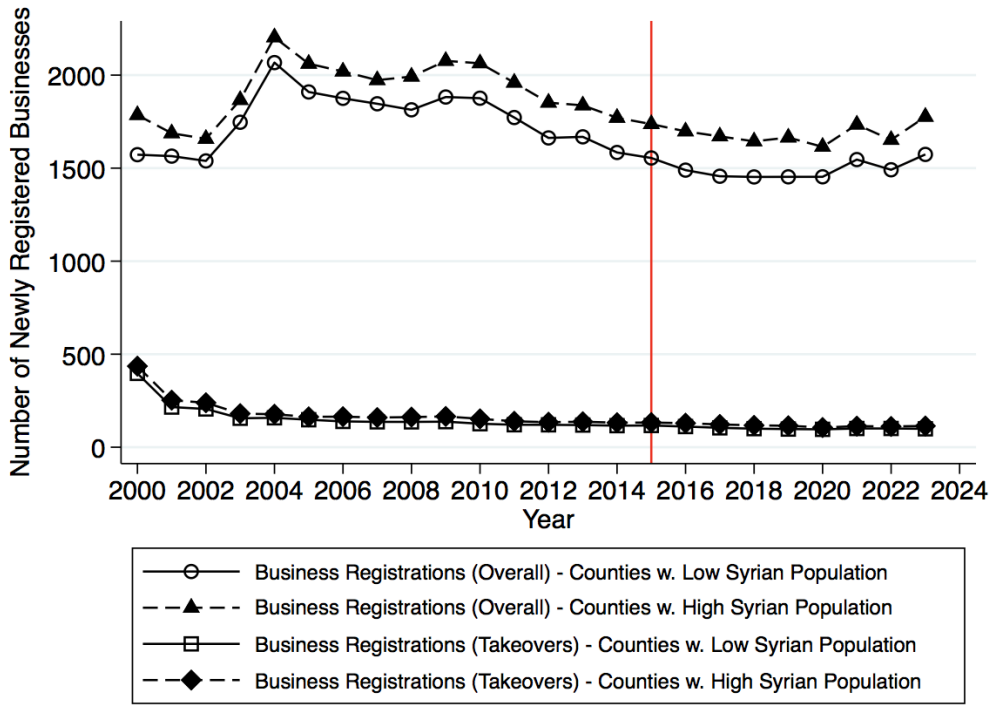

Figure 3: Newly Registered Businesses Over Time

Notes: This figure presents the yearly average number of business registrations from 2000 to 2023, categorized by high and low migration counties. High migration counties are defined as those that received more than 395 Syrian refugees in 2014/2015. The two lines at the top of the figure represent the total number of business registrations, which include business formations, start-ups, movements, and takeovers. The two lines at the bottom of the graph illustrate the number of takeovers. Source: Federal Statistical Office of Germany

While parallel pre-trends have been identified for the outcome variables in both high and low immigration counties, systematic differences between these counties influence the allocation of asylum seekers. Consequently, the validity of the estimates regarding the relationship between asylum seeker inflows and business registrations and self-employment is can be questioned. In an ideal scenario, asylum seekers would have been randomly distributed to counties, thereby creating entirely differential exogenous shocks. However, as has been demonstrated, this randomization was not given in the German context. Instead, asylum seekers were predominantly allocated to economically stronger counties, based upon fixed quotas. This may introduce endogeneity and self-selection bias into the estimates, which arise due to the non-random allocation of asylum seekers. It could be argued that the influx of asylum seekers into economically stronger counties has a direct impact on economic outcomes, when in fact these outcomes are caused by. pre-existing economic conditions. This potential for bias could be further amplified after the initial three-month period following the refugees' arrival, when they are permitted to relocate and may choose to settle in economically stronger regions. Furthermore, the issue of relocation may also give rise to a reverse causality issue. It is plausible that refugees who are inclined to pursue entrepreneurial endeavors may be more likely to settle in regions where entrepreneurial activities are more prevalent. This could, in turn, introduce a bias into the results of this thesis, whereby pre-existing entrepreneurial activities may drive the results rather than the refugees themselves.

Although the issues of self-selection and reverse causality must be taken into account when interpreting the results of this paper, some of the endogeneity issues can be mitigated by the randomness introduced in the German context through the allocation of refugees to EAEs, which differed in their capacities due to the random

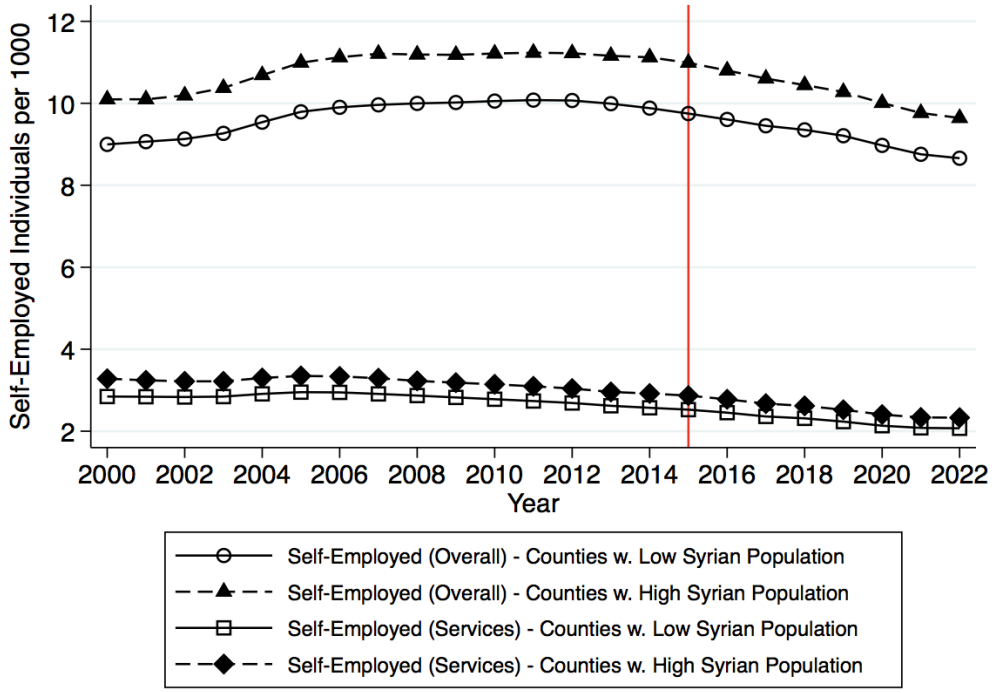

Figure 4: Self-Employment Numbers Over Time

Notes: This figure displays the annual self-employment numbers from 2000 to 2022, differentiated by low and high migration counties. High migration counties are defined as those that received more than 395 Syrian refugees in 2014/2015. The upper two lines depict the number of self-employed individuals (per 1,000), whereas the lower two lines illustrate the number of self-employed individuals in the service sector, which encompasses trade, transportation and storage, food services, and information and communication. Source: Federal Statistical Office of Germany

timing of the refugee inflows. An analysis of the predictive power of county characteristics shows that only two observable factors—the tax rates for property and commercial units—are individually significant predictors of the number of asylum seekers assigned to a county (see Table 3). Interestingly, population numbers are not statistically significant predictors of asylum seeker inflows. In general, the inflow of asylum seekers into a county within a state is largely independent of observable county characteristics. These findings suggest that asylum inflows are only partially linked to a county's economic conditions, specifically tax rates, but not GDP, for instance. Based on these results, it is crucial to include at least tax rates in this analysis in order to accurately capture the determinants of the distribution of asylum seekers and to control for potential endogeneity issues.

6 Findings

Labour market integration continues to present a significant challenge in Germany, particularly in light of the considerable influx of refugees since 2014. Despite the fact that a considerable number of refugees are driven to establish their own businesses and integrate into the economy, there is a lack of knowledge regarding their achievements in doing so. To address this research gap and present robust estimates, two models (DID and FE) have been estimated, with and without county-specific characteristics, for the overall refugee population and the subset of refugees with Syrian citizenship.

Table 3: Potential Determinants of Asylum Seeker Inflows

		Regression							
	Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	32092.05	0.112							0.003
	(14162.06)	(0.151)							(0.039)
Youth coefficient	30.133		-481.382						363.139
	(3.889)		(876.838)						(227.014)
Elderly coefficient	35.106			1146.448					-1.225
	(4.589)			(865.075)					(259.448)
Share male	.489				-226387.3				38520.53
	(.007)				(261911.8)				(79790.78)
Population	204509.5					0.069			0.035
	(226030.4)					(0.0762)			(0.075)
Property tax	389.266						30.566***		1.899
	(73.459)						(7.629)		(2.525)
Trade tax	376.234							54.3224**	-7.818
	(46.964)							(21.218)	(6.442)
Observations		393	393	393	393	393	393	393	393
R-squared		0.048	0.005	0.077	0.024	0.922	0.279	0.158	0.942

Notes: Each numbered column represents a distinct county-level regression for the total number of asylum seekers assigned to a county in 2014, based on county characteristics from the end of 2012. In this analysis, all counties are given equal weight. The youth coefficient measures the number of people under the age of 20 per 100 people aged between 20 and 64. The coefficient for older people measures the number of people aged 65 or older per 100 people aged 20 to 64. The proportion of men indicates the proportion of the male population in the total population as a percentage. The total population is measured in thousands and indicates the number of people living in a county. The property tax rate B is the percentage rate set by the municipality for the respective calendar year. The trade tax multiplier is the percentage rate set by the municipality for the respective calendar year. Heteroscedasticity-robust standard errors are shown in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively. The table is inspired by the theoretical framework presented in the paper by Gehrsitz and Ungerer (2022).

6.1 Refugees and Business Registrations

Table 4 presents the estimated results for the first outcome variable, namely business registrations. Panels A and B employ both the difference-in-difference and fixed effects models to evaluate the influence of the overall refugee influx into Germany during 2014/2015 on business registrations. Furthermore, both models are estimated for the subset of Syrian refugees (Panel C and D), who constitute a significant portion of the overall refugee population. This allows for an investigation of whether different subsets of refugees yield disparate results compared to the overall refugee population. This differentiation is crucial because the duration of the asylum process varies by nationality, affecting the timing of when individuals can establish their own businesses (Ortlieb and Knappert 2023). The findings demonstrate a notable overall decline in the average total number of business registrations following the influx of refugees, with a mean reduction of 0.056 units across counties. This finding is supported by a significant negative coefficient in the fixed effects model. When covariates are included, the observed effect is reduced to approximately 0.03 units on average in both models, implying that some of the variation in the estimates is caused by observable county-specific characteristics. The results for Syrian refugees show trends similar to those observed for the entire asylum seeker population. The estimate for overall business registrations is negative, as seen with the overall asylum seeker population, but the magnitude is almost three times larger. Specifically, Syrian refugees have a negative impact of approximately 0.145 units on business registrations, significant at the 1 percent level. The relationship is non-linear, as evidenced by a statistically significant positive coefficient for the quadratic term of the Syrian refugee population. This indicates that an increase in the number of Syrian refugees has a mitigating effect on the negative coefficient. The fixed effects coefficient confirms this negative impact.

New establishments, which constitute a significant portion of overall business registrations, exhibit a significant average decrease of 0.044 units following the refugee influx. This finding is consistent across both the difference-in-difference and fixed effects regression models. Once covariates are accounted for, the estimated decrease is reduced by half, providing further evidence that some of the variability in the estimates can be explained by the observable factors included in the model. The estimate for the Syrian sub population indicates a significantly larger decline, with a 0.114 unit reduction in newly established businesses. This relationship, however, is linear, and this trend is confirmed by the fixed effects estimates. In the case of business startups, no significant effect is found for the refugee variable itself in either of the four specifications. The quadratic term displays an ambiguous significance level, which makes it challenging to draw a definitive conclusion regarding the residual impact of additional refugees. The impact of relocations is found to be considerably less pronounced in comparison to that of new establishments. However, a notable average decline of 0.053 business registrations is observed following the influx of refugees, which reduces to an average 0.036 units when covariates are incorporated. Nevertheless, this decline remains statistically significant. The quadratic terms suggest a non-linear relationship, indicating a quadratic effect where the impact of additional refugees slightly reduces the negative influence on business registrations. The fixed effects model reports slightly larger estimates for relocations, all of which are significant. The estimate for Syrian refugees indicates a reduction of an average of 0.008 units in the number of relocations at the county level subsequent to the influx of refugees, which is more pronounced than the decline of 0.005 relocations observed for the overall refugee population. This relationship is non-linear, as supported by the fixed effects coefficient, significant at the 1 percent level.

Business takeovers show a small yet significant decrease of 0.004 units post-refugee influx, with a linear relationship observed. Fixed effects estimates for takeovers are almost twice as large but remain significant, aligning with the difference-in-difference results and thereby establishing robustness in the findings. In general, the figures for relocations and takeovers are considerably lower than those for new establishments, which suggests that there is a smaller refugee presence in these areas or that the negative effects are less pronounced. The effect on business takeovers by Syrian refugees is again larger, with a decrease of 0.013 units, and this relationship is linear, as confirmed by the fixed effects regression model. Once covariates are included, the coefficients are reduced; however, all results remain statistically significant, establishing robustness in the findings.

6.2 Refugees and Self-Employment Numbers

To substantiate the findings, county-level self-employment data is utilized to examine economic subgroups within specific sectors and identify pathways through which refugees influence entrepreneurial statistics. Table 5 presents the results, with overall self-employment levels in columns (1) and (2), and a detailed sectoral breakdown in columns (3) to (10).

The findings for self-employment numbers demonstrate comparable patterns to those observed in the preceding analysis of business registrations. Looking at Panels A and B, which estimate the total number of asylum seekers in the two models, the self-employment numbers shows a very small but significant decrease of 0.00015 self-employed individuals, which decreases to 0.00012 when covariates are introduced. In Panel B, the estimates show larger magnitudes compared to Panel A. The quadratic term is significant and positive in both panels, suggesting a slight non-linear effect, indicating that the negative effect is slightly diminishing with the arrival of additional refugees. Panels C and D confirm this trend, although the results among Syrian refugees

Table 4: Regression Estimates Business Registrations

	Business Registrations (total)		New Establishments		Business Start-ups		Relocations		Takeovers	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: DID (Refugees)										
Refugees x Post	-0.056***	-0.036***	-0.044***	-0.028***	-0.005	-0.003	-0.005***	-0.004***	-0.006***	-0.004***
	(0.013)	(0.010)	(0.0101)	(0.009)	(0.006)	(0.005)	(0.001)	(0.001)	(0.002)	(0.001)
Refugees^2 x Post	1.25e-07	6.21e-07**	5.81e-08	4.54e-07*	1.38e-07***	2.37e-07*	5.00e-08***	9.23e-08	1.04e-08	6.84e-08
	(1.01e-07)	(3.03e-07)	(7.78e-08)	(2.39e-07)	(4.06e-08)	(1.43e-07)	(8.90e-09)	(1.88e-08)	(2.06e-08)	(5.52e-08)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,156	3,148	3,153	3,145	3,153	3,145	3,152	3,144	3,149	3,141
R-squared	0.491	0.946	0.508	0.937	0.202	0.908	0.207	0.538	0.428	0.847
Panel B: FE (Refugees)										
Refugees	-0.068***	-0.031***	-0.049***	-0.018***	0.002	0.008	-0.008***	-0.005***	-0.009***	-0.005***
	(0.019)	(0.012)	(0.016)	(0.011)	(0.008)	(0.007)	(0.007)	(0.002)	(0.003)	(0.001)
Refugees^2	5.33e-08	7.86e-07**	-3.75e-08	5.68e-07**	7.63e-08	2.25e-07	5.83e-08***	1.14e-07***	1.78e-08	8.94e-08
	(1.37e-07)	(3.38e-07)	(1.08e-07)	(2.62e-07)	(3.87e-08)	(1.53e-07)	(1.31e-08)	(2.22e-08)	(2.54e-08)	(6.15e-08)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,157	3,149	3,154	3,146	3,154	3,146	3,153	3,145	3,150	3,142
R-squared	0.714	0.947	0.718	0.938	0.699	0.909	0.371	0.539	0.639	0.847
Panel C: DID (Syrian Refugees)										
SyrianRefugees x Post	-0.145***	-0.053***	-0.114***	-0.036**	-0.005	0.009	-0.015***	-0.007***	-0.013***	-0.004
	(0.025)	(0.017)	(0.021)	(0.016)	(0.009)	(0.009)	(0.002)	(0.002)	(0.004)	(0.003)
SyrianRefugees^2 x Post	1.95e-06**	9.21e-06	1.14e-06	7.16e-06***	1.33e-06***	1.91e-06	6.59e-07***	1.16e-06***	1.12e-07	8.90e-07
	(9.01e-07)	(2.97e-06)	(7.36e-07)	(2.24e-06)	(4.70e-07)	(1.62e-06)	(6.89e-08)	(1.82e-07)	(1.55e-07)	(6.19e-07)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,110	3,102	3,107	3,099	3,107	3,099	3,106	3,098	3,103	3,095
R-squared	0.286	0.948	0.307	0.939	0.354	0.910	0.068	0.537	0.257	0.847
Panel D: FE (Syrian Refugees)										
SyrianRefugees	-0.138***	-0.062***	-0.105***	-0.041**	0.009	0.015	-0.014***	-0.008***	-0.014***	-0.005
	(0.031)	(0.024)	(0.029)	(0.021)	(0.012)	(0.013)	(0.003)	(0.003)	(0.004)	(0.004)
SyrianRefugees^2	1.49e-06*	9.51e-06***	6.44e-07	7.35e-06***	8.62e-07**	1.73e-06	6.39e-07***	1.20e-06***	1.12e-07	9.15e-07
	(8.89e-07)	(2.88e-06)	(7.25e-07)	(2.18e-06)	(4.21e-07)	(1.59e-06)	(7.84e-08)	(1.84e-07)	(1.50e-07)	(6.03e-07)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,111	3,103	3,108	3,100	3,108	3,100	3,107	3,099	3,104	3,096
R-squared	0.284	0.948	0.301	0.939	0.432	0.909	0.056	0.536	0.246	0.847

Notes: Each column presents the coefficients and standard errors of a difference-in-difference and a fixed effects regression at the county level, as illustrated in equations (1) and (2), respectively. The primary explanatory variables are the total number of refugees and the number of Syrian asylum seekers, along with their respective quadratic values, distributed to a county during the 2014/15 refugee crisis. Panels A to D each present a combination of one of the models and one of the explanatory variables. The outcome variables are as follows: the overall number of newly registered businesses (columns (1) and (2)), the newly established businesses (columns (3) and (4)), the business startups related to already existing businesses (columns (5) and (6)), the relocations of businesses to other counties (columns (7) and (8)), and takeovers or transformations of already existing businesses (columns (9) and (10)). Covariates are all county-specific and include per capita GDP (in €), the youth and elderly coefficients, the total population, the share of the population that is male, as well as property and business taxes. Heteroscedasticity-robust standard errors are shown in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

are more pronounced compared to the overall refugee population. The DID estimate reveals a negative impact on overall self-employment numbers for Syrian refugees that is three times larger, at 0.0005, which decreases once covariates are controlled for. Panel D reaffirms these significant negative effects.

For the manufacturing sector, the estimates show a 0.001 decline in self-employment numbers for the overall refugee population, which reduces by half once covariates are included. In Panel B, the fixed effects estimates underline a consistent negative effect. The quadratic term is significant in Panel A but not in Panel B, indicating a lack of robustness in the linearity of the estimates. While the impact of refugees on the manufacturing sector is significant, it is also substantially small. Examining Panels C and D for the Syrian refugee subpopulation, larger effects are observed, with a reduction of 0.003, which decreases to a reduction of 0.001 in the number of self-employed once county-specific characteristics are introduced. This finding is again significantly negative, aligning with the findings of the DID estimate. The quadratic term is significant in Panel C but not in Panel D, indicating no definite conclusion on the linearity of the Syrian refugees' impact. Similar to the overall self-employment numbers, the negative impact is substantially small in this sector. In the construction sector, no significant effects on self-employment numbers are found in the difference-in-difference model with regards to the total refugee population. However, the fixed effects model indicates a significant positive effect, with an increase of 0.014 in self-employment numbers. This effect diminishes once observable county-specific characteristics are controlled for, which is nonetheless an intriguing finding and could suggest that many refugees cluster in the construction sector to establish their businesses. The quadratic term is statistically significant and negative in both panels, indicating a non-linear effect. This implies that as the number of refugees increases, the negative impact on self-employment numbers becomes more pronounced. The coefficients for Syrian refugees do not yield significant results in either model specification. The quadratic term is significant in Panel D but not in Panel C, indicating a potential non-linear effect. Given the inconsistency of estimates across the models, no definitive conclusion can be drawn regarding the construction sector.

For the service and hospitality sector, the difference-in-difference model finds the largest significant decrease of 0.077 without covariates and a decrease of 0.057 once controlling for covariates. In Panel B, the coefficients are significantly larger but remain statistically significant, indicating a stronger negative effect. The impact of the Syrian refugee population on this sector is particularly pronounced, with an average decline of 0.025 fewer individuals in self-employment at the county level. The effect reduces to 0.017 once covariates are included, indicating a strong presence of Syrian refugees in this sector. The estimates of Panel D support these findings, and a non-linear effect is observed in both models, suggesting that as more refugees arrive, the additional negative impact on self-employment numbers decreases. Furthermore, significant negative estimates across both models were found in the finance and real estate sector. The trend is negative, though smaller compared to the hospitality and service sector, with average decreases of 0.036 and 0.039 self-employed individuals, respectively, before and after controlling for county characteristics. Interestingly, the coefficient remains quite robust to the inclusion of covariates, even increasing slightly. The fixed effects estimates are much larger before and after including covariates, yet they adhere to the significant negative trend. The quadratic term is significant in both panels, indicating a non-linear relationship. For the Syrian refugee sub population, the results are again larger, indicating a substantial negative relationship between the increasing numbers of Syrian refugees and the self-employment numbers in the financial service sector, with an average decline of around 0.013 self-employed individuals.

Table 5: Regression Estimates Self-Employment Numbers

	Self-Employment (total)		Manufacturing		Construction		Service and Hospitality		Finance and Real-Estate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: DID (Refugees)										
Refugees x Post	-0.0001***	-0.0001***	-0.001***	-0.0004***	-0.0004	0.003	-0.077***	-0.057***	-0.0362***	-0.0389***
	(0.00001)	(0.00001)	(0.0001)	(0.0001)	(0.003)	(0.005)	(0.006)	(0.008)	(0.007)	(0.012)
Refugees^2 x Post	2.03e-09***	1.46e-09***	3.67e-09**	1.27e-09	-3.88e-07***	-4.57e-07***	6.76e-07***	6.11e-07***	9.71e-07***	7.83e-07***
	(2.37e-10)	(3.01e-10)	(2.01e-09)	(1.81e-09)	(2.53e-08)	(3.84e-08)	(1.46e-07)	(1.95e-07)	(9.03e-08)	(1.24e-07)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,141	3,140	3,141	3,140	3,141	3,140	3,141	3,140	3,141	3,140
R-squared	0.053	0.951	0.248	0.593	0.362	0.537	0.328	0.907	0.172	0.916
Panel B: FE (Refugees)										
Refugees	-0.0002***	-0.0002***	-0.0008***	-0.0008***	0.014**	0.007	-0.101***	-0.104***	-0.071***	-0.082***
	(0.00003)	(0.00003)	(0.0002)	(0.0002)	(0.007)	(0.008)	(0.017)	(0.015)	(0.013)	(0.015)
Refugees^2	2.16e-09***	2.32e-09***	-8.23e-10	3.02e-09	-5.34e-07***	-4.60e-07***	6.85e-07***	9.80e-07***	1.24e-06***	1.11e-06***
	(3.45e-10)	(3.56e-10)	(1.34e-09)	(2.31e-09)	(5.21e-08)	(7.40e-08)	(1.99e-07)	(2.43e-07)	(1.00e-07)	(1.58e-07)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,141	3,141	3,141	3,141	3,141	3,141	3,141	3,141	3,141	3,141
R-squared	0.279	0.701	0.215	0.586	0.209	0.606	0.564	0.937	0.003	0.905
Panel C: DID (SyrianRefugees)										
SyrianRefugees x Post	-0.0005***	-0.0004***	-0.003***	-0.001***	-0.015	0.006	-0.245***	-0.165***	-0.123***	-0.133***
	(0.00003)	(0.00005)	(0.0004)	(0.0003)	(0.016)	(0.018)	(0.026)	(0.025)	(0.019)	(0.028)
SyrianRefugees^2 x Post	2.56e-08***	2.08e-08***	3.35e-08	1.29e-08	-3.43e-06***	-1.85e-06	8.67e-06***	9.51e-06***	0.000012***	9.38e-06***
	(1.74e-09)	(3.20e-09)	(2.45e-08)	(2.87e-08)	(2.30e-07)	(1.29e-06)	(7.17e-07)	(1.94e-06)	(1.06e-06)	(1.66e-06)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,094	3,094	3,094	3,094	3,094	3,094	3,094	3,094	3,094	3,094
R-squared	0.023	0.744	0.149	0.601	0.279	0.881	0.148	0.942	0.105	0.918
Panel D: FE (SyrianRefugees)										
SyrianRefugees	-0.0004***	-0.0005***	-0.001***	-0.001***	0.013	0.005	-0.204***	-0.206***	-0.145***	-0.166***
	(0.00007)	(0.00007)	(0.0004)	(0.0004)	(0.029)	(0.023)	(0.044)	(0.036)	(0.032)	(0.034)
SyrianRefugees^2	2.23e-08***	2.38e-08***	-3.32e-08**	1.50e-08	-4.43e-06***	-1.84e-06	7.14e-06***	0.0000107***	0.0000127***	0.0000104***
	(2.62e-09)	(3.41e-09)	(1.48e-08)	(2.98e-08)	(7.15e-07)	(1.41e-06)	(1.25e-06)	(2.17e-06)	(1.12e-06)	(1.60e-06)
Covariates	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,095	3,095
R-squared	0.004	0.665	0.039	0.600	0.184	0.881	0.094	0.941	0.081	0.918

Notes: Each column presents the coefficients and standard errors of a difference-in-difference and a fixed effects regression at the county level, as illustrated in equations (1) and (2), respectively. The primary explanatory variables are the total number of refugees and the number of Syrian asylum seekers, along with their respective quadratic values, distributed to a county during the 2014/15 refugee crisis. Panels A to D each present a combination of one of the models and one of the explanatory variables. The outcome variables include the overall self-employment numbers (columns (1) and (2)), the number of self-employed individuals in the manufacturing sector (columns (3) and (4)), the self-employment numbers in the construction sector (columns (5) and (6)), movements in the service and hospitality sector—including trade, transport and storage, catering, and information & communication (columns (7) and (8)), and the finance and real-estate sector - including financial services, insurance, and business activities, real estate activities, public and other service activities, education, and healthcare (columns (9) and (10)). Covariates are all county-specific and include per capita GDP (in €), the youth and elderly coefficients, the total population, the share of the population that is male, as well as property and business taxes. Heteroscedasticity-robust standard errors are shown in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

This finding is mostly robust even after controlling for covariates, and similar findings are observed in Panel D. The quadratic terms are statistically significant and positive, indicating that as the number of refugees increases, the negative impact on self-employment rates declines.

Notably, the decline in self-employment numbers has been less pronounced than that observed in business registration rates in response to the influx of refugees. This discrepancy may be attributed to the fact that business registrations encompass a more expansive range of activities, including larger enterprises and a greater diversity of ownership structures, which may lead to an overestimation of the figures in comparison to those related to self-employment. The following section will present a discussion of the aforementioned findings.

6.3 Discussion and Interpretation

The results of the two models indicate that the presence of refugee populations exerts a significant negative impact on business registrations and self-employment rates. These findings can be attributed to a number of complex and multifaceted causes, given the numerous factors that influence refugees' access to self-employment. Despite the growing body of literature on refugee entrepreneurship, a consensus on the primary factors influencing entrepreneurial success has not been reached. Nevertheless, the majority of papers have identified individual resources and access to relevant markets as the primary determinants. While research has indicated that a significant proportion of refugees express interest in pursuing entrepreneurial activities, even in the immediate period following their arrival, the aspiration to achieve professional autonomy alone is insufficient for the successful establishment of a company. The transition from interest to actualization is often lengthy and fraught with challenges, which may be reflected in the negative results observed. Nevertheless, the findings also indicate the possibility of a beneficial impact resulting from an increase in the number of refugees. It seems that these factors serve to offset some of the negative consequences for business registration.

Navigating the significant obstacles encountered by refugees in launching their own business ventures demands considerable time, particularly due to the complex bureaucratic environment in Germany. The lack of an adequate macro-level support structure for business creation and the accumulation of start-up resources significantly hinders refugees' ability to contribute economically through entrepreneurial activities. Empirical research and economic models indicate that the influx of refugees can lead to increased unemployment rates due to challenges in their integration into the labor market (Directorate General for Internal Policies 2016). This integration issue results in elevated fiscal burdens on the social welfare system, including increased expenditures on housing and unemployment support (Bach et al. 2017). In light of the fact that economic theory posits that entrepreneurship is a key driver of economic growth, which requires a robust economic environment and targeted government support, it is evident that the role of the government in fostering entrepreneurial activity is of importance (Thurik, VanStel, and Carree 2005). The crowding-out theory posits that government expenditures on specific sectors can result in a reduction of resources available for other sectors (Friedman 1978). In this case, the German government's increased expenditures on refugee accommodations and integration, coupled with a reduction in entrepreneurial support, may have resulted in the crowding out of resources necessary for fostering entrepreneurial activities. It is hypothesised that this reallocation of resources, coupled with increased unemployment rates has resulted in a weakening of the economy, as evidenced by a reduction in overall entrepreneurial activities.

The inability of refugees to mitigate these adverse economic effects by integrating into the traditional labor market and establishing their own businesses perpetuates the persistence of these negative economic impacts.

In light of the fact that many refugees indicate their motivations for pursuing entrepreneurial activities, it can be reasonably inferred that the negative outcomes are not necessarily driven by the unwillingness of refugees to integrate and contribute to the economy per se, but rather by the insufficient entrepreneurial environment and legal hurdles associated with refugee entrepreneurship. Entrepreneurship typically requires social capital, including cultural competencies, family networks, and relationships, to function effectively in relevant markets (Strobl, Peters, and Raich 2014). In Germany, however, these standard mechanisms are often only accessible under very specific social, economic, and rural contextual conditions, such as in certain sectors or urban areas where entrepreneurs can leverage these assets (Bach et al. 2017). Refugees, who often flee their home countries abruptly, have little time to acquire the necessary social capital to build relationships, leaving them disconnected from their original networks (Harima 2022). This disconnect makes it inherently difficult to establish themselves in the host country, with limited access to resources and networks in both their host and origin communities (Harima 2022). Such factors can pose substantial barriers to successful entrepreneurship in contexts like Germany, particularly for Syrian refugees who had to leave abruptly due to the worsening political situation. These individual characteristics and limited networks may partially account for the negative estimates found in the model and the positive estimates found in the quadratic terms.

Entrepreneurial behavior is not only influenced by integration into specific social network structures but also by the socio-economic and political-institutional environment provided by the host country (Newman, Macaulay, and Dunwoodie 2023). For instance, start-ups rely not only on the support of family or friends, but also on the regional start-up ecosystem and the regulatory conditions set by chambers, associations, and the state (Bach et al. 2017). These factors affect the likelihood of achieving professional independence, as such interdependencies can hinder the creation of new entities, particularly when actors face legal constraints or market access challenges. While a macroeconomic examination of the refugee crisis reveals a considerable level of governmental support associated with the reception and accommodation of refugees, including housing construction, school integration, and language and education programs, the government provided only a limited degree of support in terms of financial assistance and the creation of an entrepreneurial environment conducive to business growth (European Commission 2016; Bach et al. 2017). It can be argued that the insufficient resources and lack of entrepreneurial support from the German and local governments may also have contributed to the negative outcomes observed in the estimates.

Given the aforementioned hurdles, refugees often self-select into economic sectors with lower market entry barriers (Elis, Citilgulu, and Nichols n.d.). When examining the results presented for self-employment numbers, the most severe impacts were evident in the hospitality and service sectors, as well as in the financial services sector, particularly among Syrian refugees. This is in line with expectations, given that refugees with comparatively lower levels of formal education and training tend to pursue opportunities in sectors with lower qualification requirements and low financial barriers to entry (Chliova, Farny, and Salminvaara 2018). However, the extent of the adverse effects identified in this analysis is unexpected, given that existing literature would suggest a rather positive impact of refugees in these economic sectors. One potential explanation for this phenomenon is that there is a supply surplus in certain sectors. It is possible that high levels of refugee self-employment in these sectors may result in refugees displacing existing local businesses or other migrant businesses, particularly in highly competitive markets such as the service sector (Bach et al. 2017). The forced competition with lower prices to attract customers among self-employed refugees may result in a price war that affects the entire industry (Bach et al. 2017).

Despite evidence indicating that the initial attitude towards entrepreneurship is predominantly positive among refugees, the challenges faced by refugee entrepreneurs result in the average refugee only taking the first step towards self-employment after an average of 11 years (Bach et al. 2017). The time factor is of great significance, as it correlates with the opportunity to gain the necessary system knowledge to run a business, identify market opportunities, learn German, acquire funds, overcome legal and institutional barriers, and build relationships with potential customers and suppliers (Bach et al. 2017). The duration of residence in Germany is not the sole factor influencing the involvement of refugees in entrepreneurship. Rather, the opportunities available during this period facilitate the preparation and support for start-ups. In comparison, in countries with fewer legal obstacles and less bureaucracy, such as Turkey and Lebanon, refugees have been able to integrate more effectively and quicker due to cultural similarities, a more comprehensive understanding of the legal context, and fewer legal constraints compared to Germany (Kachkar 2018). Despite the financial obstacles that refugees in these countries also encountered, they were able to leverage their proximity to local networks, shared cultural affiliations, and a more nuanced comprehension of local markets and consumer bases (Alexandre, Salloum, and Alam 2019). This facilitated their integration to a greater extent compared to refugees in Germany.

6.4 Expansion of Analytical Models

Given that this study is limited to the first five years after the influx of refugees, and given the crucial role that time plays in refugee entrepreneurship models, it does not capture the potential long-term positive impact that refugee entrepreneurship in Germany might have. Therefore, future longitudinal studies are needed to investigate this phenomenon more comprehensively. Nevertheless, this paper attempts to provide some clarity on the role that time plays in the models presented. Accordingly, the original fixed effects regression model, as shown in equation (3), is extended to include year dummies to visually illustrate the impact of refugees on entrepreneurial activity in Germany for each year before and after the influx [8]. Moreover, the difference-in-difference model is extended, as illustrated in equation (4), by incorporating lagged values of the inflow variables to examine how the effects evolve over time [9]. The results are presented in Figure 5 and Table 6, respectively.

The graph on the left depicts the annual estimates for business registrations from 2012 to 2018. Initially, the graph exhibits negative values, indicating low levels of business registrations at the beginning of the period, even prior to the influx of refugees. Nevertheless, a slight decline in these negative values is observed shortly after the refugee influx, indicating a potential increase in business registrations during the initial two-year period following arrival. Although an upward trend was observed in the initial two-year period following the influx of refugees, a subsequent decline was noted. However, the estimates remain less negative than those reported in 2012, with the overall effect remaining negative. The graph on the right illustrates the impact of the refugee influx on self-employment numbers from 2012 to 2018. The coefficients in this graph exhibit a comparable pattern, with an initial increase in self-employment numbers following the refugee influx, followed by a subsequent decline to levels approaching those observed prior to the influx. Nevertheless, it is clear that the net effect on self-employment numbers, while negative, is relatively minor.

Examining the extended model in the difference-in-difference analysis reveals similar trends as observed in Figure 5. Regarding overall business registrations, no significant effects are observed for the overall refugee

[8] see Appendix A for Model Specification
[9] see Appendix B for Model Specification

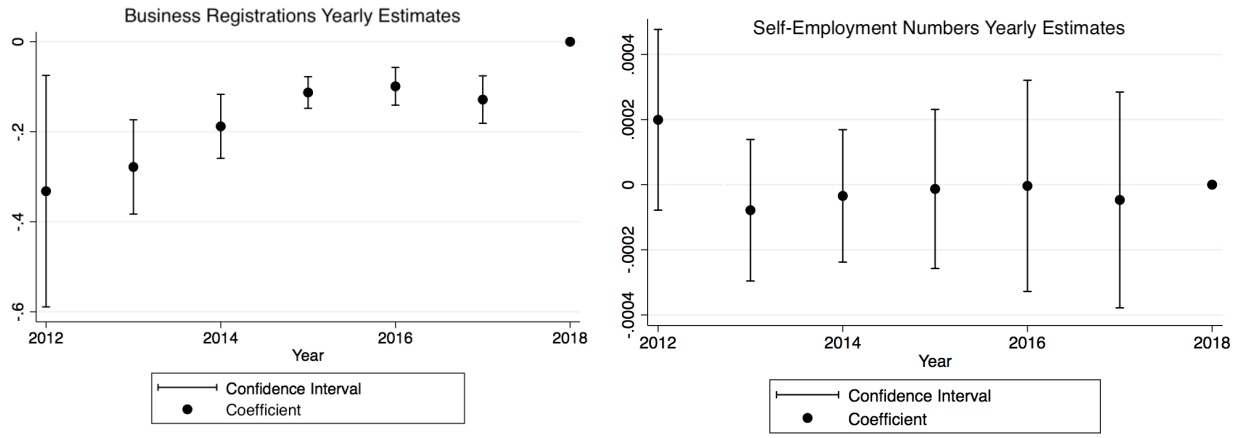

Figure 5: Newly Registered Businesses and Self-Employment over Time

Notes: This figure presents plots of the pre- and post-treatment dummy variables interacted with the overall refugee influx for both business registrations and self-employment numbers. It displays the estimated coefficients along with their respective confidence intervals, illustrating the variations.

population throughout the years, although the effects tend to be positive in the first years following their arrival. In contrast, the analysis of Syrian refugees demonstrates a notable increase in business registrations, with a significant positive effect of 0.05 units in the third year following their arrival. This suggests that some refugees may have overcome initial challenges and adapted to the local market, successfully establishing their businesses. These effects, however, become insignificant after this point in time. An examination of new establishments reveals a significant negative effect in the second year for both refugee groups, amounting to approximately 0.035 fewer newly registered business units. This decline is largely driven by the Syrian refugee population. With regard to self-employment numbers, a significant yet very little positive effect of an average 0.0002 and 0.0006 individuals is visible for both groups in the first year following the influx, though this diminishes in the subsequent year. It is noteworthy that Syrian refugees demonstrate a significant positive impact of 0.0002 in the fourth year, which subsequently transitions into a considerably larger negative impact in the subsequent year. Fluctuations of a similar nature are evident for both refugee groups in the service and hospitality sector. Initially, there are positive effects shortly after their arrival, which turn significantly negative after five years. The positive effect for the overall refugee population with 0.042 more self employed individuals in the first year, is even more pronounced for Syrian refugees. In the first year following their arrival, they contribute a 0.136 increase to the average self-employment numbers at the county level. However, five years later, this results in a significantly negative outcome, with on average 0.434 fewer self-employed individuals in that sector. This may indicate a shift in the employment status of refugees, marked by an increase in those seeking alternative forms of employment or a rise in unemployment.

Given these results and the findings from the initial model, it is evident that refugees encounter significant initial costs and challenges in navigating the German system and overcoming barriers to economic integration and self-employment. The findings of these thesis thereby provide evidence that the German economy faces challenges in absorbing the influx of refugees, posing difficulties for society at large. Should these results prove to be statistically robust, they may serve as crucial indices for policymakers to reform governmental barriers and regulatory systems to bridge the gap between refugees' entrepreneurial aspirations and their ability to realize them as a means of economic integration. The following section will present evidence demonstrating the robustness of the findings presented. Subsequently, potential policy pathways will be presented for discussion.

Table 6: Difference-in-Difference Extension and Lagged Values

	Business Registrations		Self-Employment	
	Total	New Establishments	Total	Services and Hospitality
	(1)	(2)	(3)	(4)
Panel A: DID Refugees				
Refugees x Post	-0.007	0.013	-0.00005	-0.0300
	(0.036)	(0.0338)	(0.0001)	(0.0313)
L1.Refugees	0.019	0.0006	0.0002*	0.0421*
	(0.035)	(0.027)	(0.0001)	(0.0214)
L2.Refugees	0.0174	-0.0094*	-0.00007**	-0.0085
	(0.0194)	(0.0053)	(0.00003)	(0.0060)
L3.Refugees	0.0137	0.0136	-0.00004	-0.0128
	(0.0167)	(0.0161)	(0.00005)	(0.0113)
L4.Refugees	-0.0269	-0.0339	0.000005	-0.0249
	(0.0280)	(0.0272)	(0.00004)	(0.0139)
L5.Refugees	-0.0679	-0.0513	-0.00018	-0.0519*
	(0.0531)	(0.0459)	(0.0001)	(0.0263)
Covariates	Yes	Yes	Yes	Yes
R-squared	0.2839	0.3849	0.4622	0.6965
Observations	1,182	1,179	1,179	1,179
Panel B: DID SyrianRefugees				
SyrianRefugees x Post	-0.181**	0.0107	-0.0003*	-0.0915**
	(0.0786)	(0.0556)	(0.0002)	(0.0395)
L1.SyrianRefugees	-0.0117	-0.0074	0.0006***	0.1357***
	(0.0554)	(0.0584)	(0.0001)	(0.0269)
L2.SyrianRefugees	0.0644	-0.0355**	-0.0001***	-0.0173
	(0.0684)	(0.0152)	(0.00004)	(0.0111)
L3.SyrianRefugees	0.0503*	0.0166	-0.00004	-0.0035
	(0.0257)	(0.0315)	(0.00006)	(0.0172)
L4.SyrianRefugees	-0.0884	-0.0964	0.0002*	-0.0080
	(0.0827)	(0.0745)	(0.00009)	(0.0239)
L5.SyrianRefugees	0.0625	0.0554	-0.0013**	-0.4338***
	(0.2687)	(0.2683)	(0.0004)	(0.1182)
Covariates	Yes	Yes	Yes	Yes
R-squared	0.2978	0.3908	0.5647	0.7283
Observations	1,134	1,131	1,131	1,131

Notes: The data presented in each column represent the coefficients and standard errors derived from a difference-in-difference regression at the county level, as shown in equation (2). Each column re-estimates the original specification for the aggregate levels of business registrations and self-employment numbers, as well as for new business establishments and self-employment numbers in the services and hospitality sector. Columns (1) and (4) present the estimates obtained after including lagged values of up to 5 years after the first influx of refugees and Syrian refugees in 2014, respectively, as obtained from panels A and B. All estimates include county-specific covariates. These include GDP per capita (in €), coefficients for young and old population, total population, share of male population, and property and business taxes. The results are presented with heteroscedasticity-robust standard errors in parentheses. The symbols ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

7 Robustness and Sensitivity

The analysis presented indicates that, in the short term, the presence of recognized refugees exerted an immediate and negative influence on overall entrepreneurial activity in Germany. The underlying assumption that allows for the credibility of these results is that the trends in business registrations and self-employment would have remained consistent in counties with high and low refugee populations in the absence of asylum seeker inflows (Gehrsitz and Ungerer 2022). This thesis has demonstrated graphically that the parallel trends assumption is reasonable in Section 5. Additionally, statistical tests were conducted to compare the estimates of the pre-treatment year dummies to identify any significant differences, as shown in Appendix C. Based on the results, this paper provides evidence that most comparisons confirm the parallel trends assumption, with the exception of business registrations for the total refugee category, which shows a significant difference in the pre-influx years and should therefore be interpreted with caution. The year 2014 is included in the pre-dummy years as a test to justify its use as the initial cutoff period. Given that the pre-treatment coefficients for business registrations are insignificant between 2012 and 2013 but significantly different compared to 2014, the decision to use 2014 as the cut-off year is supported.

Placebo tests provide further evidence of the validity of the identification strategy utilized by this paper. The time frame of this analysis is adjusted to a period that was not affected by the refugee crisis. Specifically, equation (1) is re-estimated for 2013 and equation (2) for 2012 and 2013, attributing the inflows of asylum seekers that actually occurred in 2014/15 to 2012. The results for this analysis are shown in Table 6. The results yield several significant findings. As illustrated in Panel A, the notable positive placebo effects indicate that the preliminary estimates for business registrations, both in aggregate and for new establishments, may be inflated for the refugee population. This overestimation may be attributed to the presence of a distinct cohort of refugees who had already resettled in Germany prior to the significant influx that occurred between 2014 and 2015. These findings indicate the presence of pre-existing differences in business registrations between high and low immigration groups in relation to asylum seekers prior to the refugee influx. This aligns with the previous evidence, which demonstrated that there are significant discrepancies in business registrations between high and low immigration counties. It is noteworthy that no significant effects were observed with regard to business registrations in relation to Syrian refugees. This could be attributed to the fact that the Syrian sub population was relatively small prior to 2014 and only became established in significant numbers from that year onwards, with four times the number of Syrian refugees entering Germany.

With regard to self-employment rates, Panel B indicates a notable negative influence for Syrian refugees, implying that the actual negative impact may be underestimated. This is further substantiated by the fixed effects model in Panel D. Nevertheless, the remaining estimates are found to be significantly insignificant, which offers reassurance for two key reasons. Firstly, it lends credibility to the findings that demonstrate a negative impact of refugee entrepreneurship on entrepreneurial measures. Secondly, this suggests that the negative effects observed are not predominantly driven by pre-existing entrepreneurial trajectories in countries with large refugee inflows prior to the refugee crisis.

Table 7: Placebo Regression: Inflow of Refugees and Change in Outcomes

	Business Registrations		Self-Employment	
	Total	New Establishments	Total	Services and Hospitality
	(1)	(2)	(3)	(4)
Panel A: DID Refugees				
Refugees	0.026***	0.024**	-0.00002	0.023**
	(0.009)	(0.009)	(0.00002)	(0.010)
Covariates	Yes	Yes	Yes	Yes
Observations	741	741	739	739
R-squared	0.923	0.915	0.953	0.919
Panel B: DID SyrianRefugees				
SyrianRefugees	0.214	0.204	-0.0004**	-0.134
	(0.176)	(0.189)	(0.0002)	(0.107)
Covariates	Yes	Yes	Yes	Yes
Observations	741	741	739	739
R-squared	0.941	0.936	0.943	0.929
Panel C: FE Refugees				
Refugees	0.114	0.108	-0.00002	-0.042
	(0.155)	(0.165)	(0.0001)	(0.113)
Covariates	Yes	Yes	Yes	Yes
Observations	741	741	739	739
R-squared	0.945	0.938	0.962	0.922
Panel D: FE SyrianRefugees				
SyrianRefugees	0.545	0.522	-0.001**	-0.452
	(0.605)	(0.645)	(0.0006)	(0.412)
Covariates	Yes	Yes	Yes	Yes
Observations	741	741	739	739
R-squared	0.951	0.941	0.959	0.929

Notes: Each column reports coefficients and standard errors from a difference-in-difference and fixed effects regression as in equations (1) and (2), respectively, but based on 2012/2013 data. The inflow of asylum seekers, including both Syrian refugees and total refugees, is set to the 2012 aggregates. Panels A to D each present a combination of one of the models and one of the explanatory variables. The outcome variables are the number of newly registered enterprises (total) and new business establishments, as well as the total self-employment numbers and the number of self-employed in the services sector. The covariates are all county-specific and include GDP per capita (in euro), the young and old coefficients, the total population, the proportion of the population that is male, and property and business taxes. Heteroscedasticity-robust standard errors are shown in parentheses. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

To further validate the findings, additional regressions were conducted with varying model specifications. The results presented in Appendices D and E demonstrate that the findings are robust to variations in model specifications, including the inclusion of different sets of covariates and the incorporation of quadratic terms in the estimation strategy employed by this thesis. It is noteworthy that economic covariates tend to overestimate the negative impact on self-employment numbers when included in isolation, whereas demographic covariates tend to underestimate the negative impact on business registrations when included in isolation. Nevertheless, the results remain consistent across all sets of covariates and specifications, retaining their significance in the same direction as previously observed. Moreover, the inclusion of quadratic terms resulted in a change of significance for some of the outcome variables, indicating that non-linear effects play a more critical role, particularly in the hospitality and service sector. This is of particular importance in the context of the increasing number of refugees in Germany and the potential long-term consequences for entrepreneurial outcomes. From a policy perspective, an understanding of the non-linear impacts can facilitate the design of more effective interventions.

In light of the robust findings presented in this thesis, it is recommended that policymakers establish a more favorable environment for refugee entrepreneurship. This could mitigate the adverse economic consequences associated with refugee populations, transforming them from a fiscal burden to contributors to economic growth. The following section will provide a more detailed examination of these potential improvements.

8 Discussion and Recommendations

The sustained growth of a vibrant economy is contingent upon the ongoing emergence of new businesses. In consideration of the declining number of self-employed German nationals and the considerable influx of refugees, particularly from entrepreneurial cultures such as Syria, it is imperative to identify groups with untapped entrepreneurial potential. Enhancing this potential is essential not only for national economic interests but also for refugees who depend on work and income (Directorate General for Internal Policies 2016). With only half of the refugees currently employed, there is a clear need for action. Therefore, integrating refugees into the labor market is a societal goal, offering the dual benefits of reducing the burden on public finances and strengthening social cohesion (Directorate General for Internal Policies 2016). Refugee entrepreneurship offers an additional pathway to employment opportunities, benefiting the economy as refugee entrepreneurs are more likely to hire other refugees than traditional businesses (Bach et al. 2017).

Despite the optimistic outlook and potential benefits that refugees can bring to the local economy through entrepreneurship, the empirical evidence presented in this thesis suggests that the presence of refugees actually has a significant negative impact on entrepreneurial activity in Germany. Although a slight positive impact was observed following the initial arrival of refugees, this effect rapidly diminished. Despite their motivation, refugees encounter significant social and institutional barriers that are more challenging than those faced by other migrant groups (Zalkat, Barth, and Rashid 2023). Consequently, refugees require a longer period to navigate these challenges and access the resources necessary for entrepreneurial success (Newman, Macaulay, and Dunwoodie 2023; Zalkat, Barth, and Rashid 2023). The obstacles and overlapping barriers, such as the difficulty of securing startup financing with an uncertain residency status, indicate that many migrant-focused advisory concepts require supplementation with new support approaches and programs specifically designed for refugees (Chliova, Farny, and Salminvaara 2018). It is therefore crucial to create a conducive environment for refugee entrepreneurs in order to ensure their long-term success. Therefore, stakeholders from a range of sectors, including the economic, administrative, political, non-profit and social spheres, need to collaborate in

order to enhance self-employment opportunities, improve access, disseminate information about the German economic system and reinforce networking efforts.

A number of enhancements can be implemented to foster a more unified entrepreneurial environment. One of the primary issues identified in this thesis is the presence of language barriers. It is therefore recommended that access to language support, including integration and job-related courses, should be provided at the earliest opportunity. For those interested in pursuing an entrepreneurial career, the language courses should include information and vocabulary related to self-employment. Moreover, the issue of qualification recognition represents a significant challenge. This not only results in a reduction in the number of successful startups but also leads to a disproportionate allocation of refugees into industries with lower entry barriers, primarily the services and hospitality sector. In order to achieve higher quality startups, particularly in modern services, it is necessary to establish a stronger connection between entrepreneurial advisory services and specialized advisory centers that are focused on the recognition of foreign qualifications (Bach et al. 2017). It is imperative to shift the focus away from sectors such as services and hospitality, particularly given the heightened risk of failure for startups in these sectors during periods of heightened economic uncertainty, as evidenced by the impact of the Covid-19 crisis on such businesses.

Furthermore, it is crucial to address the financial shortcomings faced by refugees. As a consequence of the initially temporary nature of their residency status, long-term financing options are effectively unavailable. Even when microloans with terms of three years or less are available, individuals with temporary residency status often encounter difficulties in obtaining them (Bach et al. 2017). It is recommended that instruments be provided to refugees with business concepts that are compelling, which would specifically mitigate the disadvantage of temporary residency. To this end, it is essential that funding agencies and private financiers work together to find solutions. One potential avenue for facilitating refugees' entrepreneurial aspirations is to explicitly provide access to existing funding programs, whether at federal or state level. This could be achieved by promoting transparency about existing advice and funding structures with the aim of encouraging suitable individuals to engage in entrepreneurship. It is crucial that all points of contact where refugees receive support for labour market integration are receptive to the concept of self-employment. Promoting entrepreneurship as a viable alternative to employment is a promising way to achieve economic independence among refugee populations.

Overall, it is important to emphasize that not only support in specific areas is needed, but also the establishment of a comprehensive mentoring program to help refugees navigate these complexities. Such programs can help build market knowledge, test business models and develop them together. There are already a number of initiatives involving a wide range of actors from the political and administrative spheres, the business community, numerous social start-ups and aid organizations that offer personalized support to refugees and make valuable contributions to the integration of refugees through their mentoring programs. However, there is a lack of transparency about all the existing opportunities. Better networking among these initiatives and coordinated placement of refugees are needed to maximize the impact of efforts to promote refugee entrepreneurship.

9 Conclusion

In this thesis, a natural experiment is utilized to investigate the impact of the unexpected influx of over one million refugees to Germany in 2014/15. The unique scale and skill composition of the refugee influx, along with the temporary nature of the migration, set this study apart from other natural experiments. This study

employed fixed effects panel regression and difference-in-differences continuous treatment methods to analyze administrative data on the distribution of refugees across German counties. This robust methodology allowed for a thorough examination of the causal effects of refugee settlements on business registrations and self-employment numbers.

The findings of this study indicate that the influx of refugees had a negative impact on business registrations and self-employment, particularly in sectors with low entry barriers. The considerable influx of refugees presented significant economic challenges, exerting pressure on the resources of the German economy. However, the challenges were not limited to the broader economic and social context. Asylum seekers who were granted acceptance into the country also encountered significant obstacles in establishing their own businesses, despite reporting high levels of interest in pursuing entrepreneurial opportunities. Such limitations included restricted access to financial capital, business networks, and supportive regulatory frameworks, which are more readily available to native entrepreneurs and other migrant groups. These challenges ultimately resulted in a reduction in the probability of refugees initiating and maintaining business ventures. The findings of this thesis thereby provide evidence that the German economy faces challenges in absorbing the large influx of refugees, posing difficulties for society at large. Consequently, this thesis contributes to the growing body of knowledge on refugee entrepreneurship by underscoring the significance of providing support to refugee entrepreneurship as a means of facilitating economic integration and offering an alternative to traditional employment pathways. This study is among the first to empirically assess the impact of such a significant event in Germany on entrepreneurial activity, and to provide evidence on the implications for business registrations and self-employment numbers.

Although this paper is primarily concerned with the short-term effects, the findings indicate that, in the initial phase following an influx, policymakers should allocate a significant amount of resources to support entrepreneurial opportunities and the integration for refugees. This can be accomplished by fostering transparency and accessibility to essential resources through comprehensive guidance on the regulatory environment, market opportunities, and readily available support services. Moreover, enhancing the recognition of foreign qualifications can assist refugees in effectively leveraging their existing skills and knowledge, thereby enabling them to self-select into alternative sectors beyond the service and hospitality sector.

In light of the evidence presented, this study recommends further research, particularly longitudinal studies, to investigate the long-term impact of refugee entrepreneurship. Longitudinal studies can facilitate a more profound comprehension of the manner in which refugee entrepreneurs adapt and evolve over time, thereby enabling the identification of factors that contribute to their success or failure. Moreover, a comprehensive examination of diverse host countries with disparate legal frameworks could provide insights into the impact of varying entrepreneurial ecosystems on the rates of entrepreneurial activity among migrant groups, thus enabling the identification of critical factors. Moreover, a comprehensive assessment of the impact and efficiency of specific policies and programs on refugee entrepreneurship in host countries would be advantageous. Finally, an examination of the entrepreneurial activities of diverse migrant groups and refugees can elucidate the distinctive challenges and opportunities faced by each group, thereby facilitating the implementation of more targeted and effective policy interventions. It is my hope that this thesis will encourage further research and provide a foundation for future analysis of what is anticipated to remain a significant economic and social issue in the future.

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A Model Extension Fixed Effects with Yearly Interaction Dummy Variables

$$Y_{ct} = \alpha + \beta_1 \mathrm{Z}_c + \beta_2 (\mathrm{Z}_c)^2 + \theta X_{ct} + \mu_c + \lambda_t + \epsilon_{ct} + \sum_{k=2012}^{2019} \gamma_k (\mathrm{Z}_c \cdot D_t^k) \tag{3}$$

where Y_{ct} represents the two outcomes of interest—business registrations and self-employment numbers—in county c at time t. The coefficients of primary interest are β_1 and β_2. The coefficient β_1 captures the impact of asylum seekers and Syrian refugees as a continuous measure, with the allocation of individuals to a county occurring between January 1, 2014, and December 31, 2019. Z_c thereby represents either the number of asylum seekers or the number of Syrian refugees. The coefficient β_2 accounts for the possibility of a non-linear relationship between the number of total asylum seekers or Syrian refugees and the outcome variables. The term θX_{ct} represents a vector of county-specific characteristics, such as GDP per capita, population size, and the shares of male, youth, and elderly populations, as well as tax rates, aiding to account for other factors that might influence both refugee distribution and entrepreneurial activity. The model also incorporates county fixed effects μ_c, which capture the impact of external factors that differ across counties but remain constant over time. Furthermore, year fixed effects λ_t are included to control for the influence of external factors that vary over time but are consistent across all counties in a given year and ϵ_{ct} denotes random disturbances, representing unobserved factors affecting entrepreneurship not accounted for by the model. This model also includes yearly interaction dummies to observe changes in the model over time by adding $\sum_{k=2012}^{2019} \gamma_k (\mathrm{Z}_c \cdot D_t^k)$ to the model, where D_t^k is a dummy variable that equals 1 if year t is k and 0 otherwise. The term $\gamma_k (\mathrm{Z}_c \cdot D_t^k)$ represents the interaction effects between the variable Z_c and each year from 2012 to 2019.

B Model Extension Difference-in-Difference with Lagged Values

$$Y_{ct} = \delta_c + \gamma D_{post} + \beta_1 (D_{post} \times \mathrm{Z}_c) + \beta_2 (D_{post} \times (\mathrm{Z}_c)^2) + \theta X_{ct} + \mu_c + \lambda_t + \epsilon_{ct} + \sum_{i=1}^{5} \alpha_i Z_{c,t-i} \tag{4}$$

where Y_{ct} represents the two outcomes of interest—business registrations and self-employment numbers—in county c at time t. δ_c denotes a full set of county dummies, and D_{post} is an indicator for the post-treatment period. The interaction terms $D_{post} \times \mathrm{Z}_c$ and $D_{post} \times (\mathrm{Z}_c)^2$ capture the impact of the total number of asylum seekers and Syrian refugees, respectively, captured by Z_c and their quadratic forms, captured by $(\mathrm{Z}_c)^2$, on business registration and self-employment numbers in the post-treatment period. θX_{ct} represents a vector of county-specific characteristics, as detailed previously. The model also includes county fixed effects μ_c, year fixed effects λ_t, and the error term ϵ_{ct}. This model also including lagged values for the total refugee population and Syrian refugees respectively, of the form $\sum_{i=1}^{5} \alpha_i Z_{c,t-i}$, with $Z_{c,t-i}$ being the lagged Syrian refugees variable for each year i from 1 to 5, with the initial year being 2014, the model estimates the lagged values from 2015 to 2019.

C Pre-Trends Coefficient Check

Table 8: Pre-Trends Coefficient Check

Business Registrations				
Test	Syrian Refugees		Refugees (total)	
	F-statistic	p-value	F-statistic	p-value
2012_dummy x 2013_dummy	0.73	0.3945	11.85	0.0006
2012_dummy x 2014_dummy	18.99	0.0000	108.33	0.0000
2013_dummy x 2014_dummy	26.00	0.0000	51.08	0.0000
2012_dummy x 2013_dummy x 2014_dummy	19.54	0.0000	59.28	0.0000
Self-Employment Numbers				
Test	Syrian Refugees		Refugees (total)	
	F-statistic	p-value	F-statistic	p-value
2012_dummy x 2013_dummy	1.25	0.2644	1.21	0.2720
2012_dummy x 2014_dummy	0.81	0.3682	9.50	0.0021
2013_dummy x 2014_dummy	0.26	0.6072	4.11	0.0427
2012_dummy x 2013_dummy x 2014_dummy	0.62	0.5363	5.11	0.0061

Notes: The table illustrates the interaction terms of the pre-refugee influx interaction dummies for the total asylum-seeking and Syrian refugee populations, respectively. It provides the pre-treatment differences for the outcome variables of interest, namely business registrations and self-employment numbers.

D Robustness Check: Different Sets of Covariates

Table 9: Robustness Check: Different Sets of Covariates

	Self-Employment Numbers (total)			Business Registrations (total)		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: DID Estimates Refugees						
Refugees	-0.0001***	-0.037***	-0.0001***	-0.055***	-0.042***	-0.042 ***
	(0.00002)	(0.009)	(0.00002)	(0.0145)	(0.0158)	(0.0106)
Refugees^2	1.63e-09***	6.01e-07***	1.67e-09***	1.22e-07***	4.02e-07	4.02e-07***
	(3.00e-10)	(2.77e-07)	(2.99e-10)	(1.24e-07)	(2.68e-07)	(2.68e-07)
Panel B: FE Estimates Refugees						
Refugees	-0.0002***	-0.0002***	-0.0002***	-0.0257***	-0.068***	-0.038***
	(0.00003)	(0.00003)	(0.00002)	(0.009)	(0.016)	(0.011)
Refugees^2	2.27e-09***	2.37e-09***	2.24e-09***	7.32e-07**	5.92e-08	4.96e-07
	(3.28e-10)	(3.02e-10)	(3.20e-10)	(3.09e-07)	(1.23e-07)	(3.17e-07)
Panel C: DID Estimates SyrianRefugees						
SyrianRefugees	-0.0004***	-0.049***	-0.0004***	-0.131***	-0.067***	-0.067***
	(0.00005)	(0.017)	(0.00005)	(0.028)	(0.015)	(0.015)
SyrianRefugees^2	2.17e-08***	9.07e-06***	2.20e-08***	1.55e-06*	7.34e-06**	7.34e-06**
	(2.87e-09)	(2.87e-06)	(2.37e-09)	(9.28e-07)	(3.11e-06)	(3.11e-06)
Panel D: FE Estimates SyrianRefugees						
SyrianRefugees	-0.0005***	-0.0005***	-0.0005***	-0.052**	-0.143***	-0.074***
	(0.00006)	(0.00006)	(0.00005)	(0.022)	(0.029)	(0.018)
SyrianRefugees^2	2.36e-08***	2.43e-08***	2.37e-08***	9.13e-06***	1.77e-06**	7.52e-06**
	(2.89e-09)	(2.17e-09)	(2.74e-09)	(2.81e-06)	(8.60e-07)	(3.05e-06)

Notes: The data presented in each column represent the coefficients and standard errors derived from a county-level difference-in-difference regression and fixed effects regression, as illustrated in equations (1) and (2), respectively. Panels A to D each present a combination of one of the models and one of the explanatory variables, namely total inflow of asylum seekrs and syrian refugees. Each column re-estimates the original specification with a different set of covariates. Columns (1) and (4) present the estimates obtained after the inclusion of all county-specific covariates. These include per capita GDP (in €), coefficients for the youth and elderly populations, the total population, the share of the population that is male, as well as property and business taxes. Columns (2) and (5) reestimate the specification with only the economic covariates, namely GDP and taxes, whereas columns (3) and (6) report the estimates after only including demographic covariates, such as the elderly coefficient, youth coefficient, share of males and population. The dependent variables are set to the aggregated levels of business registrations and self-employment numbers. The results are presented with heteroscedasticity-robust standard errors, which are shown in parentheses. The symbols ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

E Robustness Check: Model Specification and Quadratic Variables

Table 10: Robustness Check: Model Specification and Quadratic Variables

	Business Registrations				Self-Employment			
	Total		New Establishments		Total		Services and Hospitality	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: DID Refugees								
Refugees x Post	-0.047***	-0.056***	-0.039***	-0.0444***	-0.00001	-0.0001***	-0.029*	-0.078***
	(0.009)	(0.013)	(0.007)	(0.010)	(0.00004)	(0.00001)	(0.017)	(0.006)
Refugees^2 x Post		1.25e-07		5.81e-08		2.03e-09***		6.76e-07***
		(1.01e-07)		(7.78e-08)		(2.37e-10)		(1.46e-07)
Observations	3,156	3,156	3,153	3,153	3,140	3,141	3,140	3,141
R-squared	0.499	0.491	0.504	0.508	0.014	0.053	0.265	0.172
Panel B: FE Refugees								
Refugees	-0.0634***	-0.068***	-0.053***	-0.049***	-0.00001	-0.0001***	-0.042	-0.101***
	(0.011)	(0.019)	(0.008)	(0.016)	(0.00007)	(0.00003)	(0.030)	(0.017)
Refugees^2		5.33e-08		-3.75e-08		2.16e-09***		-5.34e-07***
		(1.37e-07)		(1.08e-07)		(3.45e-10)		(1.99e-07)
Observations	3,157	3,157	3,154	3,154	3,095	3,095	3,095	3,095
R-squared	0.713	0.714	0.719	0.718	0.031	0.279	0.493	0.564
Panel C: DID SyrianRefugees								
SyrianRefugees x Post	-0.104***	-0.1445***	-0.087***	-0.114***	-0.00003	-0.0005***	-0.079	-0.245***
	(0.014)	(0.025)	(0.016)	(0.021)	(0.0001)	(0.00003)	(0.051)	(0.026)
SyrianRefugees^2 x Post		1.95e-06**		1.14e-06		2.56e-08***		8.67e-06***
		(9.01e-07)		(7.36e-07)		(1.74e-09)		(7.17e-07)
Observations	3,110	3,110	3,107	3,107	3,094	3,094	3,094	3,094
R-squared	0.268	0.286	0.277	0.307	0.007	0.023	0.098	0.148
Panel D: FE SyrianRefugees								
SyrianRefugees	-0.112***	-0.138***	-0.094***	-0.105***	-0.00003	-0.0004***	-0.083	-0.205***
	(0.014)	(0.032)	(0.0166)	(0.029)	(0.0002)	(0.00007)	(0.059)	(0.044)
SyrianRefugees^2		1.49e-06*		6.44e-07		2.23e-08***		7.14e-06***
		(8.89e-07)		(7.25e-07)		(2.62e-09)		(1.25e-06)
Observations	3,111	3,111	3,108	3,108	3,095	3,095	3,095	3,095
R-squared	0.296	0.284	0.307	0.301	0.431	0.432	0.034	0.056

*Notes:*The data presented in each column represent the coefficients and standard errors derived from a difference-in-difference regression and a county-level fixed effects regression, as shown in equations (1) and (2) respectively. Panels A to D each present a combination of one of the models and one of the explanatory variables of refugee inflows. Each column re-estimates the original specification for aggregate levels of business registrations and self-employment, as well as for new establishments and services and hospitality self-employment numbers, once without and once with the quadratic specification of the inflow variables. Columns (2), (4), (6) and (8) report the estimates when the quadratic variable is included. All estimates exclude county-specific covariates. The results are presented with heteroscedasticity-robust standard errors in brackets. The symbols ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels respectively.