Peer Effects of Dismissed

German Scholars in Turkish Academia

by

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A Dissertation Submitted to the
Graduate School of Social Sciences and Humanities
in Partial Fulfillment of the Requirements for
the Degree of

Master of Arts

in

Economics

KOÇ
ÜNİVERSİTESİ

August 11, 2021

ABSTRACT

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This thesis investigates whether the arrival of international and more productive scientists can increase the productivity of local scientists in the context of a developing country. Specifically, the thesis examines the effects of German scientists, who escaped from Nazi Germany and resided in Turkey, on the productivity of Turkish scientists in the 1933-1945 period. The main estimates indicate that, holding the quality of German scholars constant, the number of German scholars in a department had a positive and statistically significant effect on the number of annual scientific publications of a Turkish scientist in that department. The findings also suggest that if local scientists are familiar with recent international research practices and have better language skills, they might benefit more from the interactions with international scientists in their departments.

ÖZETÇE

Görevden Alınan Alman Bilim İnsanlarının Türk Akademisindeki Akran Etkileri

Deniz Güzel

Ekonomi, Yüksek Lisans

11 Ağustos, 2021

Bu tez, uluslararası ve daha üretken bilim insanlarının, yerel bilim insanlarının üretkenliğini artırıp artıramayacağını, gelişmekte olan ülkeler bağlamında araştırmaktadır. Bu amaçla, Nazi Almanyası'ndan kaçan ve Türkiye'de ikamet eden Alman bilim insanlarının, 1933-1945 döneminde Türk bilim insanlarının üretkenliği üzerindeki etkileri incelenmektedir. Ana bulgular, Alman bilim insanlarının akademik kalitesi sabit tutulduğunda, bir bölümdeki Alman akademisyen sayısının o bölümdeki bir Türk akademisyenin yıllık bilimsel yayınları üzerinde pozitif ve istatistiksel olarak anlamlı bir etkiye sahip olduğunu göstermektedir. Bulgular ayrıca, yerel bilim insanlarının uluslararası araştırmalara aşina olmaları ve daha iyi dil becerilerine sahip olmaları durumunda, bölümlerindeki uluslararası bilim insanlarıyla etkileşimden daha fazla yararlanabileceklerini göstermektedir.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my deepest gratitude to my advisor Assist. Prof. Murat Demirci for his guidance, support, and insight; without his persistent help the completion of this thesis would not be possible. By his helpful advice and guidance, he taught me the importance of meticulous work and careful research.

I also wish to thank to the thesis committee members Assist. Prof. Emre Ekinci and Prof. Murat Kırdar, for their invaluable feedback and comments.

I would like to thank to Abdullah Altundal and Ayşe Çetinel for joining in our study group and their friendship. I am also deeply indebted to Bilal Sali, for proofreading the thesis and for his insightful comments. Our conversations always helped me a lot.

Finally, I would like to express my eternal gratitude to my family, without their unconditional love and support, none of this could have happened.

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ABBREVIATIONS

IU	Istanbul University

Chapter 1:
INTRODUCTION

Peer effects play an essential role in the process of knowledge generation, primarily due to knowledge spillovers produced by interaction and collaboration among researchers (Azoulay, Zivin, and Wang, 2010; Borjas and Doran, 2012; Waldinger, 2012). The recent literature has shown that a more productive co-author positively affects her collaborators' productivity (for example, Azoulay, Zivin, and Wang; 2010; Waldinger, 2012). However, there is no general agreement on the existence and the extent of peer effects in academia at broader levels, such as peer effects among scholars who work in the same department. Moreover, the literature so far focused on the peer effects among scientists in developed countries, where the scientific standards are established, and high-quality research practices are followed. It is important to explore possible peer effects in developing countries to improve the effectiveness of science policies in these countries. This thesis investigates whether the arrival of international and more productive scientists can increase the productivity of the local scientists in the context of a developing country's academia.

Specifically, the thesis examines the effects of German scientists, who escaped from Nazi Germany and resided in Turkey, on the productivity of Turkish scientists in the 1933-1945 period. In April 1933, the Nazi Government passed the "Law for the Restoration of the Professional Civil Service," which led to the dismissal of more than 1000 academics from German universities due to being "politically unreliable" or having Jewish descent (Waldinger, 2012). In August 1933, the first university of Turkey, Istanbul University (IU), was founded. Starting from 1933, IU hired about 100 dismissed German scientists over the following years, and it became the university with the highest number of dismissed scientists in the world during the 1930s (Widmann, 1981). The historical sources indicate that the German scientists preferred to work in IU primarily for safety reasons, and they left Turkey mainly due to financial concerns. Thus, their stay in IU created an exogenous variation in the peer quality of Turkish scientists who worked in IU at the time. Therefore, the effect of German scientists on the publications of Turkish scientists can be estimated using the Ordinary Least Squares (OLS) method without facing the endogeneity problem.

For the empirical analysis, a data set consisting of personal characteristics and publication information of both German scientists and the Turkish scientists in IU was constructed using various sources. A German scientist in IU worked in the university for around ten years on average before leaving the country. During their time in IU, the annual average number of scientific publications by the German scientists was almost 20 times more than the average of Turkish scientist. The effect of the quantity and the quality of the German scientists on the annual number of scientific publications of Turkish scientists were estimated by OLS. The main estimates indicate that, holding the quality constant, the number of German scholars in a department increased the yearly scientific publications of a Turkish scientist in that department by 73% when the department hosted the maximum number of German scholars. On the other hand, the quality of German scientists did not have a statistically significant effect on the publications of Turkish scientists, controlling after their quantity. These findings are robust to different measurements of the quality of German scientists and different scopes of the field of scientists.

The findings of the thesis appear to support the general expectation that the knowledge spillovers from more productive scientists increase the productivity of other scientists. However, the arrival of more productive scientists can also create competition for the limited sources in academia, such as research funding or journal space for publishing papers, which can, in turn, generate adverse productivity effects on the incumbent and less productive scientists (Borjas and Doran, 2015). In this context, it seems that the positive productivity effects dominated potential adverse effects due to increasing competition.

The remainder of this thesis is organized as follows. The next chapter reviews the literature on peer effects among scientists. Chapter 3 describes the institutional background of IU and other higher-level education institutions in Turkey. Chapter 4 describes the data collection process and summarizes the data. Chapter 5 explains the empirical strategy and the exogeneity of the independent variables. Chapter 6 presents the estimation results, and Chapter 7 concludes.

Chapter 2:
LITERATURE REVIEW

Identifying peer effects between scientists is challenging due to the endogeneity problem caused by the sorting of researchers. This problem occurs because researchers usually choose to work in institutions where their productivity levels are similar to their peers' productivity. Empirical research that relies on exogenous changes in the composition of faculty members has recently emerged and continues to grow. In the literature, some of the most notable studies were conducted by using the dismissal of scientists in Nazi Germany as a source of exogenous variation in the peer group of scientists.

Waldinger (2010) first uses the dismissal of mathematics professors from Nazi Germany as an exogenous change in the quality of faculty members to investigate the short-term and the long-term effects of faculty quality on Ph.D. students' outcomes. He uses the dismissal-induced change in the quality of faculty members as an instrumental variable for the average quality of faculty and analyzes its effects on the performance of students who obtained their mathematics Ph.D. from any German university between 1925 and 1938. He finds that an increase in the faculty quality increases the probability of publishing the dissertation in a top journal, the likelihood of becoming a full professor, and the number of lifetime citations.

Waldinger (2012) examines whether peer quality and the number of peers affect the productivity of scientists in fields of physics, chemistry, and mathematics. For the analysis, he first constructs a dataset that includes the publication information of scientists in these departments at all German universities from 1925 until 1938. Then, he estimates the peer effects on the scientists' productivity by using the number of dismissed scientists as an instrumental variable for the number of peers and the dismissal induced reduction in peer quality as an instrumental variable for peer quality. He measures the dependent variable, the productivity of a scientist in a given year, as the sum of the (citation-weighted) publications of the scientist in that year. Peer quality for a scientist in a certain department is measured by the average productivity of the scientist's peers who were present in the same department in a given year. He does not find evidence for peer effects. However, his findings suggest that there are peer effects among co-authors. Thus, co-author quality is important for the production of scientific knowledge.

Moser, Voena, and Waldinger (2014) analyze the productivity effects of the German Jewish emigres on the performance of US inventors in the chemistry fields. Their difference-in-differences regressions compare changes in the number of patens of domestic inventors who study in research fields where emigres are predominant with changes in domestic inventors' patents in other chemistry fields with non-emigre Germans. They find that patenting by US inventors in the fields where German Jewish emigres obtained patents increased. Moreover, they investigate the changes in the productivity of incumbent US inventors and that of new patentees. Their findings indicate that the productivity increase is observed mainly because German Jewish emigres attracted new, productive inventors to their fields rather than increasing the productivity of incumbent domestic inventors.

Waldinger (2016) extends his 2012 paper to analyze the short-run and long-run effects on both human capital and physical capital in the production of scientific knowledge. He constructs a data set of all German and Austrian scientists in physics, chemistry, and mathematics departments at seven points of time between 1926 and 1980. Then, he uses the dismissal of scientists as an exogenous shock to human capital and the bombings to the university buildings during WWII as an exogenous shock to the physical capital. Unlike Waldinger's 2012 paper, which shows that individually a scientist's productivity is not affected by her peers' quality, this research indicates that total department quality is negatively affected by a decline in the department's quality in the short run because they lose some of their best researchers. Moreover, this effect persists because the departments cannot hire more productive researchers to replace their positions in the following years. On the other hand, a decrease in physical capital negatively affects the research output in the short run, but its effect does not persist in the long run.

Other than using dismissals as a source of exogenous variation in peer quality, different settings have been used to identify peer effects between scientists. Azoulay, Zivin, and Wang (2010) use the sudden and unexpected death of 112 superstar life scientists as an exogenous variation to analyze the spillovers from a superstar on her coauthors. They find that collaborators' quality-adjusted publication rates permanently decline 5 to 8% after the death of a superstar coauthor. On the other hand, Azoulay, Fons-Rosen and Zivin (2019) find that premature death of a superstar life scientist increases the flow of articles published by non-collaborators. In addition, contributions of the new-

entrants from other subfields are more likely to be highly cited, and outsiders, rather than collaborators, tend to fill the void of leadership after the loss of a star.

Borjas and Doran (2012) examine the effects of the post-1992 emigre flow of Soviet mathematicians on the productivity of their US counterparts. Their findings suggest that the migration of Soviet mathematicians negatively affected the productivity of US mathematicians whose research overlapped with those of Soviet mathematicians.

Borjas and Doran (2015) argue there are three different spaces where knowledge spillovers can be measured; namely, the space of ideas (working on the same topics), geographic location (working in the same location), and the collaboration network (being coauthors). According to their theoretical model, a supply shock in any of these spaces creates both competition effects and spillovers, which work in opposite directions. They suggest that different findings in the existing literature might be simply due to the measuring of peer effects in different spaces.

In their empirical analysis, Borjas and Doran (2015) investigate the effects of the post-1992 emigre flow of Soviet mathematicians on non-emigre Soviet mathematicians. They find evidence that in the idea space competition effect dominated spillovers, that is, non-emigre Soviet mathematicians' productivity increased after the emigration of some Soviet mathematicians who worked on the same subjects. They do not find a consistent evidence of peer effects in the geographical space or collaboration network. However, losing a collaborator of very high productivity significantly decreased the publications of non-emigre mathematicians.

Agrawal, McHale, and Oettl (2017) study the effects of a star scientist's arrival on the department's productivity by analyzing 140 evolutionary biology departments in the US and Canada between 1985 and 2005. Using a differences-in-differences strategy, they find that the arrival of a star scientist increases the department's productivity by 46%, where citation-weighted publications per scientist measure productivity. Similar to Moser et al. (2014), this increase is mainly due to the increase in the productivity of the new recruits after the arrival of the star, rather than an increase in the productivity of the incumbent scientists. Moreover, their findings suggest that a star scientist's arrival increases the productivity of the scientists who work in the related areas but also diminishes the productivity of the scientists whose areas are unrelated to the star scientist's areas. They explain that such a finding might be due to the crowding out of the resources.

The literature on the peer effects among scientists had so far examined the peer effects in the developed countries, where the scientific standards are established and high-quality research practices are followed. This thesis is different from the existing literature since it analyzes the peer effects in a developing country. The thesis takes Waldinger (2012) as a point of departure and investigates the possible peer effects stemming from the German scientists who escaped from Nazi Germany to Turkey on the productivity of Turkish scientists. During the 1930s and 1940s, Turkey was a developing country whose first university was founded in 1933. Thus, the German scientists were considerably more productive compared to the Turkish scientists. Unlike Waldinger (2012), which does not find evidence for the peer effects among researchers who work in the same department, the findings of the thesis suggest that the number of German scientists in a Turkish scientist's department had a positive and significant effect on her productivity.

Chapter 3:
INSTITUTIONAL BACKGROUND

In the Ottoman Empire, the establishment of secular education institutions started at the end of the 18th century, with the foundation of technical schools that trained military and state officials. The education system was started to be controlled by the state with the reforms during the Tanzimat Era (1839-1876). Prior to the reforms, primary and secondary education were provided by religious communities (millets), and higher-level education was either for those who wanted to become religious scholars (provided by higher-level madrasahs) or for those who wanted to become state or military officials (provided by the institutions under the administration of Ottoman Palace, like Enderun) (Fortna, 2002).

By the regulations made in 1869, it was announced that primary education was compulsory for girls (between the ages 6 to 10) and boys (between the ages 7 to 11) (Arşiv Belgelerine Göre Osmanlı Eğitiminde Modernleşme, 2014). The Empire also started to establish secular middle schools and high schools for the students who wished to continue their education. In the middle schools (called “rüştiye”), the duration of education was 2 to 3 years. In high schools (called “idadi”), the duration of education varied between 1 to 3 years because they were perceived as preparatory schools for the higher-level education institutions (Fortna, 2002). Thus, since the 19th century Ottoman Empire had two parallel

education systems; the relatively secular state institutions and the religious institutions. In addition to these two systems, other religious communities and foreigners had established their separate primary, elementary and high schools, some of which also accepted Muslim students.

The higher-level technical education institutions had been on the rise during the 19th century. Their primary aim was to train the officials to help the state recover its organizational weaknesses and catch up with the European states (Fortna, 2002). With a similar philosophy, Darülfünun, the first university of the Ottoman Empire, was established in 1900. In the following sections, the establishment of Darülfünun and its conversion to Istanbul University in 1933 are explained. Then a description of other higher-level educational institutions that existed during the last years of the Ottoman Empire and the first years of the Republic of Turkey are provided.

3.1 Darülfünun

Darülfünun (meaning House of Sciences/University in Ottoman Turkish) was established in 1900 as the first modern university of the Ottoman Empire. It provided education until 1933, and then it was converted to Istanbul University. Before the establishment of Darülfünun, there were three unsuccessful attempts at founding a university in the Ottoman Empire.

The first two attempts of establishing a university (Darülfünun) in the Ottoman Empire occurred between the years 1863-1865 and 1869-1871. However, these "universities" were not institutionally structured in today's sense (Dölen,2008). The functioning of these institutions was such that professors were giving lectures (usually about general culture) to the public audience instead of teaching certain curricula to the registered students. The third attempt at establishing a university was realized between 1874 and 1882. Darülfünun at this time was founded as an organization under one of the most prominent high schools of the Empire, Galatasaray High School (Mekteb-i Sultani), and had its "faculties/departments" with curriculums. At the time, it was authorized to give diplomas in law and engineering. However, due to the lack of enough number of high school graduates, this attempt also ended in 1882.

In 1900 Darülfünun (named initially as Darülfünun-i Şahane, meaning Imperial University) was founded, and from the beginning, it was more institutionalized than the

earlier attempts (Dölen,2008). The lectures followed certain curricula, and the students were registered. To be registered, students had to hold high-school diploma or, if they were from religious schools, they had to take an exam, proving that they had the high-school level knowledge. Darülfünun embodied three faculties, namely, i) mathematical and natural sciences, ii) literature, and iii) religious studies. The school of law and the medical school already existed as separate institutions prior to the establishment of Darülfünun. These schools were added to Darülfünun later, in 1909, as the faculty of medicine, and the faculty of law. Thus, as of 1933, Darülfünun had five faculties: law, literature, mathematical and natural sciences, medicine, and religious studies (Dölen, 2010).

In 1914, an extension of Darülfünun, Inas Darülfünunu (Women's University) was founded, which accepted female students (Dölen, 2008). The professors of Inas Darülfünunu were the same as those of Darülfünun, and the curricula were similar to the curricula of Darülfünun, however female students were taught in a separate building from male students. As it was logistically difficult for the faculty members to commute between different buildings, these two institutions were merged in 1918, and Inas Darülfünunu was officially abolished in 1920. Between 1918 and 1921, female students and male students were in the same building, but in different classrooms. In 1921, Darülfünun became a coeducational institution (Uyar and Ertuğrul, 2020).

Since the minister of education had changed frequently during the period between 1900 and 1933, Darülfünun had undergone many changes (Dölen,2008). The most important changes can be summarized as the following:

1. The educational system (in terms of examinations and curriculums) was reshaped, and the academic hierarchy was established in 1913. That is, the hierarchy in the form of different levels of professorship was defined, and the job description of assistant professors were given in detail.
2. "Scientific autonomy" was given in 1919, whereas prior to 1919 Darülfünun was strictly under the ministry of education (also in 1924, its administrative and scientific autonomy was strengthened).
3. In 1915, 25 German academicians were hired to the faculties of literature, natural sciences, and law. These professors signed a contract for five years; however, they left Darülfünun in 1918 when the First World War ended (Dölen, 2008).

Similarly, between 1920 and 1933, 25 foreigners (mostly French) were hired to Darülfünun, where 2 of them were technicians. Of the other 23 professors, five were in the faculty of medicine, six were in the faculty of letters, nine were in the faculty of natural sciences, two were in the faculty of law, and one was in the faculty of religious studies.

Table 3.1 shows the number of academics in Darülfünun (in 1931-1932) according to their faculties and academic titles.

Table 3.1: Number of Scholars in Darülfünun's Faculties by Academic Titles (1931-1932).

Faculty	Professor	Assistant Professor	Lecturer	Assistant
Law	6	1	17	1
Literature	4	2	14	6
Medicine	32	23	28	57
Natural Sciences	2	9	17	8
Religious Studies	-	1	12	-
Total	44	36	88	72

Number of scholars in Darülfünun's faculties by academic titles, in 1931-1932.
Dentistry and pharmacology schools were under the faculty of medicine. The table gives the total number of scholars in medicine and in these schools.
Source: Albert Malche's 1932 report.

Professors of Darülfünun used to publish in the Turkish scientific journals of the time. These journals started to be published in 1916, and until the abolition of Darülfunun, there had been seven journals in different fields. Some of these journals continued to publish after the abolition of Darülfünun, as well. The journals are summarized in Table 3.2. None of these journals was indexed internationally such that the likelihood of publishing in Scopus journals was almost zero among Turkish scholars.

Table 3.2: Turkish Scientific Journals during Darülfünun Period (1900-1933).

Field	Journal Title	First Publishing Year	Last Publishing Year
Law	Darülfünun Hukuk Mecmuası	1916	-
Literature	Edebiyat Fakültesi Mecmuası	1916	1933
Medicine	Darülfünun Tıp Fakültesi Mecmuası	1916	1933
Natural Sciences and Mathematics	Darülfünun Fünun Fakültesi Mecmuas	1916	1933
Sociology	İçtimaiyat Mecmuası	1917	1917
Theology	İlahiyat Mecmuası	1924	1932
Turcology	Türkiyat Enstitüsü Mecmuası	1925	-

Table 3.3 Turkish scientific journals and their publishing periods, during Darülfünun period (1900-1933).
Darülfünun Fünün Fakültesi Mecmuası was not published between 1918 and 1923, it was started to be published again in 1924, and its name was changed to Darülfünun Fen Fakültesi mecmuası. In 1929, its name was changed again to İstanbul Darülfünunu Fen Fakültesi Mecmuası
Darülfünun Hukuk Mecmuası (Law Journal) and Türkiyat Enstitüsü Mecmuası (Turcology Journal) are still being published.
Source: Dölen,2008; Kazancıgil and Vergili, 2002

3.2 Istanbul University

After the foundation of Republic of Turkey in 1923, Darülfünun was started to be criticized as being an outdated institution. The critics were mainly focused on two subjects. First, the scientific quality of research activities was not up to the standards of the Western universities. Second, the institution did not show enough support and interest to the new reforms of the modern Turkey. For example, the law professors did not discuss the new constitution of modern Turkey, or the literature professors did not support the alphabet reform that replaced the Arabic scripts with the Latin-based new Turkish alphabet (Dölen, 2010; Widmann, 1981).

The discussions about the closure of Darülfünun and the establishment of a new and more modern university were intensified in the beginning of the 1930s. In 1932, Albert Malche, a professor of pedagogy from Switzerland, was invited to Turkey to analyze and

compare the situation of Darülfünun with the modern universities. Malche was also asked to prepare a report about the institution and potential reforms that are necessary to convert it to a modern university.

The suggested reforms of Malche's report could be summarized under three main themes (Widmann, 1981): research and teaching, organization, and the university's place in society. According to the report, teaching was based on encyclopedic knowledge and memorization. In the new university, lectures would be based on both theory and practice. The students would have to learn at least one foreign language. At the same time, scientific publications by Turkish scholars would be increased, both by translation and original research (it was noted that scientific publications by Turkish scholars were very few). The organization of the university would be changed to make sure that the appointment of new professors would be merit-based only. Finally, the new university would be more in touch with society to increase the education level of all adult citizens, not only those who attend the university. This was planned to be achieved by providing short-term courses and seminars to the public and organizing congresses in different cities.

On July 31st, 1933, Darülfünun was abolished, and Istanbul University was established on August 1st, 1933, based on Law No: 2252, issued in 31st of May in 1933. The new university followed the suggestions of Malche's report and founded with the aim of establishing an institution that would reach the scientific standards of Western universities.

The university announced its courses, faculties, and structure by the regulations issued on October 13th, 1934 (Taşer, 2006). According to these regulations, Istanbul University consisted of the faculties of law, literature, medicine, and natural sciences, as well as the schools and institutions that are affiliated with these faculties (İstanbul Üniversitesi Talimatnamesi, 1934).

As mentioned before, Darülfünun used to have five faculties: law, literature, mathematical and natural sciences, medicine, and religious studies. The faculty of religious studies was converted from a faculty to an institute, namely, Islamic Studies Institute (affiliated with the faculty of literature) with the new regulations.

The faculty members had the academic titles; ordinarius (i.e., distinguished) professor, professor, assistant professor, and assistant. The academics were affiliated with the chairs which were under the four faculties of the university. So, there was not a

department system for the academics, rather they held positions as the chairs of more specific subjects.

The faculty members in the first year of IU can be divided into three groups (Widmann, 1981). The first group was the former professors of Darülfünun. According to Dölen (2010), initially 61 professors from Darülfünun were transferred to IU, however, this number later increased with the additional hires. Among the transferred professors there were also six French scholars who were previously hired by Darülfünun. Dölen (2010) explains that the recruitment process of Darülfünun's professors to IU was not as transparent. He argues that the professors' scientific qualifications were said to be questioned, but the hires were mostly based on the networks and the politics of the time.

The second group was the newly hired Turkish scientists. Mainly, they were the individuals whom the government earlier sent to Europe or the United States for higher-level education. They usually completed undergraduate degrees or master's degrees, but only a few held doctorates. They were called back to Turkey to teach in the new university. Even though they did not hold doctorates, they were assigned as associate professors in the new university. They were later required to complete their PhDs to keep their positions at the university.

The third group consisted of the German scientists who had escaped from Nazi Germany. Most of these German scholars were dismissed by the Nazi government in 1933 due to their Jewish descent or political views. This group also included the German scholars who were not dismissed from Nazi Germany. Some of them were friends or assistants of the dismissed scientists and came to Turkey to support and work with them, and some of them were academics whose research was already related to Turkey.

The list of the new faculty members of IU was given in the issue of Cumhuriyet Newspaper on August 1st, 1933. However, the recruitment process had been slow, and the list had changed frequently. Finally, on November 6th, 1933, the first official list of the new faculty members was announced. This list of the new faculty members was valid until May, 1934. Still, even after the announcement of the official list there were still new recruitments and layoffs. Thus, the number of scholars in IU are not always consistent in different sources.

According to the collected data, when the IU was founded, 68 academics were transferred from Darülfünun to the new university and 99 academics were newly hired. In addition to these 167 faculty members, 64 German academics were hired by the

university between 1933 and 1934. The number of German scholars increased over the following years and in total 142 German scholars were hired by the university until 1945. A more detailed description of the number of scholars and their characteristics is given in the data section of the thesis.

3.3 Other Higher-Level Education Institutions

During the Ottoman era of Darülfünun, it was the only higher-level education institution that had a university structure. However, there were other higher-level education institutions that could be counted as vocational schools. They mostly accepted students who graduated from high schools and gave 2 to 3 years of education. With the foundation of the Republic of Turkey, in 1923, more structured higher-level education institutions have been established. However, they were mainly in the form of faculties (i.e., instead of a comprehensive university, they were specialized in some fields, such as only in law or only in medicine) or vocational schools.

The second university of Turkey, Istanbul Technical University, was founded in 1944, by recasting the already existing higher-level engineering schools. Similarly, in 1946, Ankara university was founded by unifying the already-existing faculties under one institution.

The list of the higher-level education institutions established in the last years of the Ottoman Empire, and in the first years of the Republic of Turkey, are provided below. The names of the Ottoman higher-level education institutions are taken from Taştekin (2019), the names of the higher-level education institutions founded in the first years of the Republic of Turkey are based on Taşer (2006).

3.3.1 Engineering and Science Schools

Yüksek Mühendislik Mektebi (High Engineering School): It was a vocational school that dated back to 1795. It consisted of two institutions; Hendese-i Mülkiyye Mektebi and Mühendishâne-i Berrî; these institutions were unified in 1924 under the name of Yüksek Mühendislik Mektebi. It aimed to improve maritime knowledge and to raise engineers for the army. In 1944, it was converted to Istanbul Technical University, which was the second university of Turkey.

Mekteb-i Harbiye (Military Academy): It was founded in 1835, and it was not giving more than high school level education for the military until around 1847. Then it started to give more science and engineering lectures. It continued to be the primary institution for raising officers for the military in modern Turkey, as well. Today, it is under the Ministry of National Defense, and it is known as the National Defense University.

Zonguldak Maden Mühendis Mektebi (The Higher School of Mining Engineering): The vocational school was founded in Zonguldak, in 1924. Its aim was to train mining engineers and technicians. It was closed in 1931.

Yüksek Ziraat Enstitüsü (Higher Agriculture Institute): It was founded in Ankara, in 1933, with the aim of training agricultural engineers and technicians. It had three faculties: agricultural sciences, veterinary sciences and forestry. In 1948, the institute's faculties of agricultural and veterinary sciences were added to Ankara University, the faculty of forestry was added to Istanbul University.

Ankara Fen Fakültesi (Ankara Faculty of Science): It was founded in Ankara, in 1943 with the aim of conducting research in physics, mathematics, chemistry and astronomy. It was added to Ankara University in 1946.

3.3.2 Medical Schools

Mekteb-i Tıbbıye-i Adliye-i Şahane (Military Medical School): It was founded in 1827 with the aim of raising doctors for the army. In 1909, it was first annexed to the first civil medical school (*Mekteb-i Tıbbiye-i Mülkiye*) and then added to Darülfünun.

Mekteb-i Tıbbiye-i Mülkiye (Civil Medical School): It was founded in 1867, it was the first civil medical school. It was added to Darülfünun in 1909.

Ankara Tıp Fakültesi (Ankara Medicine Faculty): The school was founded in Ankara, in 1937. However, due to financial difficulties it was not opened until 1945. In 1946, it was added to Ankara University.

3.3.3 Law Schools

Mektebi Hukuk (Law school): It was founded in 1880 and added to Darülfünun in 1909.

Konya, Selanik, and Bağdat Schools of Law: These law schools were founded with the help of Mektebi Hukuk in 1907. Konya School of Law was demolished in 1919, Selanik School of Law demolished in 1912, and Bağdat School of Law became part of University of Baghdad in Iraq.

Ankara Adliye Hukuk Mektebi (Ankara Judicial School of Law): It was founded in Ankara in 1925. In 1940, its name was changed to Ankara Faculty of Law, and it was added to Ankara University in 1946.

3.3.4 Social Sciences Schools

*Mülkiye Mektebi (School of Political Sciences): This school t*aught in politics, economics, and administrative subjects. It was founded in 1858. In 1915 it was closed, and its budget was transferred to Darülfünun. In 1936, it was reestablished in Ankara under the name of Siyasal Bilgiler Okulu; and in 1950, it was added to Ankara University as the faculty of political sciences, with the name "Siyasal Bilgiler Fakültesi".

Dil ve Tarih-Coğrafya Fakültesi (Faculty of Languages and History-Geography): It was founded in 1935, to train teachers for secondary education institutions and to do research in the fields of language, history, and geography with scientific and modern methods. It was added to Ankara University in 1946.

3.3.5 Education Schools

Dâru'l-Mualimîn (Teacher Training College): The school was founded in 1848 and closed in 1924. It aimed to train middle school teachers.

Dâru'l-Mualimîn-i Sıbyan (The School of Elementary Teachers): It was founded in 1848 with the aim of training teachers for elementary schools. It was closed in 1924.

Daru'l-Muallimât (Women's Teacher Training College): It was founded in 1870 with the aim of training teachers for women's elementary and middle schools. It was closed in 1924.

Yüksek Muallim Mektebi (Higher Teacher School): This school was founded in 1892 and it was originally named as Dârulmuallimîn-i Âliye. Its aim was to train high school teachers. In 1924 its name changed to Yüksek Öğretmen Okulu. The school continued to give education until 1949.

Karesi Darül Muallimini (Karesi Teacher School): It was founded in 1910 with the aim of training teachers. It continued to give education after the establishment of modern Turkey with the names Necati Bey Öğretmen Okulu and Necati Bey Eğitim Enstitüsü. Today, it is a part of Balıkesir University as the faculty of education.

Ana Muallime Mektebi (The School of Kindergartners): It was founded in 1914-1915, and it trained kindergarten teachers. It was closed in 1919.

Gazi Orta Öğretmen Okulu ve Eğitim Enstitüsü (Gazi Institute for Middle School Teachers and Education): It was founded in 1927. In 1976, its name was changed to Gazi Eğitim Enstitüsü (Gazi Institute of Education), and it was converted to Gazi University in 1982.

3.3.6 Art Schools

Mekteb-i Sanayi-i Nefise (The School of Fine Arts in Ottaman): It was the first fine arts school in the Ottoman Empire, and it was founded 1883. Some of the departments were painting, sculpture, architecture, music. It had several foreign artists from the beginning and also hosted the dismissed scientists from Nazi Germany. For a while, it was called The Fine Arts Academy. In 1982, it was converted to a university. Since then, it has been called Mimar Sinan Üniversitesi.

Daru'l-Bedâyi (Istanbul City Theater): It was founded in 1913; and it was in the form of a theater conservatory. Today it is called Istanbul City Theater.

Dâru'l-Elhan (Dar al-Alhan): The school was founded in 1914, however the education had been interrupted due to wartime. In 1927, it became the Istanbul Municipal Conservatory. Since 1986, it is a part of Istanbul University and named as IU State Conservatory.

Musiki Muallim Mektebi (School of Music Teachers): It was founded in Ankara, in 1924, with the aim of teaching music with scientific methods and training music teachers. In 1934, its name was changed to Milli Musiki ve Temsil Mektebi. In 1936, the Government Conservatory was established as a part of this institution, which aimed to train national artists. In 1937, the school was added to Gazi Institute of Education. Later, the Government Conservatory became a part of Hacettepe University in 1982.

3.3.7 Islamic Schools

Dâru'l-Hikmeti'l-İslâmiye (Dar al-Hikmat al-Islamiyya): This school survived between 1918-1922, and it was an Islamic studies academy under the Sheikh al-Islam.

Dâru'l-Hilafeti 'l Aliyye (Dar al-Caliphate al-Aliyya): In 1914, all the madrasahs (i.e., Ottoman institutions where Islam and some scientific subjects such as astronomy were taught) were unified under the name Dâru'l-Hilafeti 'l Aliyye. The duration of education was 12 years in madrasah, roughly coinciding with middle school, secondary school (high school), and college (Kütükoğlu, 1993). The education was based on Islamic principles, and religious studies were predominant, although other courses such as mathematics, astronomy, philosophy were also taught. A higher-level Islam Institute (Medresetü'l-mütehassısîn) was also founded for the students who wanted to master in Islamic studies after they graduated madrasah. In 1917 madrasahs were again separated, and in 1924 all the madrasahs were demolished.

Chapter 4:
DATA

A data set consisting of personal characteristics and publication information of each Turkish or German scholar who started working in IU during the period 1933-1945 was constructed for the empirical analysis. Personal characteristics for each scientist include

the year of birth and death, the time period that she worked in IU, the academic title she had when she started to work in the university, the chair she held, and the faculty her chair was affiliated with. Details about the data construction process in regarding to personal characteristics are provided below separately for the Turkish scholars and the German scholars, and then the source of publication data is described.

4.1 Data on Turkish Scholars

Turkish scholars analyzed in this study consist of the academics who were recruited by IU between 1933 and 1945. Those who were hired by the university when the university was first founded could be either newly hired in the year 1933 or they could be transferred from the Darülfünun, which is the institution from which IU was re-constructed with a philosophy of modern universities as mentioned before. Accordingly, each group of Turkish scholars are referred as "New Hire" and "Transfer" in the rest of this study. In addition to these two groups, some Turkish scholars were hired after 1933 (i.e., between 1934 and 1945), and they are referred as "Post-1933 Hire" in the rest of this study. The data construction process for each group of Turkish scholars is explained below.

4.1.1 New Hire and Transfer Scholars

The list of the Turkish scholars who started working in the university in its establishment (i.e., in 1933) was obtained from three major sources, which are consistent with each other. The first source is an article from Cumhuriyet newspaper, published in the August of 1933. In this newspaper article, names of faculty members of the about-to-be established university is announced. As the surname law had not passed yet at the time in Turkey, this list consists of only the first and middle names of each faculty member. Searching each name on the internet and cross-checking with the second source, Turkischer Biographischer Index (Turkish Biographical Index) (Çıkar, 2004), the information on the full name, birth and death years, and the fields of each scientist were gathered. After this list of full names and relevant information was obtained, it was verified with the third major source, which is the third volume of the book titled "Türkiye Üniversite Tarihi" (University History of Turkey) (Dölen, 2010). This book has a record of the faculty members of IU in 1933, which was collected from the university's archives.

Dölen's book also includes the information about the dates when the academics started to work in IU and when they retired or left the university.

In total, out of 167 Turkish scholars searched, 28 names in the data could not be associated with surnames in any of the aforementioned sources or in the internet. Hence, they were not included in the data set. It is possible that these scientists did not work in IU after all or quitted shortly after starting to work. It is also possible that there was a typo in the published lists. For example, the name Avni appears in Dölen's book as a faculty member transferred from Darülfünun to the faculty of natural sciences in IU. However, the same name appears twice in the new hire list of the newspaper, Cumhuriyet; once in the faculty of natural sciences and once in the faculty of medicine. On the other hand, Çıkar(2004) does not include any scientists named "Avni" in any of these faculties in IU, during 1930s. Internet search does not result in any scholar named "Avni" in IU, during 1930s, either.

To finalize the data on Transfer and New Hire scholars of IU in 1933, two lists from Cumhuriyet Newspaper and Dölen's book, were cross checked. In the cases where a name was only found in one of the lists and not in the other, further internet search was conducted. If another source, such as a memoir or a biography, indicating the existence of a faculty member with that name was found, the name was included in the final list. In total, the relevant information was collected for 76 New Hire and 63 Transfer faculty members.

4.1.2 Post-1933 Hire Scholars

The majority of the names of the Turkish scholars who were hired between the period 1934-1945 was obtained from the official government yearbook of the Republic of Turkey of 1945, published in 1946 (Türkiye Cumhuriyeti Devlet Yıllığı-1945 (1946)). The government yearbook includes personal information of the national employees of the state's institutions for the year of 1945. For Istanbul University, full names of the faculty members, their academic titles as of 1945, their chairs, and the faculties that the scientists are affiliated with are given. After obtaining the full names of the scholars, other information regarding the birth and death years and the year when each scholar was hired by IU were gathered via internet search. Out of 169 names searched from the government yearbook, 11 of the scientists' personal information could not be found in the internet,

hence they were excluded. According to the government yearbook, one of the 11 excluded scientists was in the faculty of law, one was in the faculty of literature, six were in the faculty of medicine and the other three were in the faculty of natural sciences.

The government yearbook of 1945 provides a snapshot of the scholars working in IU as of 1945, but the scholars who started working after 1933 and left IU before 1945 are not supposed be included in this list. Since the government yearbooks for the years between 1933 and 1944 do not exist, other sources were used for collecting the list of the Turkish scholars who were hired between 1934 and 1945, but whose names do not appear in government yearbook, or in the New Hire and Transfer lists.

The sources to find the names of the academics who were recruited between 1933 and 1934, and left IU before 1945, include a newspaper article published in the August of 1939 (Ulus Gazetesi, 1939), and a bibliography that consists of the books which were written by the members of IU between 1933 and 2016. The article in Ulus Newspaper provides the full names and the academic titles of the IU faculty members who were promoted in 1939. From the bibliography the authors of all the books that were published between the years 1930 and 1950 were collected.

Then, from the list of the 1939 newspaper article and the list of authors in in bibliography, the names of 21 scholars that appear neither in the list of 1933 faculty nor in the list of 1945 government yearbook faculty were identified. Their relevant personal information was gathered via the search on the internet.

In addition to the sources that had been mentioned above, other documents that have been found during the internet search of the names, such as the articles about the lives of the scientists and memoirs of the scientists, were scanned, and 7 names that appeared as IU faculty members, but are not included in any of these lists, were identified. Another internet search was conducted for these names and relevant personal information was collected.

In sum, by using the government yearbook of 1945, the newspaper article of 1939, Istanbul University's bibliography, and various other sources the list of the scholars who were recruited by IU after 1933 to up until 1945 was finalized. The relevant information was collected for 186 faculty members. Out of the 186 Post-1933 Hire scholars, names of 158 scholars were obtained from the government yearbook of 1945; and 28 names were obtained from the other sources. Therefore, in the finalized dataset there are 325 Turkish scholars, distributed as 76 New Hire, 63 Transfer, and 186 Post-1933 Hire.

4.2 Data on German Scholars

The names and the relevant personal characteristics of the German scholars were obtained from three major sources. The first source was the book called “Displaced German Scholars: A Guide to Academics in Peril in Nazi Germany During the 1930s”, which is the seventh volume of Studies in Judaica and the Holocaust. The book consists of the names of the dismissed German scholars, with the information on their year of birth and death, their academic field, the year of their dismissal from Germany, the academic title at the time they were dismissed, and, if available, the institution they worked after being dismissed. Each name with the institution information specified as Istanbul University was obtained from the book along with the other available information.

Although this book includes most of the names, there were some missing names according to the sources that specialize the dismissed scientists migrating to Turkey. The second major source that included information on the German scholars, was again Dölen's book (2010) which was particularly important for recording the period they were in IU. The third major source was the book by Stanford J. Shaw, titled as “Turkey and The Holocaust” (1993), which was helpful since it includes more detailed biographies of some of the dismissed scientists.

In addition to these three major sources, the search of the relevant information was supplemented with additional sources mainly for the purpose of cross-checking and filling the missing personal characteristics. Widmann's (1981) book, titled “Exil Und Bildungshilfe: Die Deutschsprachige Akademische Emigration in Die Tuerkei Nach 1933. [Exile And Educational Aid: The German-Speaking Academic Emigration to Turkey After 1933.]” also includes detailed biographies of the German scientists and their scientific contributions in Turkey, thus it was used to cross-check the information, as well. Other than these sources, various books, academic articles, and newspaper articles, that possessed information about the scholars individually, were referred to complete the data set on the personal information of the German scholars.

In total 142 Germans’ names were collected, but for 10 German scholars, their personal characteristics could not be found in any of the aforementioned sources or in the internet. Out of 10 Germans with missing information, 8 of them were in the faculty of medicine, and the other 2 were in the faculty of natural sciences. In the finalized dataset 132 German scholars who started to work in IU between 1933 and 1945 were identified,

and the complete information of personal characteristics and publication data were gathered. However, 20 of them were technical assistants, and they worked as nurses, x-ray specialists, laboratory assistants, or similar job. These scholars are excluded from the main analysis. Moreover, 6 of the Germans were not dismissed from Nazi Germany but they voluntarily moved in Turkey, while 6 of the dismissed German scholars' academic specialties were primarily about Turkey, such as Turcology and Ancient Anatolian Civilizations. These two groups of German are also excluded from the main analysis because of the potential endogeneity issue regarding to their migration decision. Thus, the empirical analysis focuses mainly on the 100 German scholars, who were dismissed from Nazi Germany, academically occupied, and working in fields that were not directly related to Turkey. In the rest of this study, these 100 German scholars are referred as "Dismissed German" scholars, while the remaining 32 German scholars, consisting of non-academic, non-dismissed and/or those who specialized in fields related to Turkey, are referred as "Other German" scholars.

4.3 Publication Data

Publication data consists of the journal articles that the scholars wrote during their academic career and the number of citations these publications received as of 2021, the year the relevant data are collected.

This data was collected from Scopus, which is a database that includes records back to 1788 (Scopus, 2020). For each journal article in the database, if available, Scopus provides the name of the journal, the year it was published, its authors, and the number of citations it got from the other publications in the database as of the date accessed to the data. Utilizing the author search feature in the website (https://www.scopus.com), each scholar was searched individually, and the aforementioned information was gathered if the publishing year of the article was provided.

It is important to note that, Scopus gives a unique ID number for each author. However, especially for older publications, not all author names are standardized, which might cause the same author to have more than one ID number. For example, an author might have two versions of its name in different articles: one version with the full name including the middle name and another version only with the initial of the middle name. In this case, unless reported to the database, Scopus assigns different ID numbers. Thus,

during the process of searching authors in Scopus database, each name and its different combinations including the full names were searched. If the combinations seemed to belong to the same person (as inferred from having similar publication dates and similar article titles), these publications were merged under the one unique author name.

Scopus provides the complete list of journal titles in the database as an external file. This file includes the titles of the journals, journals' coverage years in Scopus, publisher names, their fields, and other characteristics. For some of the journals, the languages of the articles are also provided, but not for all the journals (Out of 41523 journals in the database 12248 of them do not have data on their language.) Thus, without collecting the data on the language of each journal, it is not possible to exactly count how many journals were in German or in Turkish.

To have a proxy for the number of German and Turkish Journals in the Scopus, the journals were filtered and counted in the following way: For the German journals, the journals with the language information German (only German, or German with some other languages); and the journals whose titles included the words "jahrbuch" (annual/yearbook in German), "zeitschrift" (journal in German), and/or "forschung" (research in German), were counted for the years 1930, 1940, 1950, 1960, 1970 and 1980. Similarly, for the Turkish journals, the journals with the language information Turkish (only Turkish, or Turkish with some other languages); and the journals whose titles included the words "dergi" (journal in Turkish), "mecmua" (journal in Turkish), and/or "araştırma" (research in Turkish), were counted for the years 1930, 1940, 1950, 1960, 1970, and 1980. Table 4.1 gives the number of all journals, and numbers of German and Turkish Journals that were included in Scopus; by each year. Since some of the journals stop publishing after a certain period, or do not keep meeting the standards of Scopus, they are included in the database only for their active periods. The numbers in the table show the total number of journals that were included in Scopus at least one year from 1788 until the given year, and the numbers in the parentheses show the journals that were still active in the given year.

Table 4.1 Number of Journals in Scopus over the Years.

Year	All Journals	German Journals	Turkish Journals
1930	362 (281)	44 (34)	0 (0)
1940	478 (347)	51 (38)	0 (0)
1950	1642 (1194)	106 (75)	1 (1)
1960	2628 (1888)	157 (122)	2 (2)
1970	5387 (3904)	259 (182)	4 (2)
1980	10303 (7367)	433 (271)	10 (4)

Number of Journals in Scopus over the years. The numbers in parentheses show the active journals at the given years.
German Journals are counted as those with the language information indicated as German, and the journals whose titles include at least one of the words; "jahrbuch" (annual/yearbook in German), "zeitschrift" (journal in German), and "forschung" (research in German).
Turkish Journals are counted as those with the language information indicated as Turkish, and the journals whose titles include at least one of the words; "dergi" (journal in Turkish), "mecmua" (journal in Turkish), and/or "arastirma" (research in Turkish).
The data on the content coverage of Scopus is available as an external file at the website (https://www.scopus.com).

According to Table 4.1, the number of journals in Scopus increases throughout the years globally, and for the German Journals and Turkish journals, separately. For years until 1940, the number of Turkish journals in Scopus is zero, and, although it is not understood explicitly from the table, the Turkish journal with the oldest coverage years, starts from 1950 (i.e., number of Turkish journals for the years from 1941 to 1949 are also zero). By 1980, 10 Turkish Journals are included in the database, and from those 10 journals, 8 of them are about biology or medicine, 1 is about earth sciences, and 1 is about history. Again, it is possible that the database actually includes more Turkish journals, but they are not identified here, because they miss the language information and they do not have the words "dergi", "mecmua" or "arastirma" in their titles. However, when the publication data used in the analysis is investigated, it is seen that all the Scopus publications done by Turkish scholars prior to 1950 were in international journals, so, it seems unlikely that that there are some unidentified Turkish journals in Scopus before 1950.

In the finalized dataset, publication data consists of 3991 articles that were written by the scholars throughout their whole career and found in Scopus. Out of 3991 articles,

1372 articles were written by the Turkish scholars, and the remaining 2619 articles were written by the German Scholars.

Around 90% of the 1372 articles by Turkish scholars, were written during the scholars' academic careers in IU. Publication years of the articles, written by the Turkish scholars, range between 1935 and 2004. However, as of 1988, there was no Turkish scientist from the dataset that was still in IU. This is because some of the scientists kept publishing after they were retired from IU or after they were transferred to newly established universities. Also, 6 of the articles were published after the death of the scholars.

The publication years of the articles written by the German scholars, range between 1900 and 1991, and around 33% of these articles were written by the German scholars while they were in IU. 25 articles had publication dates after the death of the German scientists.

Also, another database called "Türkiye Makaleler Bibliyografyası" (Turkey Bibliography of Articles) was utilized. This database contains the bibliographic information on articles published in Turkish journals, dating back to 1923 (Türkiye Makaleler Bibliyografyası, 2014). However, this source has a wider definition of a scientific journal and includes journals that are not peer-reviewed, or the ones that are more likely to fall in the category of general knowledge magazines. Also, since it does not include any foreign journals, German scholars have significantly less publications in this database. Thus, the data from TMB was only used to check the accuracy of the information on the Turkish publications in Scopus.

4.4 Summary Statistics

Table 4.2 shows the descriptive statistics for the age of the Turkish scholars when they started to work in IU, number of years they worked in IU and the average number of annual Scopus articles during their time in IU. The average age of Turkish scientists when they started to work in IU was around 31, and their average employment time in IU was 30 years. Between 1933 and 1945, a Turkish scientist in IU published on average 0.01 Scopus articles per year. Among Turkish scientists, New Hires were the most productive group. More explicitly, a New Hire scientist published around 0.02 Scopus articles per

year, a scientist from the Post-1933 Hire group had an average of 0.01 Scopus articles per year, and a Transfer scientist had an average of 0.01 Scopus articles per year.

Table 4.2 Summary Statistics for the Turkish Scholars.

	Starting Age	Years in IU	Average Number of Scopus Articles per Year
New Hire			
mean	32.68	27.42	0.02
sd	6.46	13.88	0.06
min	23	2	0
max	56	46	0.38
count	76	76	76
Transfer from Darülfünun			
mean	31.90	29.29	0.01
sd	6.71	11.86	0.04
min	22	7	0
max	51	49	0.23
count	63	63	63
post1933			
mean	30.04	31.13	0.01
sd	8.05	13.28	0.03
min	20	3	0
max	59	51	0.17
count	186	186	186
Total Turkish			
mean	31.02	29.91	0.01
sd	7.53	13.21	0.04
min	20	2	0
max	59	51	0.38
count	325	325	325

For the Turkish faculty members of IU, who were recruited by IU between 1933 and 1945, descriptive statistics are given. Average Number of Scopus Articles per Year refers to the average annual number of Scopus articles of a Turkish faculty member, between 1933 and 1945, and during her employment time in IU.

New Hire are the Turkish faculty members who were recruited by IU in 1933, when the university was first founded. Transfer refers to the faculty members who previously held positions in Darülfünun and were transferred to IU in 1933. Post-1933 Hire refers to the faculty members who were recruited by IU between the years 1934 and 1945. The data on articles are obtained from Scopus. For New Hire and Transfers, information on starting age and years in I.U. are obtained from Dölen's book (2010). For Post-1933 Hires information on starting age and years in IU are obtained by individual web search.

Table 4.3 shows the descriptive statistics for the age of the German scholars when they started to work in IU, number of years they worked in IU and the number of Scopus articles during their time in IU. The average age of German scientists when they arrived in IU was around 38. Working period of the German scientists varied between 1 to 39 years, and on average they stayed for around 10 years in IU. Between 1933 and 1945, a German scientist in IU published on average 0.19 Scopus articles per year. As mentioned before, German scholars are further divided into two sub-groups as Dismissed Germans and Other Germans, and Table 4.3 provides the summary statistics for each of these groups separately. When only the Dismissed German scientists are considered, their yearly average number of publications were higher, with 0.24 Scopus articles per year. Since Other Germans include technical specialists, as well, it is not surprising that they were not as productive as Dismissed German scientists, with an average of 0.06 Scopus articles per year. Dismissed Germans were also slightly older and spent a little more time in IU, compared to the Other Germans.

Table 4.3 Summary Statistics for German Scholars in IU.

	Starting Age	Years in IU	Average Number of Scopus Articles per Year
Dismissed German			
mean	38.21	10.74	0.24
sd	10.51	8.33	0.43
min	23	2	0
max	60	39	2
count	100	100	100
Other German			
mean	37.69	9.28	0.06
sd	10.41	8.10	0.21
min	23	1	0
max	65	31	1
count	32	32	32
Total German			
mean	38.08	10.39	0.19
sd	10.45	8.27	0.40
min	23	1	0
max	65	39	2
count	132	132	132

For the German faculty members, who started to work in IU between 1933 and 1945, descriptive statistics are given. Average Number of Scopus Articles per Year refers to the yearly average number of Scopus articles of a German faculty member, between 1933 and 1945, and during her employment time in IU. Dismissed German are the German scientists who were dismissed from Nazi Germany and started to work in IU. Other German includes the German scholars in IU, that were under one or more of the following categories: 1) They were not dismissed from Nazi Germany, 2) their academic fields were already related to Turkey, 3) They were members of IU however, they were not academically occupied, i.e., they were technical assistants, nurses, etc. The data on articles are obtained from Scopus. Information on starting age and years in IU are obtained from Dölen (2010) and Widmann(1981).

Table 4.4 shows the total number of Turkish scientists, who started to work in IU between 1933 and 1945, by each faculty and department, and they are divided into the groups of New Hire, Transfer and Post-1933 Hire scientists. According to Table 4.4, out of 325 Turkish faculty members who started to work in IU between 1933 and 1945, 130 were employed in the faculty of Medicine that consists of the department of dentistry and the department of medicine. In particular, the department of medicine recruited more than all the other departments. Faculty of Law hired the least number of scholars among the other faculties. In addition to the four faculties, IU had Institute of Islamic studies, and this institute consisted of only 8 faculty members.

It is important to note that when IU was founded in 1933, there was a chair system. In the chair system, each professor had a chair where they would teach and research on a specific subject. The chairs were under the four main faculties of IU, however, there were not official academic departments, and the faculty members were not affiliated with departments. IU adopted the department system in 1981, with the Law of the Council of Higher Education. Thus, in the tables, departments that are associated with the chairs are available according to the 1981 classification of departments.

Table 4.4: Number of Turkish Scholars in IU Departments.

	New Hire	Transfer from Darülfünun	Post-1933 Hire	Total
Faculty of Law	8	10	34	52
Economics	2	2	9	13
Law	6	8	25	39
Faculty of Letters	18	8	38	64
Ancient Languages and Cultures	0	0	1	1
Anthropology	0	1	0	1
Archeology and Art History	2	0	7	9
Eastern Languages and Literatures	0	1	1	2
Geography	3	2	2	7
History	5	0	5	10
Philosophy	2	1	3	6
Psychology	1	1	5	7
Sociology	1	0	1	2
Turkish Language and Literature	3	2	6	11
Western Languages and Literatures	1	0	7	8
Faculty of Medicine	30	33	67	130
Dentistry	6	5	4	15
Medicine	24	28	63	115
Faculty of Natural Sciences	20	4	47	71
Astronomy	0	0	2	2
Biology	3	0	16	19
Chemistry	7	0	9	16
Geology	1	1	4	6
Mathematics	4	1	4	9
Pharmacy	1	1	2	4
Physics	4	1	10	15
Institute of Islamic Studies	0	8	0	8
Theology	0	8	0	8
Total	76	63	186	325

Total number of the Turkish scholars who were recruited by IU between 1933-1945 are given.

New Hire are the Turkish faculty members who started to work in IU in 1933, when the university was first founded. Transfer refers to the faculty members who previously held positions in Darülfünun and were transferred to IU in 1933. Post-1933 Hire refers to the faculty members who were recruited by IU between the years 1934 and 1945.

In Table 4.5, Columns 1-3 show the total number of German scientists, who started to work in IU between 1933 and 1945, by each faculty and department. Columns 4-6 show the ratio of the number of German scholars to the number of Turkish scholars by each field and faculty for the years 1933, 1939, and 1945.

According to Table 4.5, half of all the German scholars in IU worked in the faculty of medicine. After medicine, the faculty of natural sciences hosted most of the German scholars, followed by the faculty of letters and the faculty of law. The faculty of medicine had the highest number of Other Germans as well, because they hosted nurses. The faculty of letters had 9 people in the Other German category because some of the German scholars were working on subjects that were very related to Turkey, such as Turcology. Since the Institute of Islamic Studies did not host any German scholars, and since the Turkish scholars in the institute did not publish in journals, they are also not included in the analysis.

Columns 4-6 in Table 4.5 indicate that when the German scholars first started to work in 1933, the ratio of the number of German scholars to the number of Turkish scholars was 0.42 in the university. That number means that almost 30% of all the scholars in IU were German. This ratio did not change in 1939, even though the ratios changed within the departments and faculties. By 1945, the ratio of German scholars to Turkish scholars was lowest in each faculty, since many of the German scientists had started to leave Turkey, and the ratio in IU was 0.22 (i.e., 18% of all scholars were German). In particular, the faculty of law had the lowest ratios in all years. In the faculty of letters, the ratio of German scholars to Turkish scholars was highest in 1939 with 0.47, compared to the years 1933 and 1945. The faculty of medicine had above the average ratios in all years, and they also reached the highest ratio of German scholars to Turkish scholars in 1939 (0.46). In the faculty of natural sciences, this ratio dropped over the years, from 0.58 in 1933 to 0.16 in 1945.

Table 4.5 Number of German Scholars in IU Departments.

	Dismissed German	Other German	Total German	GF/TF		
				1933	1939	1945
Faculty of Law	10	0	10	0.37	0.3	0.13
Economics	6	0	6	1	0.67	0.36
Law	4	0	4	0.2	0.14	0.06
Faculty of Letters	17	9	26	0.23	0.47	0.33
Ancient Languages and Cultures	0	1	1	-	-	1
Archeology and Art History	0	4	4	0.5	1	0.38
Eastern Languages and Literatures	0	2	2	1	1	2
History	0	1	1	0	0	0.13
Library Science	1	0	1	-	-	-
Philosophy	3	0	3	0.33	1	0.5
Psychology	1	0	1	0	0.17	0.14
Western Languages and Literatures	12	1	13	3	2.67	0.88
Faculty of Medicine	46	20	66	0.44	0.46	0.24
Dentistry	1	0	1	0.08	0.07	0.08
Medicine	45	20	65	0.52	0.52	0.26
Faculty of Natural Sciences	27	3	30	0.58	0.37	0.16
Astronomy	6	0	6	-	4	0.5
Biology	5	1	6	0.75	0.38	0.16
Chemistry	9	0	9	0.43	0.56	0.25
Mathematics	3	0	3	0.6	0.33	0.25
Pharmacy	0	2	2	1	0	0.5
Physics	4	0	4	0.33	0.25	0
Total	100	32	132	0.42	0.42	0.22

Total number of German scholars who started to work in IU between 1933-1945 are given in the Columns 1-3. Columns 4-6 show the ratio of total number of German scholars (Dismissed and Other German) to total number of Turkish scholars(New Hire, Transfer and Post-1933 Hire), in years 1933, 1939, and 1945. Dismissed German are the immigrant German scientists who were dismissed from the Nazi Germany and started to work in IU. Other German includes the German scholars in IU, that were under one or more of the following categories: 1) They were not dismissed from Nazi Germany, 2) their academic fields were already related to Turkey, 3) They were members of IU however, they were not academically occupied, i.e., they were technical assistants, nurses, etc.

Figure 4.1a shows the number of Dismissed German scholars by faculties over the years. Each faculty reaches the highest number of German scientists between 1935 and 1940, and the number of German scientists starts to decrease thereafter, especially after 1945. After 1974, none of the Dismissed German scientists continued to work in Istanbul University. The faculty of medicine had at most 33 Dismissed German scholars at the

same time (in 1937 and 1938), whereas the faculty of natural sciences had 21 Dismissed German scientists at the same time (1937), the faculty of letters had 13 (in 1944), and the faculty of law had 8 (between 1934 and 1939). Figure 4.1b shows the number of Other German Scholars, hired by IU between 1933 and 1945 faculties over the years. In the faculty of medicine, number of Other German scholars has a similar pattern with that of Dismissed German scholars, because the technical assistants, such as nurses and the laboratory technicians, in the Other German category were also dismissed from Nazi Germany and they came together with the Dismissed German scholars. In the faculty of letters, most of the Other Germans started to work in IU between 1940 and 1945, and they gradually left IU after 1945.

Figures 4.1c, 4.1d, and 4.1e show the number of New Hires, Transfers from Darülfünun, and Post-1933 Hires over time, respectively. Since New Hires and Transfers are defined as the faculty members who were hired in 1933 or transferred in 1933 from Darülfünun, their numbers were highest in 1933. Their numbers decreased over the years, as they retired or left the university. Post-1933 Hires are defined as the Turkish faculty members who were hired between 1934 and 1945, and Figure 4.1e indicates that IU employed increasingly more scientists over the years. Figure 4.1e does not include the faculty members who were hired after 1945. Thus, after 1945, the number of Post-1933 Hires started to decrease as these scholars retired or left the university.

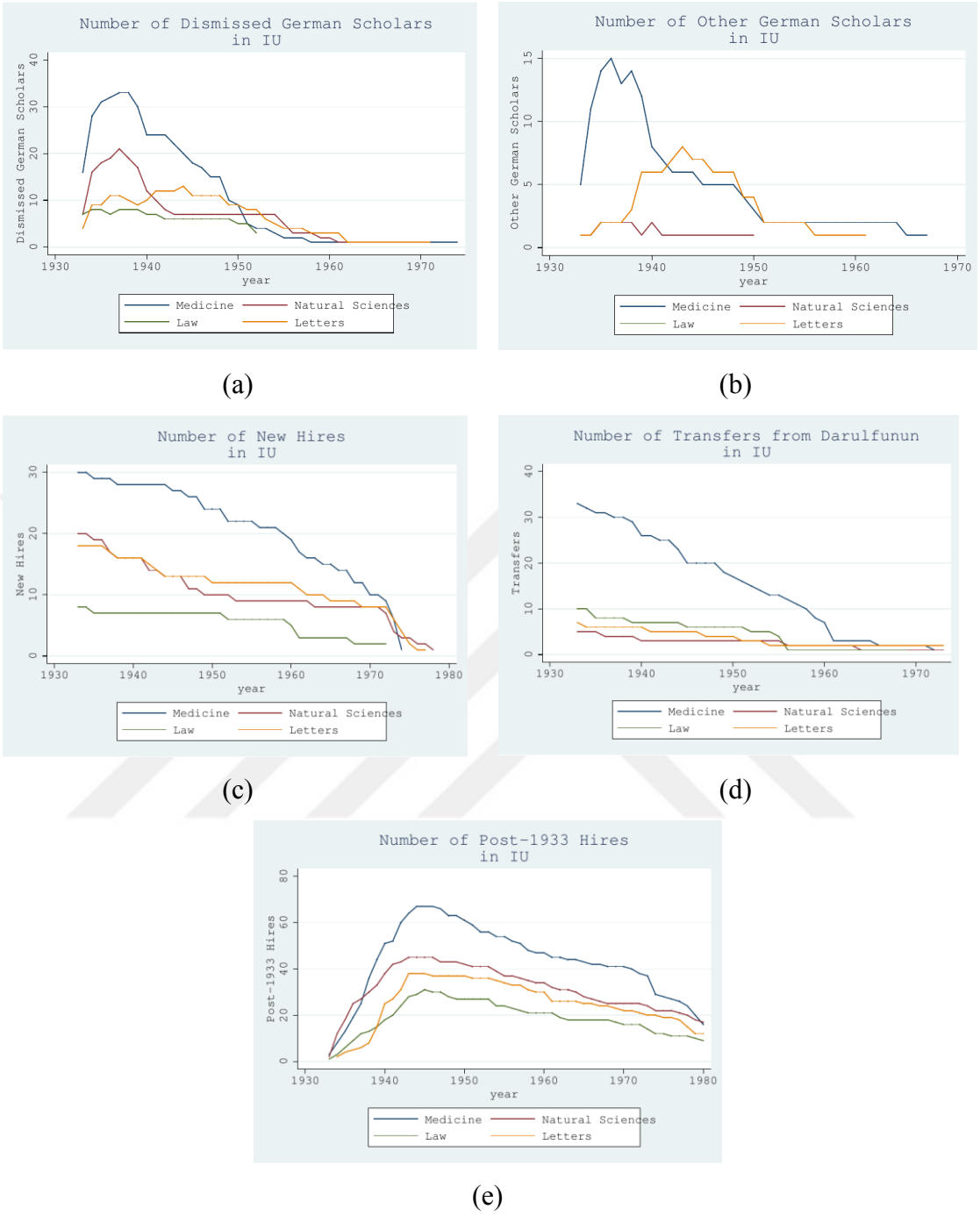


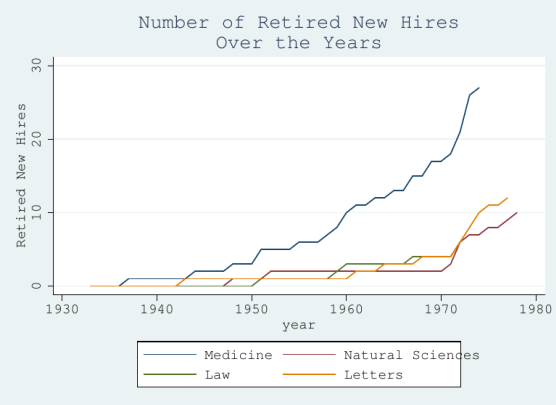
Figure 4.1: Number of German and Turkish scholars in the faculties of IU, over the years. Graphs (a) and (b) show the German scholars; divided as Dismissed Germans (a) and Other Germans (b). Graphs (c), (d), and (e) show the Turkish scholars; divided as New Hires (c), Transfers from Darülfünun (d), and Post-1933 Hires (e).

Figures 4.2a to 4.2f show the cumulative number of Turkish scientists who were retired from IU and the cumulative number of Turkish scientists who left the university for the reasons other than retirement. Especially after the 1940s, some of the Turkish scholars left IU because they were transferring to the new universities that were newly

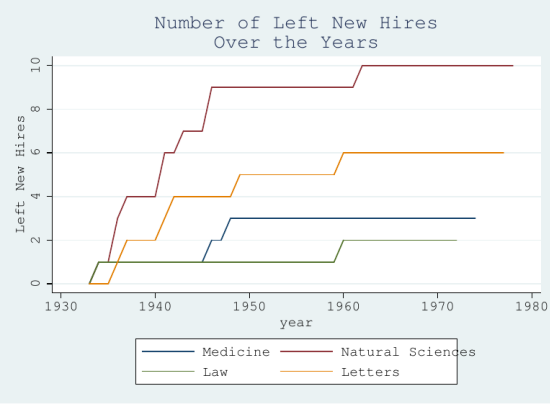
found. As it can be seen from the graphs, the majority of the Turkish faculty members worked in IU until their retirements.

Figures 4.3a to 4.3d show the cumulative number of German scholars who were retired from IU and the cumulative number of German scholars who left the university for the reasons other than retirement. Overall, out of the 100 Dismissed German Scholars, 37 of them were retired from IU. Majority of the Dismissed German scholars left IU, and they did so before 1945.

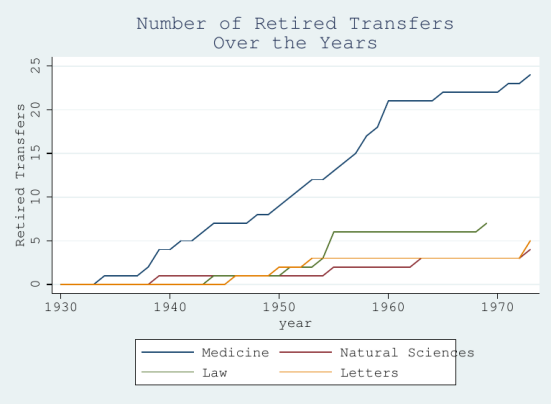
It should be noted that the information about the faculty members' retirement/leave dates was not available for 66 Turkish scholars, and for 2 German scholars. For the Turkish scholars, 75 was the official retirement age at the time, thus, if they had articles published after the age of 70 their retirement date was taken as the year they turned 75. Otherwise, the year after their most recent paper was published was taken as the year they left the university. The names of the German scholars with unknown leaving dates were found in the memoirs of some German and Turkish scholars, and one year after the most recent year they were mentioned to be in Istanbul, was taken as the year they left IU.

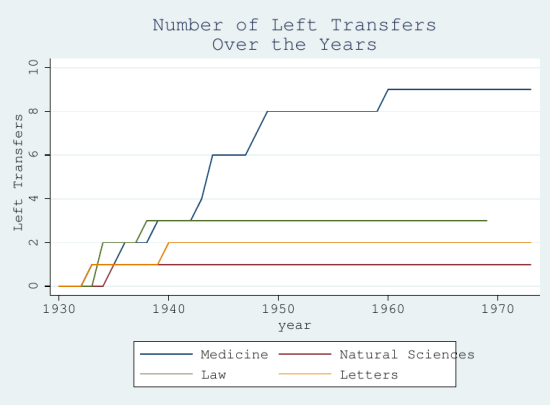


(a)

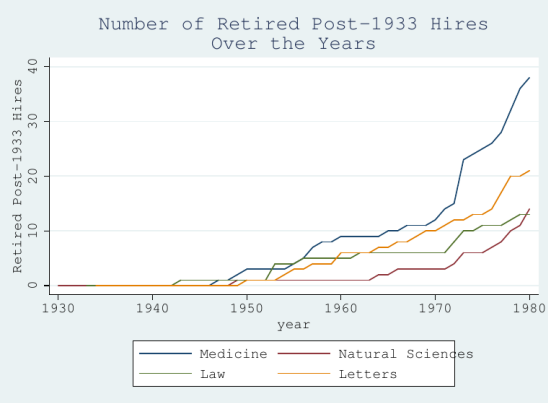


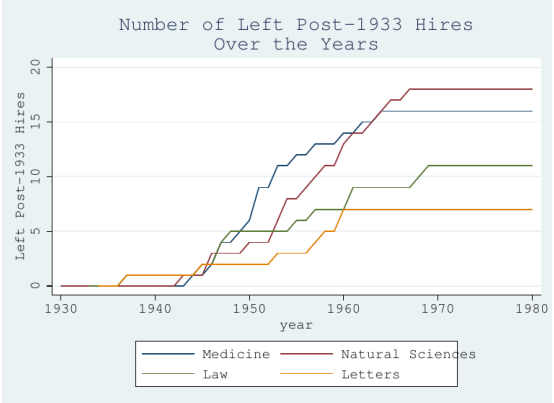
(b)





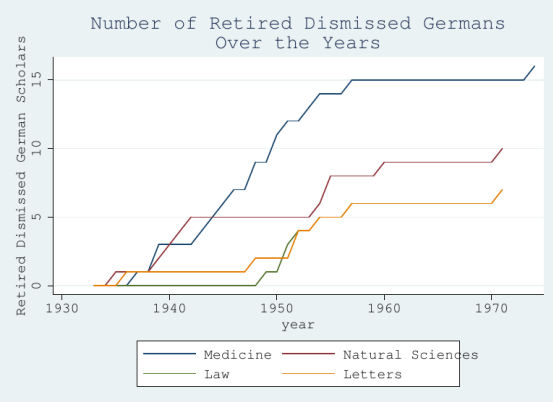
(c) (d)

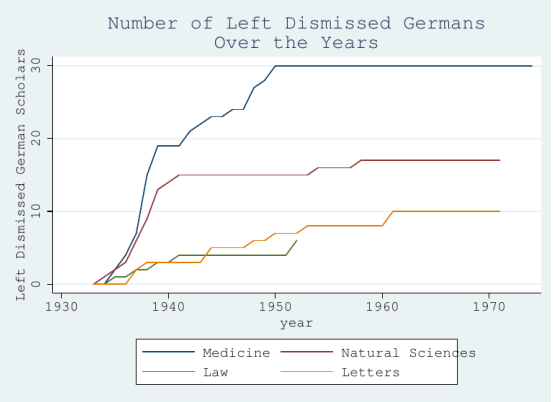




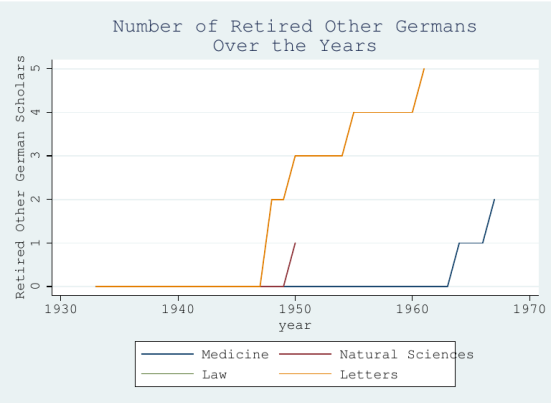
(e) (f)

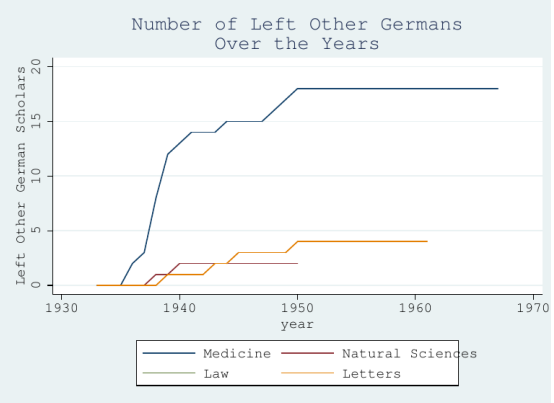
Figure 4.2 : Cumulative number of Turkish scholars who retired or left from the faculties of IU, over the years.
Turkish scholars are divided as; New Hires (Graphs (a) and (b)), Transfers from Darülfünun (Graphs (c) and (d)), and Post-1933 Hires (Graphs (e) and (f)).





(a) (b)





(c) (d)

Figure 4.3 Cumulative number of German scholars who retired or left from the faculties of IU, over the years.

German scholars are divided as; Dismissed Germans (Graphs (a) and (b)) and Other Germans (Graphs (c) and (d)).

Table 4.6 shows the average annual number of Scopus publications per Turkish scholars by each group (New Hire, Transfer, Post-1933) and by each faculty, for the periods between 1934-1936, 1937-1939, 1940-1942, and 1943-1945. From the table, it is seen that in the faculty of law and in the faculty of letters, Turkish scholars did not publish any Scopus articles between 1934 and 1945. In the faculty of medicine, New Hires were the most productive group, and their average number of annual publications were highest for the periods 1937-1939 and 1940-1942. Transfer and Post-1933 Hires in the faculty of medicine did not publish during 1934-1936 period, and they reached their peak between 1937 and 1939. In the faculty of natural sciences, Turkish scholars did not publish any Scopus articles between 1934 and 1939, and they reached the highest number of annual Scopus publications in the period between 1940 and 1942.

Table 4.6: Average Annual Scopus Publications by Turkish Scholars in IU.

	New Hire	Transfer	Post-1933 Hire
1934-1936			
Faculty of Law	0	0	0
Faculty of Letters	0	0	0
Faculty of Medicine	0.02	0.02	0
Faculty of Natural Sciences	0	0	0
1937-1939			
Faculty of Law	0	0	0
Faculty of Letters	0	0	0
Faculty of Medicine	0.07	0.05	0.03
Faculty of Natural Sciences	0	0	0
1940-1942			
Faculty of Law	0	0	0
Faculty of Letters	0	0	0
Faculty of Medicine	0.07	0.01	0.01
Faculty of Natural Sciences	0.04	0.11	0.01
1943-1945			
Faculty of Law	0	0	0
Faculty of Letters	0	0	0
Faculty of Medicine	0.05	0	0.01
Faculty of Natural Sciences	0	0	0.01

For the Turkish faculty members in IU, average annual scopus publications in each faculty, are given for different periods.
New Hire are the Turkish faculty members who were recruited by IU in 1933, when the university was first founded. Transfer refers to the faculty members who previously held positions in Darülfünun and were transferred to IU in 1933. Post-1933 Hire refers to the faculty members who were recruited by IU between the years 1934 and 1945.
The data on articles are obtained from Scopus.

Table 4.7 shows the average annual number of Scopus publications per German scholars, who stayed in IU between 1934 and 1945, by each group (Dismissed and Other German) and by each faculty, for the periods between 1934-1936, 1937-1939, 1940-1942, and 1943-1945. Dismissed German scholars in the faculty of law published only between 1934 and 1936. Apart from the faculty of law, in each faculty, Dismissed German scholars reached their highest productivity during the period 1937-1939. Other German scholars, who stayed in IU between 1933 and 1945, did not have any Scopus publications during these periods.

Table 4.8 shows the average annual number of Scopus publications per German scholars, who were in IU at some time between 1934 and 1945, but not specifically during the whole period. Dismissed German scholars, in all faculties, reached their highest productivity between 1934 and 1936, and they had the lowest productivity between 1940 and 1942. Other German scholars in the faculty of letters published the most between 1937 and 1939, those in the faculty of medicine published the most between 1942 and 1943, and those in the faculty of natural sciences published the most between 1934 and 1936.

Comparing Table 4.7 to Table 4.8 indicates that among all the German scholars who were hired by IU, those who were in IU during the whole period between 1934 and 1945, had, in general, less annual Scopus publications compared to the German scholars who stayed in IU for a shorter period. Both groups of German scholars published less between 1940 and 1945, compared to the years between 1934 and 1939, which could be because of the Second World War.

Table 4.7: Average Annual Scopus Publications by German Scholars who stayed in IU during the whole period between 1934 and 1945.

	Dismissed German	Other German
1934-1936		
Faculty of Law	0.07	-
Faculty of Letters	0	0
Faculty of Medicine	0.19	0
Faculty of Natural Sciences	0.33	-
1937-1939		
Faculty of Law	0	-
Faculty of Letters	0.11	0
Faculty of Medicine	0.30	0
Faculty of Natural Sciences	0.5	-
1940-1942		
Faculty of Law	0	-
Faculty of Letters	0	0
Faculty of Medicine	0.04	0
Faculty of Natural Sciences	0.08	-
1943-1945		
Faculty of Law	0	-
Faculty of Letters	0	0
Faculty of Medicine	0.04	0
Faculty of Natural Sciences	0.08	-

For the German faculty members in IU, who stayed during the whole period between 1933 and 1945, average annual scopus publications in each faculty, are given for different periods.
Dismissed German are the German scientists who were dismissed from Nazi Germany and started to work in IU. Other German includes the German scholars in IU, that were under one or more of the following categories: 1) They were not dismissed from Nazi Germany, 2) their academic fields were already related to Turkey, 3) They were members of IU however, they were not academically occupied, i.e., they were technical assistants, nurses, etc.
The data on articles are obtained from Scopus.

Table 4.8: Average Annual Scopus Publications by all German Scholars who were in IU at any time between 1934 and 1945.

	Dismissed German	Other German
1934-1936		
Faculty of Law	0.07	-
Faculty of Letters	0.25	0.04
Faculty of Medicine	0.41	0
Faculty of Natural Sciences	0.57	1.11
1937-1939		
Faculty of Law	0.03	-
Faculty of Letters	0.12	0.18
Faculty of Medicine	0.29	0
Faculty of Natural Sciences	0.32	1
1940-1942		
Faculty of Law	0	-
Faculty of Letters	0.02	0.11
Faculty of Medicine	0.13	0.08
Faculty of Natural Sciences	0.09	0
1943-1945		
Faculty of Law	0	-
Faculty of Letters	0.04	0
Faculty of Medicine	0.19	0.12
Faculty of Natural Sciences	0.1	0.33

For the German faculty members who were in IU at any time between 1933 and 1945, average annual scopus publications in each faculty, are given for different periods.
Dismissed German are the German scientists who were dismissed from Nazi Germany and started to work in IU. Other German includes the German scholars in IU, that were under one or more of the following categories: 1) They were not dismissed from Nazi Germany, 2) their academic fields were already related to Turkey, 3) They were members of IU however, they were not academically occupied, i.e., they were technical assistants, nurses, etc.
The data on articles are obtained from Scopus.

Chapter 5:

EMPIRICAL STRATEGY

Peer effects can arise due to academic collaborations, exchange of ideas, peer pressure, networking, and funding opportunities. These mechanisms can be affected by the average quality of the peers and the number of peers (Waldinger, 2012). The following

equation is estimated in order to understand if peer effects, from German scientists in IU to Turkish scholars, existed:

$$\#Publications_{if\,t} = \beta_1 + \beta_2(GermanQuality)_{f,t-1} + \beta_3(\#Germans)_{f,t-1} + \beta_4(AgeDummies)_{i,f,t} + \beta_5(YearFE)_t + \beta_6(IndividualFE)_i + \epsilon_{ift} \quad (5.1)$$

Where $\#Publications_{ift}$ denotes the number of publications that are found in Scopus for the Turkish scientist *i* in field *f* and year *t*. $GermanQuality_{ft-1}$ is the average productivity of the Dismissed German faculty in field *f* and in year *t-1*, where productivity of a scientist is measured by taking the sum of the number of publications in Scopus by the scientist until 1945.

$\#Germans_{f,t-1}$, is the number of Dismissed German scientists to Turkish Scientists in the field *f* and in year *t-1*. As explained in Waldinger (2012), it takes time for the newcomers to meet and start working with the existing faculty. Peer effects are therefore measurable after some time, so one-year lags of the variables *German Quality* and *#Germans*, are used in the regression. Because the number of publications differs at the different levels of an individual's academic career, age dummies indicating 5-year intervals of age for the ages between 20 to 70 are included as a control variable, similar to Waldinger (2012). Lastly, the regression includes year fixed effects to capture possible factors that might have affected the productivity of all scientists regardless of their department. Individual fixed effects are included to capture the time-persistent differences in each individual's traits, such as their talent. In all regressions, the standard errors clustered at the field level.

5.1 Exogeneity of the Independent Variables

The main potential endogeneity problem in estimating peer effects is caused by the sorting of individuals. Usually, researchers prefer to work in institutions where their productivity level is similar to other researchers' productivity level. Thus, the average productivity of the peers is influenced by the dependent variable.

If the Dismissed German scientists had preferred to work in IU because they believed that Turkish scientists had high productivity, then it would have created an endogeneity

problem, and the regression results would be biased. However, it is very likely that the Dismissed German scientists chose to work in IU for the reasons that were not related with the productivity level of the Turkish scientists in the analyzed setup of this study. Dismissals of Jewish scientists occurred only two months after Adolf Hitler came to power in March 1933. Thus, these scientists lost their jobs relatively unexpectedly, and their safety was threatened.

During the 1930s and 1940s, most countries' academic sector performed racial discrimination, especially against Jewish people, and it is clear from the memoirs of the dismissed scientists that most of them had difficulties in finding jobs through applying to positions individually (Reisman, 2007). Usually, dismissed scholars consulted emergency organizations that were established to help these scholars escape from Nazi Germany. Most of the German scientists who worked in IU found their positions through an organization called "Notgemeinschaft deutscher Wissenschaftler im Ausland" (Emergency Society of German Scholars Abroad). The organization's aim was to find jobs in safe countries for the dismissed scientists. It was written in the memoirs that when the German-Jewish scientists heard about the offers from IU through the organization, they were relieved to find a safe haven (Reisman, 2007). Also, in the letters exchanged between the dismissed scientists, safety was emphasized.

Turkey was perceived to be a safe haven because Ottoman Empire had been historically a major source of refuge for Jews since the 14th century. In general, the empire's policy towards Jews had been protective through the ages, rescuing thousands of Jews who were being persecuted by their home countries (Shaw,1993). Similarly, officials from the Republic of Turkey had shown their stand against anti-Semitic movements. For example, in 1934, after a conflict between the local Jews and other residents of Thrace, Ismet Inonu, Turkish Prime Minister of the time, stated in his Grand Assembly speech, "In Turkey every individual is under the protection of the laws of the Republic. Anti-Semitism is neither a Turkish product nor part of the Turkish mind. At certain periods, it penetrates our country from foreign countries, but we reject it." (Shaw, 1993, p.15). Thus, it is understandable that for Jewish scientists, Turkey was a safe refuge.

Moreover, negotiations between the German scientists and IU administrators started in July 1933, whereas the university's first academic semester began in November 1933 (Dölen, 2010). It was known that Darülfünun was demolished and there would be changes regarding the structure of the institution and the faculty members. The German scientists

arrived in Turkey knowing that they would be working in a very recently established university. So, they could hardly make a decision based on the productivity level of the existing Turkish faculty members in the university.

Although the total number of German scholars chose to work in IU in 1933 is presumably to be exogenous, their number observed in the following years is likely to be endogenous. The concern for the endogeneity arises if the departure of the German scientists had occurred because of the reasons related to the productivity of the Turkish scientists, as well. However, historical records in Dölen (2010) and Widmann (1981) indicated that most Germans left Turkey not because of the endogenous factors, such as the productivity of Turkish scholars, but because of the attractiveness of their outside offers. In particular, the country where most of the German scientists in Turkey had migrated to was the USA. Widmann (1981) noted that at the time the United States was aspired to invite and keep the world-famous scientists in the country. Therefore, they sent invitations to some of the German scientists in Turkey. According to Widmann (1981), by 1956, 39 of the German professors and associate professors in Turkey (in Istanbul and in Ankara) left to the USA.

The German scientists' migration to the USA might be considered as a potential endogeneity problem if their migration was taken as a sign that they were not content with Turkish scientists' productivity. However, both Dölen (2010) and Widmann (1981) emphasized that the departures of the German scientists were also related to cultural reasons and Turkey's and Germany's policies regarding the immigrant scientists. Cultural reasons mainly stemmed from adaptation problems. For example, Dr. Liselotte Dieckmann, who held position in the Faculty of Letters between 1934-1938, stated, “Beyond daily troubles, the most important problem was our adaptation. I do not know whether it was our fault or the fault of the environment's conditions. Today, we know that a German professor can never easily give up his habits..." (as cited in Dölen, 2010, p.527). Moreover, most of the German scientists had difficulties in learning Turkish, and they had to have translator assistants when they gave lectures in IU. Dölen (2010) described, when the German professors tried to give lectures in Turkish, students complained, and insisted that they preferred translators as the German professors' Turkish were not understandable. The German professors' memoirs also indicated that they all lived close to each other, and rarely socialized with their Turkish colleagues. This adaptation problem arguably played a significant role in the departure of the German Scientists.

Germany's and Turkey's policies did not help the situation, either. At the end of 1944, when Turkey declared war on Germany, German citizens in Turkey were offered two options by the Turkish government: they could either go back to Nazi Germany or they could be interned in one of the small towns of Turkey, such as in Çorum or Yozgat. Even though some of the German academics found their way around both options, they were highly concerned about their futures in Turkey (Dölen,2010). Those who stayed in Turkey faced further bureaucratic problems over time. Neither Turkey nor Germany offered pension funds for the immigrant scientists. In Turkey, most of the German scientists were hired on short contracts of 3 to 5 years, with no guarantee of recurrence. Similarly, German government announced that they would not offer any retirement plans for German academics who worked abroad. Fritz Neumark, who was an economics professor in IU between 1933 and 1952, stated, “Financial factors played an important role for most of the returnees. Because despite all the efforts of our Turkish colleagues, it was not possible to get a pension agreement that works for us." (Dölen, 2010, p. 519). Clearly, such economic and bureaucratic uncertainties discouraged the German scientists from staying in Turkey. In sum, it can be argued that the German scientists' migration from Turkey was mainly driven by cultural, financial, and bureaucratic reasons, rather than productivity concerns.

To summarize, the endogeneity problem could arise if the arrival of the German scientists and/or the departure of the German scientists had been related to the productivity of Turkish scientists. However, the historical evidence indicates that the German scientists started to work in IU for safety reasons. Similarly, their decision of leaving Turkey was mostly about cultural and bureaucratic concerns. Lastly, there can be omitted and/or unobserved factors, and these are controlled in the regression by adding year fixed effects and individual fixed effects. Since the explanatory variables do not seem to have endogeneity problem, the model can be estimated with the OLS method.

Chapter 6:
RESULTS

6.1 Main Results

Table 6.1 reports the OLS estimates of the benchmark model (Column 5). In the benchmark model, the dependent variable is the number of Scopus publications by the Turkish scientist *i* in field *f* and in year *t*. Here, the fields of the scientists are taken as their academic departments in IU (i.e., 1981 counterparts of 1933 chairs). There are 22 departments, and the full list of these departments are available at Table 4.4. Independent variables are the number of Dismissed German scientists *(#German*) in field *f* and in year *t-1*, and the quality of the Dismissed German scientists (*German Quality*) in the field *f* and in year *t-1*. The quality of the Dismissed German scientists is calculated by taking the average of the productivities of the scientists in field *f* and in year *t-1*. The productivity of a scientist is taken as the total number of Scopus articles published by the scientist until 1945. In the analysis, Turkish scholars' publication data between 1933 and 1945 is used, and if the Turkish scholar left IU, she is excluded from the sample for the years after she left the university. In the main analysis, the sample is restricted to the years between 1933 and 1945. The reasons for adopting this time frame are explained in Section 3 of Results.

Table 6.1: Main Results.

	(1)	(2)	(3)	(4)	(5)
German Quality	0.0001	0.0002	0.0003	0.0003	0.0001
	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0003)
#Germans	0.0013***	0.0012***	0.001***	0.0023***	0.0021***
	(0.0002)	(0.0002)	(0.0001)	(0.0003)	(0.0004)
Age Dummies	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Field FE	No	No	No	Yes	No
Individual FE	No	No	No	No	Yes
*R*2	0.0046	0.0156	0.0204	0.0208	0.0239
Observations	2580	2580	2580	2580	2580

Dependent variable, $Publications_{ift}$, is the number of Scopus articles for the Turkish scientist i, in the field f, and in year t.

German Quality refers to the average number of Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t. #Germans is the number of Dismissed German scientists in IU, in the field f and in year t.
In the regressions publication data between 1933 and 1945 are used.
In all regressions standard errors are clustered at the field level.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

The estimates in Table 6.1 imply that the quality of the Dismissed German scientists had a little effect on the number of publications of Turkish scientists. Although the coefficient estimates associated with the quality are positive, they are not statistically significant. The number of Dismissed Germans had a positive and statistically significant effect on the number of publications of Turkish scientists. In addition to statistical significance, the estimates show economically significant effects on the productivity of domestic scientists in IU. The arrival of one additional Dismissed German scientist increased the yearly number of publications per Turkish scientists by 0.0021. Between 1933 and 1945, the average annual number of publications per Turkish scientists was 0.01. Thus, according to the estimates, arrival of an additional German scientist increased the publications of Turkish scientists by 21% (i.e., 0.0021 divided by 0.01). The number of Dismissed Germans in IU peaked in the year 1937 with a total of 73 Dismissed German scientists, and the average number of Dismissed German scientists per department was 3.48. Thus, holding the quality of German Scholars constant, the number of Dismissed German scientists increased the yearly Scopus publications of Turkish scientists by 73.08% (i.e., 3.48*0.0021 divided by 0.01), in the year when the department hosted the maximum number of Dismissed Germans.

As can be seen from the Columns 1-3, not including the individual fixed effects, biases the coefficient estimates for #German towards zero, regardless whether the 5-year age dummies or year fixed effects are used. Analytically, the estimates for the number of German scholars in Columns 1-3 differ from the one in Column 5 if there is a correlation between the average number of Germans and the number of publications at individual level. If there was a positive selection bias, that is, if the German scholars preferred to work in the departments with higher productivity, the covariance between average number of Germans and number of publications would be higher at the individual level, and OLS estimates would be upward-biased. Excluding the individual fixed effects biases the estimates towards zero, thus, it indicates that the average number of German scholars

were higher in the departments where the productivity levels of Turkish scholars were lower.

Adding the age dummies and year fixed effects have a smaller effect on the coefficient estimates for #German, compared to adding the individual fixed effects. This can be because the correlation between the number of German scholars and these variables are low. Table 1A in the appendix reports the estimates on the age dummies and year fixed effects. Compared to the reference age group, 36-40, younger Turkish scholars' productivity was lower and statistically significant; and older Turkish scholar' productivity was higher and statistically significant. Compared to the reference year, 1938, Turkish scholars' productivity was higher and statistically significant for 1933 and their productivity was lower and statistically significant for the years 1942 and 1943, which might be due to the Second World War.

Column 4 shows the estimates when field fixed effects, instead of individual fixed effects, are added to the model. Results are similar to the benchmark model. Since field is time invariant for a scholar, individual fixed effects control for field fixed effects, too. Thus, in the benchmark model, individual fixed effects, rather than field fixed effects are added.

6.2 Robustness

The productivity measure to calculate German Quality in the benchmark model (i.e., total number of Scopus publications by the scientist until 1945) does not take the quality of the publications and the ages of the scientists into account. To deal with potential implications of not considering these factors, two additional productivity measures are constructed. Table 6.2 reports the estimates i) when German Quality is calculated by using these different productivity measures, and ii) when different scopes for the fields of the scientists are taken. The fields of the scientists are altered, because in the benchmark model, a scientist's field is determined by her academic department (according to the 1981 classification of IU departments), and it does not capture the possible peer effects at a broader level. In the Columns 1-3, the fields of the scholars are taken as the academic departments of the scholars, and in the Columns 4-6, the fields of the scholars are taken as the faculties of the scholars. The first column shows the estimates of the benchmark model, which is the model presented in Column 5 of Table 6.1.

Table 6.2: Robustness Checks (Different Quality Measures and Field Scopes).

	(1)	(2)	(3)	(4)	(5)	(6)
Quality measure:	Publications	Annual Publications	Citations	Publications	Annual Publications	Citations
Field:	Department	Department	Department	Faculty	Faculty	Faculty
German Quality	0.0001	0.0093	0.00000125	-0.0000291	0.02	-0.0000206
	(0.0003)	(0.0086)	(0.00000583)	(0.001)	(0.0369)	(0.0000350)
#German	0.0021***	0.002***	0.0021***	0.0015**	0.0016**	0.0016**
	(0.0004)	(0.0004)	(0.0004)	(0.004)	(0.0003)	(0.005)
Age Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
*R*2	0.0239	0.0240	0.0239	0.0227	0.0227	0.0227
Observations	2580	2580	2580	2580	2580	2580

Dependent variable, $Publications_{ifi}$, is the number of Scopus articles for the Turkish scientist i, in the field f, and in year t.
German Quality in columns 1 and 4 refer to the average number of total Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1. German Quality in columns 2 and 5 refer to the average number of annual Scopus articles (until 1945) by a Dismissed German scientist in field f and in year t − 1. German Quality in columns 3 and 6 refer to the average number of citations received by the Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1.
#Germans is the number of Dismissed German scientists in IU, in the field f and in year t − 1.
In the Columns 1-3, fields of the scientists are taken as their departments in IU, and in the Columns 4-6, fields of the scientists are taken as their faculties in IU.
In the regressions publication data between 1933 and 1945 are used.
In all regressions standard errors are clustered at the field level.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

When the productivity of the German scientists is measured by the scientists' total number of Scopus publications until 1945, younger academics might be taken as less productive even if they published more articles per year. Thus, the average number of annual publications of the scientist during her academic career until 1945 was used as a second productivity measure. The information about when the German scientists started their academic careers was not available. Therefore, to calculate the number of their working years until 1945, 25 was assumed to be the age for starting their academic careers of publishing, and it was subtracted from their age in 1945. After calculating the productivity of each scientist, German Quality, is calculated by taking the average of all

scientists' productivity in the field f and in year t-1. Column 2 in Table 6.2 shows the estimates when German Quality is based on this productivity measure of average annual publications, whereas Column 1 shows the estimates when German Quality is based on the productivity measure of total number of publications until 1945 (i.e., the same estimates of Column 5 of Table 6.1).

If some of the German scientists published less frequently but the quality of their work was higher, measuring the productivity of the German scientists by the number of the articles they published might be misleading. In that case, the number of citations their publications received is a better measure. Thus, the third productivity measure for the German scientists is the total number of Scopus citations that were received as of 2021 by the publications that were written by these scholars until 1945. Again, the quality of German scientists, is calculated by taking the average of productivities for all German scientists who were employed in field *f* and in year *t-1* at IU. Column 3 in Table 6.2 shows the estimates when the German Quality is based on the productivity measure of total Scopus citations. It is seen from Columns 2 and 3 that changing the productivity measure to the average annual publications or to the total number of citations do not change the results. The coefficient estimates for *German Quality* are statistically not significant; and the coefficient estimates for *#German* are statistically significant and similar to that of benchmark model.

As explained earlier, IU had a chair system during the analyzed period. In this system faculty members were not officially affiliated with the academic departments, instead, they held chairs under the faculties. Therefore, analyzing peer effects at the department level could be problematic. For example, professors who held the chair of organic chemistry might be working in fields related to chemistry or pharmacy. In our classification at the department-level in the data, the department of these scholars is taken as chemistry. On the other hand, the German professors in the department of pharmacy could be working on related subjects, or they could have simply shared their ideas with their colleagues from the chair of organic chemistry. However, when the fields of the scientists are taken as their departments, such peer effects are not captured. Thus, the benchmark model and the other specifications with different productivity measures are also estimated by taking the fields of the scientists as their faculties, to take into account potential peer effects at broader level. In these estimates, the variables of German Quality and #German are calculated at the faculty level.

In Table 6.2, Columns 4, 5 and 6 report the estimates when the fields of the scientists are taken as their affiliated faculties, while the German Quality is based on the productivity measures of the total number of publications, the average annual number of publications and the total number of citations, respectively. The coefficient estimates for German Quality are statistically not significant for any of these specifications, and the estimates for #German are positive and statistically significant. In 1937, when IU hosted the maximum number of Dismissed Germans, the average number of Dismissed German scientists in a faculty was 18.25. Thus, the estimate of #German (in Column 4) imply that, holding the quality of German scholars constant, the number of Dismissed German scientists in a faculty increased the yearly Scopus publications of Turkish scientists in that faculty by 273.75% (i.e., 18.25*0.0015 divided by 0.01), when the faculty hosted the maximum number of Dismissed Germans. Compared to department level peer effects, where the effect of #German was 73.08%, the effect of #German at the faculty level is estimated to be higher. This can be because during the analyzed period scientists' interactions were not limited to their chairs (or departments) but rather, they interacted with many of their peers from their faculty. Another reason can be that since the departments are taken according to 1981 classifications, some chairs might have been classified in different departments if the classifications would have been done in 1930s, thus broadening the peer level of scientists avoids the possible wrong department classifications for the scientists.

Table 6.3 reports the estimates of the specifications in Table 6.2, but, when the variables of German Quality and #German are calculated by using all the German scholars in IU (rather than using only Dismissed Germans). Columns 1-3 show the estimates when the fields of the scientists are taken as the academic departments of the scientists. Columns 4-6 show the estimates when the fields of the scientists are taken as the faculties of the scientists. In Columns 1 and 4, German Quality is based on the total number of publications; in Columns 2 and 5, German Quality is based on the average annual number of publications; and, in Columns 3 and 6, German Quality is based on the total number of citations.

For the regressions in Table 6.3, all the coefficient estimates for #German are positive and statistically significant. When the benchmark model is estimated with including all the German scholars (Column 1), coefficient estimate for #German is 0.0014. The number of all German scholars also peaked in the year 1937, with a total of 90 German scholars

in IU. The average number of German scholars in a department was 4.29. So, it can be inferred that, holding the quality of German scholars constant, the number of German scholars in a department increased the yearly Scopus publications of Turkish scientists by 60.06% (i.e., 4.29*0.0014 divided by 0.01), when the department hosted the maximum number of Germans. In 1937, the average number of all German scholars in a faculty was 22.5. Thus, the estimates in Column 4 indicate that, holding the quality of German scholars constant, the number of German scholars in a faculty increased the yearly publications of Turkish scientists in that faculty by 292.5% (i.e., 22.5*0.0013 divided by 0.01) in the year when the faculty hosted the maximum number of German scholars. Compared to Table 6.2, it is seen that the coefficient of the number of German scholars is estimated to be lower, when both Dismissed and Other German scholars' effects were analyzed. This difference can be explained with the fact that most of Other German scholars were not academically occupied, thus the effect of all German scholars could have been less, compared to the effect of Dismissed German scholars.

Table 6.3: Robustness Checks (with all -Dismissed and Other- German Scholars).

	(1)	(2)	(3)	(4)	(5)	(6)
Quality measure:	Publications	Annual Publications	Citations	Publications	Annual Publications	Citations
Field:	Department	Department	Department	Faculty	Faculty	Faculty
German Quality	0.0001	0.0098	0.000006	0.0007	0.0257	0.0000108
	(change)	(0.0064)	(0.00000643)	(0.0006)	(0.0244)	(0.0000173)
#German	0.0014***	0.0014***	0.0014***	0.0013***	0.0013***	0.0012**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Age Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
*R*2	0.0244	0.0245	0.0243	0.0234	0.0234	0.0233
Observations	2580	2580	2580	2580	2580	2580

Dependent variable, $Publications_{ift}$, is the number of Scopus articles for the Turkish scientist i in the field f, and in year t.
German Quality in columns 1 and 4 refer to the average number of total Scopus articles (published until 1945) by a German scientist (Dismissed and Other) in field f and in year t−1. German Quality in columns 2 and 5 refer to the average number of annual Scopus articles (until 1945) by a German scientist (Dismissed and Other) in field f and in year t−1.German Quality in columns 3 and 6 refer to the average

number of citations received by the Scopus articles (published until 1945) by a German scientist (Dismissed and Other) in field f and in year t − 1.
#Germans is the number of all German scientists (Dismissed and Other) in IU, in the field f and in year t − 1. In the Columns 1-3, fields of the scientists are taken as their departments in IU, and in the Columns 4-6, fields of the scientists are taken as their faculties in IU.
In the regressions publication data between 1933 and 1945 are used.
In all regressions standard errors are clustered at the field level.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

In the faculty of law and in the faculty of letters, Turkish scholars did not have any Scopus publications between 1933 and 1945 which means, for these observations the dependent variable is always zero and there is no within variation. So, including these faculties in the fixed effects regression, can result in the covariance between the within variations of publications, and the within variations of #German and German Quality to be lower. Moreover, having no Scopus publications by any of the Turkish scholars might suggest that for the scholars in these faculties, Scopus publications may not be the right productivity measure. For example, Turkish scholars in the faculty of letters and in the faculty of law could be publishing in journals that are not included in Scopus, or they could be publishing more in books rather than journal articles. Then, for these scholars, effect of German scientists on their productivity would not be reflected on the Scopus publications. Thus, the regressions were also estimated by excluding these faculties from the sample.

Table 6.4 shows the estimates when the regressions were estimated by using the data only from the faculty of medicine and the faculty of natural sciences. In Column 1, German Quality is based on the total number of publications; in Column 2, German Quality is based on the average annual number of publications; and, in Column 3, German Quality is based on the total number of citations. The estimates, when German Quality is based on the total number of publications and the total number of citations, imply that German Quality did not have a statistically significant effect on the yearly publications of Turkish scientists. The average number of annual publications for a Turkish scientist who was affiliated with the faculty of medicine or with the faculty of natural sciences between 1933 and 1945 was 0.02, and on average a department from the faculty of medicine or from the faculty of natural sciences, hosted at most 6 Dismissed Germans in the same year. The maximum number of Dismissed German scholars, in these departments was reached in 1937, with 54 Dismissed Germans, and the average number of German scholars in a department was 6. Thus, the estimates imply that, holding the

quality of German scholars constant, the number of German scientists in a department increased the yearly publications of Turkish scientists in that department, by 57% (i.e., 6*0.0019 divided by 0.02) in the year when the department hosted the maximum number of Dismissed Germans.

In Column 2 of Table 6.4, the coefficient estimate of German Quality implies that in the faculty of medicine and the faculty of natural sciences, one unit increase in German Quality (based on average annual publications) of a department, increases the yearly publications of a Turkish scientist in that department by 0.0159. On average, for departments in the faculty of medicine and in the faculty of natural sciences, when German Quality in a department reached its highest level, it was 0.38. Thus, it can be inferred that German Quality increased the yearly publications of Turkish scientists by 30% (i.e., 0.38*0.0159 divided by 0.02), holding the number of Germans constant.

Table 6.4: Robustness Checks (including only faculty of medicine and faculty of natural sciences).

	(1)	(2)	(3)
Quality measure:	Publications	Annual Publications	Citations
Field:	Department	Department	Department
German Quality	0.0003	0.0159 **	0.00000235
	(0.0002)	(0.0055)	(0.00000896)
#German	0.0019**	0.0018**	0.0019**
	(0.0008)	(0.0008)	(0.0008)
Age Dummies	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
*R*2	0.0314	0.0315	0.0313
Observations	1748	1748	1748

Dependent variable, Publications$_{ift}$, is the number of Scopus articles for the Turkish scientist i, in the field f, and in year t.
German Quality in Column 1 refers to the average number of total Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1. German Quality in Column 2 refers to the average number of annual Scopus articles (until 1945) by a Dismissed German scientist in field f and in year t − 1. German Quality in Column 3 refers to the average number of citations received by the Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1.
#Germans is the number of Dismissed German scientists in IU, in the field f and in year t−1. Fields of the scientists are taken as their departments in IU.
Only the scientists in the faculty of medicine and in the faculty of natural sciences are included.
In the regressions publication data between 1933 and 1945 are used.
In all regressions standard errors are clustered at the field level.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

6.3 Results with Using Different Time Period of Analysis

The main analysis and the robustness checks, so far, include the publication data of Turkish scholars from the period between 1933 and 1945. It starts from 1933, because it is the year when IU was established, and it does not extend further than 1945 for the reasons explained below.

Extending the period of analysis to years after 1945 can be problematic for a number of reasons. First, most of the German scholars already left Turkey by 1945 (around 60% of Germans left IU by 1945, and around 80% left IU by 1950) and no German scholar who arrived between 1933 and 1945 had remained at IU by 1974; so, the values of explanatory variables, #German and German Quality, reach zero eventually, and they do not change thereafter. Thus, the variation in #German and German Quality gets lower (and constant after all the Germans in a department left), causing higher standard errors.

Second, there can be time varying omitted variables that affect the individuals differently. As the analysis extended to further years, the model has a higher possibility of suffering from omitted variable bias. For example, between 1944 and 1982, 26 new universities were established in Turkey, whereas until 1944, IU was the only university in the country. New universities could have been affecting the publications of Turkish scholars, through collaboration and sharing ideas. Also, some Turkish scholars could have left IU to join the newly established universities.

Third, the dependent variable, publications of Turkish scholars, is from Scopus, and the database includes relatively more of recent Turkish journals (as can be seen from Table 4.1 in the Data section). This can be because older journals in 1930s and 1940s did not have the scientific standards to be included in the Scopus database, or they did but for some reason (such as journals not being archived) they were not included in the database. In any case, comparing the annual number of publications in Scopus when there were less journals in the database and when there were relatively more journals in the database, might not give much insight about the productivity of the scientists. Moreover, prior to 1950, all of the Scopus publications by Turkish scientists are from international journals, whereas after 1950, some of the publications are from Turkish journals that are indexed in Scopus. If the standards of Turkish and international journals were different during the analyzed period, then, when the period of analysis is extended, the dependent variable measures different types of publications over years. Lastly, it can be argued that the

departure of German scholars was likely to be exogenous in the pre-1945 period. However, if German scholars might actually have left IU because of the lower productivity of Turkish scholars after 1945, the period when the war was over, and the Nazi ideology had lost its adverse effect in the employment of Jewish scientists worldwide. In that case, their departure from IU could be endogenous. Restricting the sample to the period between 1933 and 1945 (or even to an earlier year), avoids the possible endogeneity problem.

On the other hand, the German scholars' productivity could have been affected by the World War II, as they could have been concerned about their families and friends in Germany. This could also limit the interactions between the German scholars and Turkish scholars in IU. In addition, if Turkish scholars were affected by the World War II at different levels, than there can be omitted variable bias. Thus, the estimates could be negatively biased when the period of analysis is taken between 1933 and 1945.

Table 6.5 reports the estimates of the benchmark model (Column 1) and the robustness checks (Columns 2-6) when the same regressions as in Table 6.2 and Table 6.3 were run with the sample restricted to the period between 1933 and 1938. Between 1933 and 1938, the average annual number of Scopus publications per a Turkish scholar was 0.01, and as mentioned before, the highest number of Dismissed German scholars per department was realized in 1937, with 3.48 Dismissed German scholars per department. Thus, the estimates from the benchmark model (Column 1) imply that, holding the quality of German scholars constant, number of Dismissed German scholars increased the yearly publications of Turkish scientists by 80.04% (i.e., 3.48*0.0023 divided by 0.01), in the year when number of Dismissed German scholars reached its maximum. The estimates of the benchmark model are similar for both periods (73% increase for the period 1933-1945).

Table 6.5: Robustness Checks (Different Quality Measures and Field Scopes for the period between 1933-1938).

	(1)	(2)	(3)	(4)	(5)	(6)
Quality measure:	Publications	Annual Publications	Citations	Publications	Annual Publications	Citations
Field:	Department	Department	Department	Faculty	Faculty	Faculty
German Quality	-0.0006	- 0.0019	0.00002	0.0004	-0.0101	0.0001**
	(0.0006)	(0.0116)	(0.00001)	(0.0013)	(0.0260)	(0.00003)
#German	0.0023***	0.0024***	0.0022***	0.0019**	0.0021***	0.0021**
	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0005)	(0.0004)
Age Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
*R*2	0.0364	0.0365	0.0360	0.0324	0.0324	0.0331
Observations	869	869	869	869	869	869

Dependent variable, $Publications_{ift}$, is the number of Scopus articles for the Turkish scientist i in the field f, and in year t.
German Quality in columns 1 and 4 refer to the average number of total Scopus articles (published until 1938) by a Dismissed German scientist in field f and in year t − 1. German Quality in columns 2 and 5 refer to the average number of annual Scopus articles (until 1938) by a Dismissed German scientist in field f and in year t − 1. German Quality in columns 3 and 6 refer to the average number of citations received by the Scopus articles (published until 1938) by a Dismissed German scientist in field f and in year t − 1.
#Germans is the number of Dismissed German scientists in IU, in the field f and in year t − 1.

Column 6 in Table 6.5 shows that when the German Quality is measured by the total Scopus citations of German scholars, the effect of German Quality also becomes positive and statistically significant, at the faculty level. When the number of Dismissed German scholars reached its maximum (18.25 German scholars per faculty), total Scopus citations of German scholars, per faculty was 36.11, so, German scholars increased the yearly publications of the Turkish scholars by 419.36% (i.e., (36.11*0.0001+18.25*0.0021) divided by 0.01) in the year when the faculty hosted the maximum number of Dismissed German scholars. The estimate is, again, higher compared to the department level effects, which might indicate that during the analyzed period, Turkish scholars did not limit their interactions to the German scholars only from their chairs (or departments), but rather they interacted with many of the German scholars from their faculty.

6.4 Heterogeneity

As explained earlier, Turkish scholars in the sample can be categorized in three groups as: New Hires (those who were hired by IU in 1933), Transfers (those who were transferred from Darülfünun in 1933), and Post-1933 Hires (those who were hired by IU in a year between 1934 and 1945). The effect of German scholars in IU could be different on Turkish scholars in each different group. For example, Transfer scholars, who were already teaching in Darülfünun, could have less motivation for networking. They therefore might have interacted with German scholars less frequently than the other Turkish scholars did. Another possible reason for heterogenous effects can be that some of Post-1933 Hires had their PhD's in Europe. Doing research abroad might have helped the scholars to engage more with German scholars in IU, which could be because of having better language skills, being more familiar with frontier research, or having more common research interests with the German scholars.

To analyze German scholars' effect on different groups of Turkish scholars' publications, the following regression is estimated.

$$
\begin{aligned}
\#Publications_{ift} &= \beta_1 + \beta_2 German\ Quality_{f,t-1} \times NewHire_i \\
&+ \beta_3 German\ Quality_{f,t-1} \times Transfer_i \\
&+ \beta_4 German\ Quality_{f,t-1} \times Post1933Hire_i \\
&+ \beta_5 \#German_{f,t-1} \times NewHire_i + \beta_6 \#German_{f,t-1} \times Transfer_i \\
&+ \beta_7 \#German_{f,t-1} \times Post1933Hire_i + \beta_8\, AgeDummies_{it} \\
&+ \beta_9 YearFE_t + \beta_{10} IndividualFE_i + \epsilon_{ift}
\end{aligned}
\tag{6.1}
$$

Similar to the benchmark model, $Publications_{ift}$ is the number of Scopus publications by the Turkish scholar *i* in field *f* and in year *t,* $GermanQuality_{f,t-1}$ is the average of the Dismissed German scholars' productivity in field *f* and in year *t-1*, and $\#German_{f,t-1}$ is the number of Dismissed German scholars in field *f* and in year *t-1*. $NewHire_i$ is the dummy variable which is equal to 1 if the Turkish scholar was New Hire, and it is zero otherwise. Similarly, $Transfer_i$ and $Post1933Hire_i$ are the dummy variables indicating whether the Turkish scholar was Transfer and Post-1933 hires, respectively. The specification includes their interactions with the variables *German*

Quality and *#German*. Age dummies, year fixed effects, and individual fixed effects are added, as well. In the analysis, Turkish scholars' publication data between 1933 and 1945 is used, and if the Turkish scholar left IU, she is excluded from the analysis for the years after she left the university. The standard errors are clustered at the field level.

Table 6.6, Column 1 shows the estimates when the variables German Quality and #German are calculated as explained in the benchmark model. Similar to Table 6.2 and Table 6.3, in the Columns 1-3, the fields of the scientists are taken as their academic departments, and in the Columns 4-6, the fields of the scientists are taken as their faculties. In Columns 1 and 4, the productivity measure is the total number of Scopus articles until 1945; in Columns 2 and 5, productivity measure is average number of annual Scopus articles until 1945; and in Columns 3 and 6, it is the total number of Scopus citations that were received as of 2021 by the publications that were written until 1945.

Table 6.6: Effect of Dismissed German Scholars on the Publications of Different Turkish Scholar Groups (New Hire, Transfer, Post-1933 Hire).

	(1)	(2)	(3)	(4)	(5)	(6)
Quality measure:	Publications	Annual Publications	Citations	Publications	Annual Publications	Citations
Field:	Department	Department	Department	Faculty	Faculty	Faculty
German Quality x New Hire	0.000429	0.0228	0.0000152**	0.0000477	0.0255*	-0.0000260**
	(0.000317)	(0.0153)	(0.00000627)	(0.000609)	(0.0103)	(0.00000461)
German Quality x Transfer	-0.00156**	-0.0539*	-0.000021	-0.00112	-0.0331	0.0000945
	(0.000672)	(0.0307)	(0.00002)	(0.00142)	(0.0543)	(0.0000997)
German Quality x Post-1933 Hire	-0.000103	0.00406	-0.0000111	-0.000634	0.0247	-0.0000320
	(0.000513)	(0.0114)	(0.00000963)	(0.00247)	(0.0701)	(0.0000714)
#German x New Hire	0.00208***	0.00209***	0.00191***	0.00130**	0.00154**	0.00126*
	(0.000367)	(0.000356)	(0.000364)	(0.000405)	(0.000353)	(0.000398)
#German x Transfer	0.00249***	0.00260***	0.00225***	0.00254***	0.00265***	0.00256***
	(0.000388)	(0.000459)	(0.000379)	(0.000287)	(0.000296)	(0.000387)
#German x Post-1933 Hire	0.00179**	0.00186**	0.00170**	0.000568	0.000836**	0.000659
	(0.000737)	(0.000701)	(0.000705)	(0.000344)	(0.000181)	(0.000633)
Age Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0244	0.0248	0.0240	0.0236	0.0238	0.0236
Observations	2580	2580	2580	2580	2580	2580

Dependent variable, $Publications_{ift}$, is the number of Scopus articles for the Turkish scientist i, in the field f, and in year t.
German Quality in columns 1 and 4 refer to the average number of total Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1. German Quality in columns 2 and 5 refer to the average number of annual Scopus articles (until 1945) by a Dismissed German scientist in field f and in year t – 1. German Quality in columns 3 and 6 refer to the average number of citations received by the Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1.
#Germans is the number of Dismissed German scientists in IU, in the field f and in year t − 1.
In the Columns 1-3, fields of the scientists are taken as their departments in IU, and in the Columns 4-6, fields of the scientists are taken as their faculties in IU.
In the regressions publication data between 1933 and 1945 are used.
In all regressions standard errors are clustered at the field level.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

According to Table 6.6, German Quality seems to have a negative effect on the publications of Transfer scholars (Columns 1 and 2), but a positive effect on the publications of New Hires (Columns 3 and 5). In all regressions the number of Dismissed

German scholars increases the productivity of Transfer scholars the most, compared to the other Turkish scholar groups.

Table 6.7 shows the total effect of German scholars on the publications of different Turkish scholar groups. These total effects are calculated by using the parameter estimates from the regressions in Table 6.4 and the average value of German Quality and #German from 1937. The numbers in parentheses show the p-values of the joint significance of both variables (i.e., interactions of the Turkish scholar group dummy with German Quality and #German). The total effects are calculated according to the values of the dependent variables in 1937, which is the year IU hosted the maximum number of German scholars. In 1937, the average number of Dismissed German scholars was 3.48 per department and, it was 18.25 per faculty. The values of the variable German Quality for Columns 1-6 were 5.16, 0.19, 40.46, 7.48, 0.28, and 36.11, respectively. Lastly, during the analyzed period, the average number of annual Scopus Publications for New Hires was 0.02; while for Transfers and Post-1933 Hires it was 0.01.

Table 6.7: Total Effect of Dismissed German Scholars on the Publications of Different Turkish Scholar Groups (New Hire, Transfer, Post-1933 Hire).

	(1)	(2)	(3)	(4)	(5)	(6)
Quality measure:	Publications	Annual Publications	Citations	Publications	Annual Publications	Citations
Field:	Department	Department	Department	Faculty	Faculty	Faculty
New Hire	47.26%	58.03%	36.31%	116.84%	176.23%	110.28%
	(0.0000)	(0.00001)	(0.0001)	(0.1036)	(0.0192)	(0.0032)
Transfer	6.16%	-11.93 %	69.80%	379.77%	390.95%	501.32%
	(0.0000)	(0.00001)	(0.00001)	(0.0067)	(0.0062)	(0.0161)
Post-1933 Hire	56.98%	72.44%	54.67%	56.24%	221.73%	108.71%
	(0.0168)	(0.0181)	(0.00001)	(0.1373)	(0.0362)	(0.2274)

Table shows the estimates of the total effect of German Quality and # German on the annual Scopus publications of a Turkish scholar i, in field f (for the different Turkish groups in New Hire, Transfer and Post-1933 Hire), and in the year when IU hosted the maximum number of Dismissed German scholars (1937). Numbers inside the parentheses show the p-values of the joint test for the interactions of German Quality and # German with the respective Turkish scholar group dummy (i.e., $NewHire_i$, $Transfer_i$, or $Post{-}1933Hire_i$). German Quality in Columns 1 and 4 refers to the average number of total Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t−1. German Quality in Columns 2 and 5 refers to the average number of annual Scopus articles (until 1945) by a Dismissed German scientist in field f and in year t−1.German Quality in Columns 3 and 6 refers to the average number of citations received by the Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t − 1.

#Germans is the number of Dismissed German scientists in IU, in the field f and in year t − 1.

In Columns 1-3, fields of the scientists are taken as their departments in IU, and in Columns 4-6, fields of the scientists are taken as their faculties in IU.

In 1937, the average number of Dismissed German Scholars per department was 3.48, and per faculty it was 18.25.

Columns 1 and 2 indicate that German scholars increased the productivity of Post-1933 Hires the most, followed by New Hires and Transfers. These findings might be due to the aforementioned reasons (i.e., Transfers being less motivated for networking, Post-1933 Hires having better language skills, etc.). However, at the faculty level (Columns 4-6), German scholars increased the productivity of the Transfers the most. If New Hires and Post-1933 Hires were academically more specialized, due to coming from more modern academic backgrounds, then it might be that they were not affected by German scholars in their faculties as much as Transfers were affected.

Chapter 7:
CONCLUSION

In this thesis, the peer effects of the German scientists escaping from Nazi Germany on the Turkish scientists' productivity in Istanbul University were examined for the years between 1933 and 1945. Since the arrival of the German scientists to IU was due to safety concerns, and their departure was related to financial reasons, their stay in IU was assumed as exogenous to the productivity of Turkish scholars. The main estimates indicate that, holding the quality of German scholars constant, the number of German scholars in a department increased the yearly publications of a Turkish scientist in that department by 73% in the year when the department hosted the maximum number of German scholars. On the other hand, the quality of the German scholars does not have a statistically significant effect on the yearly publications of the Turkish scholars. The findings are robust to using different quality measures of the German scholars, different periods of analysis, and different scopes of the scientists' fields.

It is estimated that the German scholars in a department increased the productivity of the Turkish scientists who were hired by IU after 1933 the most; and the productivity of Turkish scientists who were transferred from Darülfünun the least. Most of the Turkish scientists who were hired after the foundation of IU had obtained their higher-level education degrees from abroad, thus they were probably more familiar with the research by international scientists, and had better language skills, which could lead them to benefit more from the interactions with German scholars. On the other hand, it is found that the German scholars in a faculty, rather than a department, increased the productivity of

Turkish scientists who transferred from Darülfünun the most, which might be explained by these scientists being less specialized compared to their colleagues.

To sum up, the findings of the thesis suggest that international and more productive scientists can play an important role in increasing the productivity of the local scientists in the context of a developing country's academia. The findings also point that if the local scientists are familiar with the international research and have better language skills they might benefit more from the interactions with international scientists, compared to their colleagues who are less familiar with international research in their fields. Thus, a policy implication of these findings would be that, hiring international faculty members can be an effective strategy for the improvement of the local scientists' productivity, especially if the incumbent scientists have some level of familiarity with the international research.

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Appendix

Table 1A: Main Results -Coefficients of Dummy Variables.

	(1)	(2)	(3)	(4)	(5)
German Quality	0.0001	0.0002	0.0003	0.0003	0.0001
	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0003)
#Germans	0.0013***	0.0012***	0.001***	0.00225***	0.0021***
	(0.0002)	(0.0002)	(0.0001)	(0.0003)	(0.0004)
Age Dummies	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Field FE	No	No	No	Yes	No
Individual FE	No	No	No	No	Yes
5-Year Age Dummies (base =36-40)					
21-25		-0.00589	-0.00740**	-0.00812**	-0.0637**
		(0.00438)	(0.00321)	(0.00397)	(0.0277)
26-30		-0.000454	-0.000874	-0.000908	-0.0386**
		(0.00526)	(0.00442)	(0.00428)	(0.0166)
31-35		0.000538	0.00128	0.00141	-0.0167**
		(0.00412)	(0.00388)	(0.00362)	(0.00678)
41-45		-0.00470	-0.00292	-0.00314	0.0170
		(0.00396)	(0.00432)	(0.00497)	(0.0162)
46-50		0.0438*	0.0444*	0.0442*	0.0969*
		(0.0240)	(0.0232)	(0.0239)	(0.0487)
51-55		-0.00252	-0.00202	-0.000663	0.0735*
		(0.00485)	(0.00505)	(0.00554)	(0.0400)
56-60		-0.00275	-0.00181	-0.000345	0.100*
		(0.00453)	(0.00511)	(0.00524)	(0.0522)
61-65		-0.0190*	-0.0187**	-0.0175**	0.102**
		(0.00782)	(0.00765)	(0.00850)	(0.0558)
66-70		-0.0173**	-0.0128**	-0.0109*	0.132*
		(0.00730)	(0.00637)	(0.00635)	(0.0700)
Year Dummies (base = 1938)					
1933			-0.00362	0.0165	0.0411*
			(0.00378)	(0.0114)	(0.0220)
1934			-0.0114*	-0.00184	0.0114
			(0.00616)	(0.00246)	(0.00879)
1935			-0.00142	0.00167	0.0118
			(0.00108)	(0.00211)	(0.00796)
1936			-0.00436*	-0.00281	0.00295
			(0.00260)	(0.00219)	(0.00259)
1937			0.0187	0.0198	0.0221
			(0.0128)	(0.0130)	(0.0147)
1939			0.00372	0.00387*	-0.00171

			(0.00234)	(0.00226)	(0.00140)
1940			0.0174	0.0191	0.00763
			(0.0140)	(0.0133)	(0.0162)
1941			-0.00179	0.00324	-0.0153
			(0.00788)	(0.00626)	(0.0132)
1942			0.00607**	0.0111**	-0.0102
			(0.00296)	(0.00544)	(0.00617)
1943			-0.00245	0.00283	-0.0217*
			(0.00306)	(0.00177)	(0.0125)
1944			-0.00893	-0.00266	-0.0313*
			(0.00752)	(0.00497)	(0.0177)
1945			0.00937	0.0165**	-0.0154
			(0.00745)	(0.00825)	(0.0157)
Constant	0.000508	-0.00147	-0.00390	-0.00835*	-0.0126**
*R*2	0.0046	0.0156	0.0204	0.0208	0.0239
Observations	2580	2580	2580	2580	2580

Dependent variable, $Publications_{ift}$, is the number of Scopus articles for the Turkish scientist i, in the field f, and in year t.
German Quality refers to the average number of Scopus articles (published until 1945) by a Dismissed German scientist in field f and in year t. #Germans is the number of Dismissed German scientists in IU, in the field f and in year t.
In the regressions publication data between 1933 and 1945 are used.
In all regressions standard errors are clustered at the field level.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$