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ABSTRACT

Persecution and Escape: Professional Networks and High-Skilled Emigration from Nazi Germany*

We study the role of professional networks in facilitating the escape of persecuted academics from Nazi Germany. From 1933, the Nazi regime started to dismiss academics of Jewish origin from their positions. The timing of dismissals created individual-level exogenous variation in the timing of emigration from Nazi Germany, allowing us to estimate the causal effect of networks for emigration decisions. Academics with ties to more colleagues who had emigrated in 1933 or 1934 (early émigrés) were more likely to emigrate. The early émigrés functioned as "bridging nodes" that helped other academics cross over to their destination. Furthermore, we provide some of the first empirical evidence of decay in social ties over time. The strength of ties also decays across space, even within cities. Finally, for high-skilled migrants, professional networks are more important than community networks.

JEL Classification: I20, I23, I28, J15, J24, N34, N44

Keywords: Nazi Germany, professional networks, Antisemitism

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1 Introduction

Academics of Jewish origin in Weimar Germany were some of the greatest scientific luminaries of the first half of the 20th century. Nobel Laureates such as Albert Einstein, James Franck, and Max Born shaped modern physics. Fritz Haber, Otto Warburg, and George de Hevesy made some of the most important chemical discoveries of the time. Indeed, the list of prominent academics of Jewish origin cut across fields and included mathematicians such as John von Neumann and Emmy Noether, social scientists and philosophers such as Hannah Arendt and Theodor Adorno and the art historian Erwin Panofsky. In many fields, German universities, especially Berlin and Göttingen, were considered among the world's best.[1]

However, this flourishing academic culture came to a sudden halt in 1933 with the Nazi party coming to power. Jewish academics were targeted with demonstrations, class boycotts and disruption, as well as sporadic violence. This culminated in the Nazi government's initiation of mass dismissal of Jewish academics and political opponents from their positions. By 1939, around 20 percent of *all* German academics had lost their position (e.g. Hartshorne 1937, Grüttner and Kinas 2007).[2] The increasing persecution in Nazi Germany and the threat of deportation to camps, meant that academics of Jewish origin scrambled to escape through emigration.[3] For those who did not emigrate, persecution dramatically increased over time and culminated in the systematic deportations of Jews to death camps, that started in October 1941. At this point, Jews were no longer allowed to emigrate.[4]

Historical and biographic accounts suggest that academic networks may have played a crucial role for emigration. This is illustrated by the example of Richard Courant, a world-leading mathematician at the University of Göttingen. After the Nazis gained power, he was placed on leave. In a letter to his colleague and Nobel Laureate James Franck he wrote "[w]hat hurts me particularly is that the renewed wave of anti-semitism is ... directed indiscriminately against every person

[1] Academics of Jewish origin in German universities did not just include German Jews but also the Hungarian Nobel Laureates Eugene Wigner and George de Hevesy, the Swiss Nobel Laureate Felix Bloch, or the musicologist and inventor of twelve-tone music Arnold Schönberg from Austria.

[2] It is important to note that dismissal did not imply emigration. Throughout the 1930s, there were no formal restrictions to emigrate from Nazi Germany. However, if emigration had taken place or was deemed imminent, the Nazis used the so-called "Reich Flight Tax" to confiscate Jewish citizens' assets.

[3] In the following years, they were joined by academics of Jewish origin from other European countries, e.g. the physics Nobel Laureate Emilio Segrè or the economics Nobel Laureate Franco Modigliani who escaped from Fascist Italy. Historical research describes this period as follows: "émigrés from Central Europe of the Nazi period included a larger number and ratio of highly educated, trained, or creative persons than any other 20th century displaced population groups" (Röder and Strauss 1992, p. XII).

[4] In February 1940, German Jews from Stettin (now Szczecin in Poland) were deported to occupied Poland. In October 1940, 7,000 Jews from southern Germany were deported to labor camps in southern France (Kwiet 1988, pp. 634). Some Jews who had been deported to labor camps were still permitted to emigrate. A tragic case is the Jewish economics professor Robert Liefmann from the University of Freiburg. He was deported to the Camp de Gurs labor camp in southern France and died due to ill health. Tragically, he was just about to emigrate to the United States, to accept a position at New York University (Wiehn et al. 1995, pp. 72).

of Jewish ancestry, no matter how truly German he may feel within himself, no matter how he and his family have bled during the [First World] war and how much he himself has contributed to the general community" (Reid 1996, p. 140). Courant left Göttingen in 1933 and spent a year at the University of Cambridge before moving to New York University (NYU) where he was invited to build up the Department of Mathematics, which later became the *Courant Institute*. "In spite of Courant's own troubles [to secure a permanent position]...he continued to be the person other professors who had been placed on leave turned to for help...Letters asking for help and advice came "by the dozens" from mathematicians in Germany." (Reid 1996, pp. 159). Obtaining an academic position abroad was particularly challenging because of the widespread antisemitism and the shortage of job opportunities in a world still recovering from the Great Depression (Leff 2019). Figure 1 illustrates Courant's role as a "bridge" between the German and Anglo-Saxon academic networks. For example, he secured a temporary position at the University of Cambridge for Fritz John. In his letter of support, Courant recommended him "in the strongest possible way" and argued that John combined "extraordinary gifts of the receptive kind with real originality and tenacity" (Shields 2015, p. 54). After Courant had moved to the United States, he helped to secure a permanent appointment for John at the University of Kentucky and later brought him to NYU. Courant was also instrumental in helping others from his professional network (see Figure 1).[5]

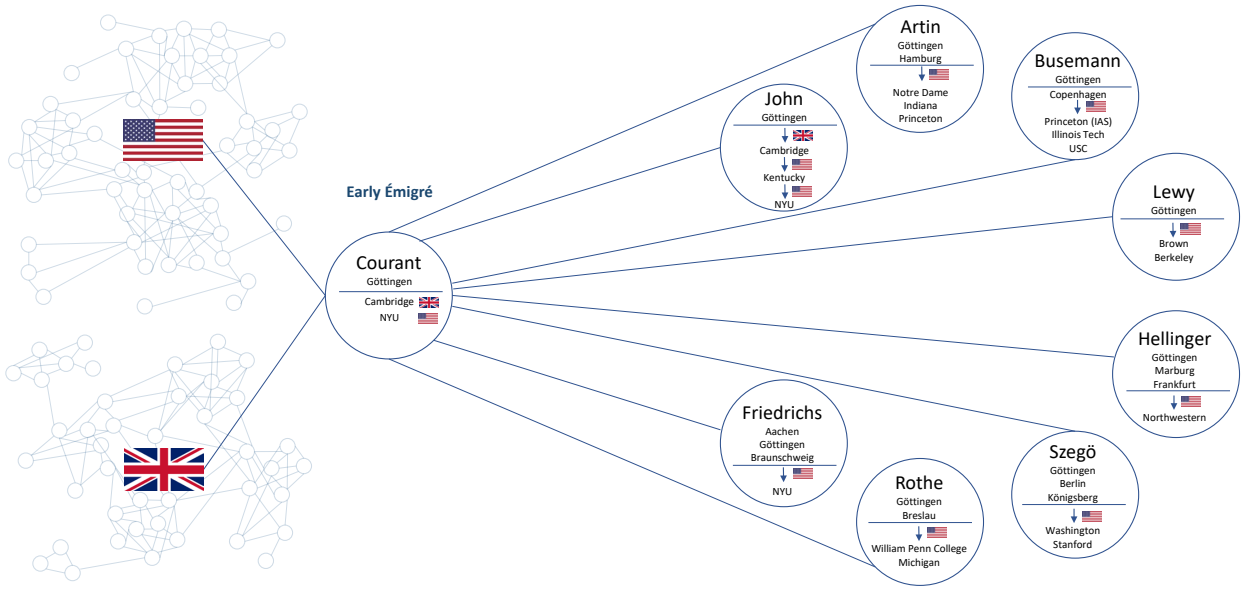
It is in this context that we ask whether professional networks played a role in helping German Jewish academics escape through emigration. Furthermore, what aspects of a network's social capital made it especially effective in facilitating emigration? In addressing these questions, we throw light on the distinctive role of professional academic networks, as opposed to community networks, to help facilitate *high-skilled* emigration. In doing so, we examine the role of the strength of social ties and their "decay" over time and geographic space. We also analyze the degree of substitutability of social ties for reputation, and we highlight the critical importance of "bridging nodes" for high-skilled individuals (Jackson 2019).

The experience of Jewish academics in Nazi Germany allows us to examine these questions. In response to persecution, some Jewish academics emigrated from Nazi Germany as early as 1933 or 1934 (early émigrés). Many became vital connectors and conduits of information who acted as a bridge between the German Jewish academic network and the network in their new host country, just like Richard Courant in the example above. Our main results estimate how emigration was affected by each academic's ties to early émigrés who served as bridging nodes. Estimating the

[5]Courant also served as a key contact for foreign organizations who assisted the persecuted German academics. For instance, the *American Emergency Committee in Aid of Displaced Foreign Scholars* and the *British Academic Assistance Council* received input from Courant about German mathematicians who needed financial assistance. Often distressed Jewish academics sought his help in obtaining positions in the United States – even if they had only briefly overlapped with him many years ago at Göttingen. In some instances, however, he was unable to help. Felix Hausdorff, one of the founders of topology, for example, asked Courant for a research fellowship to be able to emigrate into the USA, but Courant could not find one. In 1942, faced with deportation orders, Felix Hausdorff committed suicide (see Bergmann 2012 for a moving account).

effect of early émigrés on the probability of emigration faces two challenges, shared by all research on the role of networks on emigration. First, it is challenging to measure professional academic networks, and in particular to identify individuals that acted as "bridging nodes." Second, networks may be endogenous because a) academics may endogenously form ties to facilitate emigration and b) network measures may be correlated with omitted variables, such as individual reputation, that enable emigration.

Figure 1: Richard Courant's Involvement in Securing Faculty Positions



Notes: The mathematicians listed in the Figure depict professional ties for which we found explicit documentary proof (e.g. letters, testimonials etc.) of Courant's role in faciliating their emigration. Courant's involvement is represented by the small blue arrows in the Figure. Note: Friedrichs and Artin were not of Jewish origin but were persecuted because they had a Jewish wife. Table 1 reports detailed information of how Courant helped the mathematicians in his network.

In order to tackle these challenges, we hand-collect rich biographical data from numerous primary and secondary sources for the *universe* of academics in Germany with a Jewish heritage. The data encompass the academics' entire career, the number of ties to early émigrés, deportation records, and complete migration histories. Furthermore, we exploit exogenous variation, created by the *Law for the Restoration of the Professional Civil Service* which was passed on April 7, 1933. This law was used to dismiss Jewish academics from their positions.[6] Crucially for our identification strategy, the Law made a few important exemptions from immediate dismissal for Jews. Jews

[6]Most Jewish academics were dismissed under the clause in the infamous paragraph 3: "Civil servants who are not of Aryan descent are to be placed in retirement." All individuals with at least one Jewish grandparent were considered "non-Aryan." For the remainder of the paper, we use the term "Jewish academics" for all those with at least one Jewish grandparent.

could retain their positions if they had a) fought at the front in the First World War (WWI), or b) if they had lost a father or son in the war, or c) had been a civil servant since 1914. These exemptions initially allowed some Jewish academics to remain in their positions. After the Nuremberg racial laws in September 1935, the exemptions were revoked and the remaining Jewish academics had to leave their positions. The differential timing of dismissals created quasi-exogenous variation that pushed some individuals to emigrate early.

Our main results estimate how emigration was affected by the number of ties to early émigrés who served as bridging nodes. To address the endogeneity of network ties, we use the number of ties to *early dismissals* as an instrumental variable for the number of ties to *early émigrés*. To avoid contamination through endogenous network formation, we measure ties to early émigrés formed in the five year period before the Nazi party seized power.[7] Until that point, Jewish academics did not anticipate migration and the vast majority of them would have planned to end their career in Germany.

Our first set of results shows that networks with more ties to "bridging nodes" facilitated emigration. In particular, academics with 10 additional ties to early émigrés (emigrated by January 1, 1935), had a 5 percentage points higher probability to emigrate by 1939, an effect that persisted until 1945.[8] When we use the number of ties to academics dismissed early as an instrumental variable for the number of ties to early émigrés we estimate a very similar effect.

Crucially, in all regressions we control for variables that may affect emigration and at the same time be correlated with ties to early émigrés. These include not only standard individual-level characteristics, such as age, gender, marital status, the number of children, but also characteristics such as academic rank, foreign languages spoken, pre-1933 employment outside Germany, and whether the academic was born outside Germany. Moreover, we control for the employment history of each academic in the five years before January 1, 1933, thereby controlling for department-specific effects. This may be important if the probability of escape through emigration was higher for academics from better departments (for example, mathematicians from Göttingen or physicists from Berlin). We also show that the results are robust to controlling for each individual's academic reputation.

In our second set of results, we analyze characteristics of social ties that make them more or less effective in facilitating emigration. We provide some of the first systematic evidence that the strength of social ties "decays" over time. For these results, we split ties to early émigrés into two groups: ties to recent colleagues (overlap included the years 1932 and 1933) and ties to less recent

[7]Measuring ties over a five-year period has two main advantages. First, we can carefully control for department level effects that may affect the probability of emigration. Identification therefore comes from changes in pre-1933 networks caused by academic turnover. Second, measuring ties over five years allows us to estimate whether the effect of ties "decays" with how recently academics were colleagues before 1933. Results are robust to measuring networks over a ten-year period.

[8]The mean and standard deviation of the number of early émigrés in an academic's network are 11.15 and 14.02, respectively.

colleagues (overlap between 1929 and 1931, but not in 1932 and 1933). Academics with ten more ties to recent colleagues were 8 percentage points more likely to emigrate. In contrast, academics with ten more ties to less recent colleagues were only 5 percentage points more likely to emigrate. These results suggest that ongoing ties are more effective than past ties. The results also speak to the literature on strong versus weak ties going back to the seminal work of Granovetter (1973a) as well as the literature on the decline of social capital (Putnam 2000). While it is intuitive that the strength of ties changes over time, we are not aware of other research in economics that shows that, *over time*, strong ties decay and become weak. Most of the literature in economics classifies ties as either strong or weak.[9]

Furthermore, we analyze whether geographical proximity affects the strength of social ties. In particular, we differentiate between ties to early émigrés from the same subject in a) the same department versus b) other departments in the same city. For example, a physicist from the University of Berlin may have stronger ties to early émigré physicists from the University of Berlin compared to ties to early émigrés from the Technical University of Berlin. Academics with ten more ties to early émigrés from the same department were 6 percentage points more likely to emigrate. In comparison, academics with ten more ties to early émigrés from the same subject who had been employed by another institution in the same city were 5 percentage points more likely to emigrate. These results suggest that the strength of ties in professional networks also decays across space, even within cities.

We also show that ties to early émigrés were more important in humanities and social sciences than in natural sciences and medicine. These effects could arise from two sources: first, German academics in the natural sciences were widely recognized as world-leading. A reputation for excellence in these fields may have made individual professional networks less important for those in the natural sciences. Second, compounding this effect, fewer language and other barriers may have made it easier to assess the suitability of academics from those fields.

In our third set of results, we show that the effect of the professional network was directional. In particular, early émigrés functioned as a bridge that helped academics cross over into the same destination. In the process, these academics were diverted away from other destinations. Specifically, early émigrés to the United States or the United Kingdom *increased* the probability to emigrate to these countries. In contrast, they *decreased* emigration to other countries. Similarly, early émigrés to other countries *increased* emigration to other countries, but *decreased* the probability to emigrate to the United States or the United Kingdom. This result underscores the notion of bridging nodes in facilitating migration to specific destinations.

In the fourth set of results, we throw light on the relative role of professional versus community networks for emigration decisions. We show that professional networks had a much larger effect

[9]While not modeling the decay of social ties over time, theoretical models have incorporated aspects of decay in a network *formation* context depending on the distance in the network (e.g. Jackson and Watts 2002, Jackson and Rogers 2005, Hojman and Szeidl 2008, and Galeotti and Goyal 2010).

for emigration decisions for *high-skilled* individuals. In fact, for academics, community networks did not affect emigration decisions at all.

Our findings contribute to the literature on networks in economics.[10] More specifically, we contribute to the empirical literature on networks in the migration context. Existing papers in this literature usually study aggregate measures of family and community networks for low-skilled migrants. In a seminal paper, Munshi (2003) shows that community networks facilitate migration to the United States (see also Winters et al. 2001, McKenzie and Rapoport 2007, McKenzie and Rapoport 2010, and Mahajan and Yang 2020). Studying internal migration, Blumenstock et al. (2019) show that networks that provide social support are more important than networks that provide information in Rwanda.[11] More specific to our context, Buggle et al. (2020) measure community networks of German Jews using individuals born in the same city, but living in a different city by 1933. They show that emigration of network members and Nazi violence against members of their network increased emigration probabilities of German Jews. Spitzer (2018) shows that existing Jewish community networks in the United States facilitated emigration of Russian Jews after the 1903-1906 pogroms. In contrast to these papers, we study the role of *professional* networks for migration decisions of high-skilled individuals. Our results indicate that the understanding of migration and networks for *highly* skilled emigrants would be seriously incomplete, if one restricted the analysis to community networks and neglected the role of professional networks. Our study also contributes to the empirical literature on estimating the effect of networks by a) measuring *individual-level* ties, as opposed to community-level aggregates, and b) by using *individual-level* exogenous variation in the emigration decision of each academic in the network to estimate the causal effect of networks for migration decisions.[12]

Furthermore, our research design helps us to emphasize two aspects of professional networks that have not been empirically studied in the economics literature. First, we identify bridging nodes and measure *individual-level* ties to such nodes for each academic in our data. Our results indicate that bridging nodes have a central importance for migration decisions.[13] Second, this is one of the first papers to estimate the "decay" of social ties in the economics literature.[14] It is striking that the effectiveness of professional networks decayed so much in the context of severe persecution (with life and livelihood being threatened).

[10] See Jackson (2010), Jackson et al. (2017), and Goyal (2012) for classic treatments and surveys.

[11] Giulietti et al. (2018) study the role of strong and weak ties in facilitating internal migration in China.

[12] The vast majority of research on migration in economics has highlighted the role of communities of co-nationals as key attractors for subsequent migrants. One key strength of our paper lies in the fact that we can measure actual individual-level ties to such attractors. Most existing research lacks data to measure such ties. An important exception is Blumenstock et al. (2019) who use mobile phone records to measure ties in Rwanda.

[13] Empirical research on bridging social capital has been relatively sparse because it is "the most difficult measure of social capital to calculate in a network" (Jackson 2019). The concept of bridging social capital is related to the concept of individuals filling "structural holes" between networks (Burt 1992).

[14] The decay of social ties has attracted more attention in the sociology literature (Putnam 2000, Burt 2000, Burt 2001).

While not studying the role of networks, Blum and Rei (2018) show that European Jews who escaped the Holocaust through the port of Lisbon were positively selected. A number of recent papers study the effects of persecution on migration in other contexts (e.g. Bauer et al. 2013, Becker et al. 2020, and Sarvimäki et al. 2020 on forced migration in the context of WWII; see Becker and Ferrara 2019 for an extensive survey on forced migration).

Our findings also speak to the growing literature on the effects of high-skilled migrants for science and innovation in the host economy (e.g. Hunt and Gauthier-Loiselle 2010, Kerr and Lincoln 2010, Borjas and Doran 2012, Moser et al. 2014, Kerr et al. 2015; Beerli et al. 2021). While not focusing on high-skilled migrants or the effect of networks, the era of mass migration to the United States has been the focus of a number of recent papers (e.g. Abramitzky et al. 2012, Abramitzky et al. 2014, Sequeira et al. 2020, Tabellini 2020, Fouka et al. 2020, and Arkolakis et al. 2019).

Finally, our work is related to, but distinct from, recent research on the consequences of losing high-skilled Jews in *origin* countries (for example, Akbulut-Yuksel and Yuksel 2015, Liebert and Mäder 2018, Waldinger 2010, Waldinger 2012, Huber et al. 2021, on Nazi Germany and Acemoglu et al. 2011, Grosfeld et al. 2013 on Russia) or gaining them in the *destination* (Moser et al. 2014). Compared to this earlier work, we innovate in four important ways: 1) we focus on the dismissed Jewish academics *themselves* and not on their peers in their former home country or in the destination, 2) we study the role of professional networks in facilitating emigration, 3) we develop a novel identification strategy that exploits differences in the timing of dismissals, and 4) we expand the focus to all academic fields and not just the pure sciences.

2 Research Design and Data

2.1 The Dismissal of Jewish Academics

The National Socialist Party (NSDAP) seized power on January 30, 1933. Just over two months later, on April 7, 1933, the Nazi government passed the *Law for the Restoration of the Professional Civil Service* which had a dramatic effect on the life of Jewish academics in Germany. Despite its misleading name, the law was used to expel the first wave of individuals of Jewish origin from all civil service positions. For the remainder of the paper we refer to academics with at least one Jewish grandparent as "Jewish academics," even if they were baptized Christians. In later years, remaining Jewish academics were dismissed so that by 1939 virtually all Jewish academics had lost their position. Many considered emigration to flee from Nazi persecution and to try and find a university position abroad.

Roster of All Dismissed Jewish Academics

We construct a roster of all dismissed Jewish academics across all academic disciplines from a large number of primary and secondary sources. One of the main sources is the *List of Displaced*

German Scholars (LDS) which was published in 1936 and updated in 1937. We focus on the 1,129 Jewish academics who held an academic position in Germany at the beginning of 1933.[15] For various reasons, some dismissed academics did not appear on the LDS. For instance, if they had died before the LDS was compiled in 1936, they had been too old when the list was compiled, they were forgotten by the editors, and so on. To obtain a complete picture of all dismissals of individuals of Jewish origin, we augment and cross-check the roster with additional data from 60 university-specific studies and 16 subject-specific studies on the expulsion of Jewish academics from Nazi Germany (see appendix B.2.1 for details). We identify 241 additional academics of Jewish origin who were dismissed from German universities but not listed on the LDS. Combining the information from all sources we obtain a roster of 1,370 dismissed Jewish academics.

Collect Biographical Information to Measure Professional Networks, Emigration, and Dismissal Status

We reconstruct each individual biography covering each year of the academics' career until their death. For this reconstruction, we rely on extensive archival and digital searches. The main sources are the *List of Displaced German Scholars*, the 60 university-specific studies, the 16 subject-specific studies, biographical archives, which are listed in the World Biographical Information System (WBIS) (e.g. Kürschners Deutscher Gelehrten-Kalender, Juden in Preußen, British Biographical Archive, Polskie Archiwum Biograficzne, Archivo Biográfico de España, Portugal e Iberoamérica, and the Indian Biographical Archive), shipping lists, naturalization records, newspaper articles, obituaries, death records, patent documents, and academic publications (see appendix section B.2 for details).

Despite the fact that some of the academics are hard to trace, we manage to obtain almost complete biographical records for each of them. An example of the data collection effort is the record for Alfred Sklower, a marine biologist who was dismissed from the University of Königsberg. His entry in the *List of Displaced Scholars* revealed an industrial activity in Palestine, starting in 1935 but not providing any further detail (see appendix Figure A.1). Individuals in the private sector tend to be harder to trace than those staying in academia. We therefore conduct an extensive web search to reconstruct Sklower's fate after 1935. The *Palestine Gazette* of August 6, 1936 revealed that Sklower was elected chairman of the *Palestine Fishing Company* in Haifa. For 1939, we find a publication in the *ICES Journal of Marine Science* confirming his continued presence in Haifa. In a surprising reorientation of his career, the *Palestine Gazette* of June 8, 1944 reported that Sklower received his approbation as a medical doctor in Haifa. In 1947, the *Palestine Gazette* reported that the *Palestine Fishing Company* had been liquidated by Sklower, implying that he only kept his new

[15] Overall, the LDS lists 1,403 dismissed individuals, who had already obtained their PhD and were employed at a German university or research institute in January 1933. Of these, 274 academics were dismissed because they were married to an individual of Jewish origin, or for purely political reasons. To focus on Jewish academics, we exclude these individuals which leaves us with 1,129 academics of Jewish origin from the LDS.

job as a medical doctor. For 1951, we find a publication on fish-farming and freshwater biology published in the *Archiv für Hydrobiologie* by a certain Alfred Sklower from Lusaka, Northern Rhodesia. While this appears to be an unlikely move, the fact that the author is listed as Dr. Alfred Sklower *M.D.,* and that the paper is in his field of expertise, strongly indicates that it was the same person. The paper describes that Sklower moved to Northern Rhodesia in May 1949 and stayed until May 1950, when, given extremely difficult conditions, he left the country and provided an address in London. This allows us to find his death record in the United Kingdom, where he died in Holborn (London) in 1960.

Overall, we record on average 5.3 career stages per academic. To ensure consistency, we collect information as of January 1 for each year. Therefore, when we refer to a year we mean January 1. We keep track of multiple positions if an academic was employed by multiple institutions at the same time. For the four dates that form the core of the empirical analysis (1929-1933, 1935, 1939, and 1945), we are able to obtain exact locations for 1,327 academics, i.e. 97 percent of all 1,370 dismissed academics of Jewish origin (see Table 2).

2.2 Pre-1933 Professional Networks: Ties to Early Émigrés

As highlighted in the introduction, ties to early émigrés may have been a key factor in emigration decisions. The early émigrés acted as bridging nodes that facilitated information flows between the Jewish academics in Germany and the foreign networks (as in Jackson 2019). Early émigrés are defined as the set of academics who had emigrated by January 1st, 1935.

The detailed biographical data enable us to measure *pre-dismissal professional* networks for each academic. The networks are based on joint location between January 1, 1929 and January 1, 1933.[16] This rules out the concern that academics formed new ties that endogenously changed network structure, in *response* to persecution after 1933. In particular, we define the pre-1933 professional network as all those academics who worked in the same subject and city in the five years before the Nazis grabbed power (see Figure 2, panel a).[17]

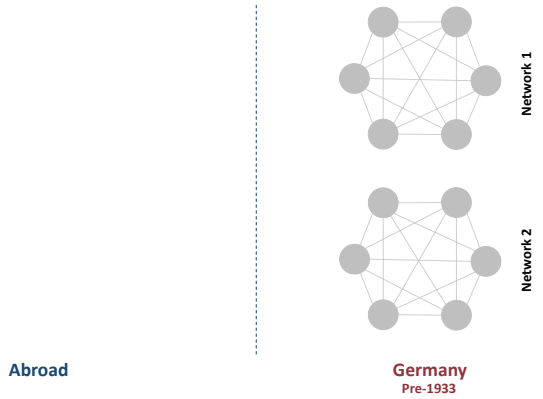
We then focus on ties to early émigrés in an academic's professional network (see Figure 2, panel b). In the schematic example, the academics in network 1 had ties to one early émigré (or to zero early émigrés for the early émigré him/herself), while the academics in network 2 had ties to three early émigrés (or to two early émigrés for the early émigrés themselves). The average academic in our sample had ties to 11.15 early émigrés who may have acted as bridging nodes (Table 2).

[16] Results are similar, and remain highly significant, if we measure networks for the ten year period between January 1, 1924 and January 1, 1933.

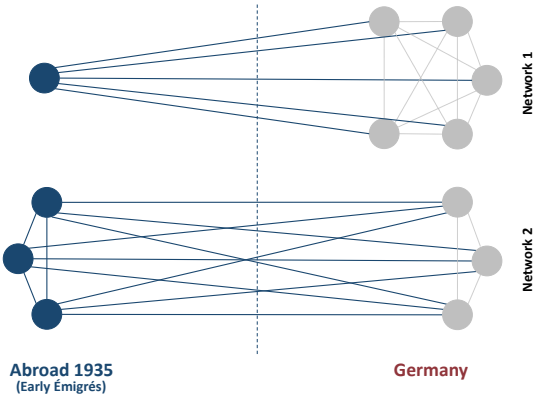
[17] In additional specifications, we differentiate the network of colleagues in the same subject and institution from the network of colleagues in the same subject and city who worked at a different institution.

Figure 2: The Role of Early Émigrés in Facilitating Emigration

(a) Network of Jewish Colleagues in Germany Pre-1933



(b) Some Colleagues Move Abroad Early (Early Émigrés)

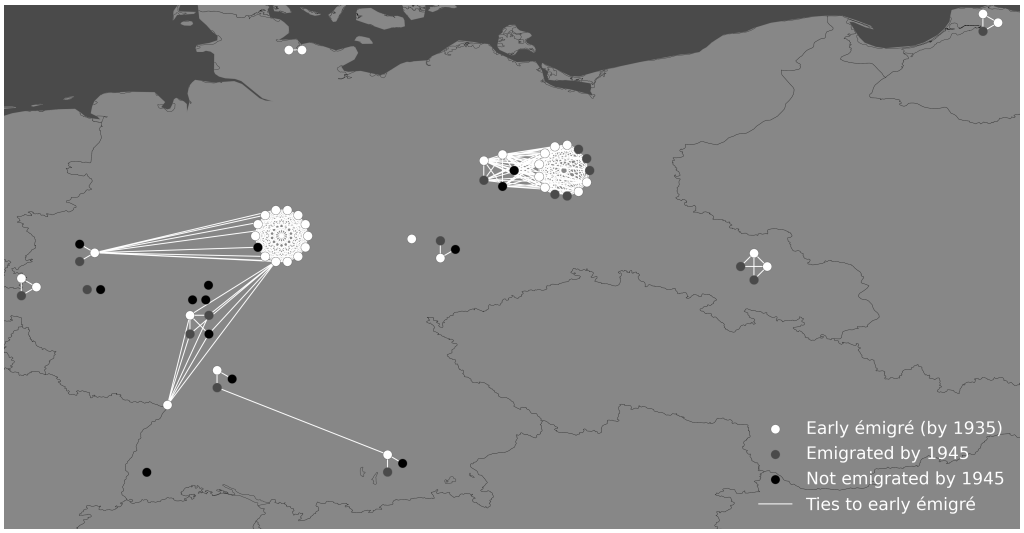


Notes: The Figure shows a schematic example of two professional networks. Panel a shows the pre-1933 networks of academics who worked in the same subject and city. Panel b shows the two networks in 1935 when early émigrés had moved abroad. The academics in network 1 had ties to one early émigré (or to zero early émigrés for the early émigré him/herself), while the academics in network 2 had ties to three early émigrés (or to two early émigrés for the early émigrés themselves).

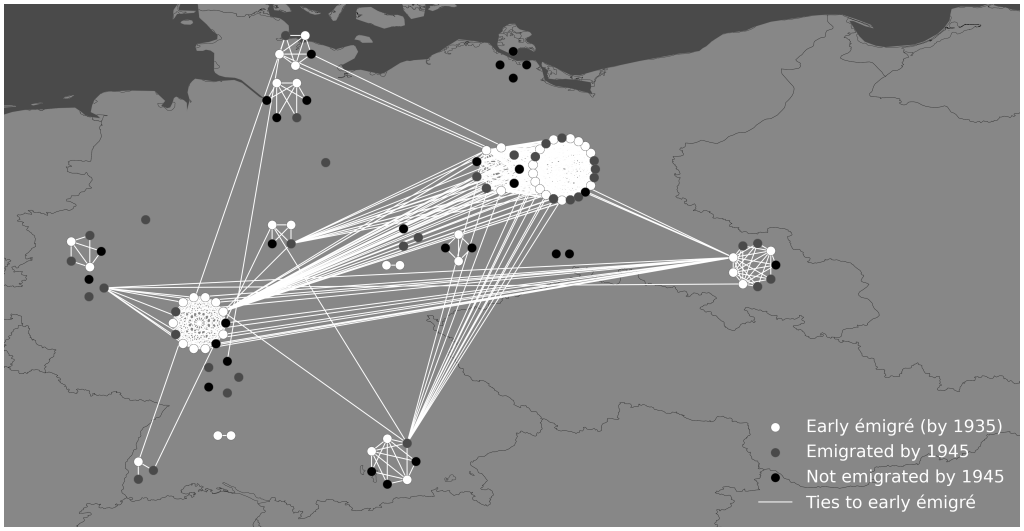
Figure 3 shows actual examples of ties to early émigrés for mathematics and law. Early émigrés are marked in white, ties to early émigrés are represented by white lines. For mathematics, the Figure shows the two important centers Göttingen and Berlin (with two universities: the University of Berlin and the Technical University of Berlin). For law, the Figure also shows a large cluster in Berlin but also other clusters in Frankfurt, Breslau and Munich. Naturally, in both disciplines there were also smaller groups of Jewish academics in many other universities. The Figure suggests that academics with many links to early émigrés were more likely to emigrate by 1935 (white dots) or by 1945 (gray dots). Most academics who did not emigrate by 1945 (black dots) either have zero, or very few, ties to early émigrés.

Figure 3: The Network of Mathematics and Law

(a) Mathematics



(b) Law



Notes: The Figure shows ties to early émigrés for mathematics (panel a) and law (panel b). The dots represent each academic's location on January 1, 1933. Early émigrés (emigrated by January 1, 1935) are marked in white. Academics who were still in Germany by January 1, 1935 but who had emigrated by January 1, 1945 are marked in gray. Academics who did not emigrate by 1945 are marked in black. Ties (formed between January 1, 1929 and January 1, 1933) to early émigrés are represented by white lines.

2.3 Colleagues Dismissed Early as Instrumental Variable for Early Émigré Colleagues

The number of ties to early émigrés is potentially endogenous. This is because ties may be correlated with omitted variables, such as individual reputation, that are also correlated with em-

igration. For example, mathematicians with ties to Richard Courant may be of higher ability or have more independent connections to foreign networks.

Early Dismissals: 1933-1934

To overcome this endogeneity concern, we exploit variation in the timing of dismissals caused by the *Law for the Restoration of the Professional Civil Service.* (see appendix B.1 for further details on the law). The law was passed on April 7, 1933 and was used to expel a large fraction of Jewish and 'politically unreliable' persons from civil service positions in Germany. As German university professors were civil servants the law directly applied to them.[18] Most Jewish academics were dismissed under the infamous paragraph 3:

> "Civil servants who are not of Aryan descent are to be placed in retirement... This does not apply to officials who had already been in the service since the 1st of August, 1914, or who had fought in the World War at the front for the German Reich or for its allies, or whose fathers or sons had been casualties in the World War." (Quoted from Hentschel 2011)

An implementation decree, published on April 11, 1933 defined "Aryan decent" as follows: "Anyone descended from non-Aryan, and in particular Jewish, parents or grandparents, is considered non-Aryan. It is sufficient that one parent or one grandparent be non-Aryan" (Hentschel 2011, p. 25). Thus, Jews who were baptized Christians were dismissed even if they had only one Jewish grandparent.

Crucially for our identification strategy, paragraph 3 made a few important exemptions from immediate dismissal for Jews. Jews could retain their position if a) they had been a civil servant since August 1, 1914, of b) if they had fought at the front in the First World War (WWI), or c) if they had lost a father or son in the war. The exemptions applied to about a third of senior Jewish academics in service when the law was enacted.[19]

[18] Via additional ordinances the law was also applied to other university academics who were not civil servants (see Reichministerium des Inneren 1933, as reprinted in Hentschel 2011, p. 47). The data on dismissed academics include all ordinary (full) professors who held a chair for a certain sub-field and were all civil servants, different types of extraordinary professors who could either be civil servants *(beamteter Extraordinarius)* or not have the status of a civil servant *(nichtbeamteter Extraordinarius*). At the lower level of university teachers were *Privatdozenten* (first university position that gave academics the right to give lectures). They did not have permanent civil servant positions. The data also include lecturers and assistant researchers who had already obtained their Ph.D. and were allowed to teach smaller classes but had not yet obtained the right to give lectures. For some purposes we distinguish between "senior academics" (everyone who was at least Privatdozent and therefore had the right to give lectures), and "junior academics," who did not have the right to give lectures. "Junior academics" were virtually all dismissed in 1933. Because they were not civil servants, their contract could be terminated without delay.

[19] Only individuals who had continuously worked as civil servants since 1914 qualified for the first exemption. Only those who had been exposed to "enemy fire" qualified for the second exemption. It was "not sufficient for someone to have stayed in the war zone during the war for official reasons without having confronted the enemy" (Reichministerium des Inneren 1933, as reprinted in Hentschel 2011, p. 47). Military doctors who had worked in field hospitals, for example, did not qualify (Kinas 2018, pp. 78). Because few Jewish professors had been in service since 1914, most of

Late Dismissals: 1935 or later

The Jewish academics who fell under the exemption clauses of paragraph 3 could remain in office until 1935. Most of them lost their position in the wake of the infamous *Reich Citizenship Law* of September 15, 1935, which formed part of the so-called *Nuremberg Laws*.[20] Some of the dismissals on the basis of the *Reich Citizenship Law* dragged into 1936 (or even later). In addition, a very small number of Jewish academics were dismissed after 1935 on the basis of two other laws targeting academic civil servants (see appendix B.1 for details).[21]

Data on Dismissal Reasons and Years

To implement the instrumental variables strategy, we collect new data on exact dismissal reasons for all academics in our sample from a large number of primary and secondary sources. E.g. the University of Freiburg provided a list of their dismissal record to the Ministry of Education and Cultural Affairs in the federal state of Baden (see appendix Figure B.1). We use this information to assign precise dismissal paragraphs. In other cases, we rely on secondary sources (e.g. the 60 university-specific studies plus the 16 subject-specific studies) plus extensive web searches to identify exact dismissal paragraphs for each academic.

Among senior academics, more than 80 percent of *early dismissals* occurred on the basis of paragraph 3 of the *Law for the Restoration of the Professional Civil Service*, followed by paragraphs 6 and 4 of the same law (appendix Figure A.4, panel b). Of the late dismissals, more than 80 percent occurred on the basis of the *Reich Citizenship Law* (appendix Figure A.4, panel c). Our newly collected data also allow us to document exact dismissal years. The majority of dismissals occurred in 1933, followed by a second wave in the wake of the *Reich Citizenship Law* in 1935 (appendix Figure A.3).

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the *exempted* academics qualified as combatants in WWI. A few Jewish academics were also dismissed on the basis of paragraphs 2, 4, or 6 of the *Law for the Restoration of the Professional Civil Service*. These paragraphs targeted members of the communist party, other political opponents, or were used when evidence under alternative paragraphs was too weak (see appendix B.1 for further details on dismissals according to these paragraphs). Among senior academics (professor, associate professor, honorary professor, and *Privatdozent*) who were dismissed early, about 82 percent were dismissed under paragraph 3. The majority of dismissals on the basis of paragraph 3 were completed by the fall of 1933. However, a small number of cases dragged on because some Jewish academics tried to provide evidence that they qualified for one of the exemptions or that they should be classified as "Aryan." We therefore use dismissal in 1933 and 1934 as early dismissals in our identification strategy.

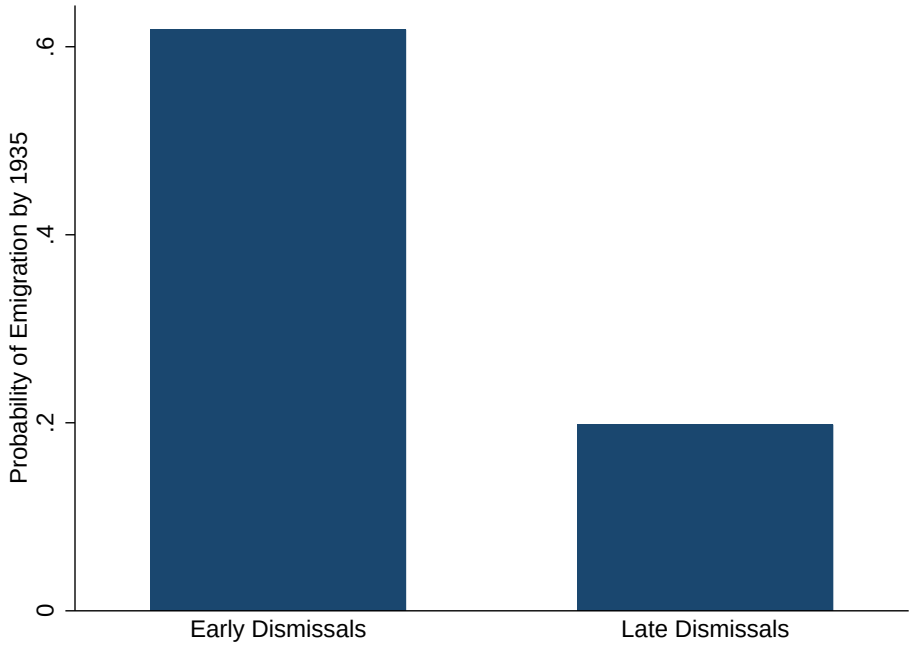
[20] According to the *Reich Citizenship Law*, all academics with at least three Jewish grandparents were dismissed. Furthermore, all academics with two Jewish grandparents, who were members of the Jewish religious community or who were married to Jews, were dismissed.

[21] Some academics who were initially exempted, resigned voluntarily either in protest of the Nazi regime or because they had already found employment abroad. E.g., the physics Nobel Laureate James Franck from Göttingen could have stayed in his position in 1933 but resigned in protest on April 17, 1933 (Hentschel 2011, pp. 26). Almost all of these academics would have been dismissed in 1935 on the basis of the *Reich Citizenship Law*. To avoid contamination of our instrumental variable, we classify such "voluntary" leavers as late dismissals.

Early Dismissal is a Good Predictor of Early Emigration

Our newly collected data indicate that academics who were dismissed early had a much higher probability of emigration by January 1, 1935. The raw gap in the probability was around 0.4 (Figure 4). When we control for detailed individual characteristics, the gap was about 0.28 (see appendix section C for details).

Figure 4: Probability of Emigration by 1935 for Early Dismissals and Late Dismissals



Notes: The Figure shows the probability of having emigrated by January 1, 1935 for academics who were dismissed early (1933 or 1934) versus late (1935 or later).

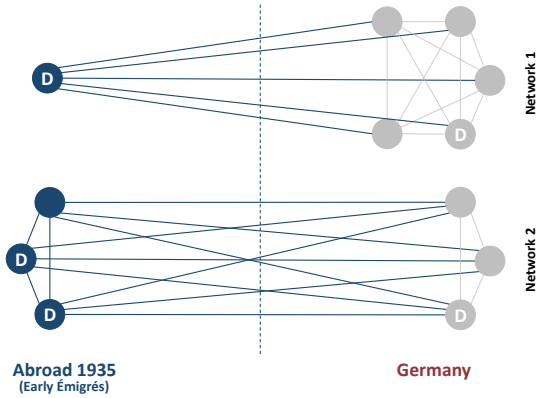
Colleagues Dismissed Early as Instrumental Variable for Early Émigré Colleagues

To instrument for the number of ties to early émigrés, we use the number of ties to colleagues who were dismissed early as an instrumental variable. As for the number of ties to early émigrés, we count the number of ties to colleagues who were dismissed early among the professional network. The network is again based on joint location between January 1, 1929 and January 1, 1933 in the same subject and city.

In the schematic example, the academics in network 1 had ties to two colleagues who were dismissed early (indicated by the letter "D", or to one colleague who was dismissed early if they were themselves dismissed early), one of which was an early émigré (Figure 5). The academics in network 2 had ties to three colleagues who were dismissed early (or to two colleagues who were dismissed early if they were themselves dismissed early), two of which were early émigrés.

The average academic in our data had ties to 16.91 academics who were dismissed early (Table 2).

Figure 5: Colleagues Dismissed Early as Instrument for Early Émigré Colleagues



Notes: The Figure shows the schematic example of two professional networks in 1935. It illustrates the instrumental variable strategy. By 1935, some academics were dismissed ("early dismissals" indicated by the letter "D") and some early émigrés had moved abroad. The example suggests that academics who were dismissed early were more likely to emigrate early. The instrumental variable strategy exploits this (first-stage) relationship and uses the number of ties to colleagues who were dismissed early as instrument for the number of ties to early émigrés.

The number of early dismissals in an academic's network should only affect emigration decisions through increasing the number of early émigrés in the network. In principle, the number of dismissals in the network could inform academics of the threat of the Nazi regime and, hence, have a direct effect on emigration decisions. However, the promulgation of the *Law for the Restoration of the Professional Civil Service* affected the entire public sector and, therefore, was common knowledge to all academics, independently of the number of dismissals in their *own* network.[22] Alternatively, the number of dismissals in the professional network could be correlated with a larger Jewish community that suddenly faced harassment which could have an independent effect on emigration decisions. To address this concern, we include detailed subject by city employment controls in the regressions reported below. We also explore independent effects of community networks in an academic's place of birth in subsection 3.5.

The subject by city employment controls also address potential alternative confounders, such as increasing administrative burdens or increases in the number of Ph.D. students that non-emigrating academics had to cope with. The number of dismissals in the professional network may also affect emigration through severing ties with colleagues who were coauthors. We address this concern

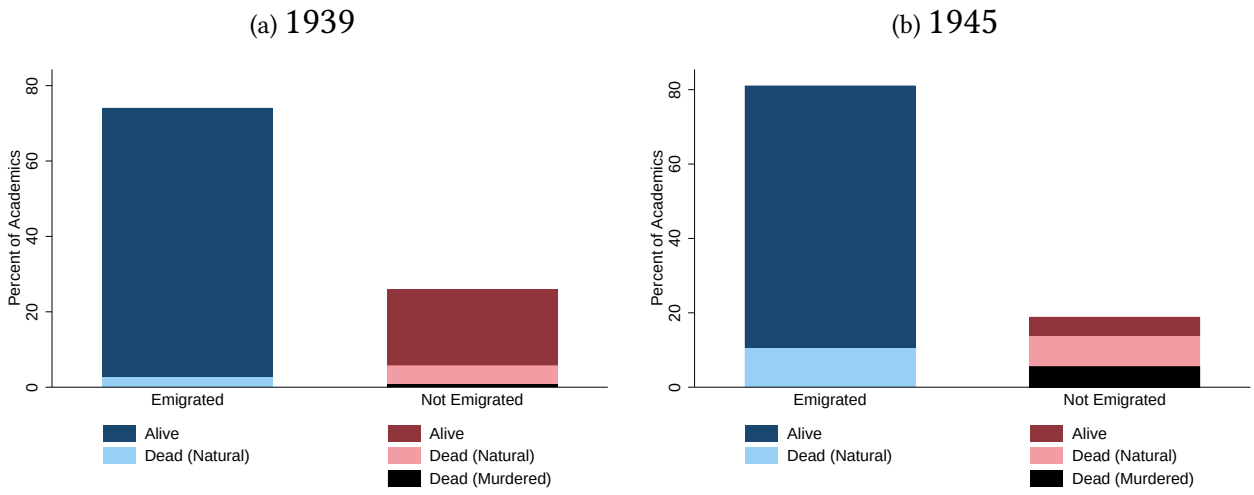
[22] As argued by Evans (2005) part of the reason that this Law had such a visible and dramatic effect was that it was one of the first pieces of Nazi legislation that codified *nationwide* discrimination against Jews and helped coordinate discriminatory measures that were being introduced at the local and regional level. The dismissals were widely reported in newspapers. For example, the *Vossische Zeitung*, which had national reach, reported on April 28, 1933 that "[h]ardly a day goes by in which a new list of lecturer suspensions is not issued" (quoted in Hentschel 2011, p. 40).

by estimating results in a sample of academics who did not coauthor with other Jewish academics (see appendix Table A.1).

2.4 Fate after 1933: Emigration?

In our main results, we use the number of ties to early dismissals as an instrumental variable for the number of ties to early émigrés to estimate the effect of early émigrés on the probability of emigration by January 1, 1939 or January 1, 1945.[23] By January 1, 1939, 74 percent of Jewish academics had managed to emigrate, while 26 percent had not emigrated and one percent had been directly or indirectly murdered by the Nazis (see Figure 6, panel a).[24]

Figure 6: Fate of Academics



Notes: The Figure reports the fate of Jewish academics for (a) January 1, 1939 and (b) January 1, 1945. The category of murdered academics contains also suicides of academics and academics who were deported to concentration camps, even if they were not murdered by the relevant date.

[23] We choose these particular dates for the following reasons: January 1, 1939 because it was the last January before the beginning of WWII; January 1, 1945 because it was the last January before the end of WWII. In January 1946, a very small number of academics who were sent to concentration camps but survived the Holocaust migrated to other countries and, hence, we would not capture whether they had managed to escape the Holocaust. Furthermore, by January 1946 a very small number of dismissed academics had already returned to Germany. Nevertheless, results are very similar if we measure emigration status in January 1946.

[24] Of the 1327 Jewish academics, 107 had passed away by 1939 and 310 passed away by 1945. Some had been murdered in the Holocaust, while most of the others died of natural causes. To avoid sample selection, we assign the place of death as their location for all dead academics when we estimate emigration probabilities. As a result, we implicitly assume that academics who died of a natural death in Germany before 1945 would not have managed to emigrate. In a number of robustness checks we show that this assumption does not affect our findings. We show that the results are similar if we exclude from the sample all individuals who had died from natural causes (appendix Table A.3, columns 1 and 2). In another test, we impute the most likely emigration status for academics who died of natural causes before 1939 (see appendix D for details). The results remain very similar (appendix Table A.3, columns 3 and 4).

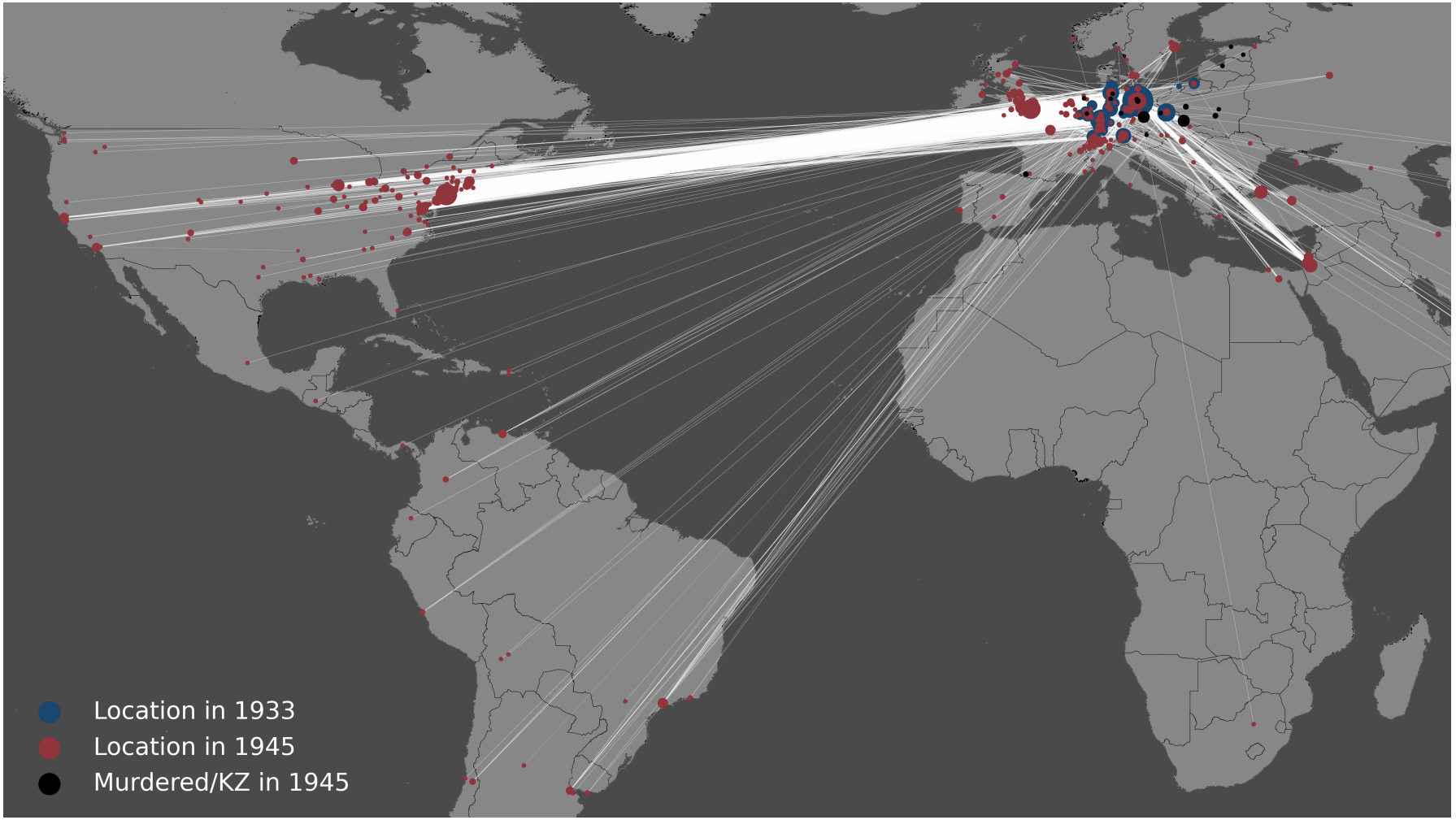
By January 1, 1945, 81 percent had managed to emigrate, while 19 percent had not emigrated and 6 percent had been directly or indirectly murdered by the Nazis.[25] The emigration rates of Jewish academics are remarkably high. They are much higher than emigration rates for the general Jewish population in Germany. Benz (1988, p. 738) reports emigration rates of 31 percent for 1939 and 51 percent for 1945 for the general Jewish population.[26]

Our detailed biographical data allow us to observe and graphically depict the exact location of each academic's fate by 1945 (Figure 7).

[25] An example of an "indirect murder" is the tragic case of Arthur Nicolaier, an extraordinary professor of medicine at the Charité of the University of Berlin, and the discoverer of the soil bacterium that causes tetanus. After his dismissal he worked as a doctor in Berlin. In 1942, he committed suicide when he was about to be deported to the Theresienstadt concentration camp. Most murdered academics, however, died in Nazi death and concentration camps such as Auschwitz. Fifteen academics survived the Nazi period in a concentration camp. E.g. the historian Ernst Perels survived Flossenbürg concentration camp but passed away on May 10, 1945, just a few days after the German surrender in WWII. For these statistics, we count them in the Dead (Murdered) category. The few Jewish academics who survived in Germany were individuals who had initially been exempted from dismissals under the *Law for Restoration of the Professional Civil Service* with at most two Jewish grandparents. If they were not practicing Jews and were not married to Jews they were not directly targeted by the Nuremberg racial laws. As a result, some of them managed to survive the Holocaust in Germany.

[26] Benz (1988) reports absolute numbers of émigrés by year. In some years he only reports ranges. We take the midpoint of the ranges, sum the emigration numbers until the relevant year, and divide them by 523,000 (the approximate number of Jews who lived in Germany before the Nazis assumed power, Museum 2020).

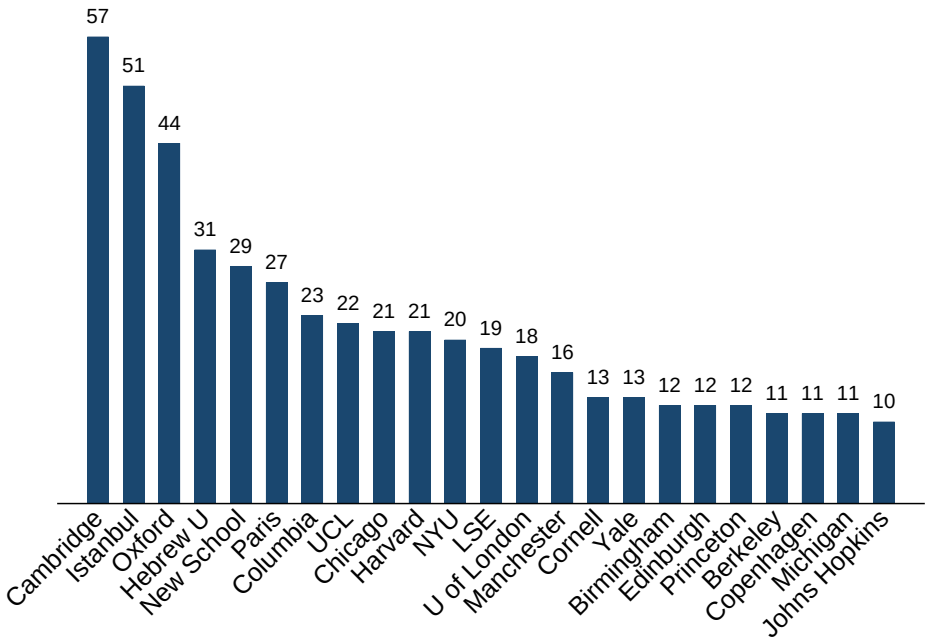
Figure 7: Movements of Academics Between 1933 and 1945



Notes: The Figure shows the location of Jewish academics on January 1, 1933 (blue dots, all in Germany) and January 1, 1945 (red dots or black dots). The size of the dots reflects the number of academics in each location. The white lines connect the locations on January 1, 1933 and January 1, 1945. The width of the lines reflects the number of academics moving between the two locations. Many academics moved to the 1945 destination via other destinations which are not reported in the Figure.

By far the two most attractive locations were the United States and the United Kingdom, where language and cultural barriers were lower than in some other locations (see also appendix Figure A.2). Furthermore, these two countries were home to leading universities. Especially, universities in the United States were improving fast and some of them had already reached the level of the leading German universities. Cambridge, Istanbul, Oxford, Hebrew University, and the New School (NY), were the top destinations for the émigrés (Figure 8).

Figure 8: Main University Destinations of German Jewish Academics: 1934-1945



Notes: The Figure reports the number of Jewish academics who had emigrated from Nazi Germany and were affiliated with the respective university at some point between January 1, 1934 and January 1, 1945. Only universities with at least 10 émigrés are reported.

2.5 Control Variables

The biographical data also allow us to construct a number of important control variables. For each academic we know their academic subject, their academic rank (e.g. full professor, associate professor, and so on), age, gender, marital status, the number of children, knowledge of foreign languages, whether they were ever employed by a foreign university before 1933, and whether they were born abroad.

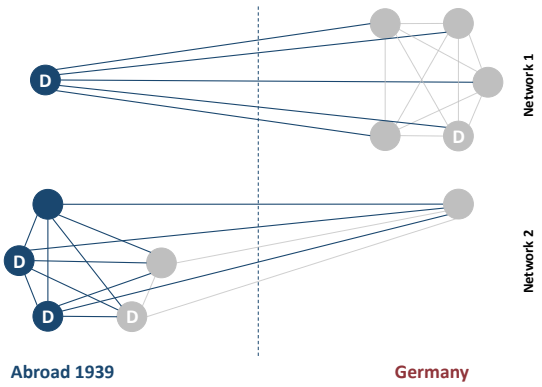
We take advantage of the rich documentation on academics to proxy for academics reputation by counting the number of entries in biographical compendia that were published *before* 1933. To

account for field-level differences, we standardize this measure by academic field. The measure is a good proxy for reputation. For example, Albert Einstein is the most reputed physicist according to this measure and the top 15 physicists contain five Nobel Laureates. In general, top-ranked academics in many fields are well-known, even to outsiders of the discipline (see appendix Table A.4). For academics in seven scientific fields (containing 59 percent of all dismissed Jewish academics) – mathematics, physics, chemistry, biochemistry, biology, medicine and psychology – we also obtained detailed publication records from the Clarivate Web of Science (see appendix B.2.6 for details). Table 2 reports summary statistics for the full sample of Jewish academics.

3 Professional Networks and Emigration

In our main analysis we estimate how ties to early émigrés affect emigration by 1939 or 1945. In Figure 9 we graphically depict the emigration choices of individuals in the two schematic networks. We examine whether individuals with more ties to early émigrés (as in network 2), were more likely to emigrate by 1939 (or 1945).

Figure 9: Early Émigrés Affect Emigration by 1939



Notes: The Figure shows the schematic example of two professional networks in 1939. We investigate whether individuals with more ties to early émigrés (as in network 2) were more likely to emigrate by 1939 (or 1945).

To investigate the effect of professional academic networks on the probability of emigration by January 1, 1939 or, alternatively, 1945 we estimate the following regression:

$$\begin{aligned} \textit{Emigrated by } 1939/45_i &= \beta_1 + \beta_2 \,\#\, \textit{Early Émigrés (Pre-1933 Network)}_{-i} \\ &+ \beta_3\, \textit{Early Émigré}_i + \beta_c\, \textit{Controls}_i + \varepsilon_i. \end{aligned} \tag{1}$$

The dependent variable is an indicator equal to one if academic i had emigrated by 1939 or, in alternative regressions, 1945. The main explanatory variable, $\#Early\,Émigrés\,(Pre\text{-}1933\,Network)_{-i}$ counts how many individuals in academic i's pre-1933 professional network had emigrated by 1935, excluding academic i him/herself.[27] As described above, we measure the pre-1933 network as all Jewish individuals who worked in the same city and subject as academic i between 1929 and 1933.[28] Since migration choices are sticky over time, equation (1) also includes the indicator $Early\,Émigré_i$ to control for academic i's own emigration status in 1935.[29]

3.1 Instrumental Variables Strategy: First Stages

As outlined above, a number of endogeneity concerns complicate the estimation of network effects in the migration context. First, individuals may endogenously form networks to facilitate emigration. In our context, individuals did not anticipate migration and the vast majority of them would have planned to end their career in Germany. This changed dramatically in 1933 when all of a sudden emigration became the preferred option for most Jewish academics. Because we measure networks until January 1, 1933, we can fully address this particular endogeneity concern.

The second endogeneity concern comes from correlated confounders. Individuals with more ties to early émigrés may also have other characteristics that facilitate emigration. E.g. physicists in Göttingen may be of higher quality than physicists in other cities. This would give them higher visibility abroad and facilitate emigration. At the same time, they may also know more colleagues who had emigrated by 1935 because their colleagues were themselves more prominent. We address this endogeneity concern in two ways. First, we add a number of controls that capture such differences. E.g. we control for age, family status, academic rank, and previous experiences abroad. In additional results, we also control for measures of an individual's reputation or publication record. Most importantly, we include controls for the city × subject history between 1929 and 1933.[30] These variables control for quality differences across location by subject cells, e.g. for the fact that physicists in Göttingen were on average better than physicists in Braunschweig. Hence, the identifying variation comes from two sources: first, from individuals who had moved across departments between 1929 and 1933, and second, from the fact that an individual's network consists

[27] To ease the reading of regression tables, we divide the number of early émigrés in the pre-1933 network by 10.

[28] Results are similar, and remain highly significant, if we measure networks for the ten year period between January 1, 1924 and January 1, 1933.

[29] Previous research has shown that earlier migration also predicts subsequent migration in modern data (Parey and Waldinger 2011).

[30] These controls allow for the possibility that academics moved across cities between 1929 and 1933 and that they held multiple appointments. For an academic who held appointments in two cities we weight each city × subject fixed effect by 0.5. Similarly, for an academic who moved between cities we weight the corresponding city × subject fixed effects by the number of years he/she spent in each city. E.g. for a mathematician who was in Göttingen between 1929 and 1931 and then moved to Braunschweig and stayed there in 1932 and 1933 we weight the Göttingen × Math fixed effect by 0.6 and the Braunschweig × Math fixed effect by 0.4. Results are very similar and remain highly significant when we condition on unweighted city × subject fixed effects for the 1933 location.

of all *other* individuals in the same city and subject. Hence, those who themselves had emigrated by 1935 had one tie less to early émigré colleagues than those who did not move abroad by 1935. Even after adding this rich set of controls, we cannot rule out other omitted variables.

To address this remaining endogeneity concern, we use early dismissals in an instrumental variables strategy, as described above. Specifically, we use the number of early dismissals in an academic's pre-1933 network as an instrumental variable for the number of early émigrés in academic i's network.

As outlined above, equation (1) also controls for academic i's own emigration status in 1935. This variable suffers from similar endogeneity concerns, e.g. because better academics may have emigrated earlier. Consequently, we use academic i's *own* early dismissal status as our second instrumental variable. The two first stage regressions are as follows:

$$\begin{aligned} \#\ Early\ Émigrés\ (Pre\text{-}1933\ Network)_{-i} &= \gamma_1 + \gamma_2\ \#\ Dismissed\ Early\ (Pre\text{-}1933\ Network)_{-i} \\ &+ \gamma_3\ Early\ Dismissal_i + \gamma_c\ Controls_i + \zeta_i. \end{aligned} \tag{2}$$

$$\begin{aligned} Early\ Émigré_i &= \lambda_1 + \lambda_2\ \#\ Dismissed\ Early\ (Pre\text{-}1933\ Network)_{-i} \\ &+ \lambda_3\ Early\ Dismissal_i + \lambda_c\ Controls_i + \xi_i. \end{aligned} \tag{3}$$

Column (1) of Table 3 reports the first stage results for the number of early émigrés in academic i's network (equation 2). The number of early dismissals in academic i's network is a very good predictor for the number of early émigrés in academic i's network. The point estimate indicates that one additional dismissal increased the number of early émigrés in his/her network by 0.64.[31] The academic's own early dismissal only had a small effect on the number of early émigrés in the network. Controlling for the city-by-subject history hardly affects the point estimates (column 3).

Column (2) reports the first stage results for academic i's own early émigré status (equation 3). The number early dismissals in academic i's network does not predict academic i's own early émigré status. In contrast, academic i's own early dismissal had a large effect on his/her own early émigré status. Controlling for the city-by-subject history hardly affects the point estimates (column 4).

The Table also reports the standard first-stage F-statistics for each of the first stage regressions. With all controls, the F-statistics are 58.4 and 957.7, indicating very strong first-stage relationships. In the context of two endogenous variables and two instrumental variables, a high first-stage F-

[31] Appendix Figure A.5 shows the first-stage relationship between the number of individuals in an academic's network who were dismissed early and the number of early émigrés in his/her network . The network measures aggregate the individual level probabilities of early dismissal and early emigration. This aggregation results in a very strong relationship. The smaller the network, the larger is the relative variation (panel b). Note, however, that also academics who were in smaller departments in 1933 had large networks, if they had previously been located in a large department.

statistic is, however, not a sufficient condition for a valid identification strategy (Stock et al. 2002). We therefore report additional statistics based on the Cragg and Donald (1993) minimum eigenvalue statistic to test for weak instruments. Because we cluster standard errors at the city level, we report the corresponding Kleibergen-Paap statistic. Stock and Yogo report a critical value of 7.03 for a model with two endogenous regressors and two instruments. With a value of 56.8, the Kleibergen-Paap statistic is way above the critical value, indicating a strong first stage relationship.

3.2 The Effect of Early Émigrés (Bridging Nodes) on the Probability of Emigration by 1939 (or 1945)

We first estimate equation (1) by ordinary least squares (OLS). We find that the number of early émigrés in an academic's pre-1933 network is a strong predictor of emigration by 1939. Ties to 10 additional early émigrés increased the probability of emigration by 1939 by 5.3 percentage points (Table 4, column 1, significant at 1 percent). Not surprisingly, academic *i*'s own emigration status in 1935 also had a strong effect on the probability of emigration by 1939.

In column (2), we present results that use the number of early dismissals in an academic's network as an instrumental variable for the number of early émigrés in the network. The IV results are similar, but minimally smaller than the OLS results, indicating that ties to 10 additional early émigrés increased the probability of emigration by 1939 by 5.0 percentage points (Table 4, column 2, significant at 1 percent).

In columns (3) and (4), we present equivalent results for the probability of emigration by 1945. Point estimates are very similar and remain highly significant, indicating that early émigrés had a long-lasting effect on emigration decisions of their colleagues.

In additional results, we confirm these findings when we control for an individual's academic reputation and publication record. We proxy for individual reputation by counting the number of entries in biographical compendia that had been published *before* 1933. To account for field level differences, we standardize this measure by fields (Table 5, columns 1 and 2). In further results, we control for the academic's detailed pre-1933 publication records (Table 5, columns 3 and 4).[32]

We also provide suggestive evidence that early émigrés only affected the emigration decisions of academics who had not emigrated by January 1, 1935 (see appendix Table A.2).[33] This suggests that the support by early émigrés to their former colleagues became effective *after* they had settled in the new destination.

[32]We observe detailed publication records for academics in seven scientific fields (containing 59 percent of all dismissed Jewish academics): mathematics, physics, chemistry, biochemistry, biology, medicine and psychology. The regressions reported in columns 3 and 4 also include an indicator variable that equals 1 if there are no publication data for the field.

[33]These results can only be suggestive because the regressions condition on whether the focal academic had emigrated by 1935.

The results are robust to excluding academics who coauthored with other Jewish academics from the sample (see appendix Table A.1). These findings address the concern that the number of dismissals in the professional network may also affect emigration through severing ties with colleagues who were coauthors.

It is important to note that the detailed employment controls at the city-by-subject-level control for a large number of factors that may have an independent effect on emigration decisions and that may be correlated with the number of early dismissals in an academic's network. E.g. they control for the *total* number of Jewish but also non-Jewish colleagues that may also assist their emigration. As mentioned above, they also control for quality differences across city-by-subject cells. Similarly, they control for community level factors, such as the size of the community network, or for antisemitic acts by local Nazis that may affect the academic's emigration decision from his/her city of residence.

3.3 Characteristics of Social Ties and their Effect on Emigration

In the second set of results, we analyze various characteristics of social ties that make them more or less effective in facilitating emigration.

Decay of Social Ties Over Time

We explore the "decay" of social ties over time. For these results we split ties to early émigrés into two groups: ties to recent colleagues (overlap included the years 1932 and 1933) and ties to less recent colleagues (overlap between 1929 and 1931, but not in 1932 and 1933). Academics with ten more ties to recent colleagues were 10.0 percentage points (OLS) or 8.0 percentage points (IV) more likely to emigrate (Table 6, columns 1 and 2). In contrast, academics with ten more ties to less recent colleagues were only around 5 percentage points (both OLS and IV) more likely to emigrate.[34] These results suggest that ongoing ties are more effective than past ties. In fact, a mere two-year interruption of regular interactions led to a decay in the strength of ties. This is particularly surprising in the context of severe persecution with lives and livelihoods being threatened. One would have expected that academics may be willing to help former colleagues – even if they had lost touch. One possible explanation for the fast decay of ties in professional networks could be that recent interactions could transmit more up-to-date information about current productivity (such as the research pipeline of an academic) that are more difficult to observe from a distance.

[34]The coefficients are significantly different at the 10 percent level in the OLS specification (p-value 0.09) but not in the IV specification (p-value 0.18). For these tests, we measure ties to recent colleagues if the academics had overlapped in the same city and subject in the years 1932 and 1933. This raises the possibility that more recent social ties are also those that persisted for a longer time period (potentially for five years between 1929 and 1933), while less recent social ties persisted for a shorter time period (between 1929 and 1931 and thus for three years at most). We explore this possibility in detail and show the effect is driven by the recency of the social interaction and not its length (appendix Table A.7).

Social Ties and Geographical Proximity

We also analyze whether geographical proximity affects the strength of social ties. For these results, we differentiate between ties to early émigrés from the same subject in a) the same department versus b) other departments in the same city. For example, a mathematician from the University of Breslau may have stronger ties to early émigré mathematicians from the University of Breslau compared to ties to early émigrés from the Technical University of Breslau. Academics with ten more ties to early émigrés from the same department were 6.3 percentage points (OLS) or 6.2 percentage points (IV) more likely to emigrate (Table 6, columns 3 and 4). In comparison, academics with ten more ties to early émigrés from the same subject who had been employed by *another* institution in the same city were 5.1 percentage points (OLS) or 4.8 percentage points (IV) more likely to emigrate. While the coefficients are not significantly different from each other, the results suggest that the strength of ties in professional networks also decays across space, even *within* the same city.

Humanities and Social Sciences vs. Natural Sciences

We also explore differences in the strength of social ties between broad disciplines. Ties to ten additional early émigrés increased the probability of emigration by 3.4 percentage points (OLS) or 3.2 percentage points (IV) for academics in the natural sciences and medicine. In contrast, ties to ten additional early émigrés increased the probability of emigration by 15.7 percentage points (OLS) or 15.2 percentage points (IV) for academics in the social sciences or humanities (Table 6, columns 5 and 6). This difference could arise from two sources: first, German academics in the natural sciences were widely recognized as world-leading. A reputation for excellence in these fields may have made individual professional networks less important for academics in the natural sciences. Second, compounding this effect, language and other barriers may have made it harder to assess the suitability and quality of academics from the humanities and social sciences, strengthening the importance of professional networks.

3.4 Do Bridging Nodes Affect the Direction of Migration?

In our third set of results, we show that the effect of the professional network was directional. Early émigrés could have provided general information that facilitated emigration to any country. Alternatively, they could have facilitated emigration predominately to their own destination. To differentiate between these two alternatives, we separately analyze ties to early émigrés who had emigrated to the United States/United Kingdom (the most attractive destinations) and ties to early émigrés who had emigrated to other countries (Figure A.2 summarizes the most important destination countries).[35] We estimate the following regressions:

[35]We do not analyze separate effects of early émigré networks in the United States and the United Kingdom because a large fraction of academics who emigrated to the United States emigrated via the United Kingdom (see appendix

$$
\begin{aligned}
\textit{Emigrated to US/UK by } 1939_i \;=\; & \delta_{11} + \delta_{12} \,\#\, \textit{Early Émigrés in US/UK } (\textit{Pre-1933 Network})_{-i} \\
& + \; \delta_{13} \,\#\, \textit{Early Émigrés in Other } (\textit{Pre-1933 Network})_{-i} \\
& + \; \delta_{14}\, \textit{Early Émigré in US/UK}_i + \delta_{15}\, \textit{Early Émigré in Other}_i \\
& + \; \delta_{1c}\, \textit{Controls}_i + \eta_i .
\end{aligned} \tag{4}
$$

$$
\begin{aligned}
\textit{Emigrated to Other by } 1939_i \;=\; & \delta_{21} + \delta_{22} \,\#\, \textit{Early Émigrés in US/UK } (\textit{Pre-1933 Network})_{-i} \\
& + \; \delta_{23} \,\#\, \textit{Early Émigrés in Other } (\textit{Pre-1933 Network})_{-i} \\
& + \; \delta_{24}\, \textit{Early Émigré in US/UK}_i + \delta_{25}\, \textit{Early Émigré}_i \\
& + \; \delta_{2c}\, \textit{Controls}_i + \mu_i .
\end{aligned} \tag{5}
$$

Ties to ten additional early émigrés in the US/UK *increased* emigration to the US/UK by 42.8 percentage points (Table 7, column 1).[36] Ties to ten additional early émigrés in other countries *decreased* emigration to the US/UK by 35.2 percentage points (Table 7, column 1). Naturally, an academic i's own emigration status was also very persistent. If the academic had emigrated to the US/UK by 1935 he/she was 50.7 percentage points more likely to also reside in any of these two countries by 1939. If the academic had emigrated to another country by 1935 he/she was 22.5 percentage points less likely to emigrate to the United States or the United Kingdom by 1939.

The role of bridging nodes in other counties was a mirror image of bridging nodes in the US/UK. Ties to early émigrés in other countries *increased* emigration to other countries. In contrast, ties to early émigrés in the US/UK *decreased* emigration to other countries (Table 7, column 2). These results indicate that early émigrés functioned as a bridge that helped academics cross over into the *same* destination. In the process, these academics were diverted away from alternative destinations.

3.5 Professional versus Community Networks

In the fourth set of results, we throw light on the relative role of professional versus community networks for emigration decisions. We construct a measure of community networks using data from the *List of Jewish Residents* compiled by the German Federal Archive. The *List of Jewish Residents* lacks the richness of the biographical data that we have compiled for the German Jewish

Figure A.6). E.g. the mathematician Richard Courant or the physicist Leo Szilard. Because early dismissals predict emigration, but not emigration to a *particular destination*, we cannot use our instrumental variable strategy for these specifications. For the main results, the OLS and IV results are very similar. This suggests that endogeneity concerns are relatively minor, once we condition on our rich set of controls.

[36]For these results, early émigrés are split by location. The average academic knew 5.6 early émigrés in the US/UK versus 11.2 early émigrés in all countries.

academics. Nonetheless, it allows us to use each academic's place of birth to construct community networks based on the Jewish population in the place of birth. In particular, we count the number of early émigrés that were born (within a ± five year window) in the same city as each academic (see appendix B.2.4 for details).[37] This definition of the community networks is similar to the definition of Jewish community networks in Buggle et al. (2020). It is important to note, that in our main results we already control for community networks in the place of *residence* via the detailed city × subject controls.

We re-estimate the specification outlined in equation 1 and add this measure of community networks:

$$\begin{aligned} \textit{Emigrated by } 1939_i &= \alpha_1 + \alpha_2 \,\#\, \textit{Early Émigrés } (\textit{Pre-1933 Network})_{-i} \\ &+ \alpha_3 \,\#\, \textit{Early Émigrés } (\textit{Community Network})_{-i} \\ &+ \alpha_4 \,\textit{Early Émigré}_i + \alpha_c \,\textit{Controls}_i + \upsilon_i. \end{aligned} \tag{6}$$

Controlling for community networks does not affect the estimated coefficients of the professional academic network (Table 8, columns 1 and 2). In fact, for academics, community networks did not affect emigration decisions at all. This is even more striking in this context, because in the early years of Nazi rule, persecution against Jews differed widely at the community level. Despite this, professional networks were much more important for emigration decisions than community networks for high-skilled individuals.

4 Conclusion

Our study throws light on the role of networks for emigration decisions of *high-skilled individuals*. We show that *professional* networks play a key role in these decisions. In particular, we show that ties to early émigrés affected emigration, which highlights the special role of bridging nodes for emigration decisions. We also show that social ties decay with time and over relatively short geographic distances, and that ties can substitute for reputation effects. We also show that early émigrés functioned as bridges that helped academics cross over into the same destination. In the process, these academics were diverted away from alternative destinations.

As a result of this wave of high-skilled emigration, some destinations, especially the United States and the United Kingdom, received many world-class academics; a gain that solidified the transition of scientific leadership from Germany to the United States. In their destinations, Eu-

[37] The results are almost unchanged if we measure the community network as all early émigrés who were born in the same city as each academic, independently of the birth year (Table 8, columns 3 and 4)

ropean émigrés made key contributions to many scientific fields. For mathematics, Raymond D. Fosdick, the president of the Rockefeller Foundation, argued in 1942 that:

> "If Hitler had set out, with benevolent intent, to build up America as the world's great mathematical center, he could hardly have achieved more successfully the result which his ruthlessness has accomplished. During the last decade 131 leading European mathematicians have migrated to the United States. Of these, sixteen came from the faculty of Göttingen. The School of Advanced Study at Princeton, Brown University, New York University, Harvard, Chicago, the University of Wisconsin, the Massachusetts Institute of Technology are only a few of the American institutions which have profited by this migration." (Foundation 1942, p. 27).

Also in other fields, émigrés from Europe made key contributions. For example, in physics, they were instrumental in the success of the Manhattan project (appendix Figure A.7).

The findings in this paper indicate that professional networks cause dynamic migration responses. Hence, even short-term interruptions or surges of high-skilled migration can have long-term implications, because they affect long-term migration flows through the professional network. For example, the recent suspension of the H-1B visa program in the United States could have long-term implications. During a suspension, high-skilled migrants may settle in other locations, and then attract other high-skilled migrants through their network, even if the suspension is lifted. E.g. Canada has recently attracted a large number of Indian IT workers who did not migrate to the United States because of restrictions on H-1B visa holders (The Economist 2018). Even after the end of the restrictions they may continue to attract other high-skilled individuals in their professional network to Canada. Our results therefore have implications for the design of visa policies for attracting high-skilled individuals who may face persecution in their home countries. In recent years academics and other high-skilled professionals have faced persecution for example in Hong Kong (Normile 2020), Hungary (Enyedi 2018), Turkey (Bohannon 2016), but also in many other countries.[38]

[38] According the organization Scholars at Risk (SAR), personal attacks on academics have been increasing in recent years. For example, there were 341 attacks on universities in 58 countries, in the period September 2019 to August 2020, alone.

Abramitzky, Ran, Leah Platt Boustan, and Katherine Eriksson, "Europe's tired, poor, huddled masses: Self-selection and economic outcomes in the age of mass migration," *American Economic Review*, 2012, *102* (5), 1832–56.

_ , _ , and _ , "A nation of immigrants: Assimilation and economic outcomes in the age of mass migration," *Journal of Political Economy*, 2014, *122* (3), 467–506.

Acemoglu, Daron, Tarek A Hassan, and James A Robinson, "Social structure and development: A legacy of the Holocaust in Russia," *The Quarterly Journal of Economics*, 2011, *126* (2), 895–946.

Akbulut-Yuksel, Mevlude and Mutlu Yuksel, "The Long-Term Direct and External Effects of Jewish Expulsions in Nazi Germany," *American Economic Journal: Economic Policy*, 2015, *7* (3), 58–85.

Arkolakis, Costas, Michael Peters, and Sun Kyoung Lee, "European Immigrants and the United States' Rise to the Technological Frontier," Technical Report, Society for Economic Dynamics 2019.

Bauer, Thomas K., Sebastian Braun, and Michael Kvasnicka, "The Economic Integration of Forced Migrants: Evidence for Post-War Germany," *The Economic Journal*, 2013, *123*, 998–1024.

Becker, Sascha O. and Andreas Ferrara, "Consequences of forced migration: A survey of recent findings," *Labour Economics*, August 2019, *59*, 1–16.

_ , Irena Grosfeld, Pauline Grosjean, Nico Voigtländer, and Ekaterina Zhuravskaya, "Forced migration and human capital: evidence from post-WWII population transfers," *American Economic Review*, 2020, *110* (5).

Beerli, Andreas, Jan Ruffner, Michael Siegenthaler, and Giovanni Peri, "The abolition of immigration restrictions and the performance of firms and workers: evidence from Switzerland," *American Economic Review*, 2021.

Benz, Wolfgang, *Die Juden in Deutschland 1933-1945: Leben unter nationalsozialistischer Herrschaft*, CH Beck, 1988.

Bergmann, Birgit, *Transcending tradition: Jewish mathematicians in German speaking academic culture*, Springer Science & Business Media, 2012.

Blum, Matthias and Claudia Rei, "Escaping Europe: health and human capital of Holocaust refugees," *European Review of Economic History*, February 2018, *22* (1), 1–27.

Blumenstock, Joshua, Guanghua Chi, and Xu Tan, "Migration and the Value of Social Networks," 2019.

Bohannon, John, "Turkish academics targeted as government reacts to failed coup," *Science, July. http://www. sciencemag. org/news/2016/07/turkish-academics-targetedgovernment-reacts-failed-coup*, 2016.

Borjas, George J and Kirk B Doran, "The collapse of the Soviet Union and the productivity of American mathematicians," *The Quarterly Journal of Economics*, 2012, *127* (3), 1143–1203.

Buggle, Johannes, Thierry Mayer, Orcan Seyhun Sakalli, and Mathias Thoenig, "The Refugee's Dilemma: Evidence from Jewish Migration out of Nazi Germany," *CEPR Discussion Paper*, 2020, (15533).

Burt, Ronald S., *Structural Holes: The Social Structure of Competition*, Cambridge, Mass: Harvard University Press, November 1992.

_ , "Decay functions," *Social networks*, 2000, *22* (1), 1–28. Publisher: Elsevier.

_ , "Attachment, decay, and social network," *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, 2001, *22* (6), 619–643. Publisher: Wiley Online Library.

Cragg, John G and Stephen G Donald, "Testing identifiability and specification in instrumental variable models," *Econometric Theory*, 1993, pp. 222–240.

Enyedi, Zsolt, "Democratic backsliding and academic freedom in Hungary," *Perspectives on Politics*, 2018, *16* (4), 1067–1074.

Evans, Richard J., *The Coming of the Third Reich*, illustrated edition ed., New York: Penguin Books, February 2005.

Fouka, Vasiliki, Soumyajit Mazumder, and Marco Tabellini, "From immigrants to americans: Race and assimilation during the great migration," *The Review of Economic Studies*, 2020.

Foundation, Rockefeller, "The Rockefeller Foundation, Annual Report 1942," 1942.

Galeotti, Andrea and Sanjeev Goyal, "The Law of the Few," *American Economic Review*, September 2010, *100* (4), 1468–1492.

Giulietti, Corrado, Jackline Wahba, and Yves Zenou, "Strong versus weak ties in migration," *European Economic Review*, May 2018, *104*, 111–137.

Goyal, Sanjeev, *Connections: an introduction to the economics of networks*, Princeton University Press, 2012.

Granovetter, Mark S., "The Strength of Weak Ties," *American Journal of Sociology*, May 1973, *78* (6), 1360–1380.

Grosfeld, Irena, Alexander Rodnyansky, and Ekaterina Zhuravskaya, "Persistent antimarket culture: a legacy of the pale of settlement after the holocaust," *American Economic Journal: Economic Policy*, 2013, *5* (3), 189–226.

Grüttner, Michael and Sven Kinas, "Die Vertreibung von Wissenschaftlern aus den deutschen Universitäten 1933–1945," *Vierteljahrshefte für Zeitgeschichte*, 2007, *55* (1), 123–186.

Hartshorne, Edward Yarnall, *The German universities and national socialism*, Harvard university press, 1937.

Hentschel, Klaus, *Physics and national socialism: An anthology of primary sources*, Springer Science & Business Media, 2011.

Hojman, Daniel A. and Adam Szeidl, "Core and periphery in networks," *Journal of Economic Theory*, 2008, *139* (1), 295 – 309.

Huber, Kilian, Volker Lindenthal, and Fabian Waldinger, "Discrimination, Managers, and Firm Performance: Evidence from "Aryanizations" in Nazi Germany," *Journal of Political Economy (forthcoming)*, 2021.

Hunt, Jennifer and Marjolaine Gauthier-Loiselle, "How much does immigration boost innovation?," *American Economic Journal: Macroeconomics*, 2010, *2* (2), 31–56.

Jackson, Matthew O., *Social and Economic Networks*, unknown edition ed., Princeton, NJ: Princeton University Press, November 2010.

Jackson, Matthew O, "A typology of social capital and associated network measures," *Social Choice and Welfare*, 2019, pp. 1–26.

Jackson, Matthew O. and Alison Watts, "The Evolution of Social and Economic Networks," *Journal of Economic Theory*, October 2002, *106* (2), 265–295.

_ **and Brian W. Rogers**, "The Economics of Small Worlds," *Journal of the European Economic Association*, 2005, *3* (2/3), 617–627. Publisher: Oxford University Press.

_ **,** _ **, and Yves Zenou**, "The Economic Consequences of Social-Network Structure," *Journal of Economic Literature*, March 2017, *55* (1), 49–95.

Kerr, Sari Pekkala, William R Kerr, and William F Lincoln, "Skilled immigration and the employment structures of US firms," *Journal of Labor Economics*, 2015, *33* (S1), S147–S186.

Kerr, William R and William F Lincoln, "The supply side of innovation: H-1B visa reforms and US ethnic invention," *Journal of Labor Economics*, 2010, *28* (3), 473–508.

Kinas, Sven, *Akademischer Exodus: Die Vertreibung von Hochschullehrern aus den Universitäten Berlin, Frankfurt am Main, Greifswald und Halle 1933-1945*, Heidelberg: Synchron, June 2018.

Kwiet, Konrad, "Nach dem Pogrom: Stufen der Ausgrenzung," in Wolfgang Benz and Volker Dahm, eds., *Die Juden in Deutschland 1933-1945: Leben unter nationalsozialistischer Herrschaft*, CH Beck, 1988.

_ , *Well Worth Saving: American Universities' Life-and-Death Decisions on Refugees from Nazi Europe*, New Haven, CT: Yale University Press, December 2019.

Liebert, Helge and Beatrice Mäder, "The impact of regional health care coverage on infant mortality and disease incidence," *mimeo*, 2018.

Mahajan, Parag and Dean Yang, "Taken by Storm: Hurricanes, Migrant Networks, and US Immigration," *American Economic Journal: Applied Economics*, April 2020, *12* (2), 250–277.

McKenzie, David and Hillel Rapoport, "Network effects and the dynamics of migration and inequality: Theory and evidence from Mexico," *Journal of Development Economics*, 2007, *84* (1), 1–24.

_ **and** _ , "Self-Selection Patterns in Mexico-U.S. Migration: The Role of Migration Networks," *The Review of Economics and Statistics*, June 2010, *92* (4), 811–821.

Moser, Petra, Alessandra Voena, and Fabian Waldinger, "German Jewish Émigrés and US Invention," *American Economic Review*, October 2014, *104* (10), 3222–3255.

Munshi, Kaivan, "Networks in the Modern Economy: Mexican Migrants in the U. S. Labor Market," *The Quarterly Journal of Economics*, 2003, *118* (2), 549–599.

Museum, United States Holocaust Memorial, "German Jewish Refugees, 1922-1939," 2020.

Normile, Dennis, "New security law rattles Hong Kong universities," 2020.

Notgemeinschaft Deutscher Wissenschaftler im Ausland, *List of Displaced German Scholars*, Notgemeinschaft deutscher Wissenschaftler im Ausland, 1936.

Parey, Matthias and Fabian Waldinger, "Studying Abroad and the Effect on International Labour Market Mobility: Evidence from the Introduction of ERASMUS," *The Economic Journal*, 2011, *121* (551), 194–222.

Putnam, Robert D., *Bowling Alone: The Collapse and Revival of American Community*, Simon and Schuster, 2000. Google-Books-ID: rd2ibodep7UC.

Reich, Karin, "Emil Artin-Mathematiker von Weltruf," in Rainer Nicolaysen, ed., *Das Hauptgebäude der Universität Hamburg als Gedächtnisort*, Hamburg University Press, 2011, pp. 141–170.

Reichministerium des Inneren, "Third Ordinance on the Implementation of the Law for the Restoration of the Professional Civil Service," 1933.

Reid, Constance, *Courant*, Springer Science & Business Media, 1996.

Röder, Werner and Herbert Strauss, "Biographisches Handbuch der deutschsprachigen Emigration nach 1933-Vol. II: The arts, sciences, and literature, edited by Institut für Zeitgeschichte München and Research Foundation for Jewish Immigration," *Inc., New York*, 1992.

Sarvimäki, Matti, Roope Uusitalo, and Markus Jäntti, "Habit Formation and the Misallocation of Labor: Evidence from Forced Migrations," 2020.

Schmidt-Böcking, Horst, Alan Templeton, and Wolfgang Trageser, eds, *Otto Sterns gesammelte Briefe – Band 1: Hochschullaufbahn und die Zeit des Nationalsozialismus*, Springer Spektrum, 2018.

Sequeira, Sandra, Nathan Nunn, and Nancy Qian, "Migrants and the making of America: The short-and long-run effects of immigration during the age of mass migration," *Review of Economic Studies*, 2020, *87* (1), 382–419.

Shields, Brittany Anne, "A mathematical life: Richard Courant, New York University and scientific diplomacy in twentieth century America," 2015.

Siegmund-Schultze, Reinhard, *Mathematicians Fleeing from Nazi Germany: Individual Fates and Global Impact*, Princeton: Princeton University Press, July 2009.

Spitzer, Yannay, "Pogroms, Networks, and Migration: The Jewish Migration from the Russian Empire to the United States, 1881–1914," Technical Report, Working Paper 2018.

Stock, James H, Jonathan H Wright, and Motohiro Yogo, "A survey of weak instruments and weak identification in generalized method of moments," *Journal of Business & Economic Statistics*, 2002, *20* (4), 518–529.

Tabellini, Marco, "Gifts of the immigrants, woes of the natives: Lessons from the age of mass migration," *The Review of Economic Studies*, 2020, *87* (1), 454–486.

The Economist, "Indian technology talent is flocking to Canada," 2018. https://www.economist.com/business/2018/12/22/indian-technology-talent-is-flocking-to-canada.

Waldinger, Fabian, "Quality Matters: The Expulsion of Professors and the Consequences for PhD Student Outcomes in Nazi Germany," *Journal of Political Economy*, 2010, *118* (4), 787–831.

_ , "Peer Effects in Science: Evidence from the Dismissal of Scientists in Nazi Germany," *The Review of Economic Studies*, April 2012, *79* (2), 838–861.

Wiehn, Erhard R., Martha Liefmann, and Else Liefmann, *Helle Lichter auf dunklem Grund: Die "Abschiebung" aus Freiburg nach Gurs 1940-1942. Mit Erinnerungen an Professor Dr. Robert Liefmann*, 1., 1995 edition ed., Konstanz: Hartung-Gorre, January 1995.

Winters, Paul, Alain de Janvry, and Elisabeth Sadoulet, "Family and Community Networks in Mexico-U.S. Migration," *The Journal of Human Resources*, 2001, *36* (1), 159–184. Publisher: [University of Wisconsin Press, Board of Regents of the University of Wisconsin System].

Tables

Table 1: Richard Courant's Involvement in Securing Faculty Positions

	Involvement:	Quotes from letters:
Fritz John	University of Cambridge	In his letter of support Courant recommended him "in the strongest possible way" and argued that John combined "extraordinary gifts of the receptive kind with real originality and tenacity." (Source: Shields 2015, p. 54)
	University of Kentucky	"He worried the most about the future of former students. Since March he had fretted over the case of Fritz John, whose grant from the Academic Assistance Council in England was going to expire in June, leaving him and his ailing young wife virtually destitute." Courant again managed to help his former assistant from Göttingen, yielding an unexpected appointment at the University of Kentucky. (Source: Reid 1996, p. 154)
	NYU	[H]e gained Fritz John as a regular member of the NYU faculty. (Source: Reid 1996, p. 255)
Emil Artin	University of Notre Dame	Courant was involved in securing a temporary position at the University of Notre Dame for Emil Artin. He even picked up Artin and his family from the pier after the arrival in the United States. (Source: Reich 2011, pp. 158)
Herbert Busemann	Institute for Advanced Study (Princeton)	Richard Courant wrote 1935 from New York to Busemann, who was temporarily in Copenhagen: "In order to be accepted here it is very advantageous not to be forced—as a Jewish immigrant—to accept a position at any cost, but to act instead as an independent human being, to adapt and wait for a chance." (Source: Siegmund-Schultze 2009, p. 93)
Hans Lewy	Brown University	In the course of his travels Courant did not forget that he was looking for places for Neugebauer and Lewy. (Source: Reid 1996, p. 136)
Ernst Hellinger	Northwestern University	[Courant contacted the Emergency Committee and wrote letters to colleagues such as Nobel Laureate Otto Stern.] From his letter to Stern: "Dear Stern: I hope you are informed about Hellinger's situation." (Source: Schmidt-Böcking et al., eds 2018, p. 214)
Gábor Szegö	George Washington University	Courant was also contacted by W.E. Tisdale, the Rockefeller Foundation officer in Paris, regarding Gabriel Szegö who had been an "ordinary Professor of Mathematics in Konigsberg." Tisdale asked Courant to rate Szegö with regards to other mathematicians. Courant about Szegö in Königsberg: „I can imagine, that especially at a place like Konisberg (sic), he and his family will [be] very isolated and unhappy." Courant then gave Tisdale an assessment of Szego's stature as a mathematician, noting he was an "excellent lecturer," a "very successful and tasteful scientist and writer," and although not in the first class group with Weyl, Siegel, Artin, Hardy or Littlewood, did rank among Polya and Hopf, and above Kneser, Rademacher, and Reidemeister. (Source: Shields 2015, p. 57)

Table 1: Richard Courant's Involvement in Securing Faculty Positions

	Involvement:	Quotes from letters:
Erich Rothe	William Penn College	Courant was also contacted as a referee for other displaced German scholars. In April 1934, Walter Adams, serving as the General Secretary of the Academic Assistance Council, requested a reference and advice on how best to help Dr. E. Rothe of Breslau. Courant's reply to Adams was favorable in terms of Rothe's ability and education, pointing to his "good research work" on partial differential equations. (Source: Shields 2015, p. 57)
Kurt Friedrichs	NYU	Courant wrote letters about Friedrichs's presence in the United States to everyone he knew who was interested in the development of applied mathematics. He emphasized the two years that Friedrichs had spent at the aerodynamics institute in Aachen and presented him as "a mathematician in the style of C. Runge." He was in fact so active on Friedrichs's behalf that even Hans Lewy began to be afraid that his efforts to place Friedrichs might jeopardize his own position at NYU. (Source: Reid 1996, p. 196)

Table 2: Summary Statistics

	(1) Means	(2) Standard Deviations
Panel A – Individual Characteristics		
Age in 1933	43.91	12.68
Female	0.04	
Married	0.78	
Number of Children	1.05	1.27
Any Foreign Language	0.82	
Pre-1933 Experience Abroad	0.06	
Born Abroad	0.19	
Pre-1933 Quality[a]	0.00	0.99
Pre-1933 Publication Record[b]	-0.00	0.99
Panel B – Network Characteristics		
# Early Émigrés (Pre-1933 Network)	11.15	14.02
# Dismissed Early (Pre-1933 Network)	16.91	21.58
Panel C – Dismissals and Emigration		
Early Dismissal	0.77	
Early Émigré	0.52	
Emigrated by 1939	0.74	
Emigrated by 1945	0.81	
Observations	1327	

Notes: The data on academics were collected from various historical sources (see section 2 for details).
[a] Pre-1933 quality is measured as the number of entries in bibliographical compendia that were published before 1933, standardized at the subject level.
[b] Annual publications between 1928 and 1932 are standardized within subjects and reported for academics in mathematics, physics, chemistry, biochemistry, biology, medicine, and psychology.

Table 3: First Stage Results

	(1)	(2)	(3)	(4)
	# Early Émigrés		# Early Émigrés	
Dep. Variable:	(Pre-1933 Network)	Early Émigré	(Pre-1933 Network)	Early Émigré
# Dismissed Early (Pre-1933 Network)	0.644***	0.011**	0.619***	-0.010
	(0.004)	(0.005)	(0.016)	(0.033)
Early Dismissal	0.040	0.300***	0.037***	0.283***
	(0.027)	(0.024)	(0.004)	(0.026)
Female	0.069*	0.099	-0.011	0.075
	(0.035)	(0.065)	(0.011)	(0.089)
Married	-0.022*	0.045	-0.007	0.085***
	(0.012)	(0.028)	(0.007)	(0.026)
Number of Children	-0.007	0.009	-0.003	0.003
	(0.004)	(0.009)	(0.002)	(0.012)
Any Foreign Language	-0.031**	0.120***	-0.017**	0.140***
	(0.015)	(0.034)	(0.007)	(0.046)
Pre-1933 Experience Abroad	0.037*	0.182***	-0.021**	0.117
	(0.020)	(0.066)	(0.010)	(0.118)
Born Abroad	0.072**	0.160***	-0.008	0.159***
	(0.031)	(0.027)	(0.006)	(0.032)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)			Yes	Yes
Number of Observations	1327	1327	1327	1327
R^2	0.971	0.303	0.998	0.509
F-statistic (excluded instruments)	46298.990	90.235	957.712	58.377
Kleibergen-Paap rk Wald F-statistic			56.849	
Mean of Dep. Variable	1.115	0.522	1.115	0.522

Notes: The Table reports the first stage regressions. The dependent variable in columns 1 and 3 is the number of early émigrés from the pre-1933 network of colleagues. The dependent variable in columns 2 and 4 is an indicator that equals 1 if academic *i* him/herself was an early émigré. The first instrument is the number of early dismissals among the pre-1933 network of colleagues. The second instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank and year of birth fixed effects. In column 3 and 4, we also include controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 4: Professional Networks and Emigration

	(1) OLS	(2) IV	(3) OLS	(4) IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1945	
# Early Émigrés (Pre-1933 Network)	0.053***	0.050***	0.054***	0.050***
	(0.014)	(0.014)	(0.015)	(0.018)
Early Émigré	0.342***	0.312**	0.187***	0.043
	(0.032)	(0.144)	(0.031)	(0.108)
Female	0.052	0.055	0.085*	0.100**
	(0.048)	(0.050)	(0.044)	(0.046)
Married	-0.003	-0.001	-0.006	0.007
	(0.017)	(0.021)	(0.024)	(0.027)
Number of Children	0.007	0.007	0.031***	0.031***
	(0.014)	(0.014)	(0.010)	(0.010)
Any Foreign Language	0.056	0.060	0.079**	0.100***
	(0.039)	(0.056)	(0.035)	(0.037)
Pre-1933 Experience Abroad	0.055*	0.059**	0.037	0.055
	(0.030)	(0.024)	(0.044)	(0.058)
Born Abroad	0.083***	0.089**	0.078***	0.106***
	(0.016)	(0.036)	(0.013)	(0.027)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Number of Observations	1327	1327	1327	1327
R^2	0.649		0.582	
Kleibergen-Paap rk Wald F-statistic		56.849		56.849
Mean of Dep. Variable	0.741	0.741	0.811	0.811

Notes: The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939 (columns 1 and 2) or by January 1, 1945 (columns 3 and 4). The main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 and 4 we instrument these variables with the number of early dismissals among the pre-1933 network of colleagues and with an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 5: Professional Networks and Emigration – Controlling for Quality

	(1) OLS	(2) IV	(3) OLS	(4) IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network)	0.052***	0.049***	0.050***	0.046***
	(0.014)	(0.014)	(0.015)	(0.015)
Early Émigré	0.335***	0.309**	0.341***	0.311**
	(0.033)	(0.145)	(0.031)	(0.142)
Female	0.058	0.061	0.054	0.057
	(0.047)	(0.050)	(0.048)	(0.050)
Married	-0.004	-0.002	-0.003	-0.000
	(0.018)	(0.022)	(0.017)	(0.020)
Number of Children	0.007	0.007	0.007	0.007
	(0.014)	(0.014)	(0.014)	(0.014)
Any Foreign Language	0.056	0.060	0.059	0.064
	(0.038)	(0.054)	(0.039)	(0.055)
Pre-1933 Experience Abroad	0.050	0.053*	0.053	0.056**
	(0.032)	(0.027)	(0.031)	(0.025)
Born Abroad	0.084***	0.089**	0.082***	0.087**
	(0.015)	(0.033)	(0.017)	(0.037)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Pre-1933 Quality	Yes	Yes		
Pre-1933 Publication Record			Yes	Yes
Number of Observations	1327	1327	1327	1327
R^2	0.652		0.650	
Kleibergen-Paap rk Wald F-statistic		67.177		48.702
Mean of Dep. Variable	0.741	0.741	0.741	0.741

Notes: The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. The main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 and 4 we instrument these variables with the number of early dismissals among the pre-1933 network of colleagues and with an indicator that equals 1 if academic *i* him/herself was dismissed early (see appendix Table A.5 for the first stage results). In columns 1 and 2 we control for indicators for whether academic *i* ranked in the 51-80th, 81-90th, or 91-100th percentile of the subject-level distribution of pre-1933 academic reputation, as measured by the number of bibliographical compendia that list each academic. In columns 3 and 4 we control for indicators for whether academic *i* ranked in the 51-80th, 81-90th, or 91-100th percentile of the pre-1933 subject-level publication distribution. For a small number of academics, information on some control variables (family status, language proficiency, place of birth, academic reputation, and publications) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 6: Professional Networks and Emigration – Mechanisms

	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network – More Recent Colleagues)	0.100**	0.080**				
	(0.042)	(0.034)				
# Early Émigrés (Pre-1933 Network – Less Recent Colleagues)	0.051***	0.049***				
	(0.018)	(0.016)				
# Early Émigrés (Pre-1933 Network – Same Department)			0.063***	0.062***		
			(0.020)	(0.016)		
# Early Émigrés (Pre-1933 Network – Same City and Subject, Different Department)			0.051***	0.048***		
			(0.015)	(0.015)		
# Early Émigrés (Pre-1933 Network) × Natural Sciences and Medicine					0.034**	0.032**
					(0.016)	(0.014)
# Early Émigrés (Pre-1933 Network) × Social Sciences and Humanities					0.157***	0.152**
					(0.049)	(0.056)
Early Émigré	0.348***	0.314**	0.344***	0.314**	0.345***	0.315**
	(0.030)	(0.143)	(0.031)	(0.144)	(0.031)	(0.145)
Female	0.051	0.055	0.051	0.054	0.052	0.055
	(0.048)	(0.050)	(0.048)	(0.050)	(0.048)	(0.050)
Married	-0.003	-0.000	-0.003	-0.000	-0.003	0.001
	(0.017)	(0.021)	(0.017)	(0.021)	(0.018)	(0.021)
Number of Children	0.007	0.007	0.007	0.007	0.007	0.006
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Any Foreign Language	0.056	0.060	0.055	0.060	0.057	0.061
	(0.040)	(0.056)	(0.040)	(0.056)	(0.040)	(0.057)
Pre-1933 Experience Abroad	0.055*	0.059**	0.054*	0.057**	0.059**	0.062***
	(0.030)	(0.024)	(0.031)	(0.025)	(0.028)	(0.022)
Born Abroad	0.083***	0.089**	0.083***	0.088**	0.081***	0.081**
	(0.016)	(0.036)	(0.016)	(0.036)	(0.016)	(0.037)
Academic Rank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1327	1327	1327	1327	1327	1327
R^2	0.649		0.649		0.650	
Kleibergen-Paap rk Wald F-statistic		37.494		36.004		39.126
Mean of Dep. Variable	0.741	0.741	0.741	0.741	0.741	0.741

Notes: The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. In columns 1 and 2, the first main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped between January 1, 1932 and January 1, 1933. The second main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped between January 1, 1929 and January 1, 1931, but not thereafter. In columns 3 and 4, the first main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues from the same institution and subject. The second main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues from other institutions in the same city and subject. In columns 5 and 6, the first main explanatory variable is the interaction of the number of early émigrés from the pre-1933 network of colleagues with an indicator that equals 1 if academic *i*'s specialization is in natural sciences or medicine. The second main explanatory variable is the interaction of the number of early émigrés from the pre-1933 network of colleagues with an indicator that equals 1 if academic *i*'s specialization is in social sciences or humanities. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2, 4, and 6 we instrument these variables with the number of early dismissals among the respective pre-1933 networks of colleagues and with an indicator for whether academic *i* him/herself was dismissed early (see appendix Table A.6 for the first stage results). For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 7: Professional Networks and Emigration To Certain Locations

	(1) OLS	(2) OLS
	Emigrated by 1939 to	
Dep. Variable:	US/UK	Other Countries
# Early Émigrés in US/UK (Pre-1933 Network)	0.428***	-0.294***
	(0.110)	(0.099)
# Early Émigrés in Other (Pre-1933 Network)	-0.352***	0.327**
	(0.115)	(0.121)
Emigrated to US/UK by 1935	0.507***	-0.168***
	(0.036)	(0.019)
Emigrated to Other Countries by 1935	-0.225***	0.569***
	(0.027)	(0.036)
Female	0.113	-0.062
	(0.070)	(0.074)
Married	-0.011	0.006
	(0.042)	(0.036)
Number of Children	0.013	-0.006
	(0.013)	(0.015)
Any Foreign Language	0.088**	-0.031
	(0.033)	(0.033)
Pre-1933 Experience Abroad	0.036	0.019
	(0.100)	(0.080)
Born Abroad	-0.006	0.089***
	(0.034)	(0.025)
Academic Rank FE	Yes	Yes
Year of Birth FE	Yes	Yes
City × Subject (1929-1933)	Yes	Yes
Number of Observations	1327	1327
R^2	0.583	0.541
Mean of Dep. Variable	0.414	0.327

Notes: The dependent variable is an indicator that equals 1 if academic *i* had emigrated to the United States or the United Kingdom (column 1) or to other countries (column 2) by January 1, 1939. The first main explanatory variable is the number of early émigrés in the United States or the United Kingdom from the pre-1933 network of colleagues. The second main explanatory variable is the number of early émigrés in other countries from the pre-1933 network of colleagues. Other important explanatory variables are academic *i*'s own early émigré status in the US/UK or in other countries. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 8: Professional Networks, Community Networks, and Emigration

	(1) OLS	(2) IV	(3) OLS	(4) IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network)	0.052***	0.048***	0.053***	0.049***
	(0.014)	(0.014)	(0.014)	(0.014)
# Early Émigrés (Community Network ± 5 Years)	-0.000	-0.000		
	(0.000)	(0.000)		
# Early Émigrés (Community Network All Years)			-0.000	-0.000
			(0.000)	(0.000)
Early Émigré	0.342***	0.315**	0.342***	0.313**
	(0.031)	(0.144)	(0.031)	(0.144)
Female	0.052	0.054	0.052	0.055
	(0.047)	(0.049)	(0.048)	(0.049)
Married	-0.003	-0.000	-0.003	-0.000
	(0.017)	(0.020)	(0.017)	(0.021)
Number of Children	0.007	0.007	0.007	0.007
	(0.014)	(0.014)	(0.014)	(0.014)
Any Foreign Language	0.055	0.059	0.056	0.060
	(0.040)	(0.056)	(0.039)	(0.056)
Pre-1933 Experience Abroad	0.054*	0.057**	0.055*	0.058**
	(0.029)	(0.024)	(0.030)	(0.024)
Born Abroad	0.078***	0.083**	0.080***	0.085**
	(0.018)	(0.038)	(0.019)	(0.038)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Number of Observations	1327	1327	1327	1327
R^2	0.649		0.649	
Kleibergen-Paap rk Wald F-statistic		60.892		62.452
Mean of Dep. Variable	0.741	0.741	0.741	0.741

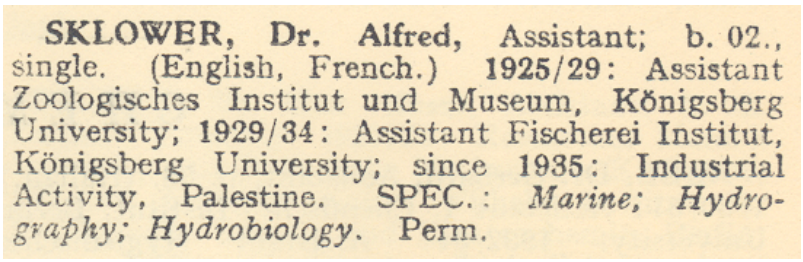
Notes: The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. The first main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues. In columns 1 and 2, the second main explanatory variable is the number of early émigrés who were born in the same place as academic *i* within ± 5 years. In columns 3 and 4, the second main explanatory variable is the number of early émigrés who were born in the same place as academic *i*. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 and 4 we instrument the pre-1933 network of colleagues with the pre-1933 network of colleagues of academic *i* who had been dismissed early and the emigration status in 1935 with an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Part I

Online Appendix

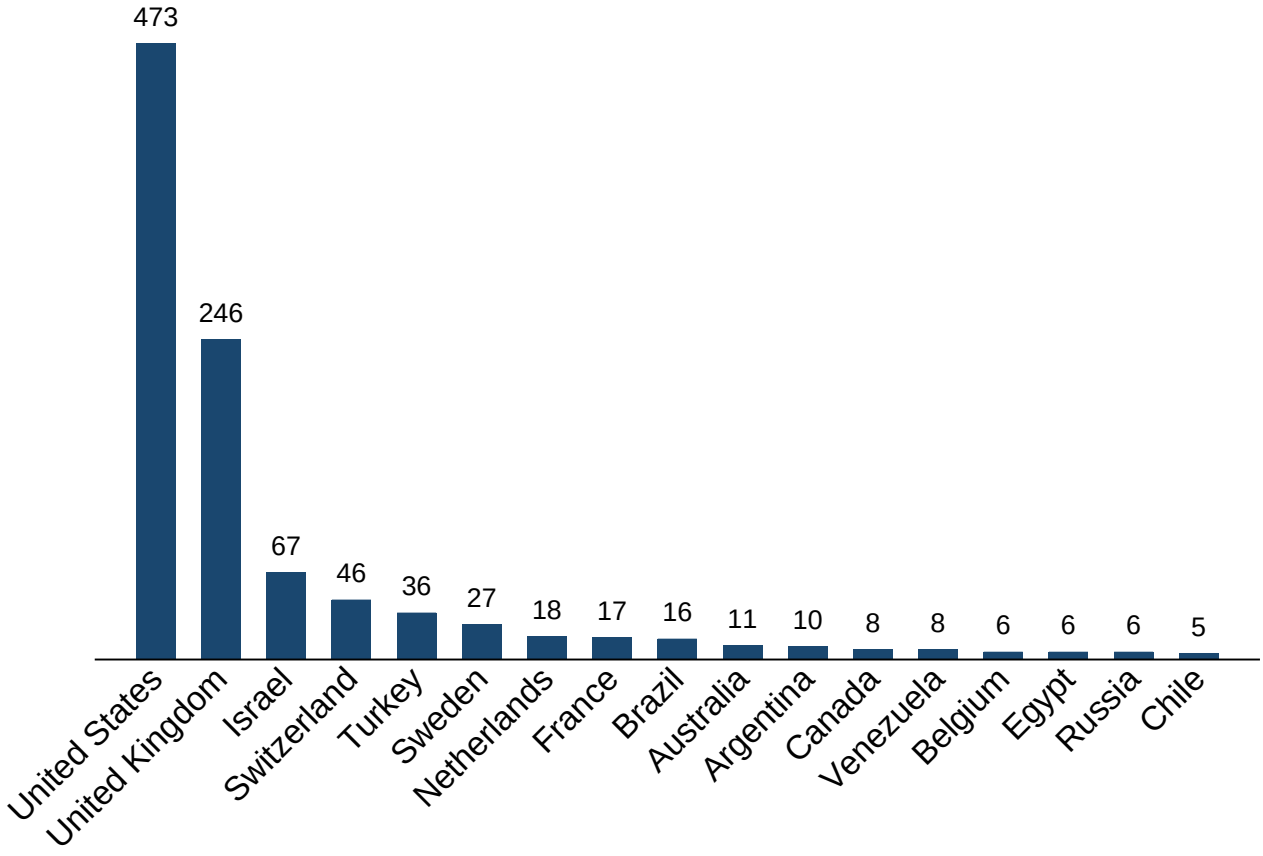
A Online Appendix Figures and Tables

Figure A.1: Entry of Alfred Sklower on the List of Displaced German Scholars


SKLOWER, Dr. Alfred, Assistant; b. 02., single. (English, French.) 1925/29: Assistant Zoologisches Institut und Museum, Königsberg University; 1929/34: Assistant Fischerei Institut, Königsberg University; since 1935: Industrial Activity, Palestine. SPEC.: *Marine; Hydrography; Hydrobiology.* Perm.

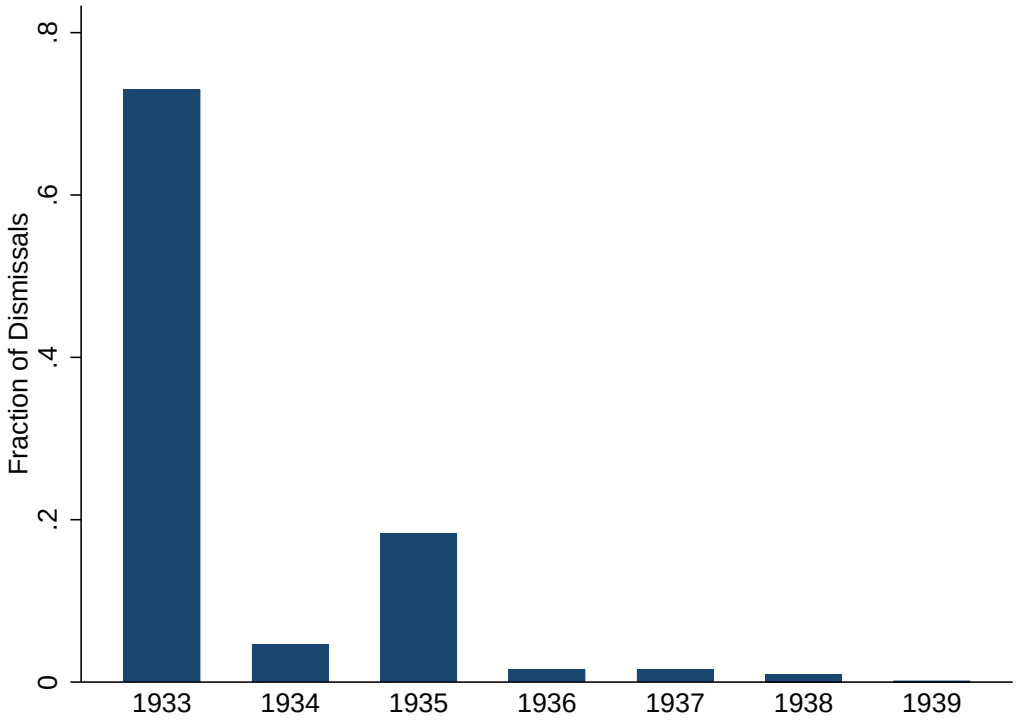
Notes: The Figure shows the entry for Alfred Sklower on the *List of Displaced German Scholars.* From this entry we reconstruct his career after 1935 as described in section 2.1.

Figure A.2: Main Destination Countries in 1945



Notes: The Figure reports the number of Jewish academics who had emigrated from Nazi Germany in each destination for January 1, 1945. Only countries with at least 5 émigrés are reported.

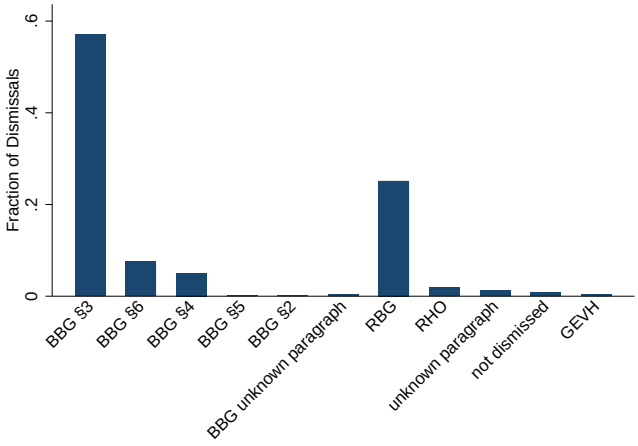
Figure A.3: Dismissal Years



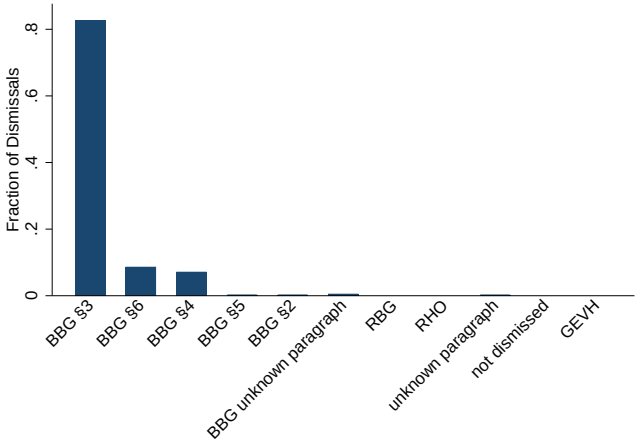
Notes: The Figure shows dismissal years of Jewish academics. The data were collected by the authors (see section 2 for details).

Figure A.4: Dismissal Paragraphs

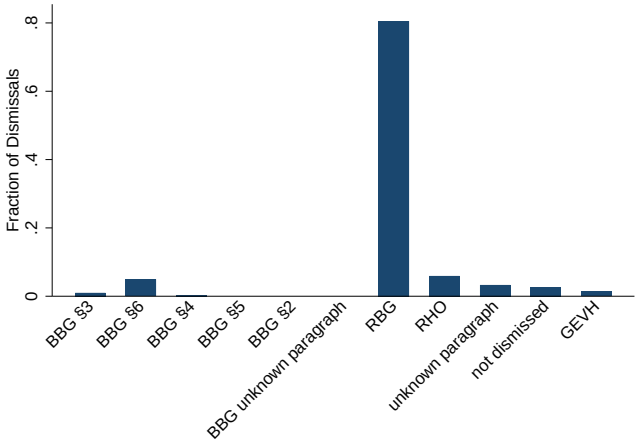
(a) All Dismissals



(b) Early Dismissals

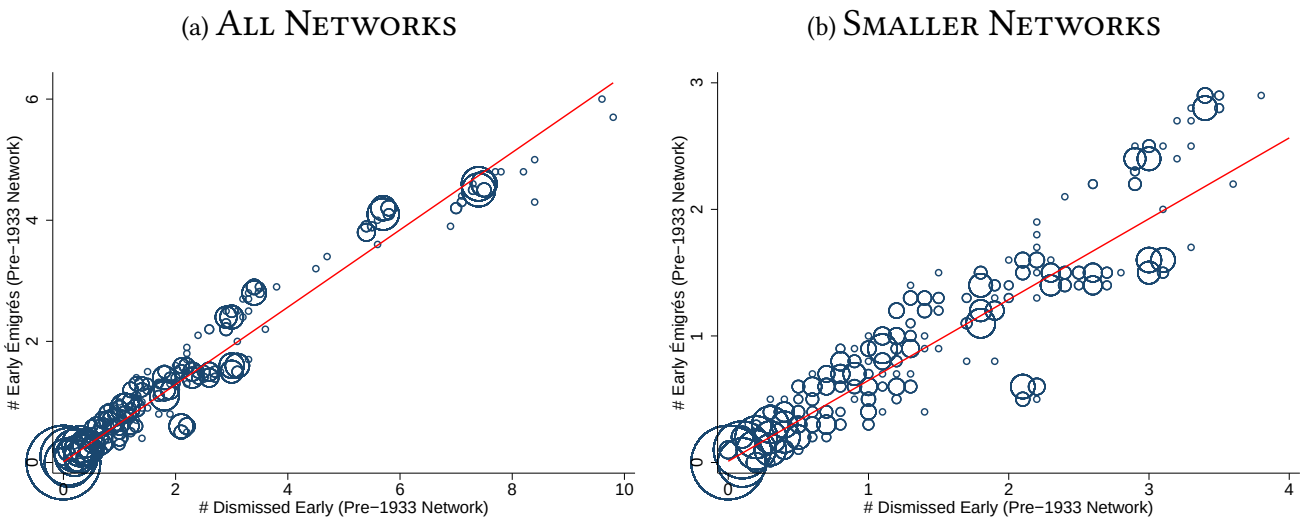


(c) Later Dismissals



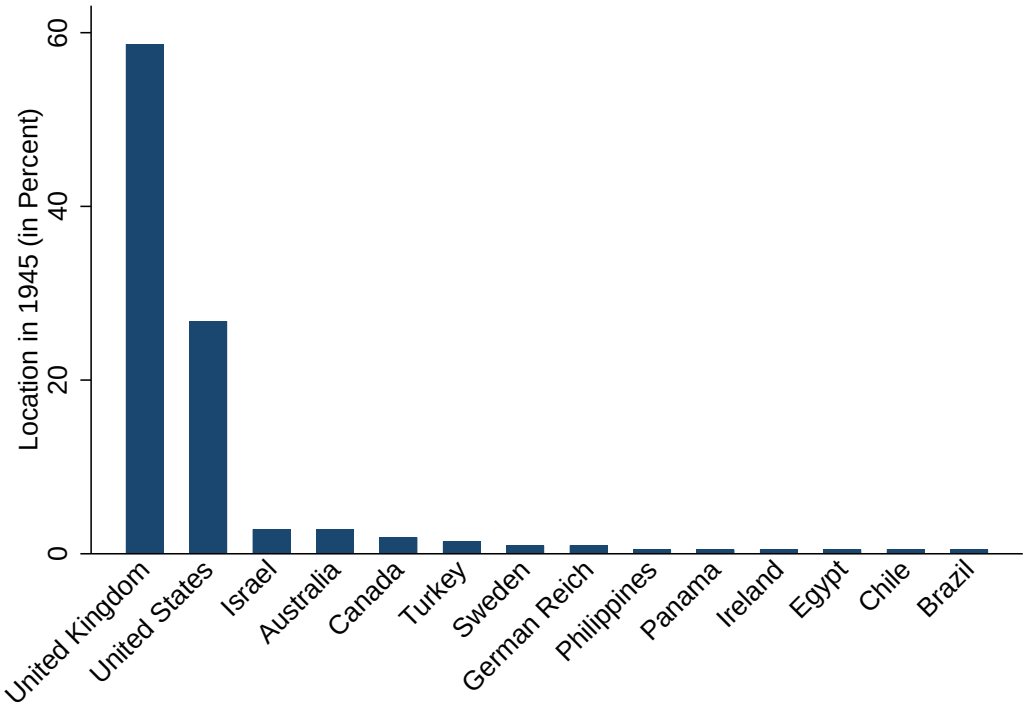
Notes: The Figure shows dismissal paragraphs for senior academics (professor, associate professor, honorary professor, and *Privatdozent*). Dismissals occurred on the basis of *Law for the Restoration of the Professional Civil Service* (BBG), the *Reich Citizenship Law* (RBG), the *Reichshabilitationsordnung* (RHO), and the *Law on the Retirement and Transfer of Professors as a Result of the Reorganization of the German System of Higher Education* (GEVH). Appendix B.1 provides further details on the laws. The contracts of junior academics were all terminated in 1933 without officially referring to the laws that applied to senior academics.

Figure A.5: First Stage Relationship



Notes: Panel a shows the first-stage relationship for the full dataset. Panel b zooms into the subsample of academics for whom the number of early dismissals among the pre-1933 network was smaller than 40. Note, networks are scaled by dividing the network size by 10. This scaling makes regression coefficients easier to read. The circles are weighted by the number of observations.

Figure A.6: Destination Country in 1945 for Early Émigrés to the UK



Notes: The Figure shows the 1945 destination for early émigrés who had emigrated to the United Kingdom by 1935.

Figure A.7: Key Scientists Involved in the Manhattan Project

(a) All Key Scientists

(b) Without Émigrés from Europe

Notes: The Figure reports scientists who were key for the success of the Manhattan Project. The list of scientists comes from en.wikipedia.org/wiki/Manhattan_Project which includes links to the most important scientists who were involved in the Manhattan project. The size of the pictures reflects the approximate importance of each scientist for the success of the project.

Table A.1: Professional Networks and Emigration – Excluding Coauthors

	(1)	(2)	(3)	(4)
Sample:	Academics Without Coauthors		Academics Without Coauthors Among Colleagues	
	OLS	IV	OLS	IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network)	0.061***	0.056**	0.058***	0.052***
	(0.020)	(0.021)	(0.018)	(0.019)
Early Émigré	0.338***	0.374**	0.341***	0.355**
	(0.034)	(0.175)	(0.032)	(0.147)
Female	0.031	0.028	0.052	0.051
	(0.050)	(0.049)	(0.048)	(0.049)
Married	-0.011	-0.013	-0.004	-0.005
	(0.020)	(0.021)	(0.017)	(0.017)
Number of Children	0.007	0.007	0.008	0.008
	(0.015)	(0.016)	(0.014)	(0.014)
Any Foreign Language	0.052*	0.046	0.057	0.055
	(0.030)	(0.050)	(0.035)	(0.052)
Pre-1933 Experience Abroad	0.050	0.045*	0.048	0.047*
	(0.034)	(0.023)	(0.035)	(0.025)
Born Abroad	0.089***	0.082*	0.097***	0.094**
	(0.017)	(0.042)	(0.019)	(0.040)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Number of Observations	1231	1231	1272	1272
R^2	0.658		0.655	
Kleibergen-Paap rk Wald F-statistic		42.948		53.082
Mean of Dep. Variable	0.736	0.736	0.737	0.737

Notes: In columns 1 and 2, the sample includes only academics without coauthors among all Jewish academics. In columns 3 and 4, the sample includes only academics without coauthors among Jewish colleagues in the same city and subject. The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. The main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 and 4 we instrument these variables with the number of early dismissals among the pre-1933 network of colleagues and with an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.2: Professional Networks and Emigration — Emigrated by 1935 vs. Not-Emigrated by 1935

	(1)	(2)	(3)	(4)
Sample:	Emigrated by 1935		Not-Emigrated by 1935	
	OLS	IV	OLS	IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network)	0.007	0.008	0.155***	0.137***
	(0.015)	(0.014)	(0.039)	(0.043)
Female	-0.027	-0.027	0.046	0.047
	(0.041)	(0.041)	(0.260)	(0.261)
Married	0.006	0.006	-0.046	-0.047
	(0.013)	(0.013)	(0.060)	(0.060)
Number of Children	-0.005	-0.005	-0.013	-0.013
	(0.004)	(0.004)	(0.027)	(0.027)
Any Foreign Language	-0.020	-0.020	0.119*	0.118*
	(0.013)	(0.013)	(0.061)	(0.061)
Pre-1933 Experience Abroad	0.035	0.035	-0.054	-0.051
	(0.024)	(0.024)	(0.107)	(0.106)
Born Abroad	0.018	0.017	0.198***	0.198***
	(0.014)	(0.014)	(0.058)	(0.058)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Number of Observations	693	693	634	634
R^2	0.559		0.652	
Kleibergen-Paap rk Wald F-statistic		633.382		617.029
Mean of Dep. Variable	0.984	0.984	0.475	0.475

Notes: In columns 1 and 2, the sample includes all academics who had emigrated by January 1, 1935. In columns 3 and 4, the sample includes only academics who had not emigrated by January 1, 1935. The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. The main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 and 4 we instrument these variables with the number of early dismissals among the pre-1933 network of colleagues and with an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.3: Professional Networks and Emigration – Robustness on Natural Deaths

	(1)	(2)	(3)	(4)
	Excluding Natural Deaths		Imputing 1939 Emigration Status for Natural Deaths	
	OLS	IV	OLS	IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network)	0.055***	0.052***	0.052***	0.050***
	(0.015)	(0.016)	(0.014)	(0.014)
Early Émigré	0.321***	0.359**	0.322***	0.315*
	(0.033)	(0.162)	(0.028)	(0.171)
Female	0.041	0.038	0.042	0.042
	(0.051)	(0.051)	(0.048)	(0.051)
Married	0.001	-0.002	-0.006	-0.005
	(0.020)	(0.024)	(0.019)	(0.023)
Number of Children	0.003	0.003	0.003	0.003
	(0.015)	(0.015)	(0.012)	(0.012)
Any Foreign Language	0.061**	0.056	0.049*	0.050
	(0.029)	(0.048)	(0.029)	(0.050)
Pre-1933 Experience Abroad	0.050*	0.046**	0.045*	0.045*
	(0.025)	(0.022)	(0.026)	(0.024)
Born Abroad	0.086***	0.079*	0.091***	0.093**
	(0.020)	(0.043)	(0.018)	(0.043)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Number of Observations	1227	1227	1327	1327
R^2	0.635		0.654	
Kleibergen-Paap rk Wald F-statistic		55.898		56.849
Mean of Dep. Variable	0.772	0.772	0.745	0.745

Notes: In columns 1 and 2 we drop academics who had died of natural causes by January 1, 1939. In columns 3 and 4 we include all academics. For academics who died of natural causes before January 1, 1939 we predict their emigration status as of January 1, 1939 (see appendix D for details). The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. The main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 and 4 we instrument these variables with the number of early dismissals among the pre-1933 network of colleagues and with an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.4: Academics With the Highest Reputation

Name	Number of Pre-1933 Sources	Name	Number of Pre-1933 Sources	Year of Nobel Prize
Panel A – Mathematics		Panel B – Physics		
Edmund Landau	6	Albert Einstein	11	1921
Leon Lichtenstein	6	Leo Graetz	10	
Arthur Korn	5	Emil Cohn	6	
Felix Bernstein	4	Max Born	5	1954
Alfred Pringsheim	4	Rudolf Ladenburg	4	
Alfred Loewy	4	Alfred Byk	4	
Paul Epstein	4	James Franck	3	1925
Theodor von Karman	3	Gustav Hertz	3	1925
Felix Hausdorff	3	Erwin Finlay-Freundlich	3	
Otto Szasz	3	Emil Less	3	
Eugen Würzburger	3	Eugene Wigner	2	1963
Richard von Mises	2	Franz Simon	2	
John von Neumann	2	Harry Dember	2	
Issai Schur	2	Paul Hertz	2	
Richard Courant	2	Marcello Pirani	2	
Panel C – Philosophy		Panel D – Biochemistry		
Theodor Lessing	10	Carl Neuburg	5	
Max Dessoir	9	Otto Warburg	4	1931
Ernst Cassirer	5	Heinrich Bechhold	4	
Emil Utitz	5	Felix Ehrlich	4	
Julius Guttmann	4	Carl Oppenheimer	3	
Jonas Cohn	4	Fritz Laquer	2	
Ernst Bresslau	4	Hans Krebs	1	1953
Richard Hönigswald	3	Eduard Strauss	1	
Isaak Heinemann	2	Rudolf Schönheimer	1	
Moritz Geiger	2	Erwin Chargaff	1	
Siegfried Marck	2	Hans Pringsheim	1	
Arthur Liebert	2	Max Lemberg	1	
Günther Jacoby	2	Georg Ettisch	1	
Theodor Adorno	1	Ernst Chain	0	1945
Richard Kroner	1	Ernst Wertheimer	0	

Table A.4: Academics With the Highest Reputation

Name	Number of Pre-1933 Sources	Name	Number of Pre-1933 Sources	Year of Nobel Prize
Panel E – Philology		Chemistry		
Victor Klemperer	5	Fritz Haber	7	1919
Franz Babinger	4	Kasimir Fajans	5	
Georg Witkowski	3	George de Hevesy	4	1943
Julius Pokorny	3	Victor Goldschmidt	4	
Richard Samuel	3	Emanuel Goldberg	4	
Max Herrmann	3	Willy Marckwald	4	
Otto Bremer	3	Friedrich Paneth	4	
Leo Spitzer	2	Peter Rona	4	
Eugen Mittwoch	2	Julius von Braun	4	
Eduard Norden	2	Karl Herrmann	4	
Walter Berendsohn	2	Herbert Freundlich	3	
Salomon Birnbaum	2	Georg Bredig	3	
Max Freiherr von Waldberg	2	Reginald Herzog	3	
Gotthold Weil	1	Isidor Traube	3	
Harry Torcyner	1	Rudolf Ehrenberg	3	

Notes: The Table lists the top 15 academics with the highest academic reputation in the mathematics, physics, philosophy, biochemistry, philology, and chemistry. We measure academic reputation according to the appearance in biographical compendia (see appendix B.2.5 for details). We rank academics based on their appearance in the number of pre-1933 biographical compendia. In case of ties in the number of pre-1933 biographical compendia, we rank the academics based on their appearance in all biographical compendia, even those that appeared after 1933. The latter variable is not reported.

Table A.5: First Stage Results – Controlling for Quality

	(1)	(2)	(3)	(4)
	# Early Émigrés		# Early Émigrés	
Dep. Variable:	(Pre-1933 Network)	Early Émigré	(Pre-1933 Network)	Early Émigré
# Dismissed Early (Pre-1933 Network)	0.620***	-0.009	0.619***	-0.009
	(0.016)	(0.031)	(0.016)	(0.031)
Early Dismissal	0.037***	0.283***	0.037***	0.283***
	(0.004)	(0.024)	(0.004)	(0.028)
Female	-0.010	0.086	-0.011	0.068
	(0.012)	(0.090)	(0.011)	(0.092)
Married	-0.007	0.081***	-0.007	0.087***
	(0.007)	(0.030)	(0.007)	(0.027)
Number of Children	-0.003	0.003	-0.002	0.002
	(0.002)	(0.013)	(0.002)	(0.012)
Any Foreign Language	-0.018***	0.138***	-0.018**	0.141***
	(0.006)	(0.045)	(0.007)	(0.043)
Pre-1933 Experience Abroad	-0.021*	0.109	-0.021*	0.115
	(0.011)	(0.121)	(0.010)	(0.113)
Born Abroad	-0.008	0.159***	-0.008	0.159***
	(0.006)	(0.031)	(0.006)	(0.033)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Pre-1933 Quality	Yes	Yes		
Pre-1933 Publication Record			Yes	Yes
Number of Observations	1327	1327	1327	1327
R^2	0.998	0.514	0.998	0.510
F-statistic (excluded instruments)	922.911	70.518	964.012	49.538
Kleibergen-Paap rk Wald F-statistic	67.177		48.702	
Mean of Dep. Variable	1.115	0.522	1.115	0.522

Notes: The Table reports first stage regressions. The dependent variable in columns 1 and 3 is equal to the number of early émigrés from the pre-1933 network of colleagues. The dependent variable in columns 2 and 4 is an indicator that equals 1 if academic *i* him/herself was an early émigré. The first instrument is the number of early dismissals among the pre-1933 network of colleagues. The second instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early. In columns 1 and 2 we control for indicators for whether academic *i* ranked in the 51-80th, 81-90th, or 91-100th percentile of the subject-level distribution of pre-1933 academic reputation, as measured by the number of bibliographical compendia that list each academic. In columns 3 and 4 we control for indicators for whether academic *i* ranked in the 51-80th, 81-90th, or 91-100th percentile of the pre-1933 subject-level publication distribution. For a small number of academics, information on some control variables (family status, language proficiency, place of birth, academic reputation, and publications) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.6: First Stage Results – Mechanisms

Dep. Variable:	(1) # Early Émigrés (Pre-1933 Network – Less Recent Colleagues)	(2) # Early Émigrés (Pre-1933 Network – More Recent Colleagues)	(3) Early Émigré	(4) # Early Émigrés (Pre-1933 Network – Same Department)	(5) # Early Émigrés (Pre-1933 Network – Same City and Subject, Different Department)	(6) Early Émigré	(7) # Early Émigrés (Pre-1933 Network) × Natural Sciences and Medicine	(8) # Early Émigrés (Pre-1933 Network) × Social Sciences and Humanities	(9) Early Émigré
# Dismissed Early (Pre-1933 Network – More Recent Colleagues)	-0.015	0.663***	-0.050						
	(0.016)	(0.012)	(0.085)						
# Dismissed Early (Pre-1933 Network – Less Recent Colleagues)	0.620***	-0.001	-0.009						
	(0.021)	(0.013)	(0.035)						
# Dismissed Early (Pre-1933 Network – Same Department)				0.613***	0.020***	-0.040			
				(0.020)	(0.006)	(0.045)			
# Dismissed Early (Pre-1933 Network – Same City and Subject, Different Department)				0.028*	0.590***	-0.006			
				(0.014)	(0.008)	(0.031)			
# Dismissed Early (Pre-1933 Network) × Natural Sciences and Medicine							0.605***	0.001	-0.000
							(0.015)	(0.001)	(0.030)
# Dismissed Early (Pre-1933 Network) × Social Sciences and Humanities							0.003	0.724***	-0.090
							(0.007)	(0.021)	(0.110)
Early Dismissal	0.002	0.038***	0.279***	0.034***	0.005	0.278***	0.024***	0.015***	0.281***
	(0.004)	(0.003)	(0.023)	(0.007)	(0.006)	(0.026)	(0.003)	(0.004)	(0.025)
Female	-0.001	-0.010	0.076	0.021	-0.033**	0.078	-0.003	-0.008	0.075
	(0.007)	(0.009)	(0.088)	(0.019)	(0.012)	(0.089)	(0.006)	(0.007)	(0.089)
Married	0.002	-0.008**	0.085***	0.004	-0.009	0.082***	-0.004	-0.001	0.084***
	(0.007)	(0.003)	(0.026)	(0.008)	(0.005)	(0.027)	(0.008)	(0.002)	(0.026)
Number of Children	-0.001	-0.002	0.003	0.002	-0.005*	0.004	-0.002	-0.001	0.003
	(0.001)	(0.001)	(0.012)	(0.002)	(0.003)	(0.012)	(0.002)	(0.001)	(0.012)
Any Foreign Language	0.001	-0.018***	0.140***	-0.013	-0.004	0.140***	-0.009*	-0.007***	0.139***
	(0.005)	(0.005)	(0.045)	(0.009)	(0.005)	(0.045)	(0.005)	(0.002)	(0.044)
Pre-1933 Experience Abroad	-0.005	-0.017**	0.118	-0.002	-0.022	0.124	-0.010	-0.006**	0.113
	(0.007)	(0.007)	(0.116)	(0.015)	(0.022)	(0.114)	(0.014)	(0.003)	(0.123)
Born Abroad	0.008	-0.016***	0.159***	-0.010	0.001	0.160***	-0.006	-0.004	0.160***
	(0.007)	(0.004)	(0.032)	(0.006)	(0.008)	(0.032)	(0.005)	(0.003)	(0.032)
Academic Rank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1327	1327	1327	1327	1327	1327	1327	1327	1327
R^2	0.983	0.999	0.509	0.990	0.991	0.510	0.999	0.997	0.509
F-statistic (excluded instruments)	295.249	2104.128	54.142	2588.258	11019.499	42.999	687.731	439.617	68.090
Kleibergen-Paap rk Wald F-statistic		37.494			36.004			39.126	
Mean of Dep. Variable	0.105	1.010	0.522	0.676	0.439	0.522	0.885	0.230	0.522

Notes: The Table reports first stage regressions. The dependent variables are defined as follows: In column 1, it is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1932 and January 1, 1933. In column 2, it is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1929 and January 1, 1931, but not thereafter. In columns 3, 6, and 9, it is an indicator that equals 1 if academic *i* him/herself was an early émigré. In column 4, it is the number of early émigrés from the pre-1933 network of colleagues from the same institution and subject. In column 5, it is the number of early émigrés from the pre-1933 network of colleagues from other institutions in the same city and subject. In column 7, it is the interaction of the number of early émigrés from the pre-1933 network of colleagues with an indicator that equals 1 if academic *i*'s specialization is in natural sciences or medicine. In column 8, it is the interaction of the number of early émigrés from the pre-1933 network of colleagues with an indicator that equals 1 if academic *i*'s specialization is in social sciences or humanities. In columns 1-3, the first instrument is the number of early dismissals among the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1932 and January 1, 1933. The second instrument is the number of early dismissals among the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1929 and January 1, 1931, but not thereafter. The third instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early. In columns 4-6, the first instrument is the number of early dismissals among the pre-1933 network of colleagues from the same institution and subject. The second instrument is the number of early dismissals among the pre-1933 network of colleagues from other institutions in the same city and subject. The third instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early. In columns 7-9, the first instrument is the interaction of the number of early dismissals among the pre-1933 network of colleagues with an indicator that equals 1 if academic *i*'s specialization is in natural sciences or medicine. The second instrument is the interaction of the number of early dismissals among the pre-1933 network of colleagues with an indicator that equals 1 if academic *i*'s specialization is in social sciences or humanities. The third instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.7: Professional Networks and Emigration – The Role of More and Less Recent Colleagues

	(1) OLS	(2) OLS	(3) IV	(4) IV
Dep. Variable:	Emigrated by 1939		Emigrated by 1939	
# Early Émigrés (Pre-1933 Network – More Recent Colleagues)	0.100**		0.080**	
	(0.042)		(0.034)	
# Early Émigrés (Pre-1933 Network – More Recent Colleagues, ≥ 3 Years Overlap)		0.097**		0.077**
		(0.042)		(0.032)
# Early Émigrés (Pre-1933 Network – More Recent Colleagues, ≤ 2 Years Overlap)		0.101**		0.080**
		(0.042)		(0.035)
# Early Émigrés (Pre-1933 Network – Less Recent Colleagues)	0.051***	0.050***	0.049***	0.048***
	(0.018)	(0.018)	(0.016)	(0.014)
Early Émigré	0.348***	0.347***	0.314**	0.314**
	(0.030)	(0.030)	(0.143)	(0.145)
Female	0.051	0.051	0.055	0.055
	(0.048)	(0.048)	(0.050)	(0.049)
Married	-0.003	-0.003	-0.000	-0.000
	(0.017)	(0.017)	(0.021)	(0.022)
Number of Children	0.007	0.007	0.007	0.007
	(0.014)	(0.014)	(0.014)	(0.014)
Any Foreign Language	0.056	0.056	0.060	0.060
	(0.040)	(0.040)	(0.056)	(0.057)
Pre-1933 Experience Abroad	0.055*	0.055*	0.059**	0.058**
	(0.030)	(0.030)	(0.024)	(0.025)
Born Abroad	0.083***	0.083***	0.089**	0.089**
	(0.016)	(0.016)	(0.036)	(0.038)
Academic Rank FE	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes
Number of Observations	1327	1327	1327	1327
R^2	0.649	0.649		
Kleibergen-Paap rk Wald F-statistic			37.494	28.052
Mean of Dep. Variable	0.741	0.741	0.741	0.741

Notes: The dependent variable is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. In columns 1 and 3, the first main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1932 and January 1, 1933. The second main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1929 and January 1, 1931, but not thereafter. In columns 2 and 4, the first main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1932 and January 1, 1933, and for at least three years between 1929 and 1933. The second main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1932 and January 1, 1933, and at most two years between 1929 and 1933. The third main explanatory variable is the number of early émigrés from the pre-1933 network of colleagues who overlapped with academic *i* between January 1, 1929 and January 1, 1931, but not thereafter. Another important explanatory variable is academic *i*'s own early émigré status. In columns 3 and 4 we instrument these variables with the corresponding number of early dismissals among the respective pre-1933 networks of colleagues and with an indicator that equals 1 if academic *i* him/herself was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. We also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table A.8: Individual Probability of Emigration by 1935

Dep. Variable: Early Émigré	(1)	(2)	(3)	(4)	(5)	(6)
Early Dismissal	0.336***	0.338***	0.294***	0.301***	0.300***	0.284***
	(0.022)	(0.021)	(0.022)	(0.021)	(0.024)	(0.027)
Age 30-39 in 1933	-0.078**	-0.089**	-0.075*	-0.060		
	(0.036)	(0.039)	(0.038)	(0.048)		
Age 40-49 in 1933	-0.161***	-0.177***	-0.169***	-0.154**		
	(0.029)	(0.032)	(0.033)	(0.062)		
Age 50-59 in 1933	-0.317***	-0.323***	-0.289***	-0.281***		
	(0.043)	(0.044)	(0.047)	(0.073)		
Age 60- in 1933	-0.523***	-0.520***	-0.412***	-0.404***		
	(0.038)	(0.041)	(0.056)	(0.075)		
Female	0.034	0.060	0.069	0.066	0.089	0.075
	(0.059)	(0.057)	(0.064)	(0.064)	(0.063)	(0.089)
Married		0.044*	0.041	0.041	0.043	0.085***
		(0.025)	(0.027)	(0.027)	(0.027)	(0.026)
Number of Children		0.002	0.006	0.006	0.009	0.003
		(0.010)	(0.010)	(0.010)	(0.009)	(0.012)
Any Foreign Language			0.127***	0.128***	0.124***	0.140***
			(0.035)	(0.036)	(0.034)	(0.046)
Pre-1933 Experience Abroad			0.188***	0.191***	0.176***	0.117
			(0.055)	(0.059)	(0.060)	(0.118)
Born Abroad			0.151***	0.147***	0.161***	0.159***
			(0.025)	(0.026)	(0.027)	(0.032)
Academic Rank FE				Yes	Yes	Yes
Year of Birth FE					Yes	Yes
City × Subject (1929-1933)						Yes
Number of Observations	1327	1327	1327	1327	1327	1327
R^2	0.221	0.233	0.271	0.275	0.301	0.509
Mean of Dep. Variable	0.522	0.522	0.522	0.522	0.522	0.522

Notes: The dependent variable is an indicator that equals 1 if academic *i* him/herself was an early émigré. The main explanatory variable is an indicator that equals 1 if academic *i* was dismissed early. For a small number of academics, information on some control variables (family status, language proficiency, and the place of birth) is missing. The regressions therefore also include unreported indicators for missing information on these variables. From column 4 onwards, we also include fixed effects for each academic rank, year of birth fixed effects, and controls for the city × subject history. Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

B Online Appendix: Further Details on the Historical Overview and Data Collection

B.1 Further Details on the Legal Basis for Dismissals

B.1.1 Early Dismissals 1933-1934

Law for the Restoration of the Professional Civil Service, April 7, 1933

As outlined in the main text, the *Law for the Restoration of the Professional Civil Service* ("Gesetz zur Wiederherstellung des Berufsbeamtentums") was used to dismiss Jewish academics starting as early as 1933. The main parts of the law read as follows:

> Paragraph 2: Officials who have entered into the civil service since the 9th of November, 1918, without the educational background requisite or usual for their career or who lack other qualifications, are to be dismissed from the service.
>
> Paragraph 3: Civil servants who are not of Aryan descent are to be placed in retirement. [...] This does not apply to officials who had already been in the service since the 1st of August, 1914, or who had fought in the World War at the front for the German Reich or for its allies, or whose fathers or sons had been casualties in the World War.
>
> Paragraph 4: Civil servants who, based on their previous political activities, cannot guarantee that they have always unreservedly supported the national state, can be dismissed from service.
>
> Paragraph 6: To simplify administration, civil servants may be placed in retirement...
>
> (Quoted from Hentschel 2011, pp. 22)

All of these paragraphs were applied by the Nazi government to dismiss Jewish academics.[39]

Paragraph 2 of the law was used to dismiss party members of leftist or liberal parties, e.g. all members of the Communist Party.[40] Because German academia was politically relatively conservative, only 0.2 percent of early dismissals of Jewish academics occurred because of paragraph 2 (appendix Figure A.4).

[39] While dismissals under any paragraph meant that the academics lost their university position, the exact dismissal paragraph had implications for their pension rights. Those dismissed under paragraph 2 did not receive a pension. Those dismissed under paragraph 3 received a pension, if they had been a civil servant for at least 10 years. Those dismissed under paragraph 4 also received a pension, if they had been a civil servant for at least 10 years, but after three months their pension was cut by 25% (Kinas 2018, p. 42). Those dismissed under paragraph 6 received a pension according to the pre-Nazi era pension rights.

[40] As explained in Hentschel (2011): "The Weimar Republic was proclaimed on Nov. 9, 1918 in Berlin. This provision gives the false impression that many official appointments made during the Weimar period had been entirely politically motivated."

As described in the main text, the infamous paragraph 3 directly targeted academics of Jewish decent.

Paragraph 4 targeted "politically unreliable" individuals in the eyes of the Nazi regime, e.g. people who openly supported Social Democrat or Liberal views. Paragraph 4 was stricter than paragraph 3 because it did not allow for exemptions. As the proportion of left-wing individuals among academics was low, only 5.1 percent of early dismissals of Jewish academics occurred because of paragraph 4 (appendix Figure A.4).

Finally, paragraph 6 was the most unspecific paragraph and paved the way for more arbitrary dismissals but its use came at a considerable cost: the position (e.g. the professorship) of the dismissed individual was irrevocably forfeited. Overall, about 7.5 percent of early dismissals of Jewish academics occurred because of paragraph 6 (appendix Figure A.4).

Dismissals under paragraphs 2-4 had to be completed until the summer of 1934. Dismissals under the paragraph 6 could be carried out until 1937 (Kinas 2018, pp. 36). See Kinas (2018, pp. 35) for a detailed description of dismissals according to the *Law for the Restoration of the Professional Civil Service*.

B.1.2 Late Dismissals: After 1935

The following laws constituted the second phase of dismissals that started in 1935 and targeted all Jewish academics who were previously exempt from dismissals under the *Law for the Restoration of the Professional Civil Service*. The main law to dismiss Jewish academics after 1935 was the *Reich Citizenship Law*. Furthermore, some additional laws were used to dismiss a small number of Jewish academics in this second phase of dismissals.

Reich Citizenship Law, September 15, 1935

The infamous *Reich Citizenship Law* ("Reichsbürgergesetz" – RBG) formed part of the so-called Nuremberg Laws that were passed in September 1935. The RBG revoked the citizenship status of all German Jews[41] and therefore provided the legal basis for further dismissals. The first implementation decree of the RBG imposed that only citizens could become civil servants and as a consequence ordered that Jewish civil servants had to retire by December 31, 1935. In a second implementation decree the law was expanded to all academics, independent of whether they were civil servants.

Law on the Retirement and Transfer of Professors as a Result of the Reorganization of the German System of Higher Education, January 21, 1935

The *Law on the Retirement and Transfer of Professors as a Result of the Reorganization of the German System of Higher Education* ("Gesetz über die Entpflichtung und Versetzung von Hochschullehrern

[41] The Nazis defined Jews as individuals with at least three Jewish grandparents or alternatively as individuals with two Jewish grandparents who were practicing Jews or married to Jews.

aus Anlass des Neuaufbaus des Hochschulwesens" – GEVH) was passed in January 1935. It specified that professors had to retire at the end of the semester they turned 65. It further specified that emeritus professors were not allowed to continue to teach unless the rector of the university gave special permission to do so. The law enabled universities to dismiss their Jewish emeritus professors who were previously exempted from the *Law for the Restoration of the Professional Civil Service*. It was applied for a few dismissals in 1935 until the *Reich Citizenship Law* was passed.

Reichshabilitationsordnung (RHO), December 13, 1934

The first Reichshabilitationsordnung from 1934 separated the habilitation and the *venia legendi* (the right to teach at universities). Up to then, the habilitation immediately granted the right to teach at universities and was conferred by a university. The new regulations downgraded the habilitation to a purely academic degree granted by the university. From now on, the Reich Ministry of Science, Education, and Culture was in charge of granting the right to teach. Furthermore, the ministry could revoke the *venia legendi* "in the interest of the university" due to paragraph 18 RHO. Up to 1939, the RHO served as main tool to dismiss Jewish academics from their positions as Privatdozent and their positions as associate professors in case they were not employed as civil servants (Kinas 2018, p. 45).[42] In our sample, the RHO was applied for a few dismissals in 1935 before the *Reich Citizenship Law* was passed and for a few post-1935 dismissals that targeted academics with at most two Jewish grandparents who were not affected by the BBG and RBG.

B.2 Further Details on Reconstructing Detailed Biographies

B.2.1 Further Details on the Roster of Dismissed Jewish Academics

As described in the main text, we augment the information contained in the List of Displaced German Scholars with university level and subject level studies describing dismissals from German universities. The sources are as follows:

University	Source
General	Grüttner and Kinas (2007); Gerstengarbe (1994)
University of Aachen	http://www.archiv.rwth-aachen.de/lehrkoerper
Technical University of Berlin	http://cp.tu-berlin.de; Baganz (2013)
University of Berlin	Kinas (2018); Tenorth et al. (2012); Fischer et al. (1994)
University of Bonn	Forsbach (2014); Höpfner (1999); Schmoeckel (2004); Becker, ed (2008)
Technical University of Braunschweig	Szabó (2000)

[42]There were two types of associate professors: associate professors employed as civil servants (beamtete außerordentliche Professoren) and associate professors not employed as civil servants (nichtbeamtete außerordentliche Professoren).

Technical University of Breslau	Kranich (2018)
University of Breslau	Kranich (2018)
Technical University of Dresden	Pommerin et al. (2003); Petschel (n.d.)
Medizinische Akademie Düsseldorf	Esch (1997)
University of Frankfurt	Kinas (2018); Epple et al. (2016)
University of Freiburg	Martin (1995)
University of Gießen	Chroust (1994); Oehler-Klein (2007)
University of Göttingen	Becker et al. (2013); Szabó (2000)
University of Greifswald	Kinas (2018); Eberle (2016)
University of Halle	http://www.catalogus-professorum-halensis.de; Kinas (2018); Stengel (2016)
University of Hamburg	hpk.uni-hamburg.de; Krause et al. (1991); Nicolaysen (1983)
Technical University of Hannover	Szabó (2000); Jung (2013)
Tierärztliche Hochschule Hannover	Szabó (2000)
University of Heidelberg	Drüll (1986, 2009); Eckart et al. (2006); Mußgnug (1988); Schultes (2010)
University of Jena	Hendel et al. (2007)
Technical University of Karlsruhe	Hoepke (2007); Seidl (2009)
University of Kiel	http://cau.gelehrtenverzeichnis.de; Uhlig (1991); Cornelißen and Mish (2009)
University of Köln	Golczewski (1988)
University of Königsberg	Tilitzki (2013, 2014)
University of Leipzig	https://research.uni-leipzig.de/catalogus-professorum-lipsiensium; Lambrecht (2006)
Handelshochschule Mannheim	Bollmus (1973)
University of Marburg	Nagel and Sieg (2000)
Technical University of Munich	Herrmann and Nerdinger (2018)
University of Munich	Böhm (1995)
University of Münster	Happ and Jüttemann (2018)
University of Rostock	http://cpr.uni-rostock.de;Buddrus and Fritzlar (2007)
Technical University Stuttgart	Becker and Nagel (2018)
University of Tübingen	Wiesing (2010)
University of Würzburg	Benkert (2005)
Kaiser-Wilhelm-Institut	Rürup and Schüring (2008); Steinhauser et al. (2011); Beyler (2004, 2006); Schüring (2006)

Subject	Source
Art History	Wendland (1998)
Chemistry	Deichmann (1999, 2001); Maier (2015)
Economics	Hagemann and Krohn (2014)
Geography – Geology	Hoppe and Hoppe (2018)
Mathematics	Siegmund-Schultze (2009)
Medicine	https://www.dgkj.de/die-gesellschaft/geschichte/ juedische-kinderaerztinnen-und-aerzte-1933-1945 https://geschichte.charite.de/verfolgte-aerzte; Möllers (2002)
Musicology	https://www.lexm.uni-hamburg.de
Philology	https://zflprojekte.de/sprachforscher-im-exil; Maas (2016)
Physics	Beyerchen (1977)
Psychology	Wolfradt et al. (2017)
Sociology	Wittebur (1991)

B.2.2 Career Stages

As described in the main text, we collect information on career stages for all Jewish academics. For each career stage we collect information on the start and end date as well as information on the position and the exact location. In some cases, academics held multiple positions at the same time. A location usually contains the name of the university or institute where the academic is employed. In some cases, the historical records do not report an employment relationship, but simply the location were the academic lived in a specified period (e.g. lived in London). In those cases we record information on the city of residence and/or the country of residence. We use the information on the start and end date to extract information on all relevant positions of an academic as of January 1 in each given year in our sample. Further, we use the Geolocation API from Google to extract coordinates, the city of the location, and the country of the location.

In some cases, the biographical data do not allow us to determine the exact position as of January 1 in each year (e.g., because a position ended prior to January 1 and the new position started after January 1). To fill these gaps, we impute locations in a time window of plus and minus ten years as follows:

1. If the reported location before and after the gap is identical (e.g. identical university, or identical private sector employer before and after), we impute the gap with the exact location. E.g. we have information that an academic started to work at Harvard University in 1936 (but we have no information on when the employment ended) and we find a paper published in 1939 that also lists Harvard University as the affiliation, we assume that he/she was at Harvard as of January 1 of 1937, 1938, and 1939.

2. If the exact location before and after the gap is different, but the city is identical, we impute the gap with the city. E.g. we have information that an academic started to work at Harvard University in 1936 but we find a paper published in 1939 with an affiliation at MIT, we assume that he/she was in Cambridge, MA as of January 1 of 1937, 1938, and 1939 (note: we do not fill in the university for the years 1937 and 1938 because it is not clear whether he/she was affiliated at Harvard or MIT – or even a different university).

3. If the city before and after the gap is different, we check if the country before and after the gap is identical. If it is identical, we assume that the academic remained in the same country. E,g. we have information that an academic started to work at Harvard University in 1936 but we find a paper published in 1939 with an affiliation at Ohio State, we assume that he/she was in the United States as of January 1 of 1936, 1937, 1938, and 1939 (note: we do not fill in the university, or the city, for the years 1937, 1938, and 1939 because it is not clear whether he/she was affiliated at Harvard or Ohio State – or even a different university).

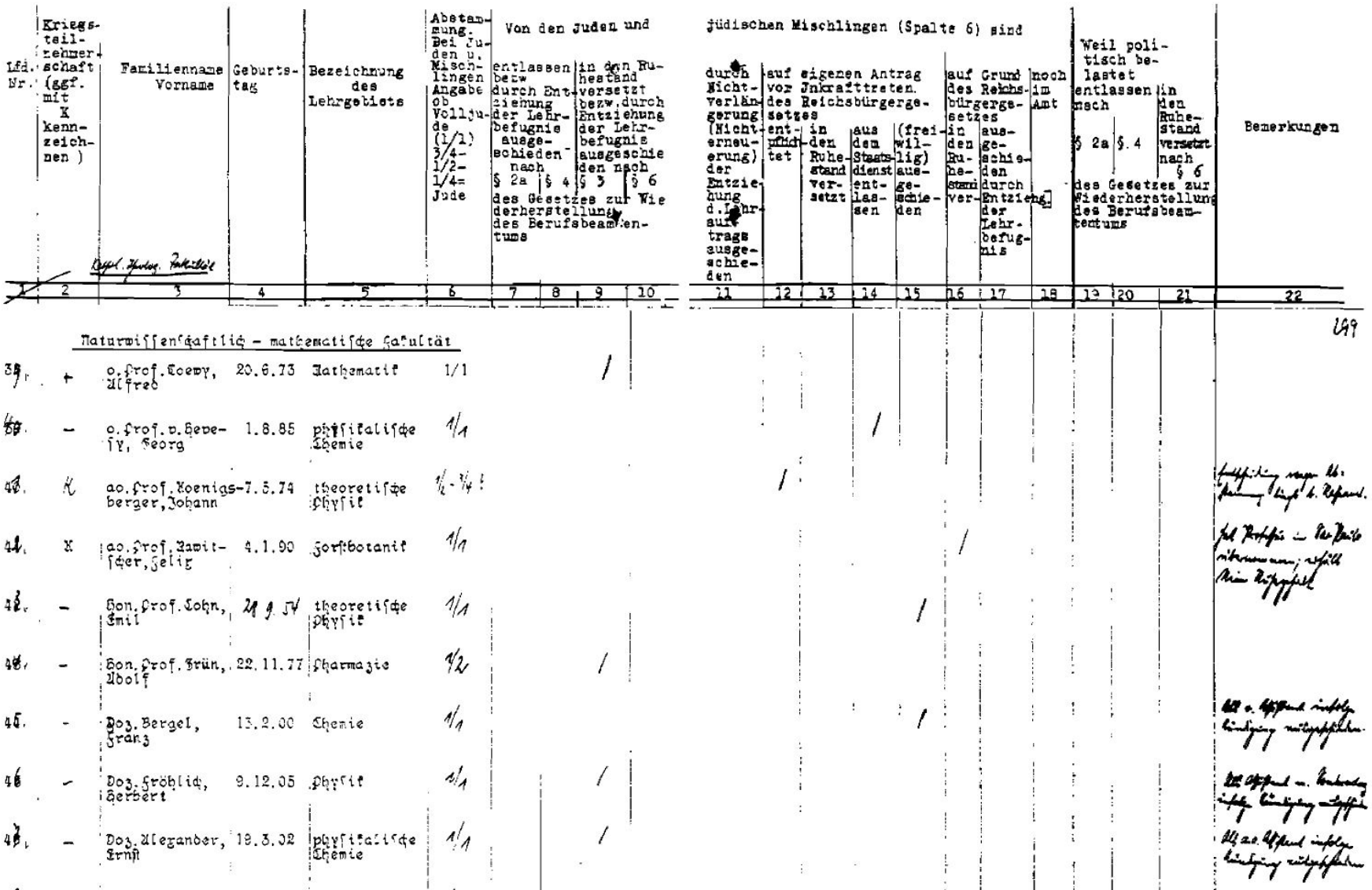
4. If the country before and after the gap is different, we assume that the academic stayed in a country until we observe him/her in a different country.[43]

B.2.3 Data on Dismissal Paragraphs

As described in the main text, we obtain data on exact dismissal paragraphs from a number of primary and secondary sources. Figure B.1 shows an example of a primary source from the University of Freiburg. The page shows a number of academics who were dismissed on the basis of paragraph 3 of the *Law for the Restoration of the Professional Civil Service*, and a number of dismissals who left the university in the wake of the *Reich Citizenship Law* in 1935.

[43]Because the imputation may artificially delay measured emigration, the imputation could affect the dependent variable *Emigrated by 1939* and the explanatory variable *Early Émigré*. We check the robustness of our results to this imputation by changing the emigration status to 1 for all academics where we imputed that they had remained in Germany until January 1, 1935 and January 1, 1939. In this sample, the results remain almost unchanged (the coefficient on # *Early Émigrés* (*Pre*-1933 $Network)_{-i}$ is 0.054 with a standard error of 0.015.

Figure B.1: Example Data Source Dismissal paragraphs Freiburg



Lfd. Nr.	Kriegsteilnehmerschaft (ggf. mit K kennzeichnen)	Familienname Vorname	Geburtstag	Bezeichnung des Lehrgebiets	Abstammung. Bei Juden u. Mischlingen Angabe ob Volljude (1/1) 3/4- 1/2- 1/4= Jude	Von den Juden und jüdischen Mischlingen (Spalte 6) sind: entlassen bezw durch Entziehung der Lehrbefugnis ausgeschieden nach § 2a / § 4 des Gesetzes zur Wiederherstellung des Berufsbeamtentums	in den Ruhestand versetzt bezw. durch Entziehung der Lehrbefugnis ausgeschieden nach § 3 / § 6 des Gesetzes zur Wiederherstellung des Berufsbeamtentums	durch Nichtverlängerung (Nichterneuerung) der Entziehung d. Lehrauftrags ausgeschieden	auf eigenen Antrag vor Inkrafttreten des Reichsbürgergesetzes entpflichtet	in den Ruhestand versetzt	aus dem Staatsdienst entlassen	(freiwillig) ausgeschieden	auf Grund des Reichsbürgergesetzes in den Ruhestand versetzt	ausgeschieden durch Entziehung der Lehrbefugnis	noch im Amt	Weil politisch belastet entlassen nach § 2a / §. 4 des Gesetzes zur Wiederherstellung des Berufsbeamtentums	in den Ruhestand versetzt nach § 6	Bemerkungen
		Dekl. Naturw. Fakultät																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
		Naturwissenschaftlich - mathematische Fakultät																			499
39.	+	o.Prof.Loewy, Alfred	20.6.73	Mathematik	1/1			/													
40.	–	o.Prof.v.Hevesy, Georg	1.8.85	physikalische Chemie	1/1								/								
43.	K	ao.Prof.Koenigsberger, Johann	7.5.74	theoretische Physik	½-¼					/											
44.	K	ao.Prof.Zamitscher, Selig	4.1.90	Forstbotanik	1/1										/						
45.	–	Hon.Prof.Lohn, Emil	21.9.74	theoretische Physik	1/1									/							
48.	–	Hon.Prof.Brün, Adolf	22.11.77	Pharmazie	½			/													
45.	–	Doz.Bergel, Franz	13.2.00	Chemie	1/1									/							
46	–	Doz.Fröhlich, Herbert	9.12.05	Physik	1/1			/													
48.	–	Doz.Alexander, Ernst	18.3.02	physikalische Chemie	1/1			/													

Notes: The Figure shows a sample page of the official list of dismissed Jewish academics that the University of Freiburg sent to the authorities. It is re-printed in (Martin, 1995, , p. 33).

B.2.4 Constructing Community Networks

Community networks are based on data from the *List of Jewish Residents in Germany 1933-1945*, compiled by the German Federal Archive. The list contains a total of 812,520 names of Jewish residents. For 109,229 of them the data report a birthplace and an emigration date. For each academic, we count the number of early émigrés who were born (within a ± five year window) in the same city. If the academic is an early émigré him/herself, we subtract the academic from the measure. For 27 academics without a known place of birth we impute the value for the community network with the median of our sample.

B.2.5 Data on Academic Reputation

As part of our data collection effort, we collect information on all entries of the Jewish academics in different biographical archives as reported in the World Biographical Information System (WBIS). We use this information to proxy for academic reputation. For each academic *i* our measure counts the number of biographical compendia that list academic *i*. We only focus on biographical compendia that were published before 1933.

B.2.6 Publication Data

We use an algorithm developed by Iaria et al. (2018) to merge papers from the Web of Science (WoS) to academics in scientific fields: mathematics, physics, chemistry, biochemistry, biology, and medicine. Iaria et al. (2018) use a machine-learning classifier on the basis of paper titles to assign a unique scientific field to each paper. This allows us to classify papers that were published in a general science journal (e.g. *Nature* or *Science*) into a unique field (e.g. medicine or physics). We then merge papers published in the 5 year period before January 1, 1933 to the Jewish academics in our data. The merge uses the following sequential steps:

1. Merge on: i) full last name, ii) full first name, iii) subject

After this step we store all matched papers and remove them from the database of potential matches and only consider the remaining papers for the following merge steps. Because many papers in the WoS database only list initials of authors we proceed with two additional merge steps:

2. Merge on: i) full last name, ii) all initials

3. Merge on: i) full last name, ii) first initial

Because the WoS and our academic data do not necessarily report the same number of initials (or because scientists do not necessarily list all their initials when they publish). We verify the matches from merge step 3 as follows. We drop merges where the initials indicate that the paper does not belong to the scientist. In particular, we remove the following merges:

a) The number of initials of academic $N(i)$ and the paper $N(p)$ are the same $N(i) = N(p)$ but the initials differ, e.g. a scientist with initials *A.A.* should not be merged to a paper with initials *A.B.*

b) The number of initials of academic $N(i)$ and the paper $N(p)$ are not the same $N(i) \neq N(p)$ and the Levenshtein distance between the two sets of initials is smaller than the difference in the length of the initials, e.g. a scientist with initials *A.B.* is merged to a paper with initials *A.B.C.* or *A.C.B.* but not to papers with initials *A.C.D.* or *A.D.C.*[44]

C Early Dismissals and Emigration by 1935

As suggested by Figure 4 academics who were dismissed early, had a much higher probability of emigrating early. In this section, we show that this result holds, if we control for detailed characteristics of the individual by estimating the following regression:

$$Early\ \acute{E}migr\acute{e}_i = \mu_1 + \mu_2\ Early\ Dismissal_i + \mu_c\ X_i + \epsilon_i \tag{B.1}$$

The outcome variable $Early\ \acute{E}migr\acute{e}_i$ is an indicator that equals one if academic i had emigrated by January 1, 1935. The main explanatory variable $Early\ Dismissal_i$ is an indicator that equals 1 if academic i was dismissed in the first wave of dismissals in 1933 or 1934.[45] The vector X_i controls for individual characteristics that affected the probability of emigration.[46]

Early dismissal increased the probability of emigration by January 1, 1935 by 33 percentage points (appendix Table A.8, column 1). The effect is highly significant (t-stat of 15.03), large (the baseline probability of emigration by 1935 was around 52 percent), and not sensitive to including additional controls (columns 2-6).

The emigration probability declined monotonically with age. Compared to academics younger than 30 (the omitted category), academics aged between 30 and 39 were 8 percentage points less likely to emigrate. Academics aged between and 40 and 49 were 16 percentage points, individuals 50 to 59 were 32 percentage points, and individuals above 60 were 52 percentage points less likely to emigrate (column 1). The few female scientists had a somewhat higher probability to emigrate, but the difference is not significant. Married individuals had a higher probability to emigrate. The number of children, however, did not affect the probability of early emigration. Skills that facili-

[44]Levenshtein distances measure the minimum number of insertions, deletions, or substitutions that are necessary to make two strings identical.

[45]Because most early dismissals occurred in 1933 (see Figure A.3) the results are very similar if we define early dismissals as those that were completed by the end of 1933.

[46]Note: this equation is similar to the first stage regression 3. However, it does not include the number of early dismissals in the network ($\#\ Dismissed\ Early\ (Pre\text{-}1933\ Network)_{-i}$).

tate emigration, such as speaking a foreign language or pre-1933 experience at a foreign research institution had a large and significant effect on the probability of emigration by 1935 (column 3).

The effect of early dismissal remains stable and highly significant if we control for fixed effects for the academic's rank in 1933 (full professor position, associate professor, and so on, column 4). It also remains stable if we control for the city × subject history between 1929 and 1933. These fixed effects implicitly control for quality. E.g. many of the best physicists were hired by Göttingen or Berlin.

D Predicting Emigration Status for Academics Who Died of Natural Causes

To study potential sample selection from natural deaths, we impute the emigration status for academics who died of natural causes before 1939.[47] The imputation follows the following steps:

1. *Use academics who did not die from natural causes to predict migration behavior.* For each academic i who did not die of natural causes, we estimate the emigration probability in 1939 based on academic i's migration status in a previous year, e.g. 1933, 1934, 1935 and so on.

$$\begin{aligned}
Emigrated\ by\ 1939_i = &\ \beta_1 + \beta_{1933}\ Emigrated\ by\ 1933_i + \beta_c\ Controls_i + \zeta_{i33} \\
Emigrated\ by\ 1939_i = &\ \beta_1 + \beta_{1934}\ Emigrated\ by\ 1934_i + \beta_c\ Controls_i + \zeta_{i34} \\
Emigrated\ by\ 1939_i = &\ \beta_1 + \beta_{1935}\ Emigrated\ by\ 1935_i + \beta_c\ Controls_i + \zeta_{i35} \\
Emigrated\ by\ 1939_i = &\ \beta_1 + \beta_{1936}\ Emigrated\ by\ 1936_i + \beta_c\ Controls_i + \zeta_{i36} \\
Emigrated\ by\ 1939_i = &\ \beta_1 + \beta_{1937}\ Emigrated\ by\ 1937_i + \beta_c\ Controls_i + \zeta_{i37} \\
Emigrated\ by\ 1939_i = &\ \beta_1 + \beta_{1938}\ Emigrated\ by\ 1938_i + \beta_c\ Controls_i + \zeta_{i38}
\end{aligned} \tag{B.2}$$

2. *Predict emigration probability for academics who died of natural causes.* For academic j who died of natural causes before 1939, we predict the emigration status in 1939 based on the parameters in equation (B.2) using the last year before his natural death. I.e. for somebody who died of a natural cause in 1937 we predict his emigration status in 1939 using the estimated parameters from the second to last line in equation (B.2).

3. *Transform emigration probability into a binary emigration status.* We then transform the continuous probability into a binary emigration status. We set the emigration status in 1939 is equal to one if the emigration probability is larger than 0.5, and equal to zero otherwise.

In columns 3 and 4 of appendix Table A.3, we use this predicted emigration status for academics who died of natural causes.

[47] By January 1, 1939 7.5 percent of the sample had died of natural causes.

Baganz, Carina, *Diskriminierung, Ausgrenzung, Vertreibung: Die Technische Hochschule Berlin während des Nationalsozialismus* 2013.

Becker, Heinrich, Hans-Joachim Dahms, and Cornelia Wegeler, *Die Universität Göttingen unter dem Nationalsozialismus*, 2. erw. ausgabe. reprint 2012 ed., Berlin, Boston: De Gruyter Saur, 2013.

Becker, Norbert and Katja Nagel, *Verfolgung und Entrechtung an der Technischen Hochschule Stuttgart während der NS-Zeit*, 1 ed., Stuttgart: Belser, January 2018.

Becker, Thomas, ed., *Zwischen Diktatur und Neubeginn: Die Universitat Bonn im >Dritten Reich< und in der Nachkriegszeit*, y first printing edition ed., Göttingen: V&R Unipress, December 2008.

Benkert, Christopher, *Die Juristische Fakultät der Universität Würzburg 1914 bis 1960: Ausbildung und Wissenschaft im Zeichen der beiden Weltkriege*, 1., ed., Würzburg: Ergon - ein Verlag in der Nomos Verlagsgesellschaft mbH & Co. KG, October 2005.

Beyerchen, Alan D., *Scientists Under Hitler: Politics and the Physics Community in the Third Reich*, first edition ed., New Haven: Yale University Press, October 1977.

Beyler, Richard H., *" Reine" Wissenschaft und personelle" Säuberungen": die Kaiser-Wilhelm-/Max-Planck-Gesellschaft 1933 und 1945*, Vol. 16, Max-Planck-Gesellschaft zur Förderung der Wissenschaften, 2004.

_ , "Maintaining Discipline in the Kaiser Wilhelm Society during the National Socialist Regime," *Minerva*, June 2006, *44* (3), 251–266.

Böhm, Helmut, *Von der Selbstverwaltung zum Führerprinzip.: Die Universität München in den ersten Jahren des Dritten Reiches*, Berlin: Duncker & Humblot, 1995.

Bollmus, Reinhard, *Handelshochschule und Nationalsozialismus - Das Ende der Handelshochschule Mannheim und die Vorgeschichte der Errichtung einer Staats- und Wirtschaftswissenschaftlichen Fakultät an der Universität Heidelberg 1933/34*, Meisenheim am Glan: Meisenheim, 1973.

Buddrus, Michael and Sigrid Fritzlar, *Die Professoren der Universität Rostock im Dritten Reich*, 1 ed., München: De Gruyter, October 2007.

Chroust, Peter, *Giessener Universität und Faschismus: Studenten und Hochschullehrer 1918-1945*, 1 ed., Münster ; New York: Waxmann, January 1994.

Cornelißen, Christoph and Carsten Mish, *Wissenschaft an der Grenze: Die Universität Kiel im Nationalsozialismus* 2009.

Deichmann, Ute, "The Expulsion of Jewish Chemists and Biochemists from Academia in Nazi Germany," *Perspectives on Science*, March 1999, *7* (1), 1–86.

_ , *Flüchten, Mitmachen, Vergessen: Chemiker und Biochemiker in der NS-Zeit*, 1. auflage ed., Weinheim Chichester: Wiley-VCH Verlag GmbH & Co. KGaA, July 2001.

Drüll, Dagmar, *Heidelberger Gelehrtenlexikon 1803-1932*, softcover reprint of the original 1st ed. 1986 ed., Springer-Verlag, January 1986.

_ , *Heidelberger Gelehrtenlexikon 1933-1986*, 2009 ed., Berlin ; New York: Springer, March 2009.

Eberle, Henrik, *"Ein wertvolles Instrument": Die Universität Greifswald im Nationalsozialismus*, Böhlau Verlag, December 2016. Publication Title: "Ein wertvolles Instrument".

Eckart, Wolfgang U., Volker Sellin, and Eike Wolgast, *Die Universität Heidelberg im Nationalsozialismus*, 2006 ed., Heidelberg: Springer, August 2006.

Epple, Moritz, Johannes Fried, Raphael Gross, and Janus Gudian, *»Politisierung der Wissenschaft«: Jüdische Wissenschaftler und ihre Gegner an der Universität Frankfurt am Main vor und nach 1933*, Göttingen: Wallstein, July 2016.

Esch, Michael G., *Die medizinische Akademie Düsseldorf im Nationalsozialismus* 1997.

Fischer, Wolfram, Klaus Hierholzer, Michael Hubenstorf, Peter Th Walther, and Rolf Winau, *Exodus von Wissenschaften aus Berlin: Fragestellungen - Ergebnisse - Desiderate. Entwicklungen vor und nach 1933*, reprint 2017 ed., Berlin: De Gruyter, January 1994.

Forsbach, Ralf, *Die Medizinische Fakultät der Universität Bonn im "Dritten Reich"*, Berlin, Boston: De Gruyter, 2014.

Gerstengarbe, Sybille, "Die erste Entlassungswelle von Hochschullehrern deutscher Hochschulen aufgrund des Gesetzes zur Wiederherstellung des Berufsbeamtentums vom 7.4.1933," *Berichte zur Wissenschaftsgeschichte*, 1994, *17* (1), 17–39.

Golczewski, Frank, *Kölner Universitätslehrer und der Nationalsozialismus*, Köln: Böhlau, 1988.

Grüttner, Michael and Sven Kinas, "Die Vertreibung von Wissenschaftlern aus den deutschen Universitäten 1933–1945," *Vierteljahrshefte für Zeitgeschichte*, 2007, *55* (1), 123–186.

Hagemann, Harald and Claus-Dieter Krohn, *Biographisches Handbuch der deutschsprachigen wirtschaftswissenschaftlichen Emigration nach 1933*, reprint 2014 ed., Berlin, Boston: De Gruyter Saur, 2014.

Happ, Sabine and Veronika Jüttemann, *"Es ist mit einem Schlag alles so restlos vernichtet": Opfer des Nationalsozialismus an der Universität Münster*, Münster: Aschendorff, February 2018.

Hendel, Joachim, Uwe Hoßfeld, Jürgen John, Oliver Lemuth, and Rüdiger Stutz, *Wege der Wissenschaft im Nationalsozialismus*, 1 ed., Stuttgart: Franz Steiner Verlag, October 2007.

Hentschel, Klaus, *Physics and national socialism: An anthology of primary sources*, Springer Science & Business Media, 2011.

Herrmann, Wolfgang A. and Winfried Nerdinger, *Die Technische Hochschule München im Nationalsozialismus*, München: TUM.University Press, May 2018.

Hoepke, Klaus-Peter, *Geschichte der Fridericiana: Stationen in der Geschichte der Universität Karlsruhe*, Karlsruhe: KIT Scientific Publishing, October 2007.

Hoppe, Andreas and Dorothee Hoppe, "Geowissenschaftler und ihr Judentum im deutschen Sprachraum des 19. und 20. Jahrhunderts," *Zeitschrift der Deutschen Gesellschaft für Geowissenschaften*, 2018, *169* (1), 73–96.

Höpfner, Hans-Paul, *Die Universitat Bonn Im Dritten Reich: Akademische Biographien Unter Nationalsozialistischer Herrschaft*, Bonn: Bouvier, 1999.

Iaria, Alessandro, Carlo Schwarz, and Fabian Waldinger, "Frontier knowledge and scientific production: Evidence from the collapse of international science," *The Quarterly Journal of Economics*, 2018, *133* (2), 927–991.

Jung, Michael, *"Voll Begeisterung schlagen unsere Herzen zum Führer": Die Technische Hochschule Hannover und ihre Professoren im Nationalsozialismus*, 1 ed., Norderstedt: Books on Demand, February 2013.

Kinas, Sven, *Akademischer Exodus: Die Vertreibung von Hochschullehrern aus den Universitäten Berlin, Frankfurt am Main, Greifswald und Halle 1933-1945*, Heidelberg: Synchron, June 2018.

Kranich, Kai, *Die »Bollwerk-Ingenieure«: Technikwissenschaft in Breslau 1900-1945*, 2018 ed., Paderborn: Verlag Ferdinand Schöningh, August 2018.

Krause, Eckart, Ludwig Huber, and Holger Fischer, *Hochschulalltag im "Dritten Reich". Die Hamburger Universität 1933-1945*, Berlin: Reimer, Dietrich, January 1991.

Lambrecht, Ronald, *Politische Entlassungen in der NS-Zeit: 44 biografische Skizzen von Hochschullehrern der Universität Leipzig*, Leipzig: Evangelische Verlagsanstalt, October 2006.

Maas, Utz, *Sprachforschung in der Zeit des Nationalsozialismus, Verfolgung, Vertreibung, Politisierung und die inhaltliche Neuausrichtung der Sprachwissenschaft*, Berlin, Boston: De Gruyter, 2016.

Maier, Helmut, *Chemiker im "Dritten Reich": Die Deutsche Chemische Gesellschaft und der Verein Deutscher Chemiker im NS-Herrschaftsapparat*, 1. ed., Weinheim: Wiley-VCH, March 2015.

Martin, Bernd, "Die Entlassung der jüdischen Lehrkräfte an der Freiburger Universität und die Bemühungen um ihre Wiedereingliederung nach 1945," *Schicksale : jüdische Gelehrte an der Universität Freiburg in der NS-Zeit. Freiburg: Rombach, 1995. (Freiburger Universitätsblätter ; 129 = 34. Jg. 1995), S. 7 - 46*, January 1995.

Möllers, Georg, *Jüdische Tierärzte im Deutschen Reich in der Zeit von 1918 bis 1945*, 1., aufl. ed., Berlin: Tenea Verlag, 2002.

Mußgnug, Dorothee, *Die vertriebenen Heidelberger Dozenten*, Heidelberg: Universitätsverlag Winter, 1988.

Nagel, Anne Christine and Ulrich Sieg, *Die Philipps-Universität Marburg im Nationalsozialismus: Dokumente zu ihrer Geschichte*, 1 ed., Stuttgart: Franz Steiner Verlag, May 2000.

Nicolaysen, R., "Die Frage der Rückkehr: Zur Remigration Hamburger Hochschullehrer nach 1945," *Z Ver Hambg Gesch*, 1983, *94*, 117–152.

Oehler-Klein, Sigrid, *Die Medizinische Fakultät der Universität Gießen im Nationalsozialismus und in der Nachkriegszeit: Personen und Institutionen, Umbrüche und Kontinuitäten*, 1 ed., Stuttgart: Franz Steiner Verlag, September 2007.

Petschel, Dorit, *175 Jahre TU Dresden: Die Professoren der TU Dresden 1828-2003.*

Pommerin, Reiner, Thomas Hänseroth, and Dorit Petschel, *175 Jahre TU Dresden: Die Professoren der TU Dresden, 1828-2003*, Böhlau Verlag Köln Weimar, 2003.

Rürup, Reinhard and Michael Schüring, *Schicksale und Karrieren. Gedenkbuch für die von den Nationalsozialisten aus der Kaiser-Wilhelm-Gesellschaft vertriebenen Forscherinnen und Forscher ... im Nationalsozialismus)*, 1. aufl. ed., Göttingen: Wallstein Verlag, January 2008.

Schmoeckel, Mathias, *Die Juristen der Universität Bonn im Dritten Reich*, 1. ed., Köln: Böhlau Köln, January 2004.

Schüring, Michael, *Minervas verstoßene Kinder. Vertriebene Wissenschaftler und die Vergangenheitspolitik der Max-Planck-Gesellschaft*, Göttingen: Wallstein Verlag, May 2006.

Schultes, Kilian Peter, "Die Staats-und Wirtschaftswissenschaftliche Fakultät der Universität Heidelberg 1934-1946." PhD Thesis 2010.

Seidl, Tobias, "Personelle Säuberungen an der Technischen Hochschule Karlsruhe 1933-1937.," *Zeitschrift fur die Geschichte des Oberrheins*, 2009, *157*, 429.

Siegmund-Schultze, Reinhard, *Mathematicians Fleeing from Nazi Germany: Individual Fates and Global Impact*, Princeton: Princeton University Press, July 2009.

Steinhauser, Thomas, Jeremiah James, Dieter Hoffmann, and Bretislav Friedrich, *Hundert Jahre an der Schnittstelle von Chemie und Physik, Das Fritz-Haber-Institut der Max-Planck-Gesellschaft zwischen 1911 und 2011*, Berlin, Boston: De Gruyter, 2011.

Stengel, Friedemann, *Ausgeschlossen.: Die 1933-1945 entlassenen Hochschullehrer der Martin-Luther-Universität Halle Wittenberg*, 1 ed., Halle an der Saale: Universitätsverlag Halle-Wittenberg, November 2016.

Szabó, Anikó, *Vertreibung, Rückkehr, Wiedergutmachung*, 1. aufl. ed., Göttingen: Wallstein Verlag, April 2000.

Tenorth, Heinz-Elmar, Michael Grüttner, Christoph Jahr, Sven Kinas, Anne Chr Nagel, and Jens Thiel, *Geschichte der Universität Unter den Linden: Band 2: Die Berliner Universität zwischen den Weltkriegen 1918-1945*, 1 ed., Berlin: De Gruyter Akademie Forschung, April 2012.

Tilitzki, Christian, *Die Albertus-Universität Königsberg, Ihre Geschichte von der Reichsgründung bis zum Untergang der Provinz Ostpreußen (1871-1945). Band 1: 1871-1918*, Berlin, Boston: De Gruyter, 2013.

_ , *Protokollbuch der Philosophischen Fakultät der Albertus-Universität zu Königsberg i. Pr. 1916-1944*, Osnabrück: fibre, December 2014.

Uhlig, Ralph, *Vertriebene Wissenschaftler der Christian-Albrechts-Universität zu Kiel*, Frankfurt am Main ; New York: Peter Lang GmbH, Internationaler Verlag der Wissenschaften, October 1991.

Wendland, Ulrike, *Biographisches Handbuch deutschsprachiger Kunsthistoriker im Exil, Leben und Werk der unter dem Nationalsozialismus verfolgten und vertriebenen Wissenschaftler. Teil 1: A–K. Teil 2: L–Z*, Berlin, Boston: De Gruyter Saur, 1998.

Wiesing, Urban, *Die Universität Tübingen im Nationalsozialismus*, 1. auflage ed., Stuttgart: Franz Steiner Verlag, July 2010.

Wittebur, Klemens, *Die deutsche Soziologie im Exil 1933-1945: Eine biographische Karthographie*, Münster: LIT, 1991.

Wolfradt, Uwe, Elfriede Billmann-Mahecha, and Armin Stock, *Deutschsprachige Psychologinnen und Psychologen 1933–1945: Ein Personenlexikon, ergänzt um einen Text von Erich Stern*, 2., akt. aufl. 2017 ed., Wiesbaden: Springer, February 2017.