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Scholars at risk: Academic networks and high-skilled emigration from Nazi Germany

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Scholars at Risk:

Academic Networks and High-Skilled Emigration from Nazi Germany*

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Abstract

We study the role of professional networks in facilitating emigration of Jewish academics dismissed from their jobs by the Nazi government. We use individual-level exogenous variation in the timing of dismissals to estimate the causal effect of networks. Academics with more ties to early émigrés (emigrated 1933-1934) were more likely to emigrate. Early émigrés functioned as "bridging nodes" that facilitated emigration to their own destination. We also distinguish between three kinds of social networks – family, community, or professional networks and study their relative importance. Lastly, we provide some of the first empirical evidence of decay in social ties over time.

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1 Introduction

In recent years, academics have faced persecution in many countries, including Hong Kong, Hungary, and Turkey. In 2020 alone, there were 341 attacks on universities in 58 countries (Scholars at Risk 2020). Throughout history, academics have been persecuted because of their ethnicity, political views, or religion. Possibly, the most prominent example is the persecution of Jewish academics in Nazi Germany.

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 and Max Born shaped modern physics. Fritz Haber and Otto Warburg made pathbreaking chemical discoveries. Indeed, the list of prominent academics of Jewish origin cut across disciplines and included mathematicians such as John von Neumann and Emmy Noether, and social scientists and philosophers such as Hannah Arendt and Theodor Adorno.[1] In many disciplines, German universities, especially Berlin and Göttingen, were among the world's best.

This flourishing academic culture came to a sudden halt in 1933 when the Nazi party came to power. Jewish academics were targeted with demonstrations, class boycotts and sporadic violence. This culminated in the Nazi government's initiation of mass dismissal of Jewish academics and political opponents. By 1939, around 20 percent of *all* German academics had lost their position (Hartshorne 1937, Grüttner and Kinas 2007). The increasing persecution in Nazi Germany and the threat of deportation to camps, meant that academics of Jewish origin scrambled to escape through emigration.[2] The United States and the United Kingdom received a disproportionate share of world-class academics, solidifying the transition of scientific leadership from Germany to the United States. In physics, they were instrumental in the success of the Manhattan project (Figure 1), the research and development that produced the first nuclear weapons during World War II. For mathematics, Raymond Fosdick, the president of the Rockefeller Foundation, argued 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 US. Of these, sixteen came from the faculty of Göttingen." IAS Prince-

[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 Ernst Bloch, or the musicologist and pioneer of atonal and twelve-tone music Arnold Schönberg from Austria.

[2] In the following years, they were joined by persecuted academics from other European countries, e.g. the future physics Nobel laureates Enrico Fermi and Emilio Segrè or the future economics Nobel laureate Franco Modigliani who escaped from Fascist Italy. Beyond academia, the emigration wave included such intellectual giants as Bertolt Brecht, Elias Canetti, Lion Feuchtwanger, Franz Werfel, and Stefan Zweig, to name just a few. 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).

> ton, Brown, NYU, Harvard, Chicago, Wisconsin, the MIT are only a few of the American institutions which have profited by this migration. (Foundation 1942, p. 27).

Historical accounts suggest that academic networks 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. Courant left Göttingen in 1933 and spent a year at Cambridge before moving to NYU. "In spite of Courant's own troubles [to secure a permanent position]... he continued to be the person other professors... turned to for help... Letters asking for help and advice came "by the dozens"" (Reid 1996, pp. 159). Figure 2 and Table A1 illustrate 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 2).

In this paper, we study the role of *professional* networks in helping German Jewish academics escape through emigration. In addition, our rich data allow us to empirically distinguish between three different kinds of social networks – professional, family, and (non-family) community networks and study their relative importance. Furthermore, we study the aspects of a network's social capital that made it especially effective in facilitating emigration.

Estimating the effect of professional networks on the probability of emigration faces two challenges. First, is the measurement of academic networks, and the identification of individuals that acted as "bridging nodes" who became vital conduits of information and acted as a bridge between the domestic and the foreign academic networks. Second, networks may be endogenous because a) academics may form ties to facilitate emigration and b) network measures may be correlated with omitted variables that enable emigration.

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. Most importantly, we exploit exogenous variation in the timing of dismissals, created by the *Law for the Restoration of the Professional Civil Service* which was passed on April 7, 1933. Crucially for our identification strategy, the law made important exemptions which initially allowed *some* Jewish academics to remain in their positions. After the Nuremberg racial laws in September 1935, the exemptions were revoked. 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 émigré colleagues* (who had emigrated from Nazi Germany by January 1, 1935). To address the endogene-

ity of network ties, we use the number of *ties to colleagues dismissed early* (dismissed 1933-1934) as an instrumental variable (IV) for the number of *ties to early émigré colleagues*.[3]

Our first set of results shows that networks with more ties to "bridging nodes" facilitated emigration. Academics with ten additional ties to early émigrés, had a 5 percentage points higher probability to emigrate by 1939, an effect that persisted until 1945.[4] When we use the number of ties to academics dismissed early as an IV 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 colleagues dismissed early. The controls include not only standard individual-level characteristics, such as age, gender, marital status, the number of children, but also characteristics such as academic reputation, academic rank, foreign languages spoken, pre-1933 employment outside Germany, and whether the academic was born outside Germany. Moreover, we control for the city$\times$subject *employment history* of each academic in the five years before January 1, 1933. The employment history controls 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 assist emigration, even if these colleagues had not emigrated abroad. They also control for differences in average characteristics of colleagues in the same department, e.g. physicists in Göttingen, may have similar characteristics (driven by homophily), e.g. more contacts abroad or higher academic reputation, that affect migration decisions. Similarly, they control for community level factors that may affect emigration decisions. With these controls, the identifying variation comes from academic turnover.

In the second set of results, we show that the effect of the professional network was directional. 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 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 other destinations.[5]

In our third 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

[3]Importantly, the IV exploits early dismissals of academic i's colleagues, *not* his/her own early dismissal. We show below that academic i's characteristics, and in fact academic i's own early dismissal status, are not related to the number of dismissals in his/her network.

[4]The mean and standard deviation of the number of early émigrés in an academic's network are 11.21 and 14.04, respectively.

[5]These results highlight the importance of bridging nodes ("the most difficult measure of social capital to calculate in a network", Jackson 2020) for migration decisions.

strength of social ties "decays" over time. We find that ties to more recent colleagues were twice as important as ties to less recent colleagues. Furthermore, we find suggestive evidence that social ties decay with geographical distance, even within cities. 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. Our results suggest that ties to early émigrés from the same department had a larger effect on emigration than ties to early émigrés from other departments in the same city. We also show that ties to early émigrés were more important in humanities and social sciences than in natural sciences and medicine. 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 disciplines 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 disciplines.

Our fourth set of results, compares the effect of *professional* networks to the effects of *family* or *(non-family) community* networks. The latter have been the focus of most empirical papers on networks and migration. We find that early émigrés from the family network also affected emigration but with a somewhat smaller magnitude than the professional networks. In contrast, community networks did not affect emigration decisions of academics *at all*. This is striking because Buggle et al. (2020) find sizeable effects of community networks for emigration from Nazi Germany of the general Jewish population, for which information on professional networks is unknown. Our results suggest that different types of networks matter for emigration decisions of *high-skilled* migrants than for migrants overall. Hence, analyses of the role of networks for migration decisions of high-skilled individuals would be seriously incomplete if they ignored professional networks.

Finally, our paper provides the first comprehensive documentation of the fate of academics of Jewish origin during the Nazi period. The documentation allows us to pay homage to this exemplary group of academics. Concretely, we complement and complete the selective historical research, by constructing the first *full census* of academics of Jewish origin including detailed records of their fate. In striking contrast to the fate of the general German Jewish population, we unearth the surprising finding that 94 percent of Jewish academics escaped the Holocaust.

Our findings contribute to the literature on networks in economics by providing some of the first empirical evidence that social ties "decay" over time.[6] Following the seminal work of Granovetter (1973a), much of the research in economics classifies ties as either strong or weak. Ours is some of the first work in economics to empirically demonstrate that the absence of social interaction can, *over time*, result in the "natural" decay of strong ties into weak ties. Estimating

[6]Jackson 2010, Goyal 2009, and Jackson et al. 2017 provide comprehensive surveys on the literature on networks in economics.

decay in networks requires measuring the networks at multiple points in time. Most existing data on networks, however, is static. Dynamically measuring the evolution of pre-1933 professional networks is a key strength of our paper. While a large literature has studied network formation (e.g. Jackson and Watts 2002, Jackson and Rogers 2005, Galeotti and Goyal 2010), the decay of networks over time has received less attention in economics.[7] A notable exception is Banerjee et al. (2021) who show that the introduction of microfinance reduces social ties in rural India, even between individuals who are unlikely to obtain microfinance.

We also contribute to the empirical literature on networks in the migration context. Existing papers usually study aggregate measures of family and community networks for *low-skilled* migrants, especially from developing countries (e.g. Munshi 2003, Winters et al. 2001, McKenzie and Rapoport 2010, Mahajan and Yang 2020). More specific to our context, Buggle et al. (2020) show that emigration of members of the community network, and Nazi violence increased emigration of German Jews. We contribute to this literature by a) measuring *individual-level* ties, as opposed to community-level aggregates, b) using *individual-level exogenous* variation in the emigration decisions of colleagues to estimate the causal effect of networks, and c) show that, for high-skilled individuals, *professional* and *family* networks matter for migration decisions while *community networks* do not.[8] Since the seminal work of Polanyi (1944) and Granovetter (1985), social scientists have emphasized the importance of an individual's embeddedness in a social context.[9] This paper takes a first step at analyzing the impact of a *multiplicity* of social networks in which an individual is embedded, by examining whether professional, family, and community networks matter for migration decisions.

Our findings also speak to the 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) and to the literature on historical migration to the United States (e.g. Abramitzky et al. 2012, Abramitzky et al. 2014, Sequeira et al. 2020, Tabellini 2020, Fouka et al. 2020, Arkolakis et al. 2019).

Finally, our work relates to research on the consequences of losing high-skilled Jewish teachers (Akbulut-Yuksel and Yuksel 2015), mathematicians, physicists, and chemists (Waldinger 2010,

[7]Decay of social ties has, however, been discussed in sociology (e.g. Burt 2000, Burt 2001). Decay of ties is akin to a decline of social capital (Putnam 2000).

[8]While not studying the role of networks, Blum and Rei (2018) show that Jews who escaped the Holocaust were positively selected. Recent papers examining the effects of persecution on migration in other contexts include Becker et al. (2020), Sarvimäki et al. (2020), and Becker and Ferrara (2019).

[9]The term "embeddedness" was coined by Karl Polanyi. He was born into a Jewish family in Vienna and became the editor of the liberal magazine *The Austrian Economist.* After the Nazis rose to power in 1933 and the establishment of the Fatherland Front government in Austria, he was forced to resign. He emigrated to London in 1933 and to the United States in 1940. Karl Polanyi is not part of our data because we focus on Jews who were academics in Germany. However, our data contains his brother, the polymath Michael Polanyi, who worked at the Technical University and the Kaiser-Wilhelm-Institute of Physical Chemistry in Berlin and made important contributions to physical chemistry, economics, and philosophy.

Waldinger 2012), managers (Huber et al. 2021), and doctors (Liebert and Mäder 2020) or gaining chemists in the United States (Moser et al. 2014). Compared to this earlier work, we innovate in four important ways: we 1) reconstruct a *census* of *all* Jewish academics recording each year of their academic career and documenting their fate, covering *all* academic disciplines – including the sciences, humanities, the social sciences, philosophy, law, and medicine, 2) focus on the dismissed Jewish academics *themselves* and not on their peers or students, 3) study the role of professional networks in facilitating emigration, 4) develop a novel identification strategy that exploits differences in the timing of dismissals.

2 Historical Overview and Data

2.1 The Dismissal of Jewish Academics

After seizing power in January 1933, the Nazi government passed the *Law for the Restoration of the Professional Civil Service* on April 7, 1933. This *Civil Service Law* had a dramatic effect on the life of Jewish academics in Germany and was used to expel the first wave of individuals of Jewish origin from civil service positions. In later years, remaining Jewish academics were dismissed so that by 1939 virtually all Jewish academics had lost their position.[10] Many considered emigration to flee from Nazi persecution and to find a university position abroad.[11]

Roster of All Dismissed Jewish Academics

We construct a census of all dismissed Jewish academics across all academic disciplines from a large number of primary and secondary sources. We refer to academics with at least one Jewish grandparent as "Jewish academics," consistent with the *Civil Service Law*. The main source is the *List of Displaced German Scholars* (LDS) which was first published in 1936 and updated in 1937. Some dismissed academics did not appear on the LDS, e.g. if they had died before the LDS was compiled. To obtain a complete picture of all dismissals of individuals of Jewish origin, we augment and cross-check the LDS roster against 60 university-specific and 16 subject-specific studies on the dismissals (Appendix B.1 provides details). Combining the information from all sources we obtain a roster of 1,370 dismissed Jewish academics.

[10] 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.

[11] For those who did not emigrate, persecution dramatically increased over time. In October 1940, 7,000 Jews from southern Germany were deported to labor camps in southern France (Kwiet 1988, pp. 634); some of the deportees were still permitted to emigrate. A tragic case is the economist Robert Liefmann from the University of Freiburg. He was deported to the Gurs internment 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 NYU (Wiehn et al., 1995, pp. 72). By October 1941, Jews were no longer allowed to emigrate and the Nazis started the systematic deportations to death camps.

Biographical Information on Academic Career

We reconstruct each individual biography covering each year of the academic's career with extensive archival and digital searches. The main sources are the LDS, the university and subject specific studies, biographical archives (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, patents, and publications (Appendix B provides further details). Even though some of the academics are hard to trace, we obtain almost complete biographical records for each of them.

To ensure consistency, we collect information as of January 1 for each year. 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, 97 percent of all 1,370 dismissed academics.[12] Table1 reports summary statistics.

2.2 Fate after 1933: Emigration?

Our main outcome variable is an indicator for emigration by January 1, 1939 or January 1, 1945.[13] By January 1, 1939, 74 percent of Jewish academics had managed to emigrate (Figure 3a).[14] By January 1, 1945, 81 percent had emigrated, while 19 percent had not emigrated. Six percent had been directly or indirectly murdered by the Nazis (Figure 3b).[15] The emigration rates of Jewish academics are remarkably high. They are much higher than emigration rates for

[12]Results are almost identical if we impute the most likely locations for the remaining 3 percent (Appendix F.1).

[13]We choose January 1, 1939 because it was the last January before the beginning of WWII, and January 1, 1945 because it was the last January before the end of WWII. A few academics survived the Holocaust in concentration camps but emigrated after WWII. Hence, measuring emigration by January 1946 would not capture whether academics escaped the Holocaust.

[14]Of the 1327 Jewish academics, 107 (310) had passed away by 1939 (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 the location of academics in 1939 or 1945. This implicitly assumes that academics who died of a natural death in Germany before 1945 would not have emigrated. Results remain unchanged if we a) exclude from the sample all individuals who had died from natural causes or b) impute the emigration status for academics who died of natural causes before 1939 (see Appendix F.4).

[15]An example of an "indirect murder" is the tragic case of Arthur Nicolaier of the University of Berlin, 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 Theresienstadt. "Direct murders" are academics who died of actions by the Nazi government, e.g. because they were deported to concentration or death 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. For these statistics, we count deported but surviving academics in the Dead (Murdered) category. The few Jewish academics who survived outside the camps 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.

the general Jewish population which were 31 percent for 1939 and 51 percent for 1945 (Benz 1988, p. 738; see Appendix B.5.2).

Our detailed biographical data allow us to observe the exact location of each academic, describing their fate. Figure 4 reports locations in 1933 and 1945. By far the two most attractive destinations were the United States and the United Kingdom, home to leading universities, and countries where language and cultural barriers were lower than in other destinations (Figure 5b). Cambridge University, Istanbul, Oxford, Hebrew University, the New School (NY), Paris, Columbia, UCL, Chicago, and Harvard received the highest numbers of émigrés (Figure 5a).

3 Professional Networks and Emigration: OLS

As highlighted above, ties to early émigrés may have been a key factor in emigration decisions. Accordingly, we focus on ties to *early émigrés* in an academic's pre-dismissal professional network (see Figure 6a for a schematic example), where early émigrés are defined as academics who had emigrated by January 1st, 1935 (Figure 6b). We define the pre-dismissal professional network as all those academics who worked in the same subject and city between January 1, 1929 and January 1, 1933.[16] This rules out the concern that academics formed new ties that endogenously changed the network structure, in *response* to persecution after 1933. In the schematic example, the academics in network 1 had ties to one early émigré (zero for the early émigré him/herself), while the academics in network 2 had ties to three early émigrés (two for the early émigrés themselves). The average academic in our sample had ties to 11.21 early émigrés (Table 1).

Figure 7 shows actual ties to early émigrés for mathematics and law. Early émigrés are marked in white, ties to early émigrés are represented by white lines. The Figure suggests that academics with links to early émigrés were more likely to emigrate by 1935 (white dots) or by 1945 (gray dots). E.g., the ten mathematicians without ties to early émigrés had a 50% emigration rate by 1945, while the 58 mathematicians with at least one tie to early émigrés had a 82.76% emigration rate.

We formally investigate how ties to early émigrés affected emigration by 1939 or 1945 by estimating the following regression:

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

[16] Results are similar if we measure networks for a ten year period before January 1, 1933.

The dependent variable is an indicator equal to one if academic i had emigrated by 1939 or, alternatively, 1945. The main explanatory variable, # Early Émigré Colleagues (Pre-1933 Network)$_{-i}$ counts how many colleagues in academic i's pre-1933 professional network had emigrated by 1935, excluding academic i him/herself. To ease the reading of regression tables, we divide the number of early émigrés in the pre-1933 network by 10. Since migration choices are sticky over time (Parey and Waldinger 2011), equation (1) also includes the indicator Early Émigré$_i$ to control for academic i's own emigration status in 1935.[17]

The regression controls for individual level variables such as: academic discipline, academic rank, age, gender, marital status, children, foreign language skills, pre-1933 employment by a foreign university, and country of birth.

Most importantly, we control for academic i's city×subject employment history between 1929 and 1933. The employment history controls allow for the possibility that academics moved across cities between 1929 and 1933 and that they held multiple contemporaneous appointments. For an academic with 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 in Braunschweig in 1932 and 1933, we weight the Göttingen×Math fixed effect by 0.6 and the Braunschweig×Math fixed effect by 0.4.[18]

The city×subject employment history controls 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 assist emigration, even if these colleagues had not emigrated abroad. They also control for differences in average characteristics of colleagues in the same department, e.g. physicists in Göttingen, may have similar characteristics (because of homophily or assortative matching), e.g. more contacts abroad or higher academic reputation, that affect migration decisions. Similarly, they control for community level factors, such as the size of the total community network, the fact that individuals from larger cities may have higher emigration probabilities, or for antisemitic acts by local Nazis that may affect emigration decisions.

With these controls, the identifying variation comes from academic turnover: either because academic i joined or left the same department as academic j at different points between 1929 and 1933, or alternatively because his/her colleagues joined or left. For example, Arthur Rosenthal (mathematician 1) in Figure 7a moved from Munich to Heidelberg. As a result, he had ties to two early émigrés (one in Munich and one in Heidelberg) while mathematician 2 who remained

[17]Note: a small number of academics were abroad in 1935 but had returned to Germany by 1939.

[18]Results remain similar and highly significant when we condition on unweighted city×subject fixed effects for the 1933 location.

in Munich had only one tie to an early émigré. Another example is Stefan Cohn-Vossen (mathematician 3) who moved from Göttingen to Cologne in 1930 and later became an early émigré. Hence, all mathematicians who had joined Göttingen before 1930 (e.g. mathematician 4) had ties to one additional early émigré (Cohn-Vossen) compared to the mathematicians who joined Göttingen later (e.g. mathematician 5).

OLS Results

We first estimate equation (1) by ordinary least squares (OLS). The number of early émigrés in an academic's pre-1933 network is a strong predictor of emigration by 1939. Ties to ten additional early émigrés increased the probability of emigration by 1939 by 5.3 pp. Not surprisingly, academic i's own emigration status in 1935 also had a strong effect on the probability of emigration by 1939 (Table 3, column 1).

4 Ties to Colleagues Dismissed Early as IV for Ties to Early Émigré Colleagues

Yet, even with the rich set of controls, we cannot rule out other omitted variables. Individuals with more ties to early émigré colleagues may also have other characteristics that facilitate emigration. E.g. academics who worked in multiple departments (either because they are of the "restless" type or because they are in high demand because of their ability) have more ties to early émigrés and were also more likely to emigrate. To address this endogeneity concern, we use the number of *colleagues dismissed early* in academic i's pre-1933 network as an IV for the number of *early émigré colleagues* in academic i's network.

4.1 Early Dismissals as IV

Early Dismissals: 1933-1934

Variation in the timing of dismissals occurred because of exemptions to dismissals under the *Law for the Restoration of the Professional Civil Service* of 1933 (Appendix C provides details). 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 ..., or whose fathers or sons had been casualties in the World War." (Hentschel 1996)

An implementation decree defined "Aryan descent" 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 1996, p. 25). Thus, even baptized Christians were dismissed if they had at least one Jewish grandparent.

Crucially for our identification strategy, Jews could retain their position if a) they had been a civil servant since August 1, 1914, or b) if they had fought at the front in WWI, or c) if they had lost a father or son in the war.[19] Importantly, the law and its exemptions were strictly enforced.

Late Dismissals: 1935 or later

Most Jewish academics who were originally exempted lost their position in the wake of the infamous *Nuremberg Racial Laws* of September 15, 1935. Some of the dismissals on the basis of the *Nuremberg Laws* 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 (Appendix C). Also note that some academics who were initially exempted resigned voluntarily. E.g., the physics Nobel Laureate James Franck could have stayed in his position in 1933 but resigned in protest on April 17, 1933 (Hentschel 1996, pp. 26). Almost all of these academics would have been dismissed in 1935 on the basis of the *Nuremberg Laws*. To avoid contamination of our IV, we classify all "voluntary" leavers as late dismissals.

Data on Dismissal Reasons and Years

To implement the instrumental variables strategy, we collect new data on exact dismissal reasons for all Jewish academics 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 C1). 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.

The newly collected data indicate that academics who were dismissed early had a much higher probability of early emigration (by January 1, 1935; see Figure 8).

Colleagues Dismissed Early as IV for Early Émigré Colleagues in the Pre-1933 Network

We measure early dismissals of colleagues in academic i's network (measured between January 1, 1929 and January 1, 1933) to construct an instrument for the number of ties to early

[19]Direct exposure to "enemy fire" was essential 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 1996, p. 47). Military doctors who had worked in field hospitals did not qualify (Kinas 2018, pp. 78). Because few Jewish professors had been in service since 1914, most of the *exempted* academics qualified as combatants in WWI. A few Jewish academics were also dismissed on the basis of alternative paragraphs of the *Civil Service Law* (see Appendix C). 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 define early dismissals as all those that occurred between 1933 and 1934.

émigrés. In the schematic example, academics in network 1 had ties to two colleagues who were dismissed early (indicated by the letter "D" in Figure 6c, or to one colleague who was dismissed early if they were themselves dismissed early). 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). The average academic had ties to 16.91 academics who were dismissed early (Table 1).

Importantly, the IV exploits early dismissals of academic i's colleagues, *not* his/her own early dismissal.[20] Academic i's characteristics, and in fact academic i's own early dismissal status, are not related to the number of dismissals in his/her network (Figure D1). The only significant coefficient is academic i's gender; the 48 women in the data have slightly fewer ties to colleagues dismissed early.[21]

The number of early dismissals in an academic's network should only affect emigration 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 *Civil Service Law* affected the entire public sector and was common knowledge to all academics, independently of the number of dismissals in *their* network. In fact, the law was the first piece of Nazi legislation that codified *nationwide* discrimination against Jews (Evans 2005) with dismissals being widely reported in newspapers: "[h]ardly a day goes by in which a new list of lecturer suspensions is not issued" (Vossische Zeitung 1933).

Furthermore, 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 controls for an academic's city$\times$subject employment history in the regressions. Because the city$\times$subject employment history also implicitly controls for the total number of Jewish and non-Jewish colleagues they also address potential alternative confounders, such as increasing administrative burdens or increases in the number of PhD students that non-emigrating academics had to cope with.

A further concern is that ties to colleagues dismissed early (or ties to early émigré colleagues) are correlated with specific employment histories (e.g. an academic working at the University of Berlin between 1929 and 1930 and then at Göttingen from 1931 to 1933 may be different from academics who worked only at Göttingen or only at Berlin). We investigate this concern by generating placebo networks. For each placebo network, we vary the subject for each academic

[20]The rules governing early dismissals meant that older academics who could have served in the German or Austro-Hungarian military were more likely to be exempted. We show that results are even stronger in restricted samples of older academics and on those born in Germany or Austria-Hungary (Appendix D.1.2). In these samples, early and late dismissals have similar age (48.2 for early dismissals and 49.8 for late dismissals, not statistically significantly different), and mostly differ in whether they experienced enemy fire in WWI.

[21]Results are robust in a sample of male academics only (Appendix F3).

but keep the employment history constant, e.g. we re-assign art history to a physicist, but keep constant the actual moves across cities and re-calculate ties to early émigrés and to colleagues dismissed early. We then re-estimate 1,000 specifications using the placebo networks. Of the 1,000 estimates not a single one is as large as our main OLS or IV estimates, and on average the estimated coefficients are centered around 0 (Figure 9). This strongly suggests that our main results are driven by actual ties to early émigrés and not by specific employment histories.

Lastly, the number of dismissals in the professional network may also affect emigration through severing ties with colleagues who were coauthors. Coauthoring with other professors was relatively limited in this period (Waldinger, 2012). Nonetheless, we show that results are very similar in a sample of academics who did not coauthor with other Jewish academics (Table F2).

4.2 First Stages

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 a better academic may have emigrated earlier. Consequently, we use academic i's *own* early dismissal status as our second IV. The two first stage regressions are:

$$\begin{aligned} \text{\# Early Émigré Colleagues (Pre-1933 Network)}_{-i} &= \gamma_1 + \gamma_2 \text{\# Colleagues Dismissed Early (Pre-1933 Network)}_{-i} \\ &+ \gamma_3 \text{Early Dismissal}_i + \gamma_c \text{Controls}_i + \zeta_i. \end{aligned} \tag{2}$$

$$\begin{aligned} \text{Early Émigré}_i &= \lambda_1 + \lambda_2 \text{\# Colleagues Dismissed Early (Pre-1933 Network)}_{-i} \\ &+ \lambda_3 \text{Early Dismissal}_i + \lambda_c \text{Controls}_i + \xi_i. \end{aligned} \tag{3}$$

Table 2, column (2) reports the first stage results for the number of early émigré colleagues from the pre-1933 professional network (equation 2). The number of colleagues *dismissed* early in academic i's network is a strong predictor for the number of *early émigré* colleagues in academic i's network. The point estimate indicates that one additionally dismissed colleague increased the number of early émigrés in his/her network by 0.65.[22] The academic's own early dismissal only had a small effect on the number of early émigrés in the network (Table 2, column 1). Controlling for the city×subject history hardly affects the point estimates (column 3).

[22]Figure D2 shows the first-stage relationship. The network measures aggregate the individual level probabilities of early dismissal and early emigration, resulting in a very strong relationship. The smaller the network, the larger is the relative variation (panel b). Note that some academics in smaller departments in 1933 had large networks, if they had previously worked in a large department.

Column (4) reports the first stage results for academic i's own early émigré status (equation 3). The number of colleagues dismissed early 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.

The first stage F-statistics are 58.4 and 886.0, indicating very strong relationships. With two endogenous variables and two IVs, a high first stage F-statistic is, however, not a sufficient condition for valid identification (Stock et al. 2002). We therefore report a Kleibergen-Paap statistic of 56.6, which is much higher than the critical value of 7.03 (Stock and Yogo 2005b).

4.3 IV Results

Next, we estimate equation 1 using our instrumental variables strategy. The IV estimates are somewhat smaller but similar in magnitude and significance compared to the OLS estimates. Ties to ten additional early émigrés increased the probability of emigration by 1939 by 5.0 pp. Not surprisingly, academic i's own emigration status in 1935 also had a strong effect on the probability of emigration by 1939 (Table 3, column 2). Ties to early émigrés had a similar effect for emigration by 1945 (column 5) and are robust to controlling for an individual's academic reputation and publication record (columns 3-4). We proxy for academic reputation by counting the number of entries in biographical compendia that were published *before* 1933. To account for discipline-level differences, we standardize this measure by academic discipline. The measure is a good proxy for reputation. For example, Albert Einstein is the most reputed physicist and the top 15 physicists contain five Nobel Laureates (Table B3). We measure pre-1933 publication records using data from the *Web of Science* for academics in seven disciplines (containing 59 percent of all dismissed Jewish academics) – mathematics, physics, chemistry, biochemistry, biology, medicine and psychology (Appendix B.4).[23]

We also show that ties to early émigré colleagues only affected the emigration decisions of academics who had *not* emigrated by January 1, 1935 (columns 7-8).[24] This suggests that the support by early émigrés to their former colleagues became effective after they had settled in the new destination.

5 Do Bridging Nodes Affect the Direction of Migration?

Early émigrés could have provided general information that facilitated emigration to *any* destination, or alternatively, only to their *own* destination. To differentiate between these two

[23]The regression also includes an indicator equal to one if we do not have publication data for the discipline.

[24]These results are only suggestive because the regressions condition on whether the focal academic had emigrated by 1935.

alternatives, we separately analyze ties to early émigré colleagues who had emigrated to the US/UK (the most attractive destinations) and ties to early émigré colleagues who had emigrated to other countries (Figure 5b shows destination countries).[25] We estimate the following regressions:

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

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

Ties to ten additional early émigrés in the US/UK *increased* emigration to the US/UK by 43.4 pp. Ties to ten additional early émigrés in other countries *decreased* emigration to the US/UK by 35.8 pp (Table 4, column 1).[26] 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 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 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 émigré colleagues in other countries *increased* emigration to other countries. In contrast, ties to early émigré colleagues in the US/UK *decreased* emigration to other countries (4, 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.

[25]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 (Appendix Figure B2). 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 IV strategy.

[26]For these results, ties to early émigrés are split by destination. The average academic had 5.6 ties to early émigrés in the US/UK and 5.6 ties to early émigrés in other countries.

6 Characteristics of Social Ties and their Effect on Emigration

Next, we analyze 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 by splitting ties to early émigré colleagues into two groups: ties to recent colleagues (overlap in 1933) and ties to less recent colleagues (overlap between 1929 and 1932, but not in 1933). Academics with ten more ties to recent colleagues were 9.7 pp more likely to emigrate (Table 5, column 2). In contrast, academics with ten more ties to less recent colleagues were only 5 pp more likely to emigrate.[27] These results suggest that ongoing ties are more effective than past ties. In fact, a mere one-year interruption of regular interactions led to a decay in the strength of ties. This is particularly surprising in the context of severe persecution during the Nazi period, 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 could be that recent interactions 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.

Social Ties and Geographical Proximity

We also analyze whether geographical proximity matters by differentiating between ties to early émigré colleagues 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 other mathematicians from the University of Breslau than to mathematicians at the Technical University of Breslau. Academics with ten more ties to early émigrés from the *same* department were 6.2 pp more likely to emigrate (column 4). The corresponding effect for early émigrés from the same subject employed by *another* institution in the same city is 4.8 pp. 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 scientific areas. Ties to ten additional early émigrés increased the probability of emigration by 3.5 percentage points for academics in the natural sciences and medicine. In contrast, ties to ten additional early émigrés increased the probability of emigration by 14.8 percentage points for academics in the social

[27] The coefficients are significantly different from each other with p-values of 0.057 (IV) and 0.058 (OLS).

sciences or humanities (Table 5, column 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 disciplines may have made 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.

7 Professional versus Family and Community Networks

Finally, we investigate the role of professional – relative to family and community networks for emigration decisions. We construct a measure of family networks using data from the *List of Jewish Residents* compiled by the German Federal Archive (see Appendix E). For our family network measure, we count the number of early émigrés (born within a $\pm$ ten-year-window) with the same last name from the city of residence of each academic.[28] The measure proxies for relatives such as wives or husbands, siblings, and cousins of each academic. The average academic had 0.8 early émigrés in his family network (Table 1), suggesting that non-academics were much less likely to emigrate early than academics. Similarly, we construct a measure of non-family community networks based on data from the *List of Jewish Residents*. The measure counts the number of early émigrés (born within a $\pm$ ten-year-window) with a *different* last name from the city of residence of each academic. The average academic had 858.6 early émigrés in his non-family community network (Table 1).[29]

We re-estimate equation 1 and add the measures of the family and community networks:

$$\begin{aligned} \text{Emigrated by 1939}_i &= \alpha_1 + \alpha_2 \text{\# Early Émigré Colleagues (Pre-1933 Network)}_{-i} \\ &+ \alpha_3 \text{\# Early Émigrés (Pre-1933 Family Network)}_{-i} \\ &+ \alpha_4 \text{\# Early Émigrés (Pre-1933 Community Network)}_{-i} \\ &+ \alpha_5 \text{Early Émigré}_i + \alpha_c \text{Controls}_i + \upsilon_i. \end{aligned} \tag{6}$$

Importantly, adding the measures for family and community networks does not affect the estimated coefficients of the professional academic network (Table 6). Early émigrés from the family

[28] The measure of family ties is related to recent work on family ties between politicians and firms (Gagliarducci and Manacorda, 2020), however as we use the full last name (and not just the first three letters) we are able to use a more precise measure of family ties.

[29] Results are similar if we measure family and community networks using $\pm$ five-year-windows. As the city$\times$subject employment history effectively controls for the sum of family and non-family community networks we do not estimate specifications without age restrictions.

network also affect emigration with a somewhat smaller magnitude than the professional networks. Ties to ten additional early émigrés from the family network increase emigration by around 4 pp (Table 5, columns 1-2, 5-6). Strikingly, for academics, community networks did not affect emigration decisions *at all* (columns 3-6), even though Buggle et al. (2020) find sizable effects of community networks for the German Jewish population overall.[30]

For academics with very common last names, the measure of family networks may capture relatively distant relatives or individuals who are not related. To probe robustness, we exclude academics with the 10 most common last names in the *Resident List* from the sample. The estimated effects are very similar in this restricted sample (columns 7-8).

These findings show that professional networks are important for the emigration decisions of *high-skilled* individuals and have a somewhat larger effect than family networks. Community networks do not matter at all for the emigration decisions of high-skilled individuals. This is an important result, because community networks have been at the center of most empirical papers that study the effect of networks on migration decisions. Our results suggest, that emigration decisions of high-skilled individuals are driven by different networks than the migration decisions of lower-skilled individuals. Furthermore, any analysis of the effect of networks on the migration decisions of high-skilled individuals would be seriously incomplete if it ignored professional networks.

8 Conclusion

Our study shows that *professional* networks play a key role in emigration decisions of high-skilled individuals. In particular, we show that ties to early émigrés affected emigration, which highlights the special role of bridging nodes for emigration. For high-skilled academics, professional networks were at least as important as family networks, and community networks played no role at all. We also show that social ties decay over time and over short geographic distances. Furthermore, early émigrés functioned as *bridges* that helped academics cross over into the same destination. Finally, we provide the first comprehensive documentation of academics of Jewish origin and their fate - whether they were murdered or escaped the Holocaust.

Our findings indicate that professional networks cause dynamic migration responses. The temporary surge in the number of world-class academics in the United States in the wake of the Nazi's rise to power solidified the transition of scientific leadership from Germany to the United States in the post-war period. More broadly, even short-term interruptions (e.g. the re-

[30]We measure networks using the place of residence because they are likely to have the largest effect on emigration decisions. Buggle et al. (2020) measure community networks in the place of birth. If we use the Buggle et al. (2020) measure of community networks (based on the place of birth) we also find that community networks do not affect emigration decisions of academics (Appendix Table E1).

cent 10-month suspension of the H-1B visa program) or surges of high-skilled migration can have long-term implications, because they affect long-term migration flows through the professional network. Similarly, brain drain caused by short-term factors can have long lasting effects because the migration decisions percolate through the professional network. This suggests that visa policies for high-skilled individuals who face persecution in their home countries can be a powerful tool to deepen a country's talent pool.

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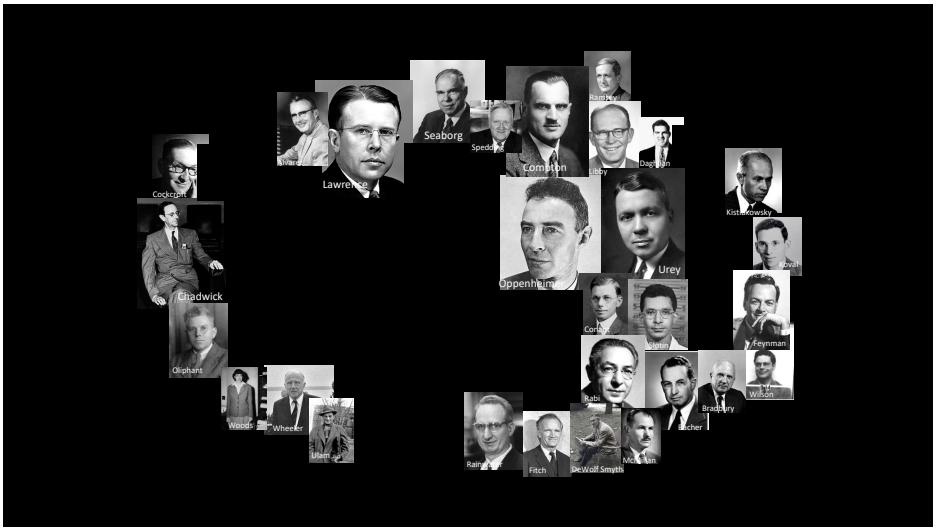
Winters, Paul, Alain de Janvry, and Elisabeth Sadoulet, "Family and Community Networks in Mexico-U.S. Migration," *The Journal of Human Resources*, 2001, *36* (1), 159–184.

Figures and Tables

Figure 1: Key Scientists Involved in the Manhattan Project

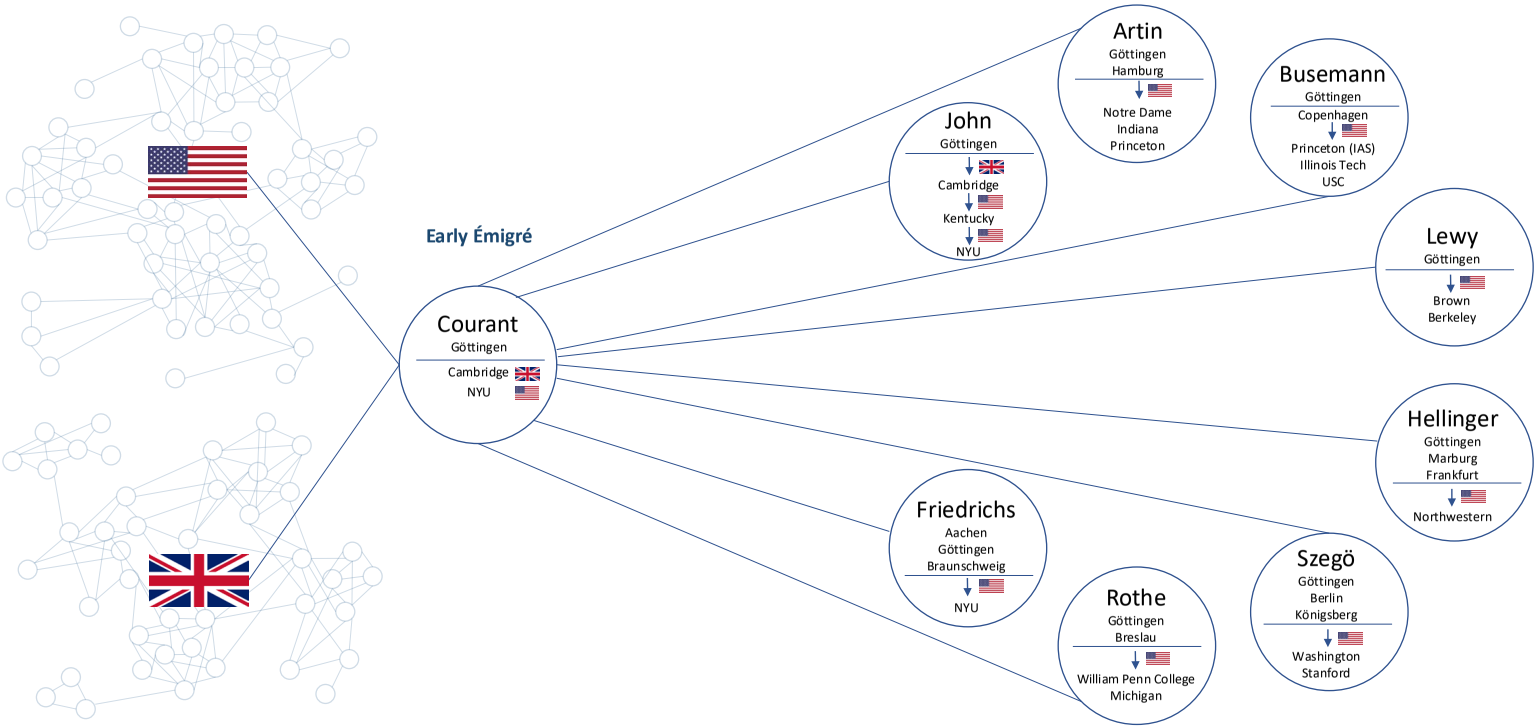
(a) All Key Scientists

(b) Without Émigrés from Europe



Notes: The Figure underlines that émigrés from Europe made key contributions in their destinations. Panel A reports all scientists who were key for the success of the Manhattan Project. Panel B excludes émigrés from Europe. 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 importance of each scientist for the success of the project. For more details see Rhodes (1986). The Atomic Heritage Foundation argued that "[o]ne of the ironies of Hitler's desire for racial purity was that it drove out of continental Europe or into the camps many individuals who would have been extremely useful to the Axis war effort. Nowhere was this more evident than in the effort to produce an atomic bomb. A startling proportion of the most famous names on the project belonged to scientists who came to England or America to flee from the Axis" (see https://www.atomicheritage.org/article/scientist-refugees-and-manhattan-project).

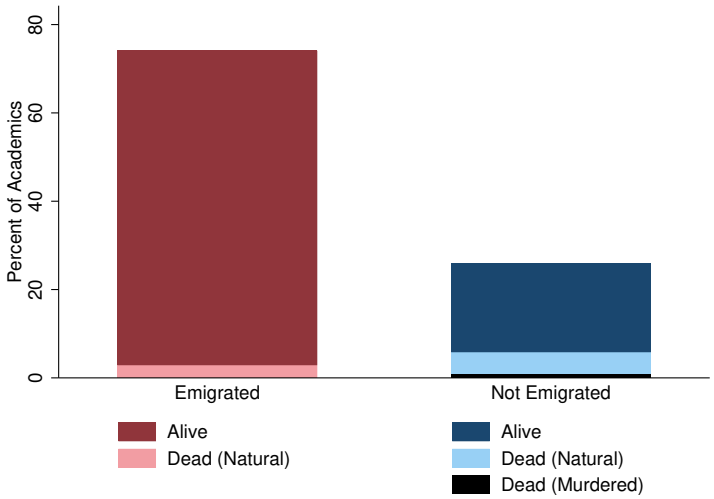
Figure 2: Richard Courant's Involvement in Securing Faculty Positions



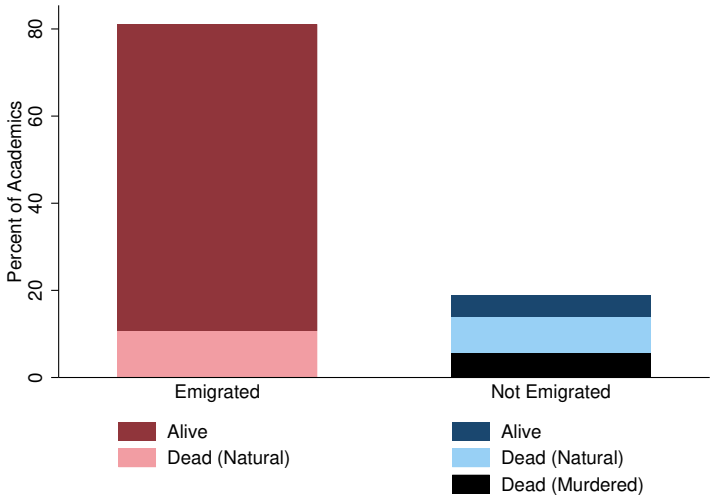
Notes: The Figure depicts professional ties for which we found explicit documentary proof (e.g. letters, testimonials etc.) of Courant's role in faciliating emigration. For example, he secured a temporary position at the University of Cambridge for Fritz John. In his letter of support, Courant recommended 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). Courant also helped his former colleague Kurt Friedrichs who had moved to the University of Braunschweig. He "wrote letters about Friedrichs [...] to everyone he knew who was interested in the development of applied mathematics. He [...] presented him as "a mathematician in the style of C. Runge." (Reid 2013, p. 196) Courant was also instrumental in helping others from his professional network to secure positions in a wide range of institutions across the United States and United Kingdom. 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 A1 reports details on Courant's help to mathematicians in his network.

Figure 3: The Fate of Persecuted Academics

(a) Fate in 1939

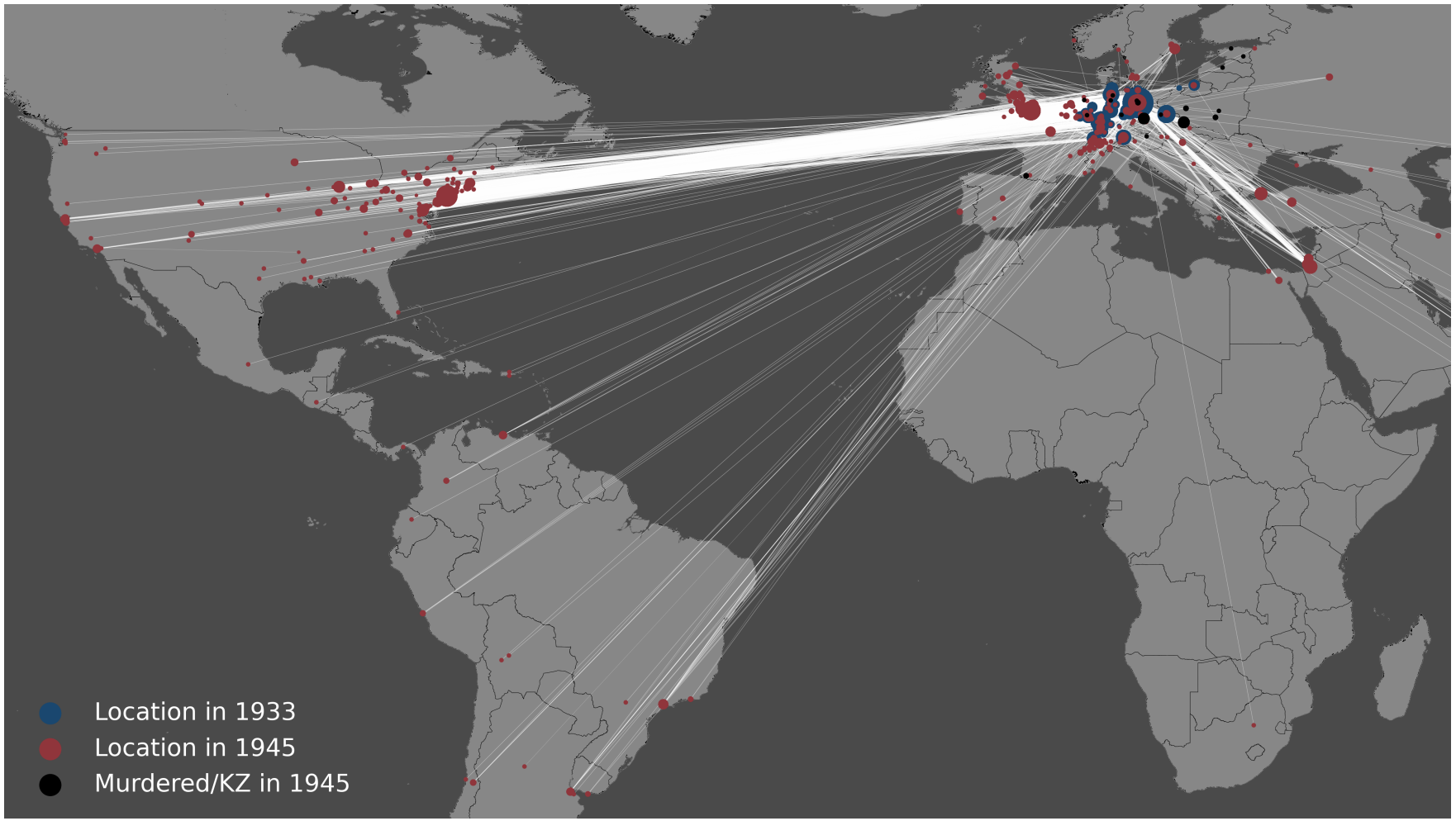


(b) Fate in 1945



Notes: The Figure reports the fate of persecuted Jewish academics. Panel a shows the fate for January 1, 1939, panel b shows the fate for January 1, 1945. The category of murdered academics also contains suicides of academics and academics who were deported to concentration camps, even if they had not been murdered by the relevant date. 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. 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*. Some of them managed to survive the Holocaust in Germany.

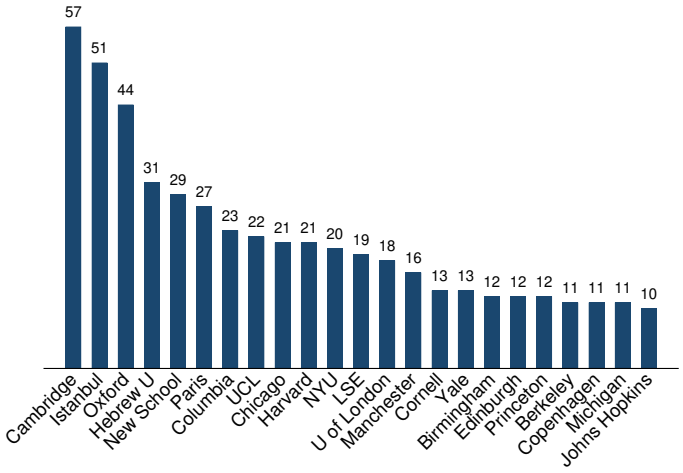
Figure 4: Movements of Academics Between 1933 and 1945



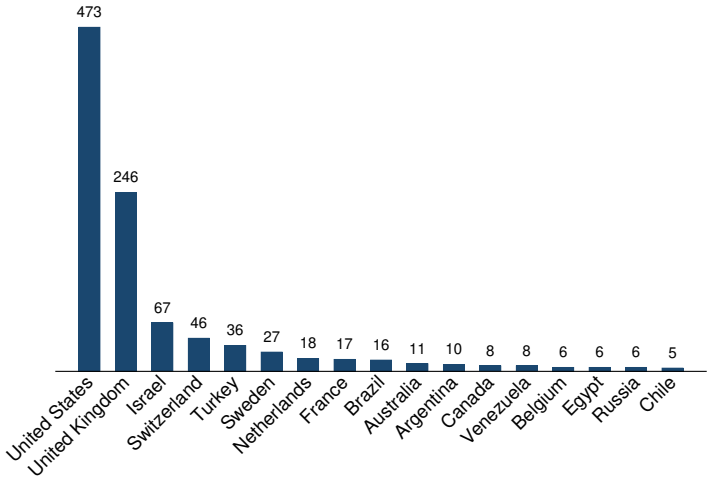
Notes: The Figure shows the location of Jewish academics on January 1, 1933 (blue dots, all in Germany) and January 1, 1945 (red dots or black dots). The size of the dots reflects the number of academics in each location. The white lines connect the locations on January 1, 1933 and January 1, 1945. The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

Figure 5: Main Destinations of German Jewish Academics

(a) University Destinations, 1934-1945



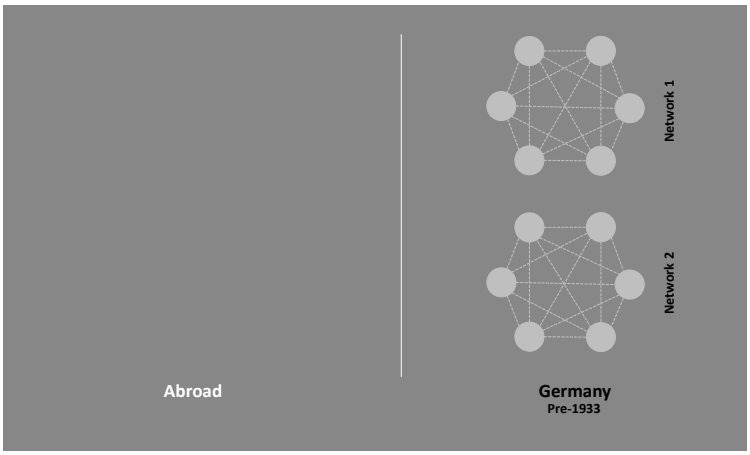
(b) Destination Countries, 1945



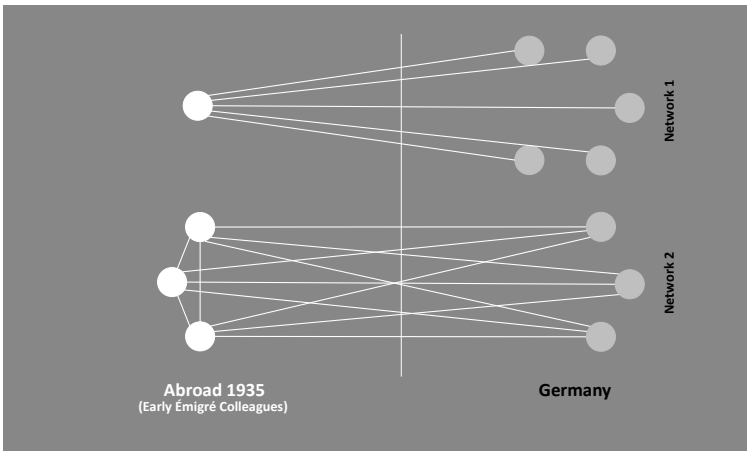
Notes: The Figure reports the main destinations of German Jewish academics. Panel a reports the number of Jewish academics who were affiliated with the respective university at some point between January 1, 1934 and January 1, 1945. Only universities with at least ten émigrés are reported. Panel b reports the number of Jewish academics in each destination country by January 1, 1945. Only countries with at least five émigrés are reported.

Figure 6: The Role of Early Émigré Colleagues in Facilitating Emigration

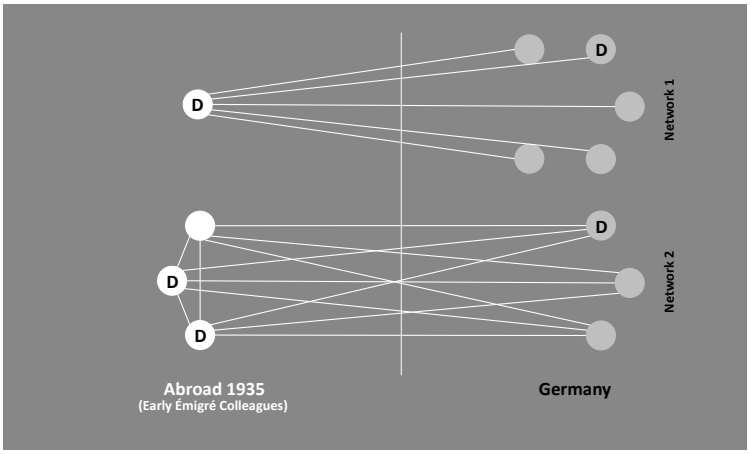
(a) Network of Jewish Colleagues in Germany Pre-1933



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



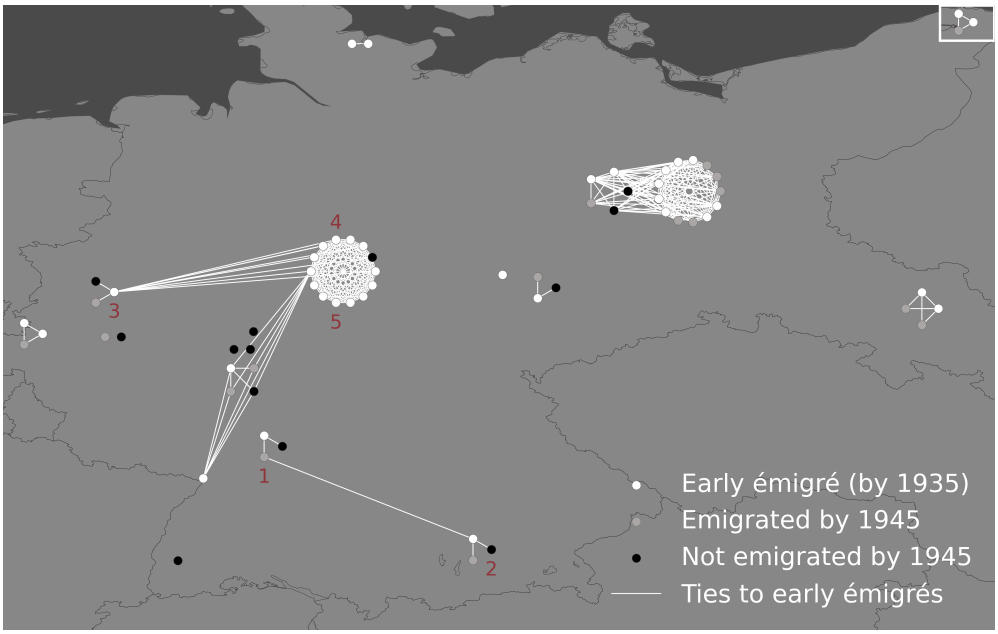
(c) Colleagues Dismissed Early as IV for Early Émigrés



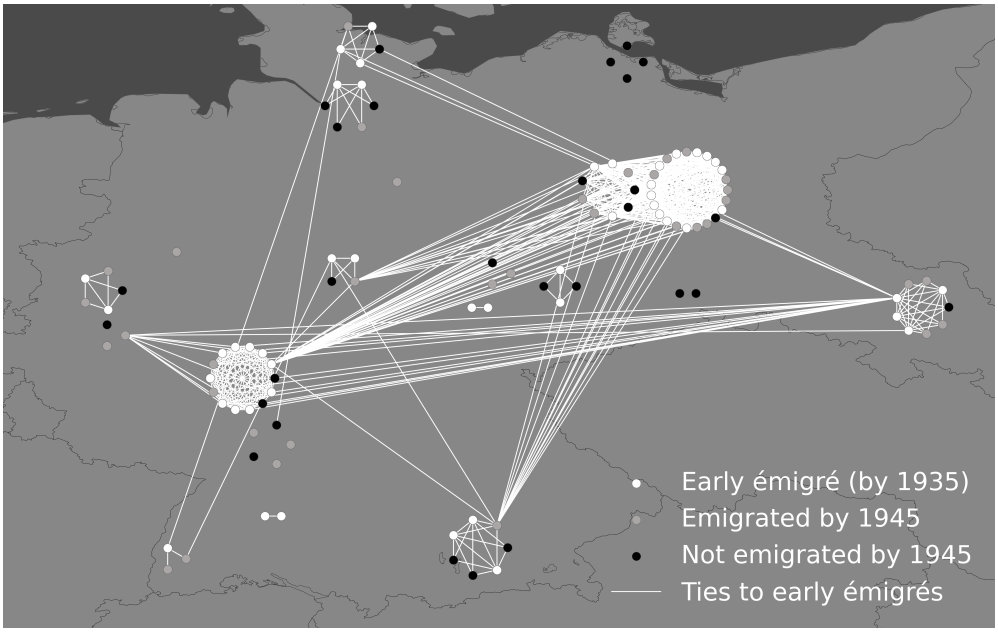
Notes: Panels a-c show a schematic example of two professional networks to illustrate the identification strategy. Panel a shows the pre-1933 networks of academics who worked in the same subject and city. Panel b shows the two networks in 1935 when early émigré colleagues had moved abroad. The academics 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). Panel c illustrates the IV strategy. By 1935, some academics were dismissed ("early dismissals" indicated by the letter "D") and some early émigrés had moved abroad. The IV strategy uses the number of dismissed colleagues among the pre-1933 network as an IV for the number of early émigré colleagues among the pre-1933 network.

Figure 7: The Role of Early Émigré Colleagues in Facilitating Emigration

(a) Actual Ties to Early Émigrés: Mathematics

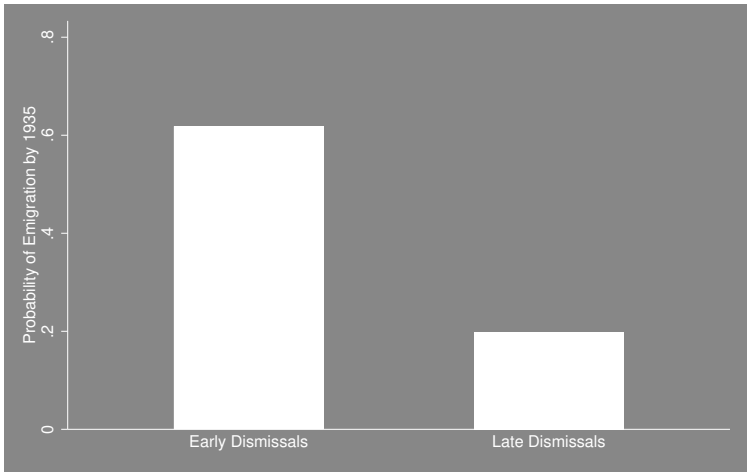


(b) Actual Ties to Early Émigrés: Law



Notes: Panels a and b show actual ties to early émigré colleagues for mathematics (panel a) and law (panel b) in our data. The dots represent academics and we report the 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 émigré colleagues are represented by white lines. For mathematics, panel a shows the two important centers Göttingen and Berlin (with two universities: the University of Berlin and the Technical University of Berlin). For law, panel b 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.

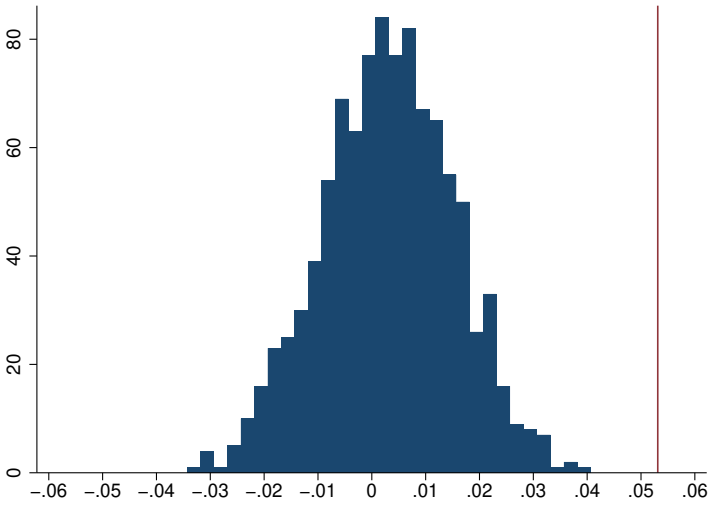
Figure 8: Probability of Emigration by 1935 by Dismissal Status



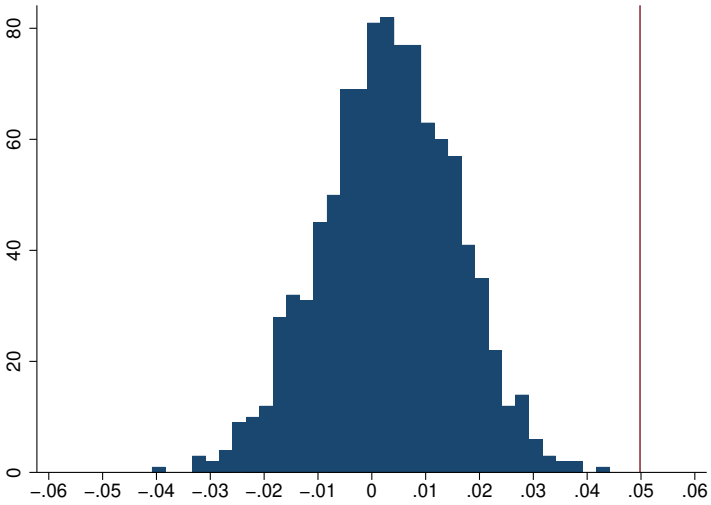
Notes: The figure shows the probability of emigration by January 1, 1935 for academics who were dismissed early (1933 or 1934) versus late (1935 or later), indicating that early dismissal is a good predictor of early emigration. Note: to construct an IV for the number of early émigré colleagues we aggregate the number of colleagues dismissed early from academic i's network.

Figure 9: Placebo Networks

(a) OLS Estimates



(b) IV Estimates



Notes: The Figure shows distributions of coefficients for OLS and IV results using the placebo networks. Panel a reports the OLS estimates, panel b reports the IV estimates. For the OLS estimates, we generate 1000 alternative placebo networks for # Early Émigré Colleagues (Pre-1933 Network) and estimate our baseline OLS model from table 1, column 3 for each placebo network. For the IV estimates, we generate 1000 alternative placebo networks for # Colleagues Dismissed Early (Pre-1933 Network) and # Early Émigré Colleagues (Pre-1933 Network) and estimate our baseline IV model from table 1, column 4 for each placebo network. The red vertical lines indicate our baseline estimates for the OLS and IV regressions.

Table 1: 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 Professional Experience Abroad	0.06	
Born Abroad	0.19	
Pre-1933 Quality[a]	1.18	1.59
Pre-1933 Publication Record[b]	0.68	0.54
Panel B – Network Characteristics		
# Early Émigré Colleagues (Pre-1933 Network)	11.21	14.04
# Colleagues Dismissed Early (Pre-1933 Network)	16.91	21.58
# Early Émigrés (Pre-1933 Family Network)	0.76	2.59
# Early Émigrés (Pre-1933 Community Network)	858.63	1125.21
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.
[a] Pre-1933 quality is measured as the number of entries in bibliographical compendia that were published before 1933.
[b] Annual publications between 1928 and 1932 are reported for academics in mathematics, physics, chemistry, biochemistry, biology, medicine, and psychology.

Table 2: First Stage Results

Dep. Variable:	(1) # Early Émigré Colleagues (Pre-1933 Network)	(2) Early Émigré	(3) # Early Émigré Colleagues (Pre-1933 Network)	(4) Early Émigré
# Colleagues Dismissed Early (Pre-1933 Network)	0.646***	0.011**	0.620***	-0.010
	(0.004)	(0.005)	(0.017)	(0.033)
Early Dismissal	0.037	0.300***	0.036***	0.283***
	(0.025)	(0.024)	(0.004)	(0.026)
Female	0.062*	0.098	-0.010	0.074
	(0.033)	(0.065)	(0.012)	(0.089)
Married	-0.024*	0.044	-0.007	0.085***
	(0.012)	(0.027)	(0.007)	(0.026)
Number of Children	-0.006	0.010	-0.002	0.003
	(0.004)	(0.009)	(0.002)	(0.012)
Any Foreign Language	-0.026*	0.119***	-0.017**	0.140***
	(0.014)	(0.034)	(0.007)	(0.046)
Pre-1933 Professional Experience Abroad	0.037*	0.183***	-0.021*	0.118
	(0.020)	(0.066)	(0.011)	(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	0.972	0.304	0.998	0.509
F-statistic (excluded instruments)	42484.401	90.526	886.407	58.082
Kleibergen-Paap rk Wald F-statistic			56.611	
Mean of Dep. Variable	1.121	0.522	1.121	0.522

Notes: The Table reports the first stage regressions. The dependent variable in columns 1 and 3 is the number of early émigré colleagues from the pre-1933 network. 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 colleagues dismissed early among the pre-1933 network. 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 prociency, 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 3: Ties to Early Émigrés and Emigration: OLS, IV

	(1) OLS	(2) IV	(3) IV	(4) IV	(5) IV	(6) IV	(7) IV
Dep. Variable:	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1945	Emigrated by 1939	Emigrated by 1939
# Early Émigré Colleagues (Pre-1933 Network)	0.053***	0.050***	0.049***	0.046***	0.050***	0.008	0.137***
	(0.014)	(0.014)	(0.014)	(0.015)	(0.018)	(0.014)	(0.043)
Early Émigré	0.342***	0.312**	0.310**	0.312**	0.043		
	(0.032)	(0.144)	(0.144)	(0.142)	(0.108)		
Female	0.052	0.055	0.061	0.057	0.100**	-0.027	0.047
	(0.048)	(0.050)	(0.050)	(0.050)	(0.046)	(0.041)	(0.261)
Married	-0.003	-0.001	-0.002	-0.000	0.006	0.006	-0.047
	(0.017)	(0.021)	(0.021)	(0.020)	(0.027)	(0.013)	(0.060)
Number of Children	0.007	0.007	0.007	0.007	0.031***	-0.005	-0.013
	(0.014)	(0.014)	(0.014)	(0.014)	(0.010)	(0.004)	(0.027)
Any Foreign Language	0.055	0.060	0.060	0.064	0.100**	-0.020	0.118*
	(0.039)	(0.056)	(0.054)	(0.055)	(0.037)	(0.013)	(0.061)
Pre-1933 Professional Experience Abroad	0.056*	0.059**	0.053*	0.056**	0.055	0.035	-0.051
	(0.030)	(0.024)	(0.026)	(0.025)	(0.058)	(0.024)	(0.106)
Born Abroad	0.083***	0.089**	0.089**	0.087**	0.105***	0.017	0.198***
	(0.016)	(0.036)	(0.033)	(0.037)	(0.027)	(0.014)	(0.058)
Academic Rank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-1933 Quality			Yes				
Pre-1933 Publication Record				Yes			
Sample:	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Emigrated by 1935	Not-Emigrated by 1935
Number of Observations	1327	1327	1327	1327	1327	693	634
R^2	0.649						
Kleibergen-Paap rk Wald F-statistic		56.611	66.773	48.522	56.611		
Mean of Dep. Variable	0.741	0.741	0.741	0.741	0.811	0.984	0.475
F-statistic (excluded instruments)						662.192	505.732

Notes: In columns 1-5, the sample includes all academics. In column 6, the sample includes academics who had emigrated by January 1, 1935. In column 7, the sample includes only academics who had not emigrated by January 1, 1935.

The dependent variable in columns 1-4 and 6-7 is an indicator that equals 1 if academic *i* had emigrated by January 1, 1939. The dependent variable in column 5 is an indicator that equals 1 if academic *i* had emigrated by January 1, 1945.

The main explanatory variable is the number of early émigré colleagues from the pre-1933 network. In columns 1-5 another important explanatory variable is academic *i*'s own early émigré status. We instrument these variables with the number of colleagues dismissed early among the pre-1933 network and with an indicator that equals 1 if academic *i* him/herself was dismissed early. First stage regressions for columns 2 and 5 are reported in Table 2. All other first stage regressions are reported in Appendix Table D2.

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 employment history. In column 3, we add 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 entries in pre-1933 bibliographical compendia. In column 4, we add indicators for whether academic *i* ranked in the 51-80th, 81-90th, or 91-100th percentile of the pre-1933 subject-level publication distribution. The regressions also include unreported indicators for academics with missing information on academic reputation or publications.

Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table 4: Directional Effects

	(1) OLS	(2) OLS
	Emigrated by 1939 to	
Dep. Variable:	US/UK	Other Countries
# Early Émigré Colleagues in US/UK (Pre-1933 Network)	0.433***	-0.301***
	(0.111)	(0.111)
# Early Émigré Colleagues in Other Countries (Pre-1933 Network)	-0.356***	0.334**
	(0.118)	(0.137)
Emigrated to US/UK by 1935	0.507***	-0.168***
	(0.036)	(0.018)
Emigrated to Other Countries by 1935	-0.227***	0.570***
	(0.027)	(0.037)
Baseline Controls	Yes	Yes
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	0.540
Mean of Dep. Variable	0.414	0.327

Notes: In column 1, the dependent variable is an indicator that equals 1 if academic *i* had emigrated to the United States or the United Kingdom by January 1, 1939. In column 2, the dependent variable is an indicator that equals 2 if academic *i* had emigrated to other countries by January 1, 1939.

The first main explanatory variable is the number of early émigré colleagues in the United States or the United Kingdom from the pre-1933 network. The second main explanatory variable is the number of early émigré colleagues in other countries from the pre-1933 network. 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 prociency, 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: Ties to Early Émigrés: 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 Émigré Colleagues (Pre-1933 Network – More Recent Colleagues)	0.109**	0.097***				
	(0.044)	(0.035)				
# Early Émigré Colleagues (Pre-1933 Network – Less Recent Colleagues)	0.052**	0.050**				
	(0.021)	(0.019)				
# Early Émigré Colleagues (Pre-1933 Network – Same Department)			0.063***	0.062***		
			(0.021)	(0.016)		
# Early Émigré Colleagues (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**	0.035**
					(0.016)	(0.014)
# Early Émigrés (Pre-1933 Network) × Social Sciences and Humanities					0.155***	0.148***
					(0.051)	(0.053)
Early Émigré	0.349***	0.318**	0.344***	0.314**	0.345***	0.313**
	(0.030)	(0.142)	(0.031)	(0.144)	(0.031)	(0.145)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
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		38.360		35.913		36.240
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 émigré colleagues from the pre-1933 network who overlapped on January 1, 1933 (more recent colleagues). The second main explanatory variable is the number of early émigré colleagues from the pre-1933 network who overlapped between January 1, 1929 and January 1, 1932, but not thereafter (less recent colleagues).
In columns 3 and 4, the first main explanatory variable is the number of early émigré colleagues from the pre-1933 network from the same institution and subject. The second main explanatory variable is the number of early émigré colleagues from the pre-1933 network 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 émigré colleagues from the pre-1933 network 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 émigré colleagues from the pre-1933 network 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 D3 for the first stage results).
For a small number of academics, information on some control variables (family status, language prociency, 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 6: Professional Networks, Family Networks, and Community Networks

	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
							Excluding Most Common Last Names	
Dep. Variable:	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939
# Early Émigré Colleagues (Pre-1933 Network)	0.052***	0.049***	0.055***	0.050**	0.056***	0.051**	0.052**	0.046**
	(0.014)	(0.014)	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.020)
# Early Émigrés (Pre-1933 Family Network)	0.041***	0.042***			0.042***	0.043***	0.041**	0.041**
	(0.012)	(0.015)			(0.011)	(0.014)	(0.017)	(0.017)
# Early Émigrés (Pre-1933 Community Network)			-0.000	-0.000	-0.000	-0.000	-0.000	0.000
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Early Émigré	0.341***	0.318**	0.342***	0.312**	0.342***	0.318**	0.342***	0.364***
	(0.031)	(0.143)	(0.032)	(0.145)	(0.031)	(0.144)	(0.032)	(0.126)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Academic Rank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1327	1327	1327	1327	1327	1327	1268	1268
R^2	0.649		0.649		0.649		0.656	
Kleibergen-Paap rk Wald F-statistic		62.637		56.409		62.761		74.073
Mean of Dep. Variable	0.741	0.741	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.
The first main explanatory variable is the number of early émigré colleagues from the pre-1933 network. In columns 1-2 and 5-8, the second main explanatory variable is the number of early émigrés who were born within a ± ten-year-window with the same last name as academic *i* and resided in cities where academic *i* worked between 1929 and 1933. In columns 3-8, the second or third main explanatory variable is the number of early émigrés who were born within a ± ten-year-window with a different last name as academic *i* and resided in cities where academic *i* worked between 1929 and 1933 (see Appendix E for details).
Another important explanatory variable is academic i's own early émigré status. In columns 2, 4, 6, and 8 we instrument the number of early émigré colleagues from the pre-1933 network with the number of dismissed colleagues from the pre-1933 network and the emigration status in 1935 with an indicator that equals 1 if academic *i* him/herself was dismissed early (see Appendix Table D4 for the first stage results).
For a small number of academics, information on some control variables (family status, language prociency, 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.

Online Appendix

This Online Appendix presents further details on historic background, data collection, construction of variables, identification strategy, and additional results.

- Appendix A gives further details on Richard Courant's involvement in helping mathematicians in his network to find positions abroad.
- Appendix B explains how we constructed detailed biographies.
- Appendix C provides a detailed explanation of the dismissals.
- Appendix D discusses our IV strategy and the validity of the exclusion restriction.
- Appendix E introduces the data we use to construct our measures of family and community networks.
- Appendix F presents robustness checks that further support the analysis in the main text.

A Further Details on Courant's Involvement

As outlined in the main text, Richard Courant was instrumental in helping mathematicians in his networks (see Figure 2). Table A1 gives further details on his involvement by means of quotes from the letters he wrote in support of his former colleagues.

Table A1: 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)

Table A1: Richard Courant's Involvement in Securing Faculty Positions

	Involvement	Quotes from letters
Gábor Szegö	George Washington University	Courant was also contacted by W.E. Tisdale, the Rockefeller Foundation officer in Paris, regarding Gábor 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)
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)

B Further Details on Data Construction

B.1 Further Details on the Roster of 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.

List of Displaced German Scholars 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.[31]

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.

Additional Sources 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. The sources are as follows:

Table B1: University-Specific Sources on Dismissed Jewish Academics

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)
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. (1998); 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)

[31]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.

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)

Table B2: Subject-Specific Sources on Dismissed Jewish Academics

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)

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.

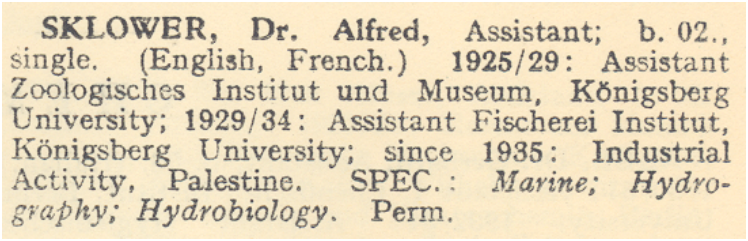
B.2 Further Details on Career Stages

We reconstruct individual biographies 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.

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 Figure B1). 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 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.

Figure B1: Entry of Alfred Sklower on the LDS


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.

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.

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 impute 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 1937, 1938, and 1939 (note: we do not impute 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.[32]

B.3 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 entries in biographical compendia that were published before 1933.

The quality of an individual academic may be an important confounder that we should control for to avoid falsely attributing an important role to academic networks. Table B3 shows the most reputed German Jewish academics for six selected disciplines: mathematics (Panel A), physics (Panel B), philosophy (Panel C), biochemistry (Panel D), philology (Panel E), and chemistry (Panel F).

[32]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 the few 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 $\#\ Early\ Émigré\ Colleagues\ (Pre\text{-}1933\ Network)_{\text{-}i}$ is 0.054 with a standard error of 0.015.

Table B3: 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	

Table B3: Academics With the Highest Reputation

Name	Number of Pre-1933 Sources	Name	Number of Pre-1933 Sources	Year of Nobel Prize
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	
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 mathematics, physics, philosophy, biochemistry, philology, and chemistry. We measure academic reputation according to the appearance in biographical compendia (see Appendix B.3 for details). We rank academics based on the number of entries in 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.

B.4 Data on Journal Publications

We use an algorithm developed by Iaria et al. (2018) to merge papers from the Web of Science (WoS) to academics in scientific disciplines: 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 discipline 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 discipline (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, iii) subject

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

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 $N(i)$ of academic i and the number of initials $N(p)$ of matched paper 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 $N(i)$ and the number of initials $N(p)$ 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.*[33]

B.5 Further Details on Fate after 1933

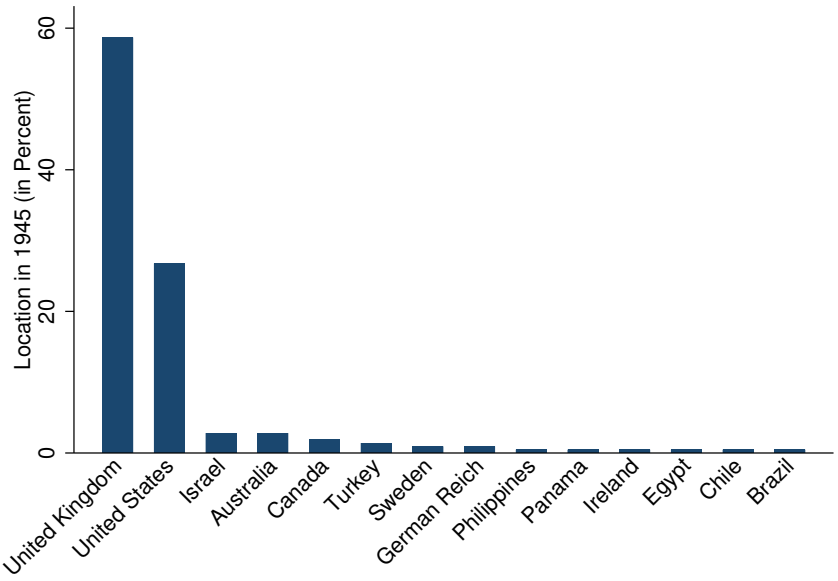
B.5.1 Emigration to the United States via the United Kingdom

While the United Kingdom was a prime destination in the years 1934-1945, for many German Jewish academics, it was not their ultimate destination. As Figure B2 shows, more than a quarter

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

of German Jewish academics who had emigrated to the United Kingdom by 1934 ultimately settled in the United States, with others settling in Israel, Australia, Canada, etc.

Figure B2: 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.

B.5.2 Comparison of Emigration Rates with Emigration in the General Jewish Population

Benz (1988) reports absolute numbers of émigrés from the general German Jewish population by year from 1933 onwards. In some years he only reports ranges. We take the midpoint of the ranges, sum the number of émigrés 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).

C Dismissals

C.1 Further Details on the Legal Basis for Dismissals

C.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. As German university professors were civil servants the law directly applied to them. 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 1996, p. 47).[34] 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 1996, pp. 22)

All of these paragraphs were applied by the Nazi government to dismiss Jewish academics.[35]

Paragraph 2 of the law was used to dismiss party members of leftist or liberal parties, e.g. all members of the Communist Party.[36] Because German academia was politically relatively conservative, only 0.2 percent of early dismissals of Jewish academics occurred because of paragraph 2 (Figure C2).

[34]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 have the status of a civil servant *(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 PhD 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.

[35]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 ten years. Those dismissed under paragraph 4 also received a pension, if they had been a civil servant for at least ten 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.

[36]As explained in Hentschel (1996): "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 descent and provided the legal basis for the majority of dismissals of academics of Jewish origin.

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 (Figure C2).

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 (Figure C2).

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*.

To implement the *Civil Service Law* the Nazi government required all academics to submit a questionnaire detailing the ancestry to the Ministry of Education of each state. As religious affiliation of the parents was included in birth registers it was easy to verify the religious affiliation of grandparents. The law was uniformly applied and left no room for local interpretations.

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.

C.1.2 Late Dismissals: After 1935

The Jewish academics who fell under the exemption clauses of paragraph 3 of the *Civil Service Law* could remain in office until 1935. Most of them lost their position after 1935. The main law to dismiss Jewish academics after 1935 was the *Reich Citizenship Law* of September 15, 1935, which formed part of the so-called *Nuremberg Laws*. 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[37] and therefore provided

[37]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.

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 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 (*RHO*) 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* was used 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) and had been exempted from dismissal under the *Civil Service Law*.[38] 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 exempt from the *Civil Service Law* and not affected by the *RBG*.

C.1.3 Overview of Legal Basis of Dismissals for Jewish Academics in Germany

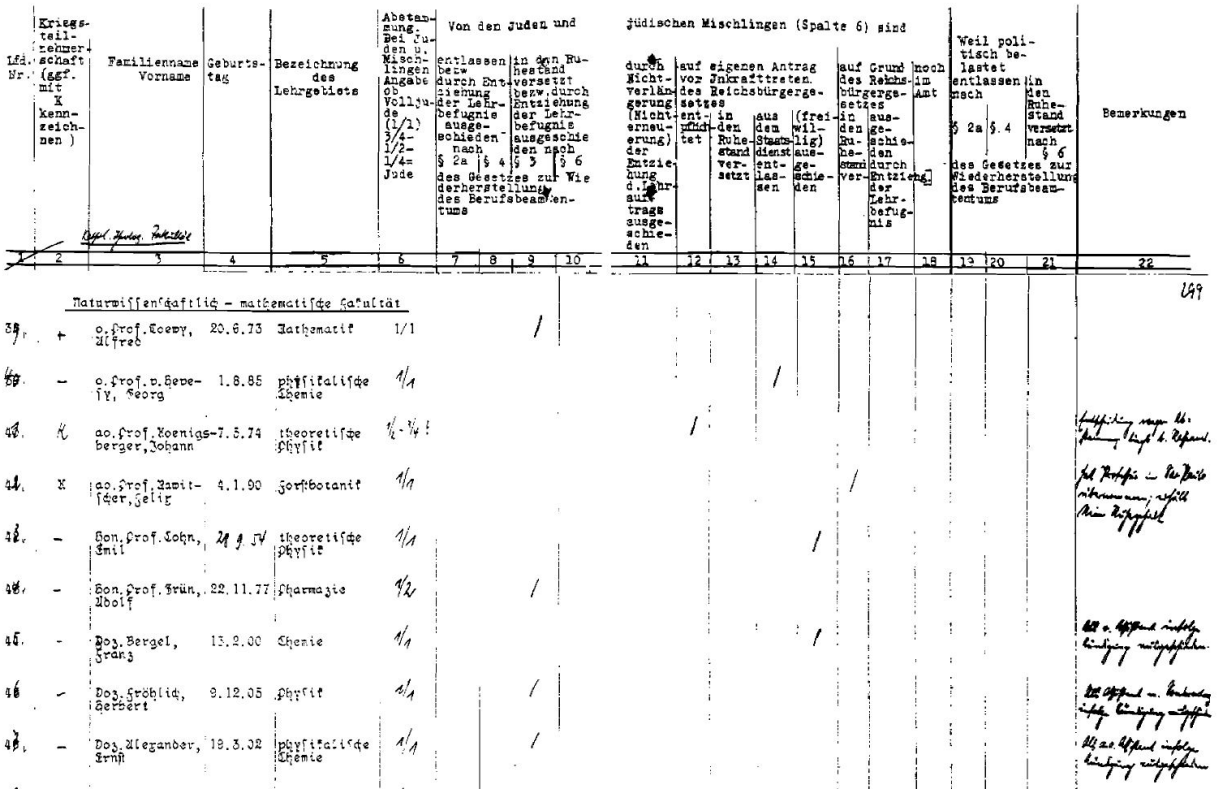
Among senior academics, more than 80 percent of *early dismissals* occurred on the basis of paragraph 3 of the *Civil Service Law*, followed by paragraphs 6 and 4 of the same law (Figure C2, panel b). Of the late dismissals, more than 80 percent occurred on the basis of the *Reich Citizenship Law* (Figure C2, panel c).

[38]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).

C.2 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 C1 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.

Figure C1: Example Data Source Dismissal paragraphs Freiburg



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).

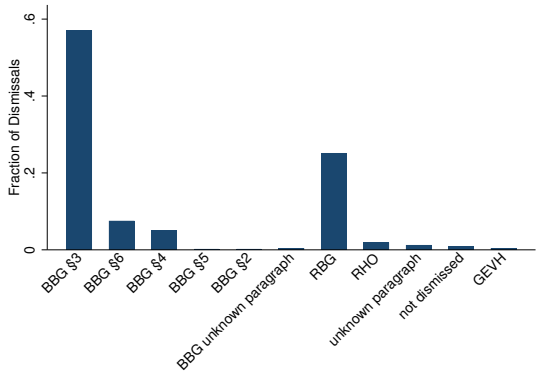
C.3 Dismissal Paragraphs and Dismissal Years of Jewish Academics

C.3.1 Dismissal Paragraphs

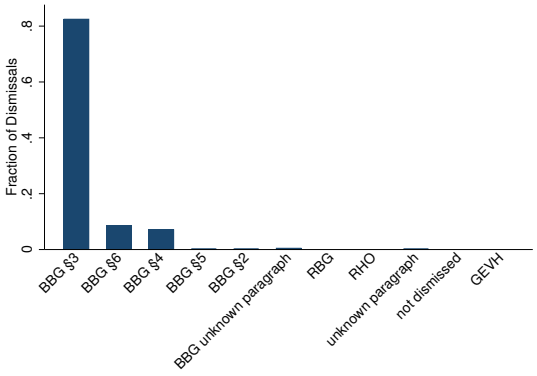
Dismissals of German Jewish academics followed specific national laws and was thus not an arbitrary act at the local level. Figure C2 shows the paragraphs that formed the basis of dismissals of German Jewish academics, for all dismissed academics (Sub-Figure C2a), and separately for early dismissals (Sub-Figure C2b) and late dismissals (Sub-Figure C2c).

Figure C2: Dismissal Paragraphs

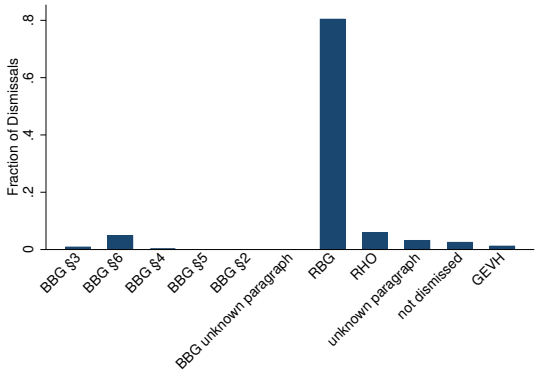
(a) All Dismissals



(b) Early Dismissals (1933-1934)



(c) Later Dismissals (1935 or Later)

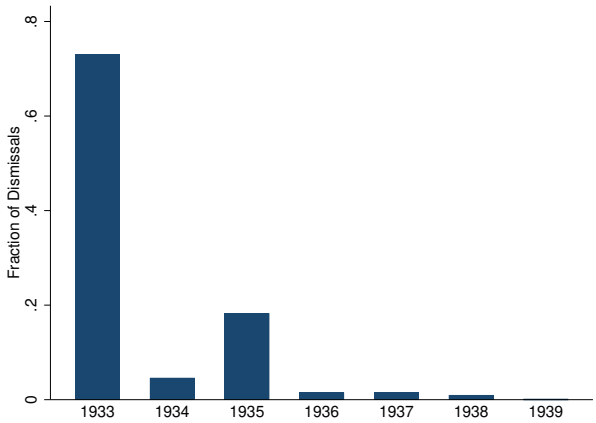


Notes: The Figure shows dismissal paragraphs for senior academics (professor, associate professor, honorary professor, and *Privatdozent*). Dismissals occurred on the basis of *Law for the Restoration of the Professional Civil Service* (BBG), the *Reich Citizenship Law* (RBG), the *Reichshabilitationsordnung* (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 C.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.

C.3.2 Dismissal Years

Jewish academics in Weimar Germany were dismissed on the basis of the *Law for the Restoration of the Professional Civil Service*. Figure C3 shows the dismissal years, More than two thirds of academics were dismissed early, in 1933 or 1934, with all other Jewish academics dismissed in 1935, or subsequent years.

Figure C3: Dismissal Years



Notes: The Figure shows dismissal years of Jewish academics.

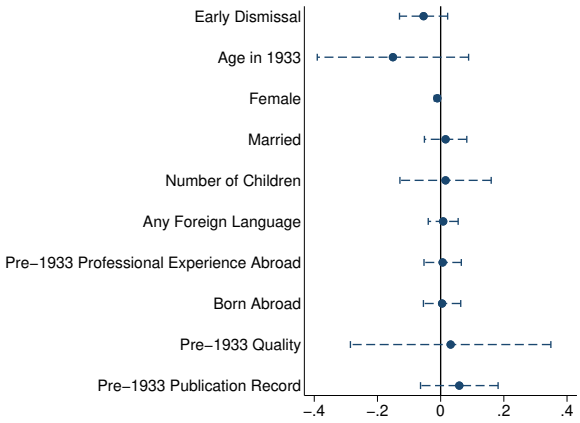
D Further Details on IV Strategy

D.1 Discussion of Exclusion Restriction

D.1.1 Correlations of Academic *i*'s Characteristics with Number of Dismissed Colleagues

We address potential concerns that the number of colleagues dismissed early, our IV for the number of early émigré colleagues, is correlated with academic i's characteristics. Figure D1 shows that most characteristics of academic i were uncorrelated with the number of colleagues dismissed early. The only significant coefficient is academic i's gender; the 48 women in the data have slightly fewer ties to colleagues dismissed early. The Figure alleviates concerns that academics with certain characteristics have more dismissals in their own academic network, propelling them to emigrate independently of the number of early émigré colleagues.

Figure D1: Correlations of Academic i's Characteristics with Number of Dismissed Colleagues



Notes: The Figure shows coefficients and 95% confidence intervals of regressions with alternative dependent variables as indicated in the figure (e.g. Early Dismissal of academic *i*) and the explanatory variable # Colleagues Dismissed Early (Pre-1933 Network). To control for sorting of academics with certain characteristics into certain departments, the regressions additionally control for the city × subject employment history. To ease readability, we scale age by a factor of ten.

D.1.2 Results for Senior Academics

Jews could retain their position if a) they had been a civil servant since August 1, 1914, or b) if they had fought at the front in 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 in 1933. The rules governing early dismissals meant that older academics who could have served in the German or Austro-Hungarian military were more likely to be exempted. We therefore show results in a sample of senior academics (academics with an academic rank of *Privatdozent* or higher) who could all possibly have qualified for the exemptions. In this sample, estimates are larger and remain highly significant (Table D1, columns 1-2). We further restrict the sample to academics who were born in the German Reich or Austria-Hungary and, hence, to academics who could have served in the military of a Central Power. In this sample, estimates are larger and remain highly significant (Table D1, columns 1-2). The effect of ties to early émigré colleagues are stronger than in the full sample presumably because senior academics were more settled and less keen to emigrate than junior academics.

Table D1: Professional Networks and Emigration – Senior Academics

	(1)	(2)	(3)	(4)
Sample:	Senior Academics		Senior Academics Born in Countries of Central Powers	
	OLS	IV	OLS	IV
Dep. Variable:	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939
# Early Émigré Colleagues (Pre-1933 Network)	0.138***	0.126***	0.153***	0.134**
	(0.037)	(0.041)	(0.052)	(0.055)
Early Émigré	0.389***	0.279*	0.405***	0.259*
	(0.039)	(0.148)	(0.042)	(0.133)
Baseline Controls	Yes	Yes	Yes	Yes
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	921	921	849	849
R^2	0.684		0.691	
Kleibergen-Paap rk Wald F-statistic		30.922		30.045
Mean of Dep. Variable	0.666	0.666	0.656	0.656

Notes: In columns 1-2, the sample includes only senior academics. In columns 3-4, the sample includes only senior academics who were born in the German Reich or Austria-Hungary.
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 émigré colleagues from the pre-1933 network. 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 dismissed colleagues from the pre-1933 network 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 employment history.
Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

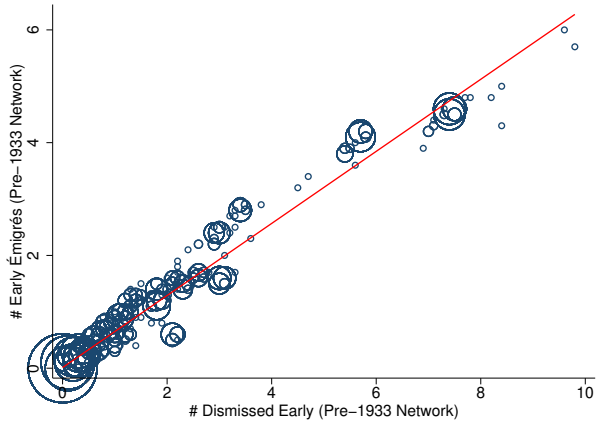
D.2 First Stage Relationship

D.2.1 Graphical Exposition of First Stage Relationship

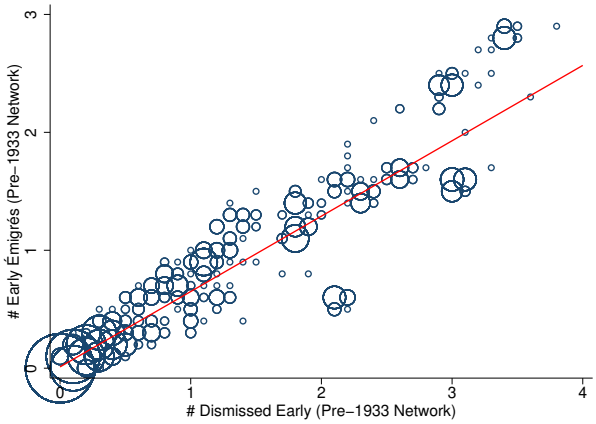
We use early dismissal of colleagues as an instrument for the number of colleagues that are early émigrés. Figure D2 shows the strength of the relationship between the number of colleagues who were dismissed early (x-axis) and the number of early émigré colleagues (y-axis). Note that both axes show the number of colleagues divided by 10, in line with the scaling in our regression tables. Sub-figure D2a shows the relationship for the whole sample, whereas D2b zooms in on smaller networks: those where fewer than 40 colleagues were dismissed early. The second figure indicates that there is substantial variation in the number of colleagues dismissed early and the number of early émigré colleagues across the network size distribution. Nonetheless, the relationship is very strong all along the axis, giving rise to a strong first stage.

Figure D2: First Stage Relationship

(a) All Networks



(b) Smaller Networks



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.

D.2.2 Additional First Stage Results for Specifications Reported in Tables 3, 5 and 6

Table D2 displays first stage results when controlling for an academic's quality (colums 1-4) and when splitting the sample by early émigré status (columns 5-6). In columns 1-2, 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 entries in pre-1933 bibliographical compendia. In columns 3-4, 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. In columns 5-6, we split the sample into early émigrés (column 5) and non early émigrés (column 6).

Table D3 shows first stage results for the IV results in columns (2), (4), and (6) of Table 5. The strength of the first stage relationships is equally strong as for our main IV regression results.

Table D4 shows first stage results for the IV results in columns (2), (4), (6), and (8) of Table 6.

Table D2: Additional First Stage Results for Specifications Reported in Table 3

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
	First Stages for Column (3)		First Stages for Column (4)		First Stage for Column (6)	First Stage for Column (7)
Dep. Variable:	# Early Émigré Colleagues (Pre-1933 Network)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network)	# Early Émigré Colleagues (Pre-1933 Network)
# Colleagues Dismissed Early (Pre-1933 Network)	0.620***	-0.010	0.620***	-0.009	0.642***	0.598***
	(0.017)	(0.031)	(0.016)	(0.030)	(0.025)	(0.027)
Early Dismissal	0.036***	0.283***	0.035***	0.283***		
	(0.004)	(0.024)	(0.004)	(0.029)		
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes
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
Pre-1933 Quality	Yes	Yes				
Pre-1933 Publication Record			Yes	Yes		
Sample:	Full Sample	Full Sample	Full Sample	Full Sample	Emigrated by 1935	Not-Emigrated by 1935
Number of Observations	1327	1327	1327	1327	693	634
R^2	0.998	0.515	0.998	0.510	0.999	0.999
F-statistic (excluded instruments)	856.196	69.954	894.799	49.314	662.192	505.732
Kleibergen-Paap rk Wald F-statistic	66.773		48.522			
Mean of Dep. Variable	1.121	0.522	1.121	0.522	1.162	1.075

Notes: The Table reports first stage regressions. In columns 1-4, the sample includes all academics. In columns 5, the sample includes academics who had emigrated by January 1, 1935. In column 6, the sample includes only academics who had not emigrated by January 1, 1935.

The dependent variable in columns 1, 3, 5, and 6 is equal to the number of early émigré colleagues from the pre-1933 network. 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 dismissed colleagues among the pre-1933 network.

In columns 1-4, the second instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early.

In columns 1-2, 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 entries in pre-1933 bibliographical compendia.

In columns 3-4, 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 employment history.

Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table D3: First Stage Results for Specifications Reported in Table 6

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	First Stages for Column (2)			First Stages for Column (4)			First Stages for Column (6)		
Dep. Variable:	# Early Émigré Colleagues (Pre-1933 Network – More Recent Colleagues)	# Early Émigré Colleagues (Pre-1933 Network – Less Recent Colleagues)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network – Same Department)	# Early Émigré Colleagues (Pre-1933 Network – Same City and Subject Different Department)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network) × Natural Sciences and Medicine	# Early Émigré Colleagues (Pre-1933 Network) × Social Sciences and Humanities	Early Émigré
# Colleagues Dismissed Early (Pre-1933 Network – More Recent Colleagues)	0.631***	0.008***	-0.001						
	(0.003)	(0.001)	(0.004)						
# Colleagues Dismissed Early (Pre-1933 Network – Less Recent Colleagues)	0.022	0.641***	0.019*						
	(0.017)	(0.020)	(0.010)						
# Colleagues Dismissed Early (Pre-1933 Network – Same Department)				0.544***	0.044***	-0.017***			
				(0.013)	(0.005)	(0.004)			
# Colleagues Dismissed Early (Pre-1933 Network – Same City and Subject, Different Department)				0.038***	0.675***	0.026***			
				(0.010)	(0.009)	(0.005)			
# Dismissed Early (Pre-1933 Network) × Natural Sciences and Medicine							0.638***	0.001	0.001
							(0.005)	(0.001)	(0.003)
# Dismissed Early (Pre-1933 Network) × Social Sciences and Humanities							-0.010	0.742***	0.032***
							(0.012)	(0.005)	(0.011)
Early Dismissal	0.060***	0.005	0.363***	0.027*	0.013	0.356***	0.040**	0.013**	0.361***
	(0.020)	(0.004)	(0.018)	(0.014)	(0.010)	(0.022)	(0.019)	(0.005)	(0.019)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes			
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	0.965	0.960	0.178	0.948	0.974	0.183	0.975	0.979	0.180
F-statistic (excluded instruments)	21174.747	1590.844	189.331	2848.702	4376.904	202.998	11536.928	19436.696	222.072
Kleibergen-Paap rk Wald F-statistic		129.191			86.290			117.150	
Mean of Dep. Variable	1.016	0.122	0.522	0.681	0.440	0.522	0.885	0.235	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 émigré colleagues from the pre-1933 network who overlapped with academic *i* on January 1, 1933. In column 2, it is the number of early émigré colleagues from the pre-1933 network who overlapped with academic *i* between January 1, 1929 and January 1, 1932, 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 émigré colleagues from the pre-1933 network from the same institution and subject. In column 5, it is the number of early émigré colleagues from the pre-1933 network from other institutions in the same city and subject. In column 7, it is the interaction of the number of early émigré colleagues from the pre-1933 network 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 émigré colleagues from the pre-1933 network 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 dismissed colleagues among the pre-1933 network who overlapped with academic *i* on January 1, 1933. The second instrument is the number of early dismissed colleagues among the pre-1933 network who overlapped with academic *i* between January 1, 1929 and January 1, 1932, 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 dismissed colleagues among the pre-1933 network from the same institution and subject. The second instrument is the number of early dismissed colleagues among the pre-1933 network 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 dismissed colleagues among the pre-1933 network 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 dismissed colleagues among the pre-1933 network 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 employment history.

Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

Table D4: Additional First Stage Results for Specifications Reported in Table 5

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First Stages for Column (2)		First Stages for Column (4)		First Stages for Column (6)		First Stages for Column (8)	
Dep. Variable:	# Early Émigré Colleagues (Pre-1933 Network)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network)	Early Émigré	# Early Émigré Colleagues (Pre-1933 Network)	Early Émigré
# Colleagues Dismissed Early (Pre-1933 Network)	0.640***	-0.002	0.622***	-0.016***	0.623***	-0.017***	0.623***	-0.016***
	(0.004)	(0.003)	(0.011)	(0.005)	(0.011)	(0.005)	(0.011)	(0.005)
Early Dismissal	0.060***	0.366***	0.056**	0.359***	0.054**	0.361***	0.052***	0.359***
	(0.021)	(0.017)	(0.021)	(0.020)	(0.020)	(0.019)	(0.018)	(0.020)
Baseline Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Academic Rank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City × Subject (1929-1933)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample:	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Full Sample	Excluding Most Common Family Names	
Number of Observations	1327	1327	1327	1327	1327	1327	1268	1268
R^2	0.968	0.180	0.969	0.188	0.969	0.189	0.969	0.185
F-statistic (excluded instruments)	14092.005	241.374	1866.872	170.257	1831.359	190.285	1653.346	174.061
Kleibergen-Paap rk Wald F-statistic	221.902		173.703		192.711		169.633	
Mean of Dep. Variable	1.121	0.522	1.121	0.522	1.121	0.522	1.126	0.523

Notes: The Table reports first stage regressions. In columns 1-6, the sample includes all academics. In columns 7-8, the sample includes only academics with less common last names.
The dependent variable in columns 1, 3, 5, and 7 is equal to the number of early émigré colleagues from the pre-1933 network. The dependent variable in columns 2, 4, 6, and 8 is an indicator that equals 1 if academic *i* him/herself was an early émigré.
The first instrument is the number of early dismissed colleagues among the pre-1933 network. The second instrument is an indicator that equals 1 if academic *i* him/herself was dismissed early.
In columns 1-2 and 5-8, we also control for the number of early émigrés from the pre-1933 family network.
In columns 3-8, we also control for the number of early émigrés from the pre-1933 non-family community network.
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 employment history.
Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

E Data on Family and Community Networks

Family and 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 107,172 of them the data report a place of residence and an emigration date. We use these observations to construct distinct measures of family and community networks.

Family Network For our family network measure, we count the number of early émigrés (born within a $\pm$ ten-year-window) with the same last name as academic i that resided in cities where academic i worked between 1929 and 1933. If academic i is an early émigré him/herself, we subtract him/her from the measure. The measure proxies for relatives such as wives or husbands, siblings, and cousins of each academic. The average academic had 0.8 early émigrés in his family network (Table 1), suggesting that non-academics were much less likely to emigrate early than academics.

Community Network For our non-family community network measure, we count the number of early émigrés (born within a $\pm$ ten-year-window) with a different last name as academic i that resided in cities where academic i worked between 1929 and 1933. If academic i is an early émigré him/herself, we subtract him/her from the measure. The average academic had 858.6 early émigrés in his non-family community network (Table 1).

Alternatively, we measure community networks similar to the definition in Buggle et al. 2020. We count the number of early émigrés that were born within a $\pm$ five-year-window in the same city as academic i. For 27 academics without a known place of birth we impute the value for the community network with the median of our sample.

Table E1: Professional Networks and Alternative Community Network Measure

Dep. Variable:	(1) OLS Emigrated by 1939	(2) IV Emigrated by 1939
# Early Émigré Colleagues (Pre-1933 Network)	0.052***	0.048***
	(0.014)	(0.014)
# Early Émigrés (Community Network – City of Birth)	-0.000	-0.000
	(0.000)	(0.000)
Early Émigré	0.342***	0.315**
	(0.031)	(0.143)
Baseline Controls	Yes	Yes
Academic Rank FE	Yes	Yes
Year of Birth FE	Yes	Yes
City × Subject (1929-1933)	Yes	Yes
Number of Observations	1327	1327
R^2	0.649	
Kleibergen-Paap rk Wald F-statistic		60.766
Mean of Dep. Variable	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 émigré colleagues from the pre-1933 network. The second main explanatory variable is the number of early émigrés who were born in the same place as academic *i* within a ± five-year-window. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 we instrument the number of early émigré colleagues from the pre-1933 network with the number of early dismissed colleagues from the pre-1933 network 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 prociency, 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.

F Further Robustness Checks

F.1 Addressing Potential Selection from Missing Career Stages

We analyze potential sample selection bias due to missing career stages. As outlined in the main text, we are able to obtain exact locations for the four relevant time periods (1929-1933, 1935, 1939, 1945) for 1,327 academics out of all 1,370 dismissed Jewish academics. This sample forms the core for our analysis. In the following, we show that including the 43 academics with missing data on career stages hardly affects the results.

We show two tests. First, we re-estimate results in an augmented sample of those academics where we have information on exact locations for three relevant time periods: 1929-1933, 1935, and 1939 (but we do not know the location of the academic in 1945). This adds 19 academics to the sample and we can estimate results for 1939 without any imputation. Results remain almost unchanged in this sample (Table F1, columns 1-2).

Second, we add the remaining 24 academics to the sample by imputing the most likely location in 1935 and/or 1939 based on their last known location. Again, the results remain almost unchanged (Table F1, columns 3-4).

Table F1: Professional Networks and Emigration – Robustness on Missing Career Stages

	(1)	(2)	(3)	(4)
	Known Location in 1939		Imputing 1939 Emigration Status with Last Location	
	OLS	IV	OLS	IV
Dep. Variable:	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939	Emigrated by 1939
# Early Émigré Colleagues (Pre-1933 Network)	0.052***	0.049***	0.054***	0.050***
	(0.014)	(0.013)	(0.014)	(0.013)
Early Émigré	0.343***	0.317**	0.366***	0.320**
	(0.032)	(0.149)	(0.036)	(0.145)
Baseline Controls	Yes	Yes	Yes	Yes
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	1346	1346	1370	1370
R^2	0.649		0.645	
Kleibergen-Paap rk Wald F-statistic		40.853		36.965
Mean of Dep. Variable	0.744	0.744	0.734	0.734

Notes: In columns 1-2, we also include 19 additional academics with a known location for 1929-1933, 1935, and 1939, but with missing location in 1945. In columns 3-4, we additionally impute the location in 1935 and/or 1939 for the remaining 24 academics by using their last known location. 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 émigré colleagues from the pre-1933 network. Another important explanatory variable is academic *i*'s own early émigré status. In columns 4-8, we instrument these variables with the number of early dismissed colleagues from the pre-1933 network 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 employment history.
Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

F.2 Excluding Coauthors

To probe the robustness of our main findings to alternative networks that might be influential, we analyze whether our results are driven by co-author networks. In columns 1-2 of Table F2, the sample includes only academics without coauthors among all Jewish academics. In columns 3-4, the sample includes only academics without coauthors among Jewish colleagues in the same city and subject. Coauthorship is measured with joint publications covered by the *Web of Science.* The findings are remarkable stable to the changes in samples because relatively few Jewish academics had other Jewish academics as coauthors.

Table F2: 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 Émigré Colleagues (Pre-1933 Network)	0.061***	0.056**	0.058***	0.052***
	(0.020)	(0.021)	(0.018)	(0.018)
Early Émigré	0.338***	0.375**	0.341***	0.355**
	(0.034)	(0.175)	(0.032)	(0.147)
Baseline Controls	Yes	Yes	Yes	Yes
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		42.995		53.153
Mean of Dep. Variable	0.736	0.736	0.737	0.737

Notes: In columns 1-2, the sample includes only academics without coauthors among all Jewish academics. In columns 3-4, 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 émigré colleagues from the pre-1933 network. 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 dismissed colleagues from the pre-1933 network 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 employment history.
Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

F.3 Only Male Academics

We also address the concern that differences in the size of networks between male and female academics might impact our results. Columns 1-2 of Table F3 show that results are robust to excluding female academics from the sample.

Table F3: Professional Networks and Emigration – Only Male Academics

	(1)	(2)
Sample:	Only Male Academics	
	OLS	IV
Dep. Variable:	Emigrated by 1939	
# Early Émigré Colleagues (Pre-1933 Network)	0.049***	0.044***
	(0.013)	(0.013)
Early Émigré	0.348***	0.316**
	(0.034)	(0.145)
Baseline Controls	Yes	Yes
Academic Rank FE	Yes	Yes
Year of Birth FE	Yes	Yes
City × Subject (1929-1933)	Yes	Yes
Number of Observations	1279	1279
R^2	0.659	
Kleibergen-Paap rk Wald F-statistic		69.672
Mean of Dep. Variable	0.736	0.736

Notes: The sample includes only male academics.
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 émigré colleagues from the pre-1933 network. Another important explanatory variable is academic *i*'s own early émigré status. In columns 2 we instrument these variables with the number of early dismissed colleagues from the pre-1933 network 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 employment history.
Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

F.4 Addressing Potential Selection from Natural Deaths

To avoid sample selection, we assign the place of death as location of academics in the main specification. E.g. if an academic died in Germany in 1938, we set his/her location as of January 1, 1939 to Germany. This implicitly assumes that academics who died of a natural death in Germany before 1945 would not have emigrated and that academics who had emigrated after 1933 would not have returned to Germany (which happened in a few cases). To study potential sample selection from natural deaths, we impute the emigration status for academics who died of natural causes before 1939.[39] 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

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

1939 based on academic i's emigration status in a previous year, e.g. 1933, 1934, 1935 and so on.

$$\begin{aligned}
Emigrated\ by\ 1939_i = &\quad \beta_1 + \beta_{1933}\, Emigrated\ by\ 1933_i + \beta_c\, Controls_i + \zeta_{i33} \\
Emigrated\ by\ 1939_i = &\quad \beta_1 + \beta_{1934}\, Emigrated\ by\ 1934_i + \beta_c\, Controls_i + \zeta_{i34} \\
Emigrated\ by\ 1939_i = &\quad \beta_1 + \beta_{1935}\, Emigrated\ by\ 1935_i + \beta_c\, Controls_i + \zeta_{i35} \\
Emigrated\ by\ 1939_i = &\quad \beta_1 + \beta_{1936}\, Emigrated\ by\ 1936_i + \beta_c\, Controls_i + \zeta_{i36} \\
Emigrated\ by\ 1939_i = &\quad \beta_1 + \beta_{1937}\, Emigrated\ by\ 1937_i + \beta_c\, Controls_i + \zeta_{i37} \\
Emigrated\ by\ 1939_i = &\quad \beta_1 + \beta_{1938}\, Emigrated\ by\ 1938_i + \beta_c\, Controls_i + \zeta_{i38}
\end{aligned} \tag{F1}$$

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 (F1) 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 (F1).

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 equal to one if the emigration probability is larger than 0.5, and equal to zero otherwise.

In columns 3-4 of Table F4, we use this predicted emigration status, and not their location at time of death for the 7.5 percent of academics who had died of natural causes.

Table F4: 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 Émigré Colleagues (Pre-1933 Network)	0.055***	0.052***	0.052***	0.050***
	(0.015)	(0.016)	(0.014)	(0.014)
Early Émigré	0.321***	0.360**	0.322***	0.315*
	(0.033)	(0.162)	(0.028)	(0.171)
Baseline Controls	Yes	Yes	Yes	Yes
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		55.716		56.611
Mean of Dep. Variable	0.772	0.772	0.745	0.745

Notes: In columns 1-2, we drop academics who had died of natural causes by January 1, 1939. In columns 3-4, 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.
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 émigré colleagues from the pre-1933 network. 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 dismissed colleagues from the pre-1933 network 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 employment history.
Standard errors are clustered at the city level. Significance levels: *** p<0.01, ** p<0.05, and * p<0.1.

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